

GLOBÁLNÍ RÁMEC ODBORNÉ ZPŮSOBILOSTI PRO MATEMATIKU

1.–9. ročník

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#### 

## PODĚKOVÁNÍ

Tento dokument, Globální rámec odborné způsobilosti (Global Proficiency Framework, GPF) pro matematiku pro první až devátý ročník, byl vypracován Institutem statistiky UNESCO (UIS); Agenturou USA pro mezinárodní rozvoj (USAID); skupinou Světové banky; úřadem Foreign, Commonwealth and Development Office (FCDO) (dříve Britské ministerstvo pro mezinárodní rozvoj [DFID]); Australskou radou pro výzkum ve vzdělávání (ACER); Nadací Billa a Melindy Gatesových; zástupci mnoha dalších partnerských organizací, včetně univerzitních profesorů. Úplný seznam osob, které této iniciativě propůjčily své odborné znalosti, je uveden v části Přispěvatelé.

GPF pro matematiku definuje důležité znalosti a dovednosti v matematice, které si žáci mají osvojit na základních školách a nižších gymnáziích. Popisuje také minimální úrovně znalostí, které by žáci měli prokázat v jednotlivých ročnících.

Materiál by nevznikl bez značného přispění všech zúčastněných stran. Bez jejich času a obětavosti by tento rámec nemohl existovat.

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## ZKRATKY

ACER Australská rada pro výzkum ve vzdělávání (Australian Council for Educational Research)

DFAT Australské ministerstvo zahraničních věcí a obchodu (Australian Department of Foreign Affairs and Trade)

DFID Britské ministerstvo pro mezinárodní rozvoj (U.K. Department for International Development)

GAML Globální aliance pro monitorování vzdělávání (Global Alliance for Monitoring Learning)

GCFRM Globální obsahový referenční rámec pro matematiku (Global Content Framework of Reference for Mathematics)

GPD Deskriptor globální způsobilosti (Global Proficiency Descriptor)

GPE Globální partnerství pro vzdělávání (Global Partnership for Education)

GPF Globální rámec odborné způsobilosti (Global Proficiency Framework)

GPL Globální minimální způsobilost (Global Proficiency Level)

IBE Mezinárodní úřad pro vzdělávání (International Bureau of Education (UNESCO))

PLM Metody nástrojů pro propojování politik (Policy Linking Method)

PLT Soubor nástrojů pro propojování politik (Policy Linking Toolkit)

SDG Cíl udržitelného rozvoje (Sustainable Development Goal)

UIS Statistický institut UNESCO (UNESCO Institute for Statistics)

UNESCO Organizace spojených národů pro výchovu, vědu a kulturu (United Nations Educational, Scientific and Cultural Organization)

USAID Agentura USA pro mezinárodní rozvoj (U.S. Agency for International Development)

## POPIS PROCESU VÝVOJE

Globální rámec odborné způsobilosti pro matematiku (označovaný také jako GPF) definuje globální úrovně minimální způsobilosti, které by měli žáci prokázat na konci jednotlivých ročníků základního vzdělávání. Rámec GPF vznikl ve spolupráci učitelů matematiky, odborníků na tvorbu osnov a psychometriků s bohatými zkušenostmi s vývojem a realizací matematických programů v mnoha zemích. Jejich jména a afiliace jsou uvedené v sekci věnované přispěvatelům.

Proces vývoje rámce byl velmi bohatý. Začal v říjnu 2018, kdy Mezinárodní úřad pro vzdělávání UNESCO (IBE) vytvořil Globální obsahový referenční rámec pro matematiku (GCFRM). GCFRM syntetizuje informace o obsahu a rámcích hodnocení z více než 50 zemí světa a poskytuje obraz o očekáváních, která mají země od výsledků svých žáků v matematice.

V dubnu a červnu 2019 se ve Washingtonu sešli učitelé matematiky, odborníci na kurikulum a odborníci v psychometrii z celého světa, aby na základě GCFRM a dalších národních a regionálních kurikul a rámců hodnocení pro matematiku vytvořili výzkumem podložený soubor minimálních znalostí a dovedností, které by měli mít žáci od 2. do 6. ročníku základních škol v klíčových oblastech matematiky. Navržený rámec vymezuje výkony žáků na čtyřech úrovních způsobilosti, jak ukazuje obrázek níže: Globální minimální odbornou způsobilost nesplňuje ani částečně, Částečně splňuje globální minimální odbornou způsobilost, Splňuje globální minimální odbornou způsobilost a Překračuje globální minimální odbornou způsobilost, a to v každé definované dovednosti či pro každou definovanou znalost.

Obrázek 1: Úrovně globální minimální způsobilosti (GPL)



Návrh rámce byl v akademickém roce 2019–2020 testován ve více než devíti zemích včetně Bangladéše, Džibutska, Gambie, Ghany, Indie, Madagaskaru, Malawi, Nigérie a Senegalu. Na základě poznatků získaných z tohoto testování proběhlo od května 2020 druhé kolo konzultací s učiteli matematiky, odborníky na kurikulum a odborníky v psychometrii z celého světa, z nichž mnozí se projektu účastnili od samého začátku. Během on-line konzultací v období od května do srpna 2020 byl revidován původní GPF a byl doplněn o 1. (základní), 7., 8. a 9. ročník. Výsledkem je tedy rámec, který pokrývá celých devět ročníků základního vzdělávání.

GPF je výsledkem rozsáhlých diskusí a živých debat, které probíhaly po dobu osmnácti měsíců. Výsledkem výměny odborných znalostí je předložený komplexní rámec hodnocení v matematice, který představuje konsensus světových odborníků v oblasti toho, co by měli žáci znát a umět v matematice.

GPF je také výsledkem rozsáhlé spolupráce mezi dárcovskými agenturami a organizacemi, které se zavázaly, že budou vyvíjet a zavádět společné metody měření toho, jak se daří měřit cíle udržitelného rozvoje (SDG) 4, včetně Statistického institutu UNESCO (UIS), amerického Úřadu pro výzkum a vývoj (U.S. Agency for International Development (USAID), úřadu Foreign, Commonwealth and Development Office (FCDO) (dříve Britské ministerstvo pro mezinárodní rozvoj [DFID]), skupiny Světové banky, Globálního partnerství pro vzdělávání (Global Partnership for Education), Australské rady pro výzkum ve vzdělávání (Australian Council for Educational Research) (DFAT) a Nadace Billa a Melindy Gatesové. Tyto organizace poskytly zásadní technickou a finanční podporu při vyvíjení a testování GPF. Statistický institut UNESCO, jakožto „oficiální zdroj mezinárodně srovnatelných údajů o vzdělávání“ pro cíle udržitelného rozvoje (Akční rámec pro vzdělávání 2030, 2015), je v tomto společném úsilí vůdčí silou, a to i díky roli, kterou hrál při organizaci Globální aliance pro monitorování vzdělávání (GAML).

## ÚČEL RÁMCE

Hlavním účelem GPF je poskytnout zemím a regionálním/mezinárodním hodnoticím organizacím společný referenční rámec nebo měřítko při vykazování pokroku v ukazateli 4.1.1 cílů udržitelného rozvoje. Tento rámec má podobu definice minimálních znalostí a dovedností, které musí žáci prokázat v klíčových okamžicích svého vzdělávání. Ukazatel 4.1.1 zavazuje signatáře ke sledování:

*Podílu dětí a mladých lidí podle pohlaví: a) ve 2./3. ročníku, b) na konci 1. stupně a c) na konci 2. stupně vzdělávání, kteří dosáhli alespoň minimální úrovně znalostí v i) čtení a ii) matematice.*

GPF umožňuje interpretovat výsledky různých národních, regionálních nebo mezinárodních hodnocení na základě společného referenčního rámce či stupnice. Pokud země propojí svá hodnocení s GPF s pomocí nástrojů pro propojování politik (Policy Linking Method)1, mohou stanovit referenční hodnoty pro svá hodnocení, což jim umožní určit procento žáků, kteří částečně splnili, splnili nebo překročili globální minimální úroveň odborné způsobilosti pro vykazování indikátoru 4.1.1 v rámci cíle udržitelného rozvoje. Takové propojení stávajících a budoucích hodnocení matematiky s použitím společné stupnice (GPF) umožňuje porovnávat výsledky z různých hodnocení v rámci jednotlivých zemí i mezi jednotlivými zeměmi, agregovat výsledky a sledovat výsledky v čase.

Přestože hlavním účelem předloženého rámce je poskytnout společnou referenční úroveň pro globální interpretaci výsledků národních, regionálních a mezinárodních hodnocení v matematice, ukázalo se, že je rámec cenným nástrojem pro země a organizace, které mají zájem o tvorbu nových nástrojů hodnocení pro měření pokroku v porovnání se společnými mezinárodními standardy, případně pro země a organizace, které mají zájem kriticky zkoumat míru, do jaké stávající učební osnovy rozvíjejí dovednosti, jež jsou mezinárodním společenstvím označeny jako klíčové. GPF rovněž dává jednotlivým zemím možnost zkoumat soulad mezi jejich standardy, učebními osnovami, hodnocením, odbornou přípravou učitelů, výukovými materiály a výukou ve třídách a minimálními očekáváními na žáky uvedenými v GPF. Využití GPF pro tyto další účely vede k debatám o kvalitě výuky a pomáhá hodnocení.

Mnoho partnerských organizací, která podporují tuto iniciativu, včetně USAID, upravilo své hodnoticí indikátory tak, aby byly v souladu s cíli udržitelného rozvoje, zejména s cílem 4.1.1. GPF poskytuje těmto organizacím cenný nástroj pro sledování pokroku.

1 Soubor nástrojů, který pomáhá provést jednotlivé státy a hodnotitelské organizace jednotlivými kroky při vytváření mezinárodně sladěných referenčních úrovní nebo standardů. Tento proces využívá mezinárodně uznávanou metodiku nazývanou „modifikovaný Angoff“.

## POUŽÍVÁNÍ RÁMCE

GPF se skládá z pěti tabulek:

* Tabulka 1 uvádí čtyři úrovně globální způsobilosti a stručné definuje každou ze čtyř úrovní (viz obr. 1, kde jsou úrovně znázorněny). Tyto čtyři úrovně se vztahují na všechny ročníky, a to ve čtení i matematice (první z nich je podrobně popsána v části Globální rámec způsobilosti pro čtení). Úroveň Splňuje globální minimální odbornou způsobilost popisuje znalosti a dovednosti žáků, kteří splnili minimální očekávání pro indikátor 4.1.1 cílů udržitelného rozvoje (SDG) a pro požadavky na vykazování USAID. Ačkoli SDG pouze požaduje, aby země vykazovaly procento žáků, kteří splnili nebo překročili tuto minimální úroveň, GPF popisuje výkon žáků na třech dalších úrovních: Překračuje globální minimální odbornou způsobilost, Částečně splňuje globální minimální odbornou způsobilost a Globální minimální odbornou způsobilost nesplňuje ani částečně. Tým GPF definoval tyto další úrovně způsobilosti, aby pomohl zemím a hodnoticím organizacím získat vhled do toho, jak se žákům daří propracovat se k dosažení nebo překročení minimální odborné způsobilosti. Rámec však neobsahuje deskriptory výkonu pro úroveň nižší než Částečně splňuje globální minimální úroveň způsobilosti. Výkon žáků na této úrovni je nižší než referenční hodnoty stanovené pro žáky na úrovni Částečně splňující globální minimální úroveň způsobilosti.
* Tabulka 2 poskytuje přehled o struktuře GPF pro matematiku. Předkládá oblasti, které jsou v rámci zahrnuty, a specifické konstrukty a subkonstrukty, které do jednotlivých oblastí spadají, jakož i ročníky, ve kterých je jednotlivým konstruktům věnována pozornost.
* Tabulka 3 nabízí druhý, podrobnější přehled GPF. Uvádí klíčové znalosti a/nebo dovednosti, které jsou předmětem hodnocení v jednotlivých oblastech, a to po jednotlivých ročnících.2 Tato tabulka umožňuje odborníkům v oblasti kurikula a hodnocení rychle identifikovat položky hodnocení konkrétních znalostí a dovedností, jimiž se GPF zabývá. Výsledná analýza poskytuje informaci o míře souladu mezi hodnocením a znalostmi a dovednostmi v GPF. Tento proces sladění je prvním úkolem v procesu propojování národních politik, který je podrobně popsán v Souboru nástrojů pro propojování politik (Policy Linking Toolkit).
* Tabulka 4 shrnuje popis toho, co v rámci úrovně globálního minima odborné způsobilosti žáci umí v každé oblasti po jednotlivých znalostech a dovednostech v jednotlivých ročnících (nazývá se globální deskriptor odborné způsobilosti [GPD]). Tabulka poskytuje přehled o tam, jak se vyvíjí znalosti a dovednosti žáků při postupu do vyšších ročníků. Tabulka je užitečná zejména pro vlády nebo hodnotitelské organizace, které mají zájem o stanovení jediné referenční úrovně pro hodnocení, konkrétně minimálního skóre potřebného pro splnění globálních minimálních požadavků na znalosti.
* Tabulka 5 představuje kompletní rámec GPF s globálními deskriptory, které popisují výkon žáka na všech čtyřech úrovních znalostí, a to pro každou znalost a dovednost zvlášť. Tato tabulka je užitečná zejména pro vlády a organizace, které mají zájem stanovit více referenčních úrovní pro jednotlivé ročníky, což jim umožní získat detailnější obraz o procentuálním zastoupení žáků v každé kategorii.

Glosář — za tabulkami je k dispozici slovníček používaných pojmů.

2 Znalosti nebo dovednosti se v některých zemích označují jako obsahové standardy. Autoři však tento termín záměrně nepoužívají, protože předpokládáme, že jednotlivé země mají vlastní národní standardy, které nemusí být přímo v souladu s tímto rámcem. Nicméně země, které nemají národní obsahové standardy nebo které si možná budou přát revidovat své standardy, aby lépe odpovídaly globálním očekáváním a vývoji, mohou znalosti nebo dovednosti uvedené v této tabulce použít jako vodítko pro diskuse a další plánování. Je také důležité poznamenat, že dobře fungující vzdělávací systémy mají obsahové a výkonové standardy, které jsou vzájemně sladěny, stejně jako osnovy, příprava učitelů, výukové materiály, výuka ve třídách a hodnocení.

Klíč k dokumentu — Tabulky v dokumentu obsahují následující barevné kódy:

* Černý text označuje hlavní obsah, konstrukt, subkonstrukt, znalosti nebo dovednosti.
* Hnědý text psaný kurzívou označuje příklad, který má pomoci objasnit černý text.

Vertikální postup – při tvorbě GPF pro matematiku se autoři snažili o takový postup, že GPD pro první ročník na úrovni překonání globální minimální odborné způsobilosti je zároveň základem pro druhý ročník na úrovni splnění globální minimální odborné způsobilosti a třetí ročník na úrovni částečného splnění globální minimální odborné způsobilosti. Je však důležité si uvědomit, že ačkoli tento vývoj byl výchozím bodem při definování jednotlivých úrovní, autoři výstupy upravovali tak, aby odpovídaly tomu, kdy se určité znalosti a dovednosti vyučují.

## TABULKA 1: DEFINICE ÚROVNÍ GLOBÁLNÍ MINIMÁLNÍ ZPŮSOBILOSTI

|  |  |
| --- | --- |
| Úroveň globální minimální odborné způsobilosti | Definice |
| Globální minimální odbornou způsobilost nesplňuje ani částečně | Žákům chybí základní znalosti a dovednosti. V důsledku toho většinou nedokáží splnit ani základní úkoly na úrovni příslušného ročníku. |
| Částečně splňuje globální minimální odbornou způsobilost | Žáci mají omezené znalosti a dovednosti. V důsledku toho mohou částečně plnit základní úkoly na úrovni ročníku jen částečně. |
| Splňuje globální minimální odbornou způsobilost | Žáci si osvojili dostatečné znalosti a dovednosti. Díky tomu mohou úspěšně plnit základní úkoly na úrovni příslušného ročníku. |
| Překračuje globální minimální odbornou způsobilost | Žáci si osvojili vynikající znalosti a dovednosti. Díky tomu zvládnou řešit složité úkoly na úrovni příslušného ročníku. developed superior knowledge and skills. As a result, they can complete complex grade-level tasks. |

TABLE 2: STRUCTURE OF THE GPF

„x“ v tabulce znamená, že v daném ročníku existují globální deskriptory odborné způsobilosti (GPD). „a“ znamená, že v daném ročníku nejsou žádné GPD. Předpokládá se, že znalosti a dovednosti v těchto oblastech již žáci mají z nižších ročníků.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Domain | Construct | | Subconstruct | | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| N  Number and operations | N1 | Whole numbers | N1.1 | Identify and count in whole numbers, and identify their relative magnitude | x | x | x | x | x | x | a | a | a |
| N1.2 | Represent whole numbers in equivalent ways | x | x | x | x | x | x | a | a | a |
| N1.3 | Solve operations using whole numbers | x | x | x | x | x | x | see integers | | |
| N1.4 | Solve real-world problems involving whole numbers | x | x | x | x | x | x | see integers | | |
| N2 | Fractions | N2.1 | Identify and represent fractions using objects, pictures, and symbols, and identify relative magnitude |  |  | x | x | x | x | x | a | a |
| N2.2 | Solve operations using fractions |  |  |  | x | x | x | x | a | a |
| N2.3 | Solve real-world problems involving fractions |  |  |  | x | x | x | x | a | a |
| N3 | Decimals | N3.1 | Identify and represent decimals using objects, pictures, and symbols, and identify relative magnitude |  |  |  |  | x | x | x | a | a |
| N3.2 | Represent decimals in equivalent ways (including fractions and percentages) |  |  |  |  | x | x | x | x | a |
| N3.3 | Solve operations using decimals |  |  |  |  | x | x | x | x | a |
| N3.4 | Solve real-world problems involving decimals |  |  |  |  |  | x | x | x | a |
| N4 | Integers | N4.1 | Identify and represent integers using objects, pictures, or symbols, and identify relative magnitude |  |  |  |  |  |  | x | a | a |
| N4.2 | Solve operations using integers |  |  |  |  |  |  | x | x | a |
| N4.3 | Solve real-world problems involving integers |  |  |  |  |  |  | x | x | a |
| N5 | Exponents and roots | N5.1 | Identify and represent quantities using exponents and roots, and identify the relative magnitude |  |  |  |  |  |  | x | x | x |
| N5.2 | Solve operations involving exponents and roots |  |  |  |  |  |  |  | x | x |
| N6 | Operations across number | N6.1 | Solve operations involving integers, fractions, decimals, percentages, and exponents |  |  |  |  |  |  |  | x | x |
| M  Measurement | M1 | Length, weight, capacity, volume, area, and perimeter | M1.1 | Use non-standard and standard units to measure, compare, and order | x | x | x | x | x | x | x | x | a |
| M1.2 | Solve problems involving measurement |  |  |  | x | x | x | x | x | x |
| M2 | Time | M2.1 | Tell time | x | x | x | x | x | a | a | a | a |
| M2.2 | Solve problems involving time |  | x | x | x | x | x | x | x | x |
| M3 | Currency | M3.1 | Use different currency units to create amounts | x | x | x | a | a | a | a | a | a |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Domain | Construct | | Subconstruct | | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| G  Geometry | G1 | Properties of shapes and figures | G1.1 | Recognize and describe shapes and figures | x | x | x | x | x | x | x | x | x |
| G2 | Spatial visualizations | G2.1 | Compose and decompose shapes and figures | x | x | x | x | x | x | x | x | x |
| G3 | Position and direction | G3.1 | Describe the position and direction of objects in space | x | x | x | x | x | x | x | x | x |
| S  Statistics and probability | S1 | Data management | S1.1 | Retrieve and interpret data presented in displays | x | x | x | x | x | x | x | x | x |
| S1.2 | Calculate and interpret central tendency |  |  |  |  |  |  | x | x | x |
| S2 | Chance and probability | S2.1 | Describe the likelihood of events in different ways |  |  |  |  | x | x | x | x | x |
| S2.2 | Identify permutations and combinations |  |  |  |  |  |  |  | x | x |
| A  Algebra | A1 | Patterns | A1.1 | Recognize, describe, extend, and generate patterns | x | x | x | x | x | x | x | a | a |
| A2 | Expressions | A2.1 | Evaluate, model, and compute with expressions |  |  |  |  |  |  | x | x | x |
| A3 | Relations and functions | A3.1 | Solve problems involving variation (ratio, proportion, and percentage) |  |  |  |  |  | x | x | x | x |
| A3.2 | Demonstrate an understanding of equivalency |  | x | x | x | x | x | a | a | a |
| A3.3 | Solve equations and inequalities |  |  |  |  |  |  | x | x | x |
| A3.4 | Interpret and evaluate functions |  |  |  |  |  |  |  |  | x |

# TABULKA 3: KLÍČOVÉ ZNALOSTI A DOVEDNOSTI PO JEDNOTLIVÝCH ROČNÍCÍCH

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Construct | Subconstruct | Knowledge or Skill | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| N1  Whole numbers | N1.1  Identify and count in whole numbers, and identify their relative magnitude | N1.1.1 Count, read, and write whole numbers | x | x | x | x | x | x |  |  |  |
| N1.1.2 Compare and order whole numbers | x | x | x | x | x | x |  |  |  |
| N1.1.3 Skip count forwards or backwards |  | x | x | x | x | x |  |  |  |
| N1.2  Represent whole numbers in equivalent ways | N1.2.1 Determine or identify the equivalency between whole numbers represented as objects, pictures, and numerals | x | x | x |  |  |  |  |  |  |
| N1.2.2 Use place-value concepts |  | x | x | x | x | x |  |  |  |
| N1.2.3 Round whole numbers |  |  |  | x | x | x |  |  |  |
| N1.3  Solve operations using whole numbers | N1.3.1 Add, subtract, multiply and divide whole numbers | x | x | x | x | x | x |  |  |  |
| N1.3.2 Find the double or half of a set of objects | x | x |  |  |  |  |  |  |  |
| N1.3.3 - Multiply and divide whole numbers |  |  | x | x | x | x |  |  |  |
| N1.3.4 Demonstrate fluency with basic addition and subtraction facts |  |  | x | x |  |  |  |  |  |
| N1.3.5 Demonstrate fluency with basic multiplication and division facts |  |  |  | x |  |  |  |  |  |
| N1.3.6 Identify factors and multiples of whole numbers |  |  |  |  |  | x |  |  |  |
| N1.3.7 Perform calculations involving two or more operations on whole numbers |  | x | x | x | x | x |  |  |  |
| N1.4  Solve real-world problems involving whole numbers | N1.4.1 Solve real-world problems involving the addition and subtraction of whole numbers, including with measurement and currency units | x | x | x | x | x | x |  |  |  |
| N1.4.2 Solve real-world problems involving the multiplication and division of whole numbers, including with measurement and currency units |  |  |  | x | x | x |  |  |  |
| N2  Fractions | N2.1  Identify and represent fractions  using objects, pictures, and symbols, and identify relative magnitude | N2.1.1 Express a visual representation of a fraction (picture, objects) in fractional notation |  |  | x | x |  |  |  |  |  |
| N2.1.2 Identify equivalent fractions |  |  |  | x | x | x | x |  |  |
| N2.1.3 - Identify and express equivalences between improper fractions and mixed numbers |  |  |  |  | x | x | x |  |  |
| N2.1.4 - Compare and order fractions and mixed numbers, including when they are positive and negative |  |  |  | x | x | x | x |  |  |
| N2.2  Solve operations using fractions | N2.2.1 Add and subtract fractions and mixed numbers |  |  |  | x | x | x | x |  |  |
| N2.2.2 Multiply and divide fractions by whole numbers, fractions, and mixed numbers |  |  |  |  | x | x | x |  |  |
| N2.3  Solve real-world problems involving fractions | N2.3.1 Solve real-world problems involving the addition and subtraction of fractions (proper and improper), whole numbers, and mixed numbers |  |  |  | x | x | x | x |  |  |
| N2.3.2 - Solve real-world problems involving the multiplication and division of fractions (proper and improper), whole numbers, and mixed numbers |  |  |  |  | x | x | x |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Construct | Subconstruct | Knowledge or Skill | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| N3  Decimals | N3.1  Identify and represent decimals  using objects, pictures, and symbols, and identify relative magnitude | N3.1.1 Identify and represent quantities using decimal notation |  |  |  |  | x | x | x |  |  |
| N3.1.2 Compare and order decimal numbers, including when they are positive or negative |  |  |  |  | x | x | x |  |  |
| N3.2  Represent decimals in equivalent ways (including fractions and percentages) | N3.2.1 Round decimal numbers |  |  |  |  | x | x | x | x |  |
| N3.2.2 Express fractions as decimals and vice versa |  |  |  |  | x | x | x | x |  |
| N3.2.3 Compare and order decimals, fractions, and percentages, including when they are positive and negative |  |  |  |  |  | x | x | x |  |
| N3.2.4 Express percentages as fractions or mixed numbers (and vice versa) |  |  |  |  |  |  | x | x |  |
| N3.3  Solve operations using decimals | N3.3.1 Add and subtract decimals, including positive and negative decimals |  |  |  |  | x | x | x | x |  |
| N3.3.2 Multiply and divide decimals by whole numbers or decimals; divide whole numbers by decimals |  |  |  |  |  |  | x | x |  |
| N3.4  Solve real-world problems involving decimals | N3.4.1 Solve real-world problems involving the addition, subtraction, multiplication, and division of decimals, including currency or money problems |  |  |  |  |  | x | x | x |  |
| N4  Integers | N4.1  Identify and represent integers using objects, pictures, or symbols, and identify relative magnitude | N4.1.1 Compare and order integers |  |  |  |  |  |  | x |  |  |
| N4.2  Solve operations using integers | N4.2.1 Multiply and divide integers |  |  |  |  |  |  | x | x |  |
| N4.2.2 Identify factors and multiples, including common factors and common multiples, of whole numbers |  |  |  |  |  |  | x | x |  |
| N4.3  Solve real-world problems involving integers | N4.3.1 Solve real-world problems involving the addition, subtraction, multiplication, and division of integers |  |  |  |  |  |  | x | x |  |
| N5  Exponents and roots | N5.1  Identify and represent quantities using exponents and roots, and identify the relative magnitude | N5.1.1 Identify the square and cube, and the square and the cube root, of whole numbers |  |  |  |  |  |  | x | x |  |
| N5.1.2 Identify and represent numbers using scientific notation and exponents |  |  |  |  |  |  | x | x | x |
| N5.1.3 Compare and order numbers expressed in scientific notation |  |  |  |  |  |  | x | x | x |
| N5.2  Solve operations involving exponents and roots | N5.2.1 Add, subtract, multiply, and divide quantities expressed in exponential notation, including scientific notation |  |  |  |  |  |  |  | x | x |
| N6  Operations across number | N6.1  Solve operations involving integers, fractions, decimals, percentages, and exponents | N6.1.1 Perform calculations involving two or more operations on integers, decimals, fractions, and exponents |  |  |  |  |  |  |  | x | x |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Construct | Subconstruct | Knowledge or Skill | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| M1  Length, weight, capacity, volume, area, and perimeter | M1.1  Use non-standard and standard units to measure, compare, and order | M1.1.1 Use non-standard units to estimate, measure, and compare length, weight, volume, and capacity | x | x | x | x |  |  |  |  |  |
| M1.1.2 Use standard units to estimate, measure, and compare the length, weight, capacity, and volume of two objects |  | x | x | x | x |  |  |  |  |
| M1.1.3 Convert between units of measures of length, weight, volume, and capacity within a standard measurement system or between different systems of measurement |  |  |  |  | x | x | x | x |  |
| M1.1.4 Read scales on a variety of measuring tools involving fractions and decimals |  |  |  |  | x | x | x |  |  |
| M1.2  Solve problems involving measurement | M1.2.1 Solve problems involving the perimeter of polygons |  |  |  | x | x | x | x | x |  |
| M1.2.2 Solve problems involving the circumference of circles |  |  |  |  |  |  |  | x | x |
| M1.2.3 - Solve problems involving the area of rectangles or of compound shapes composed of rectangles |  |  |  | x | x | x | x |  |  |
| M1.2.4 - Solve problems involving the area of triangles or of compound shapes composed of triangles or of triangles and rectangles |  |  |  |  |  |  | x | x | x |
| M1.2.5 - Solve problems involving the circumference or area of circles |  |  |  |  |  |  |  | x | x |
| M1.2.6 Solve problems involving the surface area of a familiar polyhedron |  |  |  |  |  |  |  | x | x |
| M1.2.7 Solve problems involving the volume of prisms |  |  |  |  |  |  | x | x | x |
| M1.2.8 Solve problems involving the application of Pythagoras' theorem |  |  |  |  |  |  |  |  | x |
| M2  Time | M2.1  Tell time | M2.1.1 Distinguish between parts of the day, and sequence and describe events in time, using informal comparisons | x | x |  |  |  |  |  |  |  |
| M2.1.2 Tell time using an analog clock | x | x | x | x | x |  |  |  |  |
| M2.1.3 Identify equivalence between analog and digital representations of time |  |  |  | x | x |  |  |  |  |
| M2.1.4 Identify or solve problems involving equivalences between different units of time |  |  |  | x | x |  |  |  |  |
| M2.2  Solve problems involving time | M2.2.1 Solve problems involving the calendar |  | x | x |  |  |  |  |  |  |
| M2.2.2 Solve problems involving elapsed time, including when times are presented in a schedule |  |  |  | x | x | x | x |  |  |
| M2.2.3 Solve problems involving conversions of time: 12-hour and 24-hour time, time zones, and different units of time |  |  |  |  |  |  | x | x | x |
| M3  Currency | M3.1  Use different currency units to create amounts | M3.1.1 Count or create combinations of currency denominations | x | x | x |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Construct | Subconstruct | Knowledge or Skill | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| G1  Properties of shapes and figures | G1.1  Recognize and describe shapes and figures | G1.1.1 Recognize and name two-dimensional shapes and three-dimensional figures; distinguish between regular and irregular shapes | x | x | x |  |  |  |  |  |  |
| G1.1.2 Identify the attributes of two-dimensional shapes or three-dimensional figures |  |  | x | x | x | x |  |  |  |
| G1.1.3 Classify complex two-dimensional shapes by their defining attributes |  |  |  |  |  | x | x | x |  |
| G1.1.4 Recognize and name different types of lines | x | x | x |  |  |  |  |  |  |
| G1.1.5 Recognize and name types of quadrilaterals |  |  |  |  | x | x | x |  |  |
| G1.1.6 Recognize and name parts of the circle, and identify the relationship between the radius and the diameter |  |  |  |  |  |  | x | x | x |
| G1.1.7 Recognize angles and estimate their size |  |  |  |  |  | x | x | x |  |
| G1.1.8 Solve problems involving the angle sum of a triangle, or angles formed by intersecting lines or parallel lines intersected by a transverse line |  |  |  |  |  |  | x | x | x |
| G1.1.9 Recognize two-dimensional shapes that have been rotated or reflected | x | x | x |  |  |  |  |  |  |
| G1.1.10 Identify the line of symmetry of two-dimensional shapes |  | x | x | x |  |  |  |  |  |
| G1.1.11 Recognize and describe the congruence and similarity of two-dimensional shapes |  |  | x | x | x |  |  |  |  |
| G1.1.12 Recognize two-dimensional shape transformations that are expressed quantitatively or describe and implement such transformations |  |  |  |  |  |  | x | x | x |
| G2  Spatial visualizations | G2.1  Compose and decompose shapes and figures | G2.1.1 Compose larger two-dimensional shapes from smaller shapes; decompose a larger shape into smaller shapes | x | x | x | x |  |  |  |  |  |
| G2.1.2 Identify the net of familiar, three-dimensional shapes or particular sides represented in a net |  |  |  | x | x | x | x | x | x |
| G2.1.3 Identify different views of three-dimensional shapes, including cross sections |  |  |  |  |  | x | x | x | x |
| G3  Position and direction | G3.1  Describe the position and direction of objects in space | G3.1.1 Use positional terms, including left and right, to describe the location of an object | x | x | x | x |  |  |  |  |  |
| G3.1.2 Use maps, including grid maps with compass directions, to describe locations or give directions |  |  | x | x | x | x |  |  |  |
| G3.1.3 Use a Cartesian coordinate system to locate and plot points, describe or calculate distances between locations, and draw shapes |  |  |  |  |  | x | x | x | x |
| G3.1.4 Describe or implement transformations |  |  |  |  |  |  |  | x | x |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Construct | Subconstruct | Knowledge or Skill | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| S1  Data management | S1.1  Retrieve and interpret data presented in displays | S1.1.1 - Retrieve information from data displays (i.e., tally charts, bar graphs, or pictographs) with single-unit scales and up to four categories of data | x |  |  |  |  |  |  |  |  |
| S1.1.2 - Solve problems involving data displays (i.e., tally charts, bar graphs, or pictographs) with single-unit scales and up to four categories of data |  | x | x | x |  |  |  |  |  |
| S1.1.3 - Solve problems involving data displays (i.e., tally charts, bar graphs, or pictographs) with multi-unit scales and up to four categories of data |  |  |  | x | x |  |  |  |  |
| S1.1.4 Construct data displays using categories of data and single- or multi-unit scales |  |  |  | x | x | x |  |  |  |
| S1.1.5 Retrieve information from, or solve problems involving, data displays with single- or multi-unit scales and categories and sub-categories of data |  |  |  | x | x | x | x |  |  |
| S1.1.6 Retrieve information from or construct pie charts and Venn diagrams (for categorical data) and line graphs and dot plots (for bivariate data) to represent data |  |  |  |  |  | x | x | x | x |
| S1.1.7 Understand, describe, and use relationships within displays of bivariate data |  |  |  |  |  |  |  |  | x |
| S1.2  Calculate and interpret central tendency | S1.2.1 Solve problems involving means, medians, and modes, including the effect of outliers on means and medians |  |  |  |  |  |  | x | x | x |
| S1.2.2 Compare key features of the distribution of two different but related sets of data, or the distribution of subcategories within a set of data |  |  |  |  |  |  | x | x | x |
| S1.2.3 Identify desirable characteristics of sampling methods |  |  |  |  |  |  |  | x | x |
| S2  Chance and probability | S2.1  Describe the likelihood of events in different ways | S2.1.1 Use words to describe the likelihood of an event happening or to compare the likelihood of two events happening |  |  |  |  | x | x | x |  |  |
| S2.1.2 Calculate the probability of events happening or place probability values or events on a continuum from 0 (impossible) to 1 (certain) |  |  |  |  |  | x | x | x |  |
| S2.1.3 Identify or calculate the probability of specific outcomes of simple or compound events, experimentally or otherwise |  |  |  |  |  |  |  | x | x |
| S2.2  Identify permutations and combinations | S2.2.1 Identify all the possible outcomes (sample space) for a situation involving a compound event comprised of two simple events, with and without replacement |  |  |  |  |  |  |  | x | x |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Construct | Subconstruct | Knowledge or Skill | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| A1  Patterns | A1.1  Recognize, describe, extend, and generate patterns | A1.1.1 Copy, recognize, describe, or extend repeating patterns, or identify missing elements of such patterns | x | x | x | x | x | x | x |  |  |
| A1.1.2 Describe increasing or decreasing numerical patterns, or identify missing elements of such patterns |  |  |  | x | x | x |  |  |  |
| A1.1.3 Generate a pattern from a given rule or match a pattern to a given rule |  |  |  |  | x | x | x |  |  |
| A1.1.4 Recognize and extend non-linear patterns, including squaring patterns, when they are supported, or not, by a visual representation |  |  |  |  |  | x | x |  |  |
| A2  Expressions | A2.1  Evaluate, model, and compute with expressions | A2.1.1 Use expressions to represent problem situations with single or multiple variables |  |  |  |  |  |  | x | x | x |
| A2.1.2 Add and subtract linear expressions |  |  |  |  |  |  | x | x |  |
| A2.1.3 Multiply, divide, simplify, and factor linear expressions |  |  |  |  |  |  | x | x | x |
| A2.1.4 Evaluate, simplify, and factor exponential expressions |  |  |  |  |  |  |  | x | x |
| A3  Relations and functions | A3.1  Solve problems involving variation (ratio, proportion, and percentage) | A3.1.1 Reason proportionally to solve problems involving ratio, when the ratio is expressed informally or formally |  |  |  |  |  | x | x | x |  |
| A3.1.2 Solve problems involving equal ratios |  |  |  |  |  |  | x | x | x |
| A3.1.3 Solve problems involving percentages |  |  |  |  |  |  | x | x | x |
| A3.2  Demonstrate an understanding of equivalency | A3.2.2 Create numerical expressions to model addition, subtraction, multiplication, or division situations |  | x | x | x | x |  |  |  |  |
| A3.2.3 Represent real-world problems by number sentences, with a symbol or blank to represent the missing value |  |  | x | x | x | x |  |  |  |
| A3.2.4 Find the missing value in a number sentence |  | x | x | x | x | x |  |  |  |
| A3.3  Solve equations and inequalities | A3.3.1 Represent and solve real-world problems involving equations |  |  |  |  |  |  | x | x | x |
| A3.3.2 Graph linear equations, and identify the x- and y-intercepts or the slope of a line |  |  |  |  |  |  |  | x | x |
| A3.3.3 Represent and solve real-world problems using two linear equations |  |  |  |  |  |  |  | x | x |
| A3.3.4 Solve inequalities |  |  |  |  |  |  |  |  | x |
| A3.4  Interpret and evaluate functions | A3.4.1 Identify a function presented in a graph |  |  |  |  |  |  |  |  | x |

GLOBAL PROFICIENCY FOR MATHEMATICS: GRADES 1 TO 9 15

# TABLE 4: “MEETS MINIMUM PROFICIENCY” LEVEL DESCRIPTORS

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| N1.1  Identify and count in whole numbers, and identify their relative magnitude | Count in whole numbers up to 30. | x |  |  |  |  |  |  |  |  |
| Count in whole numbers up to 100. |  | x |  |  |  |  |  |  |  |
| Count in whole numbers up to 1,000. |  |  | x |  |  |  |  |  |  |
| Count in whole numbers up to 10,000. |  |  |  | x |  |  |  |  |  |
| Count in whole numbers up to any whole number. |  |  |  |  | x |  |  |  |  |
| Read and write whole numbers up to 30 in numerals. | x |  |  |  |  |  |  |  |  |
| Read and write whole numbers up to 100 in words and in numerals. |  | x |  |  |  |  |  |  |  |
| Read and write whole numbers up to 1,000 in words and in numerals. |  |  | x |  |  |  |  |  |  |
| Read and write whole numbers up to 10,000 in words and numerals. |  |  |  | x |  |  |  |  |  |
| Read and write whole numbers greater than 10,000 in words and numerals. |  |  |  |  | x |  |  |  |  |
| Compare and order whole numbers up to 30. | x |  |  |  |  |  |  |  |  |
| Compare and order whole numbers up to 100. |  | x |  |  |  |  |  |  |  |
| Compare and order whole numbers up to 1,000. |  |  | x |  |  |  |  |  |  |
| Compare and order whole numbers up to 10,000. |  |  |  | x |  |  |  |  |  |
| Compare and order whole numbers up to 100,000. |  |  |  |  | x |  |  |  |  |
| Compare and order any whole numbers. |  |  |  |  |  | x |  |  |  |
| Skip count forwards by twos or tens. |  | x |  |  |  |  |  |  |  |
| Skip count backwards by tens. |  |  | x |  |  |  |  |  |  |
| Skip count forwards and backwards by hundreds. |  |  |  | x |  |  |  |  |  |
| Skip count forwards and backwards by thousands. |  |  |  |  | x |  |  |  |  |
| N1.2  Represent whole numbers in equivalent ways | Identify equivalence between whole quantities up to 10 represented as objects, pictures, and numerals (e.g., when given a picture of 10 objects and other pictures of various numbers of objects, select the picture that has the same number of objects; associate a numeral with the appropriate number of objects). | x |  |  |  |  |  |  |  |  |
| Identify and represent the equivalence between whole quantities up to 30 represented as objects, pictures, and numerals (e.g., when given a picture of 30 flowers, identify the picture that has the number of butterflies that would be needed for each flower to have a butterfly; given a picture of 19 shapes, draw 19 more shapes). |  | x |  |  |  |  |  |  |  |
| Use place-value concepts for tens and ones (e.g., compose or decompose a two-digit whole number using a number sentence such as 35 = 3 tens and 5 ones, 35 =30 + 5 or using number bonds; determine the value of a digit in the tens and ones place). |  |  | x |  |  |  |  |  |  |
| Use place-value concepts for hundreds, tens, and ones (e.g., compose or decompose a three-digit whole number using a number sentence such as 254 = 2 hundreds, 5 tens, and 4 ones; 254 = 200 + 50 + 4; determine the value of a digit in the hundreds place). |  |  |  | x |  |  |  |  |  |
| Use place-value concepts for thousands, hundreds, tens, and ones (e.g., compose or decompose a four-digit whole number using a number sentence such as 1,383 = 1 thousand, 3 hundreds, 8 tens, and 3 ones; 1,383 = 1,000 + 300 + 80 + 3; determine the value of a digit in the thousands place). |  |  |  |  | x |  |  |  |  |
| Use place-value concepts beyond the thousands (e.g., compose or decompose a seven-digit whole number using a number sentence such as 1,383,547 = 1 million, 3 hundred thousands, 8 ten thousands, 3 thousands, 5 hundreds, 4 tens, and 7 ones;  1,383,547 = 1,000,000 + 300,000 + 80,000 + 3,000 + 500 + 40 + 7; determine the value of a digit in the millions place). |  |  |  |  |  | x |  |  |  |
| Round whole numbers to the nearest ten. |  |  |  | x |  |  |  |  |  |
| Round whole numbers to the nearest hundred. |  |  |  |  | x |  |  |  |  |
| Round whole numbers to the nearest thousand. |  |  |  |  |  | x |  |  |  |

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| N1.3  Solve operations using whole numbers | Add and subtract within 10 (i.e., where the sum or minuend does not surpass 10), and represent these operations with objects, pictures, or symbols (e.g., 5 + 4 = ; 7 - 5 = ; when presented with a picture of 3 baskets, with the first basket showing 3 bananas and a second basket showing 5 bananas, complete the addition statement 3 + 5 = or find an appropriate addition statement from a list. Or, when presented with a picture of 6 whole bananas and 3 banana peels, match to sentence 9 - 3 = 6 or complete statement 9 - 3 = ). | x |  |  |  |  |  |  |  |  |
| Add and subtract within 20 (i.e., where the sum or minuend does not surpass 20), and represent these operations with objects, pictures, or symbols (e.g., 16 - 3= ; 12 + 3 = ; when presented with a picture of 12 marbles with 3 more marbles added, complete or match to the number sentence 12 + 3 = . Or, when presented with a picture of a carton that can hold 20 bottles, 7 of which have been removed, complete or match to the subtraction statement 20 - 7= ). |  | x |  |  |  |  |  |  |  |
| Add and subtract within 1,000 (i.e., where the sum or minuend does not surpass 1,000), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 550 + 250; 457 - 129; use hundreds grids, number lines, or multibase arithmetic blocks to reason through or solve addition and subtraction problems). |  |  |  | x |  |  |  |  |  |
| Add and subtract beyond 1,000 (i.e., where the sum or minuend surpasses 1,000), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 1457 - 129; use number lines to reason through or solve addition and subtraction problems). |  |  |  |  | x |  |  |  |  |
| Demonstrate fluency with addition and subtraction within 20; and add and subtract within 100 (i.e., where the sum or minuend does not surpass 100), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 32 + 59; solve an addition or subtraction problem presented by images of bundles of tens and ones; use number lines or skips on hundreds grid to reason through or solve addition and subtraction problems). |  |  | x |  |  |  |  |  |  |
| Demonstrate fluency with multiplication facts up to 10 x 10 (i.e., 1 × 1 up to 10 × 10) and related division facts, including the relationship between them. |  |  |  | x |  |  |  |  |  |
| Find the double of a set of up to five objects, and divide a group of up to 10 objects into two equal sets (e.g., There are 4 biscuits in a package. There are 2 packages of biscuits. How many biscuits are there in total?; There are 8 biscuits in a package. The biscuits will be shared equally by 2 friends. How many biscuits will each friend get?). | x |  |  |  |  |  |  |  |  |
| Find the double of a set of up to 10 objects, and divide a group of up to 20 objects into two equal sets (e.g., An octopus has 8 legs. There are 2 octopuses. How many octopus legs are there in total?; There are 16 biscuits. The biscuits will be shared equally by 2 friends. How many biscuits will each friend get?). |  | x |  |  |  |  |  |  |  |
| Identify factors of whole numbers within 100 and multiples of whole numbers within 20 (e.g., find all factors of 84; find multiples of 15). |  |  |  |  |  | x |  |  |  |
| Multiply and divide within 100 (i.e., up to 10 x 10 and 100 ÷ 10, without a remainder), and represent these operations with objects, pictures, or symbols (e.g., 72 ÷ 8; 6 x 9; solve multiplication problems by using a rectangular array or by repeating groups of the same number of objects; solve division problems by dividing a group of objects into a given number of equal groupings). |  |  | x |  |  |  |  |  |  |
| Multiply, with and without regrouping, and divide, with no remainder, any number by a one-digit number and multiply two 2-digit numbers, with and without regrouping (e.g., 342 x 4 = ; 42 x 34 = ; 1,380 ÷ 5 = ). |  |  |  |  | x |  |  |  |  |
| Multiply any number by a two-digit number, with and without regrouping, and divide any number by a one-digit number, with and without a remainder (e.g., 3,427 x 68; 1,380 ÷ 6 = ). |  |  |  |  |  | x |  |  |  |
| Perform calculations involving two or more additions and subtractions, within the limits for meets expectations described above, when order of operations is not a factor (e.g., 14 - 5 + 4 = ; 17 - 3 - 7 = ). |  | x |  |  |  |  |  |  |  |
| Perform calculations involving two or more operations, within the limits for meets expectations described above, when order of operations is not a factor (e.g., 6 x 7 + 19 = ; 6 x 4 ÷ 8 = ). |  |  | x |  |  |  |  |  |  |
| Perform calculations involving two or more operations, within the limits for meets expectations described above, when order of operations is not a factor (e.g., 6 x 7 + 519 = ; 6 x 4 ÷ 8 = ). |  |  |  | x |  |  |  |  |  |

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|  | Perform calculations involving two or more operations, within the limits for meets expectations described above, respecting the order of operations (e.g., 1754 + 53 x 53 = ; 4 x 9 x 8 = ). |  |  |  |  | x |  |  |  |  |
| Perform calculations involving two or more operations, within the limits for meets expectations described above, respecting the order of operations (e.g., 6,584 + 2,187 x 38 = ; 675 ÷ 9 x 652 = ). |  |  |  |  |  | x |  |  |  |
| N1.4  Solve real- world problems involving whole numbers | Solve simple real-world problems using addition and subtraction facts within 10 (i.e., where the sum or minuend does not surpass  10) (e.g., There are 7 eggs in a carton. 3 more eggs are put in the carton. How many eggs are in the carton now?; 3 eggs in a carton of 10 eggs are cracked. How many eggs are not cracked?). | x |  |  |  |  |  |  |  |  |
| Solve simple real-world problems using addition and subtraction facts within 20 (i.e., where the sum or minuend does not surpass  20) (e.g., There are 15 sheep in a field. 4 more sheep come into the field. How many sheep are in the field now?; There are 16 sheep in a field. 4 go to the stable. How many sheep are left in the field?). |  | x |  |  |  |  |  |  |  |
| Solve simple real-world problems involving addition and subtraction of whole numbers within 100 (i.e., where the sum or minuend does not surpass 100) without regrouping, including problems involving measurement and currency units (e.g., There are 33 sheep in a field. 25 more sheep come into the field. How many sheep are in the field now?; There are 54 children in total in grade  3. Thirteen are absent today. How many grade 3 children are at school today?). |  |  | x |  |  |  |  |  |  |
| Solve simple real-world problems involving addition and subtraction of whole numbers within 100 (i.e., where the sum or minuend does not surpass 100) with and without regrouping, including problems involving measurement and currency units (e.g., There are 34 sheep in a field. 29 more sheep come into the field. How many sheep are in the field now?; There are 54 children in total in grade 4. 7 are absent today. How many grade 4 children are at school today?). |  |  |  | x |  |  |  |  |  |
| Solve simple real-world problems involving the multiplication of two whole numbers to 5, and associated division facts (e.g., Amina is putting fruit into bags. Each bag will contain 4 pieces of fruit. How many bags will Amina need for 20 pieces of fruit?; Amina has 5 bags. Each bag contains 4 pieces of fruit. How many pieces of fruit are there in total?). |  |  |  | x |  |  |  |  |  |
| Solve simple real-world problems involving addition and subtraction of whole numbers within 1,000 (i.e., where the sum or  minuend does not surpass 1,000) with and without regrouping, including problems involving measurement and currency units (e.g., There were 740 people living in a town. 83 more people come to live in the town. What is the total number of people living in the town now?; There are 750 people living in a town. Only 327 of them were born in the town. How many were born outside the town?). |  |  |  |  | x |  |  |  |  |
| Solve simple real-world problems involving the multiplication of two whole numbers to 10, and associated division facts (e.g., Amina is putting fruit into bags. Each bag will contain 7 pieces of fruit. How many bags will Amina need for 28 pieces of fruit?; Amina has 4 bags. Each bag contains 7 pieces of fruit. How many pieces of fruit are there in total?). |  |  |  |  | x |  |  |  |  |
| Solve real-world problems involving combinations of any two or more of the four operations, including problems involving measurement and currency units and:   * addition and subtraction of whole numbers beyond 1,000 with and without regrouping * multiplications and divisions of any number by a one-digit number with and without regrouping (multiplication) and with and without a remainder (division) * multiplications of two 2-digit numbers. |  |  |  |  |  | x |  |  |  |

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| N2.1  Identify and represent fractions using objects, pictures, and symbols, and identify relative magnitude | Compare and order everyday unit fractions (e.g., 1/4; 1/3; 1/2). |  |  |  | x |  |  |  |  |  |
| Compare and order fractions with different but related denominators up to 12 (e.g., 2/3 and 5/6). |  |  |  |  | x |  |  |  |  |
| Compare and order fractions and mixed numbers (e.g., 9/6, 1 1/3, 5/12, 2 1/2). |  |  |  |  |  | x |  |  |  |
| Compare and order proper and improper fractions with different, unrelated denominators (e.g., 1/4; 7/10; 5/6). |  |  |  |  |  | x |  |  |  |
| Compare and order positive and negative fractions (proper and improper) and mixed numbers (e.g., -2/3, 1/3, 5/6, -1 1/2, 5/9). |  |  |  |  |  |  | x |  |  |
| Identify unit fractions with denominators up to 12 (e.g., 1/5; 1/7; 1/8; 1/10) represented as objects or pictures (as part of a whole or part of a set) in fractional notation (e.g., shade 1/5 of this shape; indicate 1/6 of these objects when arranged in a 3 by 6 array). |  |  | x |  |  |  |  |  |  |
| Identify and express everyday unit fractions (e.g., 1/2; 1/3; 1/4) as equivalent fractions when the fractional notations are accompanied by pictures or objects (e.g., 1/3 = ¨/6 when the task is supported by pictures; 1/2 = 3/¨). |  |  |  | x |  |  |  |  |  |
| Identify and express proper fractions as equivalent fractions with denominators up to 12 (e.g., express a fraction in simplest form 6/9 = **/3; 2/10 = 1/**; express as a multiple of another 4/5 = 8/**). |  |  |  |  | x |  |  |  |  |
| Identify and express improper fractions as equivalent mixed numbers (or vice versa), with pictures or symbols (e.g., represent 9/6 as 1 3/6 or 1 1/2; use two arrays or rectangles and coloring to represent 9/6). |  |  |  |  |  | x |  |  |  |
| Identify and express proper fractions as equivalent fractions (any denominator) (e.g., 13/25 = 26/50). |  |  |  |  |  | x |  |  |  |
| N2.2  Solve operations using fractions | Add and subtract proper fractions with the same denominator when fractions are represented with symbols, and represent such additions with objects or pictures (e.g., 2/3 + 1/3; 3/5 - 1/5; add 2/5 and 1/5, or subtract 3/8 from 6/8 using fraction bars). |  |  |  | x |  |  |  |  |  |
| Add and subtract proper fractions with different but related denominators (e.g., 2/3 + 1/6; 7/8 - 1/4). |  |  |  |  | x |  |  |  |  |
| Add and subtract improper fractions or mixed numbers with different but related denominators (e.g., 2 2/3 + 1 1/6; 25/4 + 5/12). |  |  |  |  |  | x |  |  |  |
| Add and subtract improper fractions or mixed numbers with different, unrelated denominators (e.g., 9/4 + 3/9; 3 1/6 - 2/5). |  |  |  |  |  |  | x |  |  |
| Multiply commonly-used fractions by whole numbers, or divide proper fractions by whole numbers, and represent such operations with objects or pictures (e.g., represent 3/4 x 12 with a 3 x 4 grid with three of the columns colored in; represent 3/4 divided by 2 as a 1 x 1 grid with one side divided into 4 equal parts and 3 blocks colored in and the other side divided into 2 to produce 8 equal blocks with 6 colored in). |  |  |  |  | x |  |  |  |  |
| Multiply and divide proper fractions and divide improper fractions by whole numbers, and represent such operations with pictures or symbols (e.g., 2/5 ÷ 3/5; 3/4 x 2/6; 7/5 ÷ 2; represent 3/4 x 1/2 as a rectangle split into 4 equal parts with 3 parts shaded and each of the 4 equal parts split into 2 equal sections. Note that the smaller shaded sections represent the answer). |  |  |  |  |  | x |  |  |  |
| Multiply and divide fractions (including proper and improper fractions and mixed numbers) (e.g., 3/4 x 7/6 = ; 2/3 x 3 1/4 = ; 4/5  ÷ 5/3 = ). |  |  |  |  |  |  | x |  |  |

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| N2.3  Solve real- world problems involving fractions | Solve real-world problems involving addition and subtraction of proper fractions with the same denominators (e.g., Paola has 2/5 of a chocolate bar left. Her friend Carola has 1/5 of the same chocolate bar. Together, they have what fraction of the chocolate bar?; Paola ate 2/5 of a chocolate bar at recess. How much of the chocolate bar is left?). |  |  |  | x |  |  |  |  |  |
| Solve real-world problems involving addition and subtraction of proper fractions with different but related denominators (e.g., Paola has 2/5 of a chocolate bar left. Her friend Carola has 3/10 of the same chocolate bar. Together, they have what fraction of the chocolate bar?; Paola has 2/3 of a chocolate bar left. If she gives her friend Carola 1/6 of what remains, what fraction of the chocolate bar will Paola have left?). |  |  |  |  | x |  |  |  |  |
| Solve real-world problems involving the multiplication and division of a proper fraction and a whole number (e.g., Misha has half a pizza. If she shares it equally with her brother, what fraction of the original pizza will each receive?). |  |  |  |  | x |  |  |  |  |
| Solve real-world problems involving addition and subtraction of improper fractions and mixed numbers with different but related denominators (e.g., Maya is cutting some oranges for a picnic. She cuts each orange into 8 equal pieces. She puts 25 pieces of orange onto a large plate and 11 pieces of orange onto a smaller plate. What is the smallest number of whole oranges Maya could have cut?; A tree is now 3 and a half meters tall. When it was planted, it was one and one quarter meters tall. By how many meters has the tree grown since it was planted?). |  |  |  |  |  | x |  |  |  |
| Solve real-world problems involving the multiplication of two proper fractions or the division of an improper fraction or mixed number by a whole number (e.g., Misha has half a pizza. If she shares it equally with her brother, what fraction of the original pizza will each receive?). |  |  |  |  |  | x |  |  |  |
| Solve real-world problems involving the addition and subtraction of proper and improper fractions and mixed numbers with unrelated denominators (e.g., A carpenter has a piece of wood that measures 15 and 7/8 ft. She only needs a piece that measures 10 and 5/12 ft. What is the length of the piece of wood she should cut off the long piece?). |  |  |  |  |  |  | x |  |  |
| Solve real-world problems involving the multiplication and division of fractions (including proper and improper fractions and mixed numbers) (e.g., A cake needs one and a half cups of flour. How much is needed to make half a cake?; Dean has a piece of wood that is 3/4 of a foot in length. He needs to cut it into pieces that are 1/16 of a foot long. How many pieces can he cut?). |  |  |  |  |  |  | x |  |  |

### DOMAIN: N— NUMBER AND OPERATIONS | Construct: N3—Decimals

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| N3.1  Identify and represent decimals using objects, pictures, and symbols, and identify relative magnitude | Identify and represent quantities using decimal notation (i.e., symbols) up to the tenths place (e.g., identify that 0.8 is 8 tenths). |  |  |  |  | x |  |  |  |  |
| Identify and represent quantities using decimal notation up to the hundredths place (e.g., identify that 0.65 is 65 hundredths). |  |  |  |  |  | x |  |  |  |
| Identify and represent quantities using decimal notation beyond the hundredths place (e.g., identify that 0.655 is 655 thousandths). |  |  |  |  |  |  | x |  |  |
| Compare and order decimal numbers up to the tenths place (e.g., sort the following decimals from high to low: 0.8, 0.3, 0.1). |  |  |  |  | x |  |  |  |  |
| Compare and order decimal numbers up to the hundredths place (e.g., sort the following decimals from high to low: 0.8, 0.33, 0.08, 0.6). |  |  |  |  |  | x |  |  |  |
| Compare and order decimal numbers beyond the hundredths place (e.g., sort the following decimals from low to high: 0.821, 0.33, 0.08, 0.698, 0.7). |  |  |  |  |  |  | x |  |  |
| Compare and order positive and negative decimal numbers, including those beyond the thousandths place (e.g., compare +0.821,  -0.33, -0.08, +0.698, +0.7). |  |  |  |  |  |  | x |  |  |

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| N3.2  Represent decimals in equivalent ways (including fractions and percentages) | Round decimal numbers to the nearest tenths place (e.g., round 3.46 to 3.5). |  |  |  |  | x |  |  |  |  |
| Round decimal numbers to the nearest hundredths place (e.g., round 3.456 to 3.46). |  |  |  |  |  | x |  |  |  |
| Round decimal numbers to any place value beyond the hundredths place (e.g., round 3.45619 to 3.4562). |  |  |  |  |  |  | x |  |  |
| Identify and express fractions with denominators of 10 using decimal notation (e.g., 7/10 = 0.7). |  |  |  |  | x |  |  |  |  |
| Identify and express fractions with denominators of 100 and everyday fractions, using decimal notation, and represent fractions with denominators of 100 as percentages (e.g., 3/4 = 0.75; 72/100 = 0.72 = 72%). |  |  |  |  |  | x |  |  |  |
| Identify and express fractions with any denominator using decimal notation and vice versa (e.g., 752/1000 = 0.752; 7/8 = 0.875). |  |  |  |  |  |  | x |  |  |
| Identify and express percentages as fractions with denominators of 10 or 100 or as decimals and vice versa (e.g., 80% = 80/100 or 8/10; 75% = 0.75). |  |  |  |  |  |  | x |  |  |
| Identify and express percentages less than 1% and greater than 100% as fractions or mixed numbers and vice versa (e.g., 124% = 1 24/100; 0.2% = 2/1000). |  |  |  |  |  |  |  | x |  |
| Compare and order decimals (to the hundredths place) and proper fractions (e.g., place a list of decimals and proper fractions on a number line). |  |  |  |  |  | x |  |  |  |
| Compare and order fractions, decimals, and percentages (e.g., place these numbers on a number line: 0.4, 1/2, 0.50%, 4/5, 0.25, 1/3, 0.25%). |  |  |  |  |  |  | x |  |  |
| Compare and order positive and negative decimals and fractions (e.g., place these numbers on a number line from -1 to +1: -0.4,  +1/2, -4/5, 0.25, -1/3, 3/4). |  |  |  |  |  |  |  | x |  |
| N3.3  Solve operations using decimals | Add and subtract decimal numbers up to the tenths place. Create or identify concrete or picture models to represent such additions  (e.g., 0.5 + 0.2). |  |  |  |  | x |  |  |  |  |
| Add and subtract decimal numbers up to the hundredths place. Create or identify concrete or picture models to represent such additions (e.g., 3.41 + 5.3). |  |  |  |  |  | x |  |  |  |
| Add and subtract any positive and negative decimal numbers. |  |  |  |  |  |  | x |  |  |
| Multiply and divide a decimal number by a whole number. |  |  |  |  |  |  | x |  |  |
| Multiply and divide two decimal numbers and divide a whole number by a decimal. |  |  |  |  |  |  |  | x |  |
| N3.4  Solve real- world problems involving decimals | Solve real-world problems involving the addition and subtraction of decimals to the tenths place (e.g., Diego has 3.2 meters of roof sheeting. If he buys another 1.4 meters, how many meters of roof sheeting will he have altogether? Aminata has 32.5 kg of grout for tiling. If she uses 12.1 kg for a new project, how many kgs of tile grout will she have left?). |  |  |  |  |  | x |  |  |  |
| Solve real-world problems involving addition and subtraction of decimals beyond the tenths place (e.g., Aria has a height of 1.55 meters. Her mother has a height of 1.63 meters. How much taller than Aria is her mother? Adwoa has 1.64 meters of roof sheeting and another 1.4 meters. How many meters of roof sheeting does she have?). |  |  |  |  |  |  | x |  |  |
| Solve real-world problems involving the multiplication or division of a decimal by a whole number (e.g., Misha buys 4 bags of sugar. Each bag holds 1.5 kg. How many kilos of sugar did he buy? Saira has 2.4 kg of sugar. She wants to separate the sugar into 3 bags of equal size. How many kgs should she put in each bag?). |  |  |  |  |  |  | x |  |  |
| Solve real-world problems involving the multiplication or division of two decimal numbers (e.g., Pascal has seven .75-liter containers of olive oil. He sells half of them. How many liters of olive oil did he sell? Sheila buys a 4.5-liter barrel of olive oil. She sells them in 0.75-liter containers. How many containers can she make with the 4.5-liter barrel?). |  |  |  |  |  |  |  | x |  |

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| N4.1  Identify and represent integers using objects, pictures, or symbols, and identify relative magnitude | Compare and order integers (e.g., order the following from smallest to largest: -4, 6, -9, 2). |  |  |  |  |  |  | x |  |  |
| N4.2  Solve operations using integers | Multiply any two positive integers, with and without regrouping, and divide any integer by a two-digit number, with and without a remainder (e.g., 2342 x 1478; 3388 ÷ 15 = ). |  |  |  |  |  |  | x |  |  |
| Perform calculations involving two or more operations with positive integers, within the limits for meets expectations described above, respecting the order of operations (e.g., (6584 + 2187) x 318 = ; (9675 - 823) ÷ 19 = ). |  |  |  |  |  |  | x |  |  |
| Perform calculations involving operations with negative integers. |  |  |  |  |  |  | x |  |  |
| Identify factors of whole numbers beyond 100 and multiples of whole numbers beyond 20 (e.g., find factors of 125 or find multiples of 25). |  |  |  |  |  |  | x |  |  |
| Identify common factors and common multiples of two numbers (e.g., find the lowest common multiple and the greatest common factor of 12 and 16). |  |  |  |  |  |  |  | x |  |
| N4.3  Solve real- world problems involving integers | Solve real-world problems involving combinations of any two or more of the four operations, including problems involving measurement and currency units and:   * addition and subtraction of any integers * multiplication of any positive integers * division of any positive integers by a positive two-digit number with or without a remainder   (e.g., The temperature last night was -3 C. This morning it was +2 C. What was the change in temperature between last night and this morning?). |  |  |  |  |  |  | x |  |  |
| Solve real-world problems involving the multiplication or division of two integers, including at least one negative integer (e.g., It is - 8 degrees Celsius on Tuesday. On Wednesday, it is three times colder. What is the temperature on Wednesday?). |  |  |  |  |  |  |  | x |  |



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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| N5.1  Identify and represent quantities using exponents and roots, and identify the relative magnitude | Identify the square, cube, square root, and cube root of whole numbers using pictures and symbols, and represent a square or cube number using exponential notation (e.g., use square arrays or grids to represent square numbers or identify the square of a number; identify the square of 8 or the square root of 81; represent 64 as 82). |  |  |  |  |  |  | x |  |  |
| Identify and represent very large whole numbers using scientific notation and positive exponents (e.g., 600 = 6 x 102). |  |  |  |  |  |  |  | x |  |
| Identify and represent very small numbers using scientific notation and negative exponents (e.g., 0.065 is 6.5 x 10-2). |  |  |  |  |  |  |  |  | x |
| Compare and order large numbers expressed in scientific notation (e.g., 3.1 x 105, 9.2 x 105, 2.7 x 103; 6.1 x 102). |  |  |  |  |  |  |  | x |  |
| Compare and order large and small numbers expressed in scientific notation (e.g., 3.1 x 105, 9.2 x 10-5, 2.7 x 103; 6.1 x 10-2). |  |  |  |  |  |  |  |  | x |
| N5.2  Solve operations involving exponents and roots | Add and subtract quantities expressed in exponential notation (e.g., 32 + 35 = , including scientific notation). |  |  |  |  |  |  |  |  | x |
| Multiply and divide quantities expressed in exponential notation, including scientific notation (e.g., 35 ÷ 32 or 43 x 42). |  |  |  |  |  |  |  |  | x |

DOMAIN: N— NUMBER AND OPERATIONS | Construct: N6—Operations across number

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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| N6.1  Solve operations involving integers, fractions, decimals, percentages, and exponents | Perform calculations involving two or more operations of integers, decimals, and fractions, within the limits for meets expectations described above, respecting the order of operations. |  |  |  |  |  |  |  | x |  |
| Perform calculations involving two or more operations of integers, decimals, fractions, and exponents, within the limits for meets expectations described above, respecting the order of operations. |  |  |  |  |  |  |  |  | x |

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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| M1.1  Use non- standard and standard units to measure, compare, and order | Measure the length of objects using non-standard units (e.g., identify that the pencil is 5 paper clips long). | x |  |  |  |  |  |  |  |  |
| Use non-standard units to estimate and compare the length of objects (e.g., identify that the red pencil is 4 paper clips long and the black pencil is 6 paper clips long). |  | x |  |  |  |  |  |  |  |
| Use standard units to compare length and weight when provided the unit of measurement (e.g., identify that the pencil is one centimeter longer than the crayon). |  |  | x |  |  |  |  |  |  |
| Use non-standard units to estimate or measure volume/capacity (e.g., identify which container would hold the most sand or which box would hold the most balls given pictures of these items). |  |  | x |  |  |  |  |  |  |
| Select and use appropriate standard units to estimate, measure, and compare length and weight when measurements involve whole numbers only (e.g., choose centimeters instead of meters to measure a pencil; estimate the weight of the apple when given the following choices: a) 5g b) 200g c) 1kg d) 5kg). |  |  |  | x |  |  |  |  |  |
| Select and use appropriate standard units to measure and compare capacity/volume when measurements involve whole numbers only (e.g., the measuring cups contain 200 ml of water and 100 ml of oil). |  |  |  | x |  |  |  |  |  |
| Identify the relationship between the relative size of adjacent units within a standard system of measurement for length and weight (e.g., identify the number of millimeters in a centimeter). |  |  |  |  | x |  |  |  |  |
| Identify the relationship between the relative size of adjacent units within a standard system of measurement for capacity/volume  (e.g., identify the number of pints in a quart). |  |  |  |  | x |  |  |  |  |
| Read scales to the nearest marked increment on a variety of measuring tools involving fractions and decimals to the tenths place, containing both labeled and unlabeled scale increments (e.g., read a kitchen scale containing increments expressed as fractions). |  |  |  |  | x |  |  |  |  |
| Read scales to the nearest marked increment on a variety of measuring tools involving decimals to the hundredths place, containing both labeled and unlabeled scale increments (e.g., read a depth gauge in a dam with scale increments increasing in  25 centimeter intervals and labels expressed as decimal meters e.g., 1.25, 1.5, 1.75, 2.0, when the needle is pointing directly at a marked increment of the scale). |  |  |  |  |  | x |  |  |  |
| Read scales on a variety of measuring tools by reading between marked scale increments (interpolating) (e.g., read a kitchen scale marked in grams and kilograms with some unlabeled scale markings and needle pointing between two unlabeled scale markings; measure an angle using a protractor/angle measurer). |  |  |  |  |  |  | x |  |  |
| Make conversions between non-adjacent units of length and weight within a standard system of measurement (e.g., convert kilometers to millimeters). |  |  |  |  |  |  | x |  |  |
| Make conversions between non-adjacent units of capacity/volume within a standard system of measurement (e.g., convert pints to gallons). |  |  |  |  |  |  | x |  |  |
| Make conversions between adjacent units of length and weight within a standard system of measurement (e.g., identify that the 16-centimeter pencil is 160 millimeters long). |  |  |  |  |  | x |  |  |  |
| Make conversions between adjacent units of capacity/volume within a standard system of measurement (e.g., identify that there are four pints in a two-quart container). |  |  |  |  |  | x |  |  |  |
| Make conversions of units of length and weight between different systems of measurement when the conversion factor is provided (e.g., convert 12 cm to inches given 1 inch is 2.54 cm, or convert pounds to kilograms given 1 pound is 0.45 kg). |  |  |  |  |  |  |  | x |  |
| Make conversions of units of capacity/volume between different systems of measurement where the conversion factor is provided  (e.g., convert 750 milliliters to pints given 1 pint is 473 mL). |  |  |  |  |  |  |  | x |  |

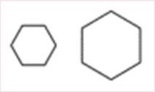
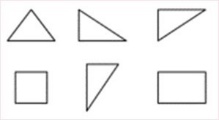
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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
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| M1.2  Solve problems involving measurement | Calculate the perimeter of a polygon. |  |  |  | x |  |  |  |  |  |
| Solve problems, including real-world problems, involving the area of a rectangle using concrete or pictorial representations of units (e.g., grid squares or tiles). |  |  |  | x |  |  |  |  |  |
| Solve problems, including real-world problems, involving the perimeter of a polygon. |  |  |  |  | x |  |  |  |  |
| Solve problems, including real-world problems, involving the calculation of the area of a rectangle. |  |  |  |  | x |  |  |  |  |
| Solve problems, including real-world problems, involving comparing the perimeters of polygons. |  |  |  |  |  | x |  |  |  |
| Solve problems, including real-world problems, involving the area of compound shapes comprised of rectangles using concrete or pictorial representations of units (e.g., grid squares or tiles). |  |  |  |  |  | x |  |  |  |
| Solve problems, including real-world problems, involving perimeter in which a length is unknown (e.g., identify the fifth length in a picture of an irregular pentagon with four sides labeled with length and a given perimeter). |  |  |  |  |  |  | x |  |  |
| Solve problems, including real-world problems, involving the calculation of the area of compound shapes comprised of rectangles  (e.g., calculate the area of a compound L-shape given a picture with the lengths of all sides provided). |  |  |  |  |  |  | x |  |  |
| Solve problems, including real-world problems, involving the calculation of the area of a triangle (e.g., work out the area of a triangle with base length and height given). |  |  |  |  |  |  |  | x |  |
| Solve problems, including real-world problems, involving the calculation of the area of compound shapes comprising rectangles and triangles (e.g., calculate the area of a composite shape given a picture of the shape made up of a rectangle connected to a right-angled triangle with the lengths of all sides provided). |  |  |  |  |  |  |  | x |  |
| Solve problems, including real-world problems, involving the calculation of the volume of a rectangular prism (e.g., calculate the volume in cubic centimeters of a box with a length of 10 cm, width of 10 cm, and height of 15 cm). |  |  |  |  |  |  |  | x |  |
| Solve problems, including real-world problems, involving the calculation of the circumference of a circle given the diameter or radius and vice versa. |  |  |  |  |  |  |  |  | x |
| Solve problems, including real-world problems, involving the calculation of the area of a circle given the diameter or radius and vice versa. |  |  |  |  |  |  |  |  | x |
| Solve problems, including real-world problems, involving the calculation of the surface area of a familiar polyhedron (i.e., a rectangular prism, square-based pyramid, triangular prism) (e.g., calculate the surface area in square centimeters of a box with a length of 10 cm, width of 10 cm, and height of 15 cm). |  |  |  |  |  |  |  |  | x |
| Solve problems, including real-world problems, involving calculating the volume of a non-rectangular prism, given its dimensions  (e.g., calculate the volume of a regular triangular prism, with the length of one side of the base and its height provided). |  |  |  |  |  |  |  |  | x |
| Solve problems, including real-world problems, involving application of Pythagoras' theorem. |  |  |  |  |  |  |  |  | x |

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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| M2.1  Tell time | Identify, sequence, and describe activities/events that take place at different parts of the day (e.g., morning and afternoon). | x |  |  |  |  |  |  |  |  |
| Tell time using an analog clock to the nearest hour. |  | x |  |  |  |  |  |  |  |
| Tell time using an analog clock to the nearest half hour. |  |  | x |  |  |  |  |  |  |
| Tell time using an analog clock to the nearest minute. |  |  |  | x |  |  |  |  |  |
| Recognize the number of days in a week and months in a year. |  | x |  |  |  |  |  |  |  |
| Recognize the number of hours in a day, minutes in an hour, and seconds in a minute. |  |  | x |  |  |  |  |  |  |
| Recognize equivalence between representations of time (e.g., digital, analog, and written; 15 minutes is a quarter of an hour). |  |  |  |  | x |  |  |  |  |
| M2.2  Solve problems involving time | Solve problems, including real-world problems, using a calendar (e.g., given a calendar, answer this question: March 2 falls on what day of the week?). |  | x |  |  |  |  |  |  |  |
| Solve problems, including real-world problems, involving elapsed time in hours and half-hours (e.g., calculate the difference between 2:00 and 5:30 or the difference between 16:00 and 16:30). |  |  | x |  |  |  |  |  |  |
| Solve problems, including real-world problems, involving elapsed time in minutes within an hour (e.g., calculate the difference between 3:42 and 3:56 or the difference between 16:35 and 16:52). |  |  |  | x |  |  |  |  |  |
| Solve problems, including real word problems, involving elapsed time in minutes across hours (e.g., calculate the difference between 3:24 and 5:12 or the difference between 16:35 and 18:22), including problems involving schedules (i.e., timetables, agendas, itineraries). |  |  |  |  | x |  |  |  |  |
| Solve problems, including real-world problems, involving the number of days in a week, months in a year, hours in a day, minutes in an hour, and seconds in a minute. |  |  |  |  | x |  |  |  |  |
| Solve problems, including real-world problems, involving elapsed time across a.m. and p.m. in countries that teach 12-hour time  (e.g., calculate the difference between 10:30 a.m. and 3:15 p.m.). |  |  |  |  |  | x |  |  |  |
| Solve problems, including real-world problems, involving conversion between 12-hour and 24-hour time (e.g., A ferry departs at 16:30 hours. It takes 2 hours and 15 minutes to reach its destination. At what time does the ferry arrive at its destination? Give your answer in a.m./p.m. time). |  |  |  |  |  |  | x |  |  |
| Solve problems, including real-world problems, involving time zones (e.g., When it is 4 p.m. on Tuesday in New York, it is 6 a.m. on Wednesday in Sydney. When it is 11 a.m. on Thursday in Sydney, what time and day will it be in New York?). |  |  |  |  |  |  |  | x |  |
| Solve problems, including real-world problems, involving conversion between years, months, weeks, days, hours, fractions of hours, or minutes (e.g., Ali spends two hours per week practicing piano. How many days per year does he spend practicing piano?). |  |  |  |  |  |  |  |  | x |

DOMAIN: M—MEASUREMENT | Construct: M3—Currency

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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
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| M3.1  Use different currency units to create amounts | Count simple combinations of two commonly used currency denominations in a country. | x |  |  |  |  |  |  |  |  |
| Count combinations of commonly used currency denominations. |  | x |  |  |  |  |  |  |  |
| Combine commonly used currency denominations to make a specified amount. |  | x |  |  |  |  |  |  |  |
| Combine commonly used currency denominations to make a specified amount in a variety of ways. |  |  | x |  |  |  |  |  |  |

DOMAIN: G—GEOMETRY | Construct: G1—Properties of shapes and figures



Subconstruct Global Proficiency Descriptor for "Meets Global Minimum Proficiency"

Recognize and name basic shapes (e.g., recognize a picture of a square, circle, rectangle, or triangle or name a shape when it is

Grade

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pointed to). x

Recognize and name shapes that are regular and irregular (e.g., if shown an irregular triangle, recognize that it is a triangle; x

name a hexagon).

Recognize and name straight and curved lines and attributes of shapes (e.g., number of sides, number of corners). x

Recognize when a two-dimensional shape has been rotated or reflected (e.g., when shown a number of shapes, identify those that are the same, even when some are rotated or reflected).

x

Recognize and name two-dimensional shapes and familiar three-dimensional figures in everyday life. x

Recognize and name two-dimensional shapes by a written or spoken description of their simple attributes (e.g., name a shape

given a description of the number of sides or corners or the relative length of the sides, etc.). x

Recognize and describe the congruence and similarity of two-dimensional shapes (e.g., when shown two shapes,

explain how they are similar using mathematical or non-mathematical language: "It got bigger and has been x

turned" or "It's been enlarged and rotated").

### G1.1

Recognize and describe shapes and figures

Recognize and name types of triangles (e.g., isosceles, scalene, equilateral, and right angle). x

Recognize and name three-dimensional figures by their attributes (e.g., faces, edges, vertices). x

Recognize types of angles by their magnitude (e.g., right, straight, acute, obtuse). x

Recognize and name types of quadrilaterals (e.g., parallelogram, trapezium, etc.). x

Recognize single-step, two-dimensional shape transformations expressed quantitatively (i.e., rotation by a given fraction of a x turn, reflection along a given mirror line, or enlargement by a given scale factor).

Recognize and name parts of the circle (i.e., radius, diameter, circumference) and identify the relationship between the radius x

and diameter.

Identify a line of symmetry in two-dimensional shapes. x

Identify parallel and perpendicular sides of shapes. x

Use the defining attributes (i.e., type of angle, parallel and perpendicular lines) of complex two-dimensional shapes to classify x

them.

Use the angle relationships associated with intersecting lines, and with parallel lines intersected by a transverse line to solve x

problems (e.g., calculate missing angles on a diagram with parallel and intersecting lines).

Estimate the size of angles by comparing to reference/benchmark angles (e.g., estimate the size of a given angle with reference

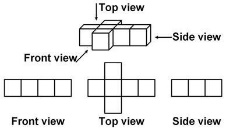
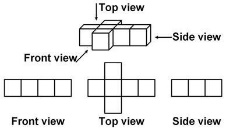
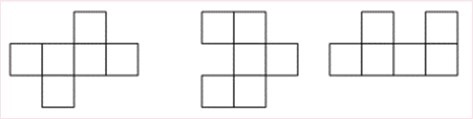
to the fact that it is smaller than a right angle and larger than 45°). x

Use the angle sum of a triangle to solve problems (e.g., determine the missing angle of a triangle where two angles are given). x

Describe and implement two-dimensional shape transformations (i.e., reflection, rotation, translation, enlargement/reduction). x

Describe and implement sequential two-dimensional shape transformations (i.e., reflection, rotation, translation, x enlargement/reduction).

### DOMAIN: G—GEOMETRY | Construct: G2—Spatial visualizations



Subconstruct Global Proficiency Descriptor for "Meets Global Minimum Proficiency"

Compose a larger two-dimensional shape from a small number of given shapes when the

Grade

1 2 3 4 5 6 7 8 9

outlines for the shapes are provided (e.g., use the smaller shapes to make the larger shape). x

Compose/decompose a larger two-dimensional shape from a small number of given shapes

without lines showing where the shapes go (e.g., use the smaller shapes to make the larger x

shape).

Use a small number of given shapes to compose multiple larger two-dimensional shapes (e.g., identify which

of these larger shapes can be made from the smaller shapes?) and decompose a larger shape into a given x

number of smaller shapes (e.g., draw one line on the triangle below to show how it can be cut into exactly two

smaller triangles).

Identify the net of a cube or specific faces on the net of a cube (e.g., fold mentally to answer the

### G2.1

Compose and decompose shapes and figures

question, which of these is the net of a cube?; identify opposite faces on a net). x

Identify front, top, and side views of a familiar three-dimensional figure (i.e., prism, cylinder, cone, or pyramid) (e.g., identify that

the top view of an upright cylinder is a circle). x

Identify alternate views of the same compound or irregular three-dimensional shape, such as its front, top and side view, a rotated view, or a view of a hidden side (e.g., label images (i), (ii), and (iii) as the front, top

and side view of the three-dimensional shape). x

Identify the net of a familiar three-dimensional figure (i.e. prism, cylinder, cone, or pyramid) (e.g., fold or unfold mentally to answer the question, "What figure does this make when folded?"; "What figure does this

make when unfolded?"). x

Identify a cross-section of a familiar three-dimensional figure (i.e. prism, cylinder, cone, or pyramid) (e.g., identify that the cross x

section of a cylinder that is not parallel to the base is an ellipse).

### DOMAIN: G—GEOMETRY | Construct: G3—Position and direction

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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| G3.1  Describe the position and direction of objects in space | Use familiar positional terms (e.g., answer the question, "Where is the book?" by saying, "The book is next to the pencil."). | x |  |  |  |  |  |  |  |  |
| Recognize and use positional terms that describe the location of an object with more precision (e.g., answer the question, "Where is the book?" by saying, "The book is between the pencil and the bag."). |  | x |  |  |  |  |  |  |  |
| Accurately use the terms left and right, and use simple maps to describe locations using positional terms (e.g., answer, "Where is the teacher's desk?" "To the [left] of the chalkboard."). |  |  | x |  |  |  |  |  |  |
| Use different kinds of simple maps (i.e., an alphanumeric map, grid map, or local equivalent) to give and follow two-step directions to a given location (e.g., Using this map, if you are at the school, you walk towards the tree, and turn left. What would you be facing?; Using this map, how do you get from the school to the green house?). |  |  |  | x |  |  |  |  |  |
| Use a grid map with compass directions when the grid dimensions are given in terms of the real-world distance (e.g., Which of these is closest to the distance between the park and Juan’s house? a) 100 meters b) 150 meters c) 200 meters d) 250 meters). |  |  |  |  | x |  |  |  |  |
| Locate and plot points on a plane in the first quadrant of a Cartesian coordinate system. |  |  |  |  |  | x |  |  |  |
| Locate and plot points on a plane in all four quadrants of a Cartesian coordinate system. |  |  |  |  |  |  |  | x |  |
| Draw shapes in the first quadrant of a Cartesian coordinate system, and find missing points (e.g., if (1,1), (1,3), and (1,2) are three corners of a rectangle, identify the fourth corner). |  |  |  |  |  |  | x |  |  |
| Draw shapes in all four quadrants of a Cartesian coordinate system and find missing points (e.g., If (1,2), (-3,2), and (-3,-2) are three corners of a square, what is the fourth corner?). |  |  |  |  |  |  |  |  | x |
| Identify horizontal and/or vertical distances between two points in the first quadrant of the Cartesian coordinate system (e.g., using the Cartesian coordinate system, identify how many horizontal and vertical units is (1,1) from (3,4)). |  |  |  |  |  |  | x |  |  |
| Describe and implement a single transformation (i.e., reflection, rotation, translation, enlargement/reduction) of a two-dimensional shape in all four quadrants of a Cartesian coordinate system. |  |  |  |  |  |  |  |  | x |

Subconstruct Global Proficiency Descriptor for "Meets Global Minimum Proficiency"

Retrieve information about a single category from a tally chart, bar graph, or pictograph with up to four categories and a single-unit scale (e.g., How many children liked red on this bar graph?)

Grade

1 2 3 4 5 6 7 8 9

x

Retrieve information from data displays that arrange data into categories and sub-categories with a single- or multi-unit scale (e.g., How many girls liked green in this bar chart?).

x

Retrieve categorical data from pie charts and Venn diagrams and bivariate data from line graphs and dot plots. x

Compare between categories of a tally chart, bar graph, or pictograph with up to four categories and a single-unit scale, using terms such as more than, less than, etc. (e.g., Which color was chosen less

often than green on this bar graph?). x

### S1.1

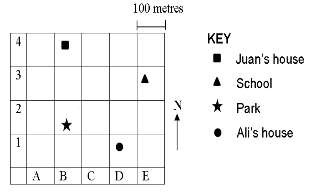
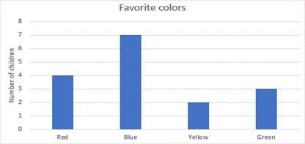
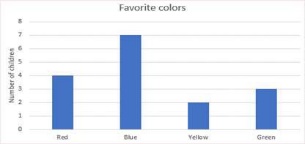
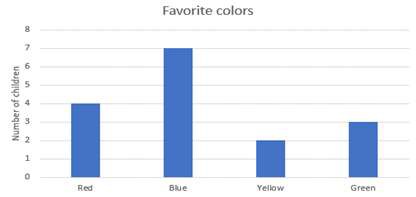
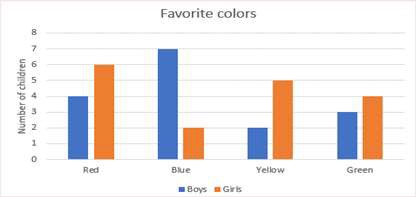
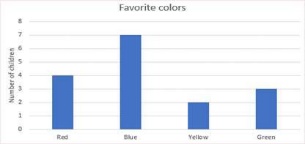
Retrieve and interpret data presented in displays

Solve a problem involving the sum of or difference between two specified categories of a tally chart, bar graph, or pictograph with a single-unit scale (e.g., How many children like red and blue in this bar

graph?). x

Solve a problem involving more than two pieces of information from a tally chart, bar graph, or pictograph with a single-unit scale (e.g., How many children were asked about their favorite color in this

bar graph?). x



Complete missing information in a tally chart, bar graph, or pictograph that arranges data into categories and uses a single-unit x

scale (e.g., add a row or column to a partially completed pictograph).

Retrieve information from a tally chart, bar graph, or pictograph with a multi-unit scale. x

Organize data and construct a tally chart, bar graph, or pictograph that arranges data into categories and uses a single- or multi-unit scale.

x

Organize data and construct pie charts and Venn diagrams (categorical data) and line graphs and dot plots (bivariate data) when

some support is provided (e.g., construct a line graph when given labeled horizontal and/or vertical axes, or match a table to the x

correct pie chart given a range of pie chart options).

Compare by calculating differences between categories in a tally chart, bar graph, or pictograph with a multi-unit scale. x

Understand, describe, and use relationships within displays of bivariate data (e.g., describe the strength of association shown in a

scatter plot, or a linear relationship between two functionally related variables). x

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| S1.2  Calculate and interpret central tendency | Solve problems, including real-world problems, involving calculation of the mean, median, or mode of a set of data. |  |  |  |  |  |  | x |  |  |
| Compare key features of the distribution of two different but related sets of data (e.g., compare the heights of 10 grade four students to the heights of 10 grade seven students with reference to minimum value, maximum value, and spread of the data). |  |  |  |  |  |  | x |  |  |
| Describe the effect of adding or removing a specific data value on the mean, median, or mode of a set of data (e.g., What would be the effect of removing a score of 20 from the scores 20, 80, 70, and 75 on the mean? The possible answers are: a) it would increase, b) it would decrease, and c) it would stay the same. The same question can be asked about the effect on the median and the mode. Another example is: Juanita plays hockey and aims to achieve a mean of 3 goals per game by the end of the season.  Her goals for the first four games are shown: 2, 4, 1, 3. She has one more game to play this season. How many goals must she score in this game to achieve her aim?). |  |  |  |  |  |  |  | x |  |
| Compare the distribution of sub-categories within a set of data (e.g., compare temperatures in a 24-hour period split into day temperatures and night temperatures). |  |  |  |  |  |  |  | x |  |
| Determine and compare the mean, median, and mode for different sets of data and choose which is most appropriate in a given context (e.g., determine why the median is more appropriate than the mean as a representation of house prices in a given area). |  |  |  |  |  |  |  |  | x |
| Recognize the effect of outliers in a set of data on the mean and median. |  |  |  |  |  |  |  |  | x |
| Identify desirable characteristics of sampling methods that will enable the mean of a sample to be as close as possible to the mean of a population (e.g., Anoush wants to determine the mean number of siblings each student in her school has. She decides to ask  a sample of students. For which of these samples will the mean of the sample be closest to the mean of the whole school? a) The first 10 students she sees in the corridor, b) All the students on her football team, c) 50 grade 7 students selected randomly, and d) 50 students from various grade levels selected randomly). |  |  |  |  |  |  |  |  | x |

### DOMAIN: S—STATISTICS AND PROBABILITY | Construct: S2—Chance and probability

|  |  |  |  |  |  |  |  |  |  |  |
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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| S2.1  Describe the likelihood of events in different ways | Identify the likelihood of an event happening as likely or unlikely (e.g., There are 9 blue, 1 red, 1 green, and 1 yellow marbles in a bag. Which color is likely to be selected?). |  |  |  |  | x |  |  |  |  |
| Compare the likelihood of two or more events happening, using descriptive words (e.g., Given a picture of a spinner with 5 equal colored sections—red, blue, yellow, green, and purple—the question is: "If the spinner is spun two times, what is the chance that it will land on blue both times?" The possible answers are a) impossible, b) unlikely, c) likely, and d) certain). |  |  |  |  |  | x |  |  |  |
| Calculate the probability of a simple event happening, with the answer expressed as a fraction, decimal, or percentage, and place probability values or events on a continuum from 0 (impossible) to 1 (certain), with 0.5 meaning equal chance of occurring or not occurring. (e.g., What is the probability of rolling a 6 on a standard number die?). |  |  |  |  |  |  | x |  |  |
| Find the expected number of occurrences of a specific independent outcome when a probability experiment is repeated many times (e.g., calculate the expected number of heads with 50 flips of a fair coin). |  |  |  |  |  |  |  | x |  |
| Calculate probabilities of different outcomes for compound events containing two simple events, when they can be listed as a discrete sample space (e.g., calculate the chance of rolling a sum of 7 when rolling two standard number dice). |  |  |  |  |  |  |  |  | x |
| Use a wide range of representations such as tree diagrams and two-way tables to explore possible outcomes of chance events and experiments involving multiple compound events (containing two or more simple events). |  |  |  |  |  |  |  |  | x |

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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| S2.2  Identify permutations and combinations | Systematically count all the possible outcomes (sample space) for a situation involving a compound event comprised of two simple events with replacement (e.g., calculate all of the possible outcomes when selecting a marble from a bag containing 5 marbles, then selecting a second marble after putting the first marble back in the bag) and without replacement (e.g., calculate all of the possible outcomes when selecting a card randomly from a set containing 1 yellow, 1 blue, 1 red, and 1 green card, then selecting a second card without putting the first card back into the set). |  |  |  |  |  |  |  |  | x |

DOMAIN: A—ALGEBRA | Construct: A1—Patterns

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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| A1.1  Recognize, describe, extend, and generate patterns | Copy repeating patterns of items such as colors, shapes, and sounds (e.g., when provided □ □ □, select another pattern that is similar to that one, e.g., red, blue, red, blue, red, blue. Or, when someone claps a simple repeated rhythm, "clap; clap clap; clap; clap clap; clap; clap clap," continue the rhythm). | x |  |  |  |  |  |  |  |  |
| Recognize repeating sets in a pattern and use this to identify a missing element and extend the pattern (e.g., identify that □□ is the repeating set in □□ □□ □□; identify the missing element in the following set □□ □□ □□; when presented with  □□ □□ □□, add two additional sets to the pattern). |  | x |  |  |  |  |  |  |  |
| Describe repeating patterns (e.g., explain that □□ repeats three times in the following set □□ □□ □□; explain that 1, 2, 3, 4 repeats three times in the following set: 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4). |  |  | x |  |  |  |  |  |  |
| Describe numerical patterns that increase or decrease by a constant value with a simple rule, and use this information to identify a missing element or extend the pattern (e.g., describe the pattern 6, 9, 12, 15 as going up by threes; identify the missing element in the pattern 3, 7, 11, \_\_, 19; extend the pattern 6, 11, 16, 21). |  |  |  | x |  |  |  |  |  |
| Describe numerical patterns that increase or decrease by a constant multiplier, and use this information to identify a missing element or extend the pattern (e.g., describe that the pattern 2, 4, 8, 16 starts at 2 and doubles or that the pattern 20, 10, 5, 2.5 starts at 20 and halves; identify the missing element in the pattern 3, 6, \_\_, 24, 48; write the next two numbers in the pattern 80, 40, 20, 10). |  |  |  |  | x |  |  |  |  |
| Generate a pattern from a given rule, or match a pattern to a given rule using any operation (e.g., start at 5 and increase by 3 to generate 5, 8, 11, 14, 17 . . .; match the pattern 3, 6, 12, 24, … to one of these rules a) start at 3 and add 3, b) start at 3 and double, c) start at 3 and add 6, and d) start at 3 and halve). |  |  |  |  |  | x |  |  |  |
| Recognize and extend non-linear patterns, including squaring patterns, which may be supported by a visual representation (e.g., recognize that 1, 3, 6, 10 increases by 2, then 3, then 4, when accompanied by dots or points arranged into triangles; extend the pattern 2, 4, 16, 25 ). |  |  |  |  |  |  | x |  |  |

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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| A2.1  Evaluate, model, and compute with expressions | Use linear expressions to represent problem situations with a single variable (e.g., The cost of buying cinema tickets online is £12 per ticket plus a £2 booking fee. Write this as an expression where x is the number of tickets purchased). |  |  |  |  |  |  | x |  |  |
| Add and subtract linear expressions (e.g., (3x + 4y) - (2x + 5y)). |  |  |  |  |  |  | x |  |  |
| Use expressions to represent problem situations with multiple variables (e.g., Akeelah bought 4 blouses for x dollars and a wristwatch for y dollars. Represent this as an expression). |  |  |  |  |  |  |  | x |  |
| Multiply and divide linear monomials, and simplify linear expressions by using the distributive property (e.g., multiply (3x)(5y); simplify 2x(3x + 4)). |  |  |  |  |  |  |  | x |  |
| Evaluate and simplify exponential expressions using the Laws of Exponents (e.g., evaluate 2x3 when x = 7; simplify (2x3)2). |  |  |  |  |  |  |  | x |  |
| Multiply two binomial linear expressions (e.g., multiply (3x 4y)(2x + 5y)). |  |  |  |  |  |  |  |  | x |
| Factor linear and exponential expressions using the greatest common factor algebraically (e.g., factor 4x2+ 8xy - 6x to 2x(2x + 4y - 3)). |  |  |  |  |  |  |  |  | x |

DOMAIN: A—ALGEBRA | Construct: A3—Relations and functions

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| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| A3.1  Solve problems involving variation (ratio,  proportion, and percentage) | Reason proportionally to answer real-world problems involving a unit ratio expressed informally (e.g., If Tulika needs 3 eggs for 1 cake, how many eggs does Tulika need for 5 cakes?). |  |  |  |  |  | x |  |  |  |
| Reason proportionally to answer real-world problems involving a ratio (e.g., Purple paint is made from 2 parts blue paint to 3 parts red paint. I have 10 parts of blue paint. How many parts of red paint do I need?; The ratio of teachers to students on a school trip must be 1:9. How many teachers are needed if there are 36 students?). |  |  |  |  |  |  | x |  |  |
| Solve problems, including real-world problems, involving finding the percentages of a known quantity (e.g., 20% of 70 = ; A stadium holds 3,200 people. If the stadium is 80% full, how many people are in the stadium?). |  |  |  |  |  |  | x |  |  |
| Solve proportions written as two equal ratios (e.g., solve 2/3 = 10/x). |  |  |  |  |  |  |  | x |  |
| Solve problems, including real-world problems, involving percent increase or decrease (e.g., A shirt that normally costs 25 euros is on sale for 10% off. How much does it cost now?; A shirt cost 25 euros in November and then 20 euros in December. What is the percent decrease in cost?). |  |  |  |  |  |  |  | x |  |
| Solve problems, including real-world problems, involving percentages where the percentage and final quantity are known, but the initial quantity is not (e.g., Ana paid $8 for a belt that was on sale. The price had been reduced by 20%. What was the original price of the belt?). |  |  |  |  |  |  |  |  | x |
| Write a proportion as two equal ratios to model a proportional relationship (e.g., write 2/3 = 10/x to represent a problem that says, "Purple paint is made from 2 parts blue paint to 3 parts red paint. If I have 10 parts of blue paint, how many parts of red paint do I need?"). |  |  |  |  |  |  |  |  | x |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Subconstruct | Global Proficiency Descriptor for "Meets Global Minimum Proficiency" | Grade | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| A3.2  Demonstrate an understanding of equivalency | Create a numerical expression using + or - to model a situation (e.g., represent the following in a number sentence: 3 people are on a bus, and 4 more get on). |  |  | x |  |  |  |  |  |  |
| Create a numerical expression using x or ÷ to model a situation (e.g., represent the following in a number sentence: 3 people get on the bus at each of four stops). |  |  |  | x |  |  |  |  |  |
| Find a missing value in real-world addition and subtraction problems within 20 (e.g., 3 people are on a bus. More people get on. There are now 7 people on the bus. How many people got on the bus?). |  |  | x |  |  |  |  |  |  |
| Find a missing value in a number sentence using addition and subtraction of numbers within 100 (e.g., 23 + = 59). |  |  |  | x |  |  |  |  |  |
| Find a missing value in a number sentence using multiplication and division within 100 (e.g., 7 x \_ = 35). |  |  |  |  | x |  |  |  |  |
| Find a missing value in a number sentence using any one of the four operations (e.g., 3 x = 18). |  |  |  |  |  | x |  |  |  |
| Represent real-world addition and subtraction problems within 20 using a number sentence with a symbol or blank to represent the missing value (e.g., 13 people are on a bus. More people get on. There are now 17 people on the bus. How many people got on the bus? Represent this situation with an addition or a subtraction sentence). |  |  |  | x |  |  |  |  |  |
| Represent real-world problems involving the multiplication of two whole numbers to 10 and related division facts, using a number sentence with a symbol or blank to represent the missing value (e.g. Paul has 3 bags of oranges. There is the same number of oranges in each bag. He has 18 oranges altogether. How many oranges are there in each bag? Represent the situation with a multiplication sentence). |  |  |  |  | x |  |  |  |  |
| Represent real-world problems using a number sentence with one of the four operations (e.g., Abu has 5 identical water bottles that weigh a total of 15 pounds. Represent the problem as 5 × = 15). |  |  |  |  |  | x |  |  |  |
| A3.3  Solve equations and inequalities | Represent and solve problems, including real-world problems, using a two-step equation with any of the four operations (e.g., solve 3x + 4 = 22; Some people got on a bus, doubling the number of passengers. At the next stop, 8 people got off, leaving 16 people on the bus. Represent the situation as an equation, and solve to find the number of people on the bus originally). |  |  |  |  |  |  | x |  |  |
| Represent and solve problems, including real-world problems, using more than two steps, including those that involve the distributive property, combining like terms, etc. (e.g., solve 3x + 4 (x + 2) = 22; The older children get 2 more cookies than the younger children. If there are 3 younger children and 4 older children and 22 cookies were distributed, how many cookies did the younger children get?; Represent as 3x + 4 (x + 2) = 22) and solve. |  |  |  |  |  |  |  | x |  |
| Represent and solve problems, including real-world problems, using two linear equations (e.g., If 3x + 4y = 24 and 4x + 3y = 22, solve for x and y; Or, Andre has more money than Bob. If Andre gives Bob $20, they would have the same amount. If Bob gave Andre $22, Andre would then have twice as much as Bob. Represent as two linear equations, and work out how much each of them actually has). |  |  |  |  |  |  |  |  | x |
| Interpret equations and their solutions in terms of context (e.g., given an algebraic graph, such as a distance-time graph, interpret the slope as speed). |  |  |  |  |  |  |  | x |  |
| Graph linear equations, including those of the form y = k and x = k and calculate the slope of a line from a table, equation, graph, or ordered pairs. Identify the x- and y-intercepts of the graphed line of an equation (e.g., graph y = 5x + 2; graph y = 4; graph x = 4; in the equation y = 3x + 2, identify what the slope is; given a coordinate at (2,4) and a coordinate of (3,7), solve for the slope). |  |  |  |  |  |  |  |  | x |
| Solve multi-step inequalities (e.g., x + 5 (x - 2) > 2). |  |  |  |  |  |  |  |  | x |
| A3.4  Interpret and evaluate functions | Identify a function presented in a graph, either as a set of points or as a continuous line (curved or straight). |  |  |  |  |  |  |  |  | x |

TABLE 5: DESCRIPTORS FOR THE THREE HIGHEST PROFICIENCY LEVELS

GLOBAL PROFICIENCY FOR MATHEMATICS: GRADES 1 TO 9 36

# Grade 1

|  |  |  |  |
| --- | --- | --- | --- |
|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N: NUMBER AND OPERATIONS

N1: WHOLE NUMBERS

N1.1: Identify and count in whole numbers, and identify their relative magnitude

N1.1.1\_P Count in whole numbers up to 20. N1.1.1\_M Count in whole numbers up to 30. N1.1.1\_E Count in whole numbers up to 100.

N1.1.2\_P Read whole numbers up to 20 in numerals. N1.1.2\_M Read and write whole numbers up to 30 in

numerals.

N1.1.2\_E Read and write whole numbers up to 100 in numerals.

N1.1.3\_P Compare and order whole numbers up to 20.

N1.1.3\_M Compare and order whole numbers up to 30. N1.1.3\_E Compare and order whole numbers up to

100.

N1.2: Represent whole numbers in equivalent ways N1.2.1\_P Identify equivalence between whole

quantities up to 5 represented as objects, pictures, and numerals (e.g., when given a picture of 5 objects and other pictures of various numbers of objects, select the picture that has the same number of objects; associate a numeral with the appropriate number of objects).

N1.2.1\_M Identify equivalence between whole quantities up to 10 represented as objects, pictures, and numerals (e.g., when given a picture of 10 objects and other pictures of various numbers of objects, select the picture that has the same

number of objects; associate a numeral with the appropriate number of objects).

N1.2.1\_E Identify equivalence between whole quantities up to 30 represented as objects, pictures, and numerals (e.g., when given a picture of 30 flowers, identify the picture that has the number of butterflies that would be needed for each flower to have a butterfly).

N1.3: Solve operations using whole numbers

N1.3.1\_P Add and subtract within five (i.e., where the N1.3.1\_M Add and subtract within 10 (i.e., where the sum

N1.3.1\_E Add and subtract within 20 (i.e., where the

sum or minuend does not surpass five), and represent these operations with objects, pictures, or symbols (e.g., 3 + 2 =

; 5 - 1 = ; when presented with a picture of 3 whole bananas and 1 banana peel, match to the sentence 4 - 1 = 3 or complete the statement 4 - 1 = ).

N1.3.2\_P Find the double of a set up to 2 objects, and divide a group of up to 4 objects into two equal sets (e.g., There are 2 biscuits in a package. There are 2 packages of biscuits. How many biscuits are there in total?; There are 4 biscuits in a package. The biscuits will be shared equally by 2 friends. How many biscuits will each friend get?).

or minuend does not surpass 10), and represent these operations with objects, pictures, or symbols (e.g., 5 + 4 = ; 7 - 5 =

; when presented with a picture of 3 baskets, with the first basket showing 3 bananas and a second basket showing 5 bananas, complete the addition statement 3 + 5 = or find an appropriate addition statement from a list. Or, when presented with a picture of 6 whole bananas and 3 banana peels, match to sentence 9 - 3 = 6 or complete statement 9 - 3

= ).

N1.3.2\_M Find the double of a set of up to 5 objects, and divide a group of up to 10 objects into two equal sets (e.g., There are 4 biscuits in a package. There are 2 packages of biscuits.

How many biscuits are there in total?; There are 8 biscuits in a package. The biscuits will be shared equally by 2 friends. How many biscuits will each friend get?).

sum or minuend does not surpass 20) and represent these operations with objects, pictures, or symbols (e.g., 8 + 6 = ; 15 -

4 = ; when presented with a picture of 12 bananas and 3 more bananas added, complete addition statement 12 + 3 = or find a matching addition statement 12 + 3 = 15 from a list. Or, when presented with a picture of 15 whole bananas and 4 banana peels, match to the sentence 19 - 4 = 15 or complete the statement 19 - 4 = ).

N1.3.2\_E Find the double of a set of up to 10 objects, and divide a group of up to 20 objects into two equal sets (e.g., An octopus has 8

legs. There are 2 octopuses. How many octopus legs are there in total?; There are 16 biscuits. The biscuits will be shared equally by 2 friends. How many biscuits will each friend get?).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| N1.4: Solve real-world problems involving whole numbers | | | |

N1.4.1\_P Solve simple real-world problems using

N1.4.1\_M Solve simple real-world problems using addition N1.4.1\_E Solve simple real-world problems using

addition and subtraction facts within 5 (i.e., where the sum or minuend does not surpass 5) (e.g., There are 2 eggs in a carton. One more egg is put in the carton. How many eggs are in the carton now?; One egg in a carton of 4 eggs is cracked. How many eggs are not cracked?).

and subtraction facts within 10 (i.e., where the sum or minuend does not surpass 10) (e.g., There are 7 eggs in a carton. 3 more eggs are put in the carton. How many eggs are in the carton now?; 3 eggs in a carton of 10 eggs are cracked. How many eggs are not cracked?).

addition and subtraction facts within 20 (i.e., where the sum or minuend does not surpass 20) (e.g., There are 14 eggs in a carton. 5 more eggs are added. How many eggs are in the carton now?; 6 eggs in a carton of 12 eggs are cracked. How many eggs are not cracked?).

N2: FRACTIONS

Not applicable to grade 1

N3: DECIMALS

Not applicable to grade 1

|  |  |
| --- | --- |
| N4: INTEGERS | |
| Not applicable to grade 1 | |
|  |  |
| N5: EXPONENTS AND ROOTS | |
| Not applicable to grade 1 | |

N6: OPERATIONS ACROSS NUMBER

Not applicable to grade 1

M: MEASUREMENT

M1: LENGTH, WEIGHT, CAPACITY, VOLUME, AREA, AND PERIMETER

M1.1: Use non-standard and standard units to measure, compare, and order

M1.1.1\_P Visually compare relative lengths (e.g., longer/shorter; closer/further) of everyday objects.

M1.1.1\_M Measure the length of objects using non- standard units (e.g., identify that the pencil is 5 paper clips long).

M1.1.1\_E Use non-standard units to estimate and compare the length of objects (e.g., identify that the red pencil is 4 paper clips long and the black pencil is 6 paper clips long).

M1.2: Solve problems involving measurement—not applicable to grade 1

M2: TIME

M2.1: Tell time

M2.1.1\_P Distinguish between parts of the day by everyday activities (e.g., eat breakfast in the morning and go to sleep at night).

M2.1.1\_M Identify, sequence, and describe activities/events that take place at different parts of the day (e.g., morning and afternoon).

M2.1.1\_E Tell time using an analog clock to the nearest hour.

M2.1.2\_P N/A M2.1.2\_M N/A M2.1.2\_E Recognize that there are 7 days in a week and 12 months in a year.

M2.2: Solve problems involving time—not applicable to grade 1

|  |  |  |  |
| --- | --- | --- | --- |
|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| M3: CURRENCY | | | |
| M3.1: Use different currency units to create amounts | | | |

M3.1.1\_P Know the value of a coin or paper money (banknotes) (e.g., identify that a dime is worth ten cents).

M3.1.1\_M Count simple combinations of two currency denominations commonly used in the country.

M3.1.1\_E Count combinations of currency denominations commonly used in the country.

G: GEOMETRY

G1: PROPERTIES OF SHAPES AND FIGURES

G1.1: Recognize and describe shapes and figures G1.1.1\_P Recognize basic shapes (i.e., circles,

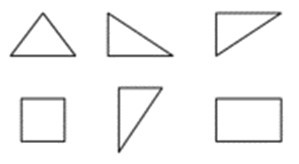
squares, triangles) in the environment (e.g., point to a wheel in a picture when asked to identify the circle in the picture).

G1.1.1\_M Recognize and name basic shapes (e.g., recognize a picture of a square, circle, rectangle, or triangle or name a shape when it is pointed to).

G1.1.1\_E Recognize and name shapes that are regular and irregular (e.g., if shown an irregular triangle, recognize that it is a triangle; name a hexagon).

G1.1.2\_P N/A G1.1.2\_M N/A G1.1.2\_E Recognize and name straight and curved lines and attributes of shapes (e.g., number of sides, number of corners).

G1.1.3\_P N/A G1.1.3\_M N/A G1.1.3\_E Recognize when a two-dimensional shape has been rotated or reflected (e.g., when shown a number of shapes, identify those that are the same, even when some are rotated or reflected).



G2: SPATIAL VISUALIZATIONS

G2.1: Compose and decompose shapes and figures G2.1.1\_P Compose a larger two-dimensional shape

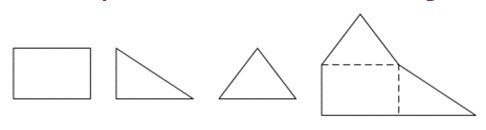
from two given shapes when the outlines for the shapes are provided.

G3: POSITION AND DIRECTION

G3.1: Describe the position and direction of objects in space G3.1.1\_P Recognize familiar positional terms (e.g.,

answer the question, "Which object is next to the book?" by saying, "The book is next to the pencil.").

G2.1.1\_M Compose a larger two-dimensional shape from a small number of given shapes when the outlines for the shapes are provided (e.g., use the smaller shapes to make the larger shape).



G3.1.1\_M Use familiar positional terms (e.g., answer the question, "Where is the book?" by saying, "The book is next to the pencil.").

G2.1.1\_E Compose/decompose a larger two- dimensional shape from a small number of given shapes without lines showing where the shapes go (e.g., use the smaller shapes to make the larger shape).

G3.1.1\_E Recognize and use positional terms that describe the location of an object with more precision (e.g., answer the question, "Where is the book?" by saying, "The book is between the pencil and the bag.").

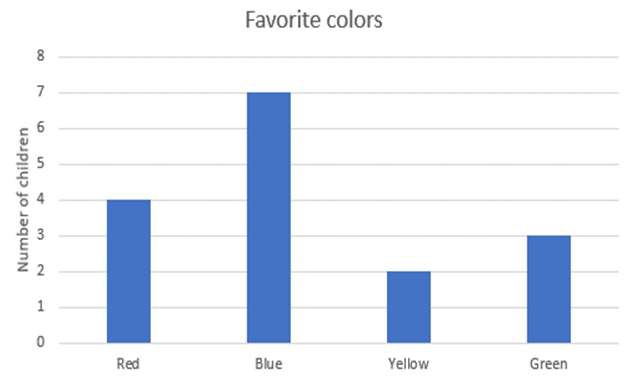
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| --- | --- | --- | --- |
|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

S: STATISTICS AND PROBABILITY

S1: DATA MANAGEMENT

S1.1: Retrieve and interpret data presented in displays S1.1.1\_P Retrieve information about a single

category from a tally chart, bar graph, or pictograph with up to two categories and a single-unit scale (e.g., How many children liked red on this bar graph?).



A: ALGEBRA

S2: CHANCE AND PROBABILITY

Not applicable to grade 1

S1.2: Calculate and interpret central tendency—not applicable to grade 1

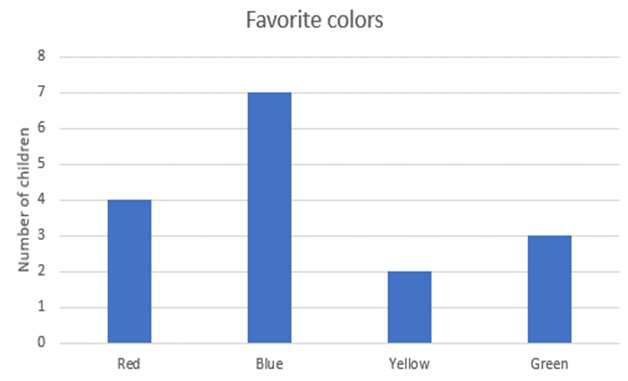
A1: PATTERNS

A1.1: Recognize, describe, extend, and generate patterns A1.1.1\_P Recognize repeating patterns of items

such as colors, shapes, and sounds (e.g., when provided with several options,

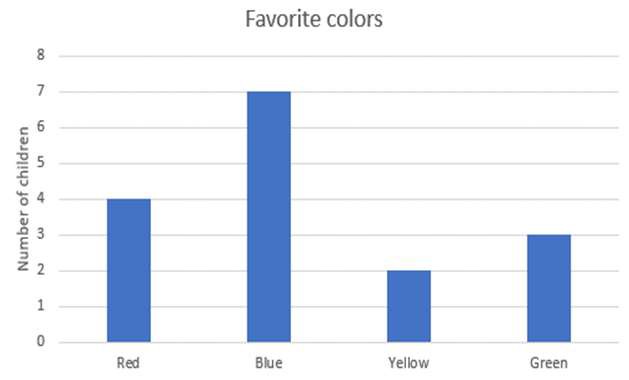
□ □ □, □□ □ , □□□ □ , identify which one is a pattern).

S1.1.1\_M Retrieve information about a single category from a tally chart, bar graph, or pictograph with up to four categories and a single-unit scale (e.g., How many children liked red on this bar graph?).



A1.1.1\_M Copy repeating patterns of items such as colors, shapes, and sounds (e.g., when provided □ □ □, select another pattern that is similar to that one, for example, red, blue, red, blue, red, blue. Or, when someone claps a

S1.1.1\_E Compare between categories of a tally chart, bar graph, or pictograph with up to four categories and a single-unit scale, using terms such as more than or less than (e.g., Which color was chosen less often than green on this bar graph?).



A1.1.1\_E Recognize repeating sets in a pattern and use this to identify a missing element and extend the pattern (e.g., identify that □□ is the repeating set in □□ □□ □□;

identify the missing element in the following

simple repeated rhythm, "clap; clap clap; clap;

set □□ □□

□□; when presented with

clap clap; clap; clap clap," continue the rhythm).

□□ □□ □□, add two additional sets to the pattern).

A2: EXPRESSIONS

Not applicable to grade 1

A3: RELATIONS AND FUNCTIONS

Not applicable to grade 1

# Grade 2

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N: NUMBER AND OPERATIONS

N1: WHOLE NUMBERS

N1.1: Identify and count in whole numbers, and identify their relative magnitude

N1.1.1\_P Count in whole numbers up to 30. N1.1.1\_M Count in whole numbers up to 100. N1.1.1\_E Count backwards from 20.

N1.1.2\_P Read and write whole numbers up to 30 in words and in numerals.

N1.1.2\_M Read and write whole numbers up to 100 in N1.1.2\_E N/A words and in numerals.

N1.1.3\_P Compare and order whole numbers up to 30.

N1.1.3\_M Compare and order whole numbers up to 100.

N1.1.3\_E N/A

N1.1.4\_P N/A N1.1.4\_M Skip count forward by twos or tens. N1.1.4\_E Skip count backwards by tens.

N1.2: Represent whole numbers in equivalent ways N1.2.1\_P Identify and represent the equivalence

between whole quantities up to 10 represented as objects, pictures, and numerals (e.g., when given a picture of 10 objects and other pictures of various numbers of objects, select the picture that has the same number of objects; associate a numeral with the appropriate number of objects).

N1.2.1\_M Identify and represent the equivalence between whole quantities up to 30 represented as objects, pictures, and numerals (e.g., when given a picture of 30 flowers, identify the picture that has the number of butterflies that would be needed for each flower to have a butterfly; given a picture of 19 shapes, draw 19 more shapes).

N1.2.1\_E Use place-value concepts for tens and ones (e.g., compose or decompose a two- digit whole number using a number sentence such as 35 = 3 tens and 5 ones, 35 = 30 + 5, or using number bonds, determine the value of a digit in the tens and ones place).

N1.3: Solve operations using whole numbers

N1.3.1\_P Add and subtract within 10 (i.e., where the sum or minuend does not surpass 10), and represent these operations with objects, pictures, or symbols (e.g., when presented with two pictures of marbles, with the first showing 3 marbles and the second showing 5 marbles, complete or match to the addition statement 3 + 5 = . Or, when

presented with a picture of a carton that can hold 10 bottles, 3 of which have been removed, complete or match to the subtraction statement 10 - 3 = ).

N1.3.1\_M Add and subtract within 20 (i.e., where the sum or minuend does not surpass 20), and represent these operations with objects, pictures, or symbols (e.g., 16 - 3= ; 12 + 3 = ; when presented with a picture of 12 marbles with 3 more marbles added, complete or match to the number sentence 12 + 3 = . Or, when presented with a picture of a carton that can hold 20 bottles, 7 of which have been removed, complete or match to the subtraction statement 20 - 7= ).

N1.3.1\_E Add and subtract within 30 (i.e., where the sum or minuend does not surpass 30), and represent these operations with objects, pictures, or symbols (e.g., when presented with a picture of 22 marbles with 3 more marbles added, complete or match to the number sentence 22 + 3 = . Or, when presented with a picture of a carton that can hold 30 bottles, 13 of which have been removed, complete or match to the subtraction statement 30 - 13 = ).

N1.3.2\_P Find the double of a set of up to 5 objects,

N1.3.2\_M Find the double of a set of up to 10 objects, N1.3.2\_E Find the triple of a set of up to 10 objects,

and divide a group of up to 10 objects into two equal sets (e.g., There are 4 biscuits in a package. There are 2 packages of biscuits. How many biscuits are there in total?; There are 8 biscuits in a package. The biscuits will be shared equally by two friends. How many biscuits will each friend get?).

and divide a group of up to 20 objects into 2 equal sets (e.g., An octopus has 8 legs. There are 2 octopuses. How many octopus legs are there in total?; There are 16 biscuits. The biscuits will be shared equally

by two friends. How many biscuits will each friend get?).

and divide a group of up to 30 objects into 3 equal sets (e.g., An octopus has 8 legs. There are 3 octopuses. How many octopus legs are there in total?; There are 24 biscuits. The biscuits will be shared equally by three friends. How many biscuits will each friend get?).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N1.3.3\_P Perform calculations involving two or more additions and subtractions, within the limits for partially meets expectations described above, when order of operations is not a factor (e.g., 4 - 1 + 2 = ; 1 + 2 + 1 = ).

N1.3.3\_M Perform calculations involving two or more additions and subtractions, within the limits for meets expectations described above, when order of operations is not a factor (e.g., 14 - 5 + 4 = ; 17 - 3 - 7 = ).

N1.3.3\_E Perform calculations involving two or more additions and subtractions, within the limits for exceeds expectations described above, when order of operations is not a factor (e.g., 19 + 5 - 14 = ; 13 + 9 + 5 = ).

N1.4: Solve real-world problems involving whole numbers N1.4.1\_P Solve simple real-world problems using

addition and subtraction facts within 10 (i.e., where the sum or minuend does not

surpass 10) (e.g., There are 8 sheep in a field. 2 more sheep come into the field. How many sheep are in the field now?; There

are 7 sheep in a field. 3 go to the stable. How many sheep are left in the field?).

N1.4.1\_M Solve simple real-world problems using addition and subtraction facts within 20 (i.e., where the sum or minuend does not surpass 20) (e.g., There are 15 sheep in a field. 4 more sheep come into the field.

How many sheep are in the field now?; There are 16 sheep in a field. 4 go to the stable. How many sheep are left in the field?).

N1.4.1\_E Solve simple real-world problems involving addition and subtraction of whole numbers within 30 (i.e., where the sum or minuend does not surpass 30) (e.g., There are 15 sheep in a field. 12 more sheep come into the field. How many sheep are in the field now?; There are 24 sheep in a field. 12 go to the stable. How many sheep are left in the field?).

N2: FRACTIONS

Not applicable to grade 2

N3: DECIMALS

Not applicable to grade 2

N4: INTEGERS

Not applicable to grade 2

N5: EXPONENTS AND ROOTS

Not applicable to grade 2

N6: OPERATIONS ACROSS NUMBER

Not applicable to grade 2

M: MEASUREMENT

M1: LENGTH, WEIGHT, CAPACITY, VOLUME, AREA, AND PERIMETER

M1.1: Use non-standard and standard units to measure, compare, and order

M1.1.1\_P Measure the length of objects using non- standard units (e.g., identify that the pencil is 5 paper clips long).

M1.1.1\_M Use non-standard units to estimate and compare the length of objects (e.g., identify that the red pencil is 4 paper clips long and the black pencil is 6 paper clips long).

M1.1.1\_E Use standard units to compare length and weight (e.g., identify that the pencil is one centimeter longer than the crayon).

M1.1.2\_P N/A M1.1.2\_M N/A M1.1.2\_E Use non-standard units to estimate or measure volume/capacity (e.g., identify which container would hold the most sand or which box would hold the most balls given pictures of these items).

M1.2: Solve problems involving measurement—not applicable to grade 2

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| --- | --- | --- | --- |
|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| M2: TIME | | | |
| M2.1: Tell time | | | |

M2.1.1\_P Identify, sequence, and describe activities/events that take place at different parts of the day (e.g., morning and afternoon).

M2.1.1\_M Tell time using an analog clock to the nearest hour.

M2.1.1\_E Tell time using an analog clock to the nearest half hour.

M2.1.2\_P N/A M2.1.2\_M Recognize the number of days in a week and months in a year.

M2.1.2\_E Recognize the number of hours in a day, minutes in an hour, and seconds in a minute.

M2.2: Solve problems involving time

M2.2.1\_P N/A M2.2.1\_M Solve problems, including real-world problems, using a calendar (e.g., given a calendar, answer the question: March 2 falls on what day of the week?).

M2.2.1\_E N/A

M3: CURRENCY

M3.1: Use different currency units to create amounts M3.1.1\_P Count simple combinations of two

commonly used currency denominations in a country.

M3.1.1\_M Count combinations of commonly used currency denominations.

M3.1.1\_E N/A

M3.1.2\_P N/A M3.1.2\_M Combine commonly used currency denominations to make a specified amount.

M3.1.2\_E Combine commonly used currency denominations to make a specified amount in a variety of ways.



G: GEOMETRY

G1: PROPERTIES OF SHAPES AND FIGURES

G1.1: Recognize and describe shapes and figures G1.1.1\_P Recognize and name basic shapes (e.g.,

identify circles, squares, and triangles when asked, "What shape is this?").

G1.1.1\_M Recognize and name shapes that are regular and irregular (e.g., if shown an irregular triangle, recognize that it is a triangle; name a hexagon).

G1.1.1\_E Recognize and name two-dimensional shapes and familiar three-dimensional figures in everyday life.

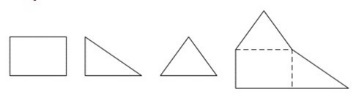
G1.1.2\_P N/A G1.1.2\_M Recognize and name straight and curved lines and attributes of shapes (e.g., number of sides, number of corners).

G1.1.3\_P N/A G1.1.3\_M Recognize when a two-dimensional shape has been rotated or reflected (e.g., when shown a number of shapes, identify those that are the same, even when some are rotated or reflected).

G1.1.2\_E N/A

G1.1.3\_E Identify a line of symmetry in two- dimensional shapes.

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| G2: SPATIAL VISUALIZATIONS | | | |
| G2.1: Compose and decompose shapes and figures | | | |

G2.1.1\_P Compose a larger two-dimensional shape from a small number of given shapes when the outlines for the shapes are provided (e.g., use the smaller shapes to make the larger shape).

G2.1.1\_M Compose/decompose a larger two- dimensional shape from a small number of given shapes without lines showing where the shapes go (e.g., use the smaller shapes to make the larger shape).

G2.1.1\_E Use a small number of given shapes to compose multiple larger two-dimensional shapes (e.g., identify which of these larger shapes can be made from the smaller shapes) and decompose a larger shape into a given number of smaller shapes (e.g., draw one line on the triangle below to show how it can be cut into exactly two smaller triangles).

G3: POSITION AND DIRECTION

G3.1: Describe the position and direction of objects in space G3.1.1\_P Use familiar positional terms (e.g., answer

the question, "Where is the book?" by saying, "The book is next to the pencil.").

G3.1.1\_M Recognize and use positional terms that describe the location of an object with more precision (e.g., answer the question, "Where is the book?" by saying, "The book is between the pencil and the bag.").

G3.1.1\_E Recognize that a map represents a physical space, and use simple maps to recognize the position of objects (e.g., using a map of the classroom, identify which object is between the desk and the door).

S: STATISTICS AND PROBABILITY

S1: DATA MANAGEMENT

S1.1: Retrieve and interpret data presented in displays S1.1.1\_P Retrieve information about a single

category from a tally chart, bar graph, or pictograph with up to four categories and a single-unit scale (e.g., How many children liked red on this bar graph?).

S1.1.1\_M Compare between categories of a tally chart, bar graph, or pictograph with up to four categories and a single-unit scale, using terms such as more than or less than (e.g., Which color was chosen less often than green on this bar graph?).

S1.1.1\_E Solve a problem involving the sum of or difference between two specified categories of a tally chart, bar graph, or pictograph with a single-unit scale (e.g., How many children like red and blue in this bar graph?).

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S1.2: Calculate and interpret central tendency—not applicable to grade 2

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| S2: CHANCE AND PROBABILITY | | | |
| Not applicable to grade 2 | | | |

A: ALGEBRA

A1: PATTERNS

A1.1: Recognize, describe, extend, and generate patterns A1.1.1\_P Copy repeating patterns of items such as

colors, shapes, and sounds (e.g., when provided □ □ □, select another pattern that is similar to that one, for example, red, blue, red, blue, red, blue. Or, when

A1.1.1\_M Recognize repeating sets in a pattern and use this to identify a missing element and extend the pattern (e.g., identify that □□ is the repeating set in □□ □□ □□;

identify the missing element in the following

A1.1.1\_E Describe repeating patterns (e.g., explain that □□ repeats three times in the following set □□ □□ □□; explain that 1, 2, 3, 4 repeats three times in the following

set 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4).

someone claps a simple repeated rhythm,

set □□ □□

□□; when presented with

"clap; clap clap; clap; clap clap; clap; clap

clap," can continue the rhythm).

□□ □□ □□, add two additional sets to the pattern).

A2: EXPRESSIONS

Not applicable to grade 2

A3: RELATIONS AND FUNCTIONS

A3.1: Variation (ratio, proportion, and percentage)—not applicable to grade 2

A3.2: Demonstrate an understanding of equivalency

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| A3.2.1\_P N/A | A3.2.1\_M | N/A | A3.2.1\_E | Create a numerical expression using + or - |
|  |  |  |  | to model a situation (e.g., represent the |
|  |  |  |  | following in a number sentence: 3 people |
|  |  |  |  | are on a bus, and 4 more get on: 3 + 4). |
| A3.2.2\_P N/A | A3.2.2\_M | N/A | A3.2.2\_E | Find a missing value in real-world addition |
|  | | | | and subtraction problems within 20 (e.g., 3 |
| people are on a bus. More people get on. |
| Now there are 7. How many people got on |
| the bus?). |

A3.3: Solve equations and inequalities—not applicable to grade 2

A3.4: Interpret and evaluate functions—not applicable to grade 2

# Grade 3

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N: NUMBER AND OPERATIONS

N1: WHOLE NUMBERS

N1.1: Identify and count in whole numbers, and identify their relative magnitude

N1.1.1\_P Count in whole numbers up to 100. N1.1.1\_M Count in whole numbers up to 1,000. N1.1.1\_E Count in whole numbers up to 10,000.

N1.1.2\_P Read and write whole numbers up to 100 in

N1.1.2\_M Read and write whole numbers up to 1,000 in N1.1.2\_E Read and write whole numbers up to

words and in numerals.

N1.1.3\_P Compare and order whole numbers up to 100.

words and numerals.

N1.1.3\_M Compare and order whole numbers up to 1,000.

10,000 in words and in numerals.

N1.1.3\_E Compare and order whole numbers up to 10,000.

N1.1.4\_P Skip count forwards by twos or tens. N1.1.4\_M Skip count backwards by tens. N1.1.4\_E Skip count forwards and backwards by

hundreds.

N1.2: Represent whole numbers in equivalent ways N1.2.1\_P Identify and represent the equivalence

between whole quantities up to 30 represented as objects, pictures, and numerals (e.g., when given a picture of 30 flowers, identify the picture that has the number of butterflies that would be needed for each flower to have a butterfly; given a picture of 19 shapes, draw 19 more shapes).

N1.2.1\_M Use place-value concepts for tens and ones (e.g., compose or decompose a two-digit whole number using a number sentence such as 35 = 3 tens and 5 ones, 35 =30 + 5, or using number bonds; determine the value of a digit in the tens and ones place).

N1.2.1\_E Use place-value concepts for hundreds, tens, and ones (e.g., compose or decompose a three-digit whole number using a number sentence such as 254 = 2 hundreds, 5 tens, and 4 ones; 254 = 200 + 50 + 4; determine the value of a digit in the hundreds place, etc.).

N1.3: Solve operations using whole numbers

N1.3.1\_P Add and subtract within 100 (i.e., where the sum or minuend does not surpass 100), without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 65 + 23; solve an addition or subtraction problem presented by images of bundles of tens and ones; use skips on a hundreds grids or a number line or multibase arithmetic blocks to solve addition and subtraction problems).

N1.3.2\_P Multiply and divide within 25 (i.e., up to 5 x 5 and 25 ÷ 5, no remainder), and represent these operations with objects, pictures, or symbols (e.g., 15 ÷ 3; 3 x 4; solve multiplication problems by using a rectangular array or by repeating groups of the same number of objects; solve division

problems by dividing a group of objects into a given number of equal groupings).

N1.3.1\_M Demonstrate fluency with addition and subtraction within 20 and add and subtract within 100 (i.e., where the sum or minuend does not surpass 100), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 32 + 59; solve an addition or subtraction problem presented by images of bundles of tens and ones; use number lines or skips on a hundreds grid to reason through or solve addition and subtraction problems).

N1.3.2\_M Multiply and divide within 100 (i.e., up to 10 x 10 and 100 ÷ 10, without a remainder), and represent these operations with objects, pictures, or symbols (e.g., 72 ÷ 8; 6 x 9; solve multiplication problems by using a

rectangular array or by repeating groups of the same number of objects; solve division problems by dividing a group of objects into a given number of equal groupings).

N1.3.1\_E Add and subtract within 1,000 (i.e., where the sum or minuend does not surpass 1,000), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 550 + 250; 457 - 129; use hundreds grids, number lines, or multibase arithmetic blocks to reason through or solve addition and subtraction problems).

N1.3.2\_E Multiply and divide within 144 (i.e., up to 12 x 12 and 144 ÷ 12, without a remainder), and represent these operations with objects, pictures or symbols (e.g., 120 ÷

10; 6 x 12; solve multiplication problems by using a rectangular array or by repeating groups of the same number of objects; solve division problems by dividing a group of objects into a given number of equal groupings).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N1.3.3\_P Perform calculations involving two or more operations, within the limits for partially meets expectations described above, when order of operations is not a factor (e.g., 5 x 3 + 62 =

; 4 x 4 ÷ 2 = ).

N1.3.3\_M Perform calculations involving two or more operations, within the limits for meets expectations described above, when order of operations is not a factor (e.g., 6 x 7 + 19 =

; 6 x 4 ÷ 8 = ).

N1.3.3\_E Perform calculations involving two or more operations, within the limits for exceeds expectations described above, when order of operations is not a factor (e.g., 452 + 369 + 78 = ; 64 ÷ 8 ÷ 2 = ).

N1.4: Solve real-world problems involving whole numbers N1.4.1\_P Solve simple real-world problems involving

addition and subtraction of whole numbers within 30 (i.e., where the sum or minuend does not surpass 30), including problems involving measurement and currency units, without regrouping (e.g., There are 15 sheep in a field. 12 more sheep come into the field. How many sheep are in the field now?; There are 24 sheep in a field. 12 go to the stable.

How many sheep are left in the field?).

N1.4.1\_M Solve simple real-world problems involving addition and subtraction of whole numbers within 100 (i.e., where the sum or minuend does not surpass 100) without regrouping, including problems involving measurement and currency units (e.g., There are 33 sheep in a field. 25 more sheep come into the field. How many sheep are in the field now?; There are 54 children in total in grade 3. 13 are absent today. How many grade 3 children

are at school today?).

N1.4.1\_E Solve simple real-world problems involving addition and subtraction of whole numbers within 100 (i.e., where the sum or minuend does not surpass 100) with and without regrouping, including problems involving measurement and currency units (e.g., There are 33 sheep in a field. 28 more sheep come into the field. How many sheep are in the field now?; There are 81 children in total in grade 3. 13 are absent today. How many grade 3 children are at school today?).

N2: FRACTIONS

N2.1: Identify and represent fractions using objects, pictures, and symbols, and identify relative magnitude

N2.1.1\_P Identify everyday unit fractions (e.g., 1/2; 1/3; N2.1.1\_M Identify unit fractions with denominators up to N2.1.1\_E Identify non-unit fractions with

1/4) represented as objects or pictures (as part of a whole or part of a set) in fractional notation (e.g., shade half of this shape; indicate 1/4 of these objects).

12 (e.g., 1/5; 1/7; 1/8; 1/10) represented as objects or pictures (as part of a whole or part of a set) in fractional notation (e.g., shade 1/5 of this shape; indicate 1/6 of these objects when arranged in a 3 x 6 array).

denominators up to 12 (e.g., 2/5; 4/7; 3/8; 5/10) represented as objects or pictures (as part of a whole or part of a set) in fractional notation (e.g., shade 2/3 of this shape).

N3: DECIMALS

Not applicable to grade 3

N4: INTEGERS

Not applicable to grade 3

N5: EXPONENTS AND ROOTS

Not applicable to grade 3

N6: OPERATIONS ACROSS NUMBER

Not applicable to grade 3

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| --- | --- | --- | --- |
|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

M: MEASUREMENT

M1: LENGTH, WEIGHT, CAPACITY, VOLUME, AREA, AND PERIMETER

M1.1: Use non-standard and standard units to measure, compare, and order

M1.1.1\_P Use non-standard units to measure or estimate and compare the length of two objects (e.g., identify that the red pencil is 4 paper clips long, and the black pencil is 6 paper clips long).

M1.1.1\_M Use standard units to compare length and weight when provided the unit of measurement (e.g., identify that the pencil is one centimeter longer than the crayon).

M1.1.1\_E Select and use appropriate standard units to estimate, measure, and compare length and weight (e.g., choose centimeters instead of meters to measure a pencil; estimate the weight of the apple when given the following choices: a) 5g b) 200g

c) 1kg d) 5kg).

M1.1.2\_P N/A M1.1.2\_M Use non-standard units to estimate or measure volume/capacity (e.g., identify which container would hold the most sand or which box would hold the most balls given pictures of these items).

M1.1.2\_E Select and use appropriate standard units to measure and compare capacity/volume (e.g., the measuring cups contain 200 ml of water and 100 ml of oil).

M1.2: Solve problems involving measurement—not applicable to grade 3 M2: TIME

M2.1: Tell time

M2.1.1\_P Tell time using an analog clock to the nearest M2.1.1\_M Tell time using an analog clock to the nearest M2.1.1\_E Tell time using an analog clock to the

hour.

half hour.

nearest minute.

M2.1.2\_P Recognize the number of days in a week and M2.1.2\_M Recognize the number of hours in a day,

M2.1.2\_E N/A

months in a year.

minutes in an hour, and seconds in a minute.

M2.2: Solve problems involving time

M2.2.1\_P Solve problems, including real-world problems, using a calendar (e.g., given a calendar, answer the question: March 2 falls on what day of the week?).

M2.2.1\_M Solve problems, including real-world problems, involving elapsed time in hours and half-hours (e.g., calculate the difference between 2:00 and 5:30 or the difference between 16:00 and 16:30).

M2.2.1\_E Solve problems, including real-world problems, involving elapsed time in minutes within an hour (e.g., calculate the difference between 3:42 and 3:56 or the difference between 16:35 and 16:52).

M3: CURRENCY

M3.1: Use different currency units to create amounts M3.1.1\_P Count combinations of commonly used

currency denominations.

M3.1.1\_M N/A M3.1.1\_E N/A

M3.1.2\_P Combine commonly used currency denominations to make a specified amount.

M3.1.2\_M Combine commonly used currency denominations to make a specified amount in a variety of ways.

M3.1.2\_E Solve problems, including real-world problems, involving combining commonly used currency denominations.

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

G: GEOMETRY

G1: PROPERTIES OF SHAPES AND FIGURES

G1.1: Recognize and describe shapes and figures G1.1.1\_P

Recognize and name shapes that are regular shown an irregular triangle, recognize that it is hexagon).

G1.1.1\_M Recognize and name two-dimensional shapes and familiar three-dimensional figures in everyday life.

G1.1.1\_E Recognize and name two-dimensional shapes by a written or spoken description of their simple attributes (e.g., name a shape given a description of its number of sides, number of corners, relative lengths of sides, etc.).

G1.1.2\_P Recognize and name straight and curved lines and attributes of shapes (e.g., number of sides, number of corners).

G1.1.3\_P Recognize when a two-dimensional shape

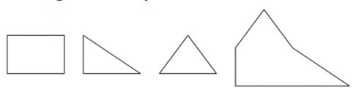
G1.1.2\_M N/A G1.1.2\_E N/A

G1.1.3\_M Identify a line of symmetry in two-dimensional G1.1.3\_E Recognize and describe the congruence

has been rotated or reflected (e.g., when shown a number of shapes, identify those that are the same, even when some are rotated or reflected).

G2: SPATIAL VISUALIZATIONS

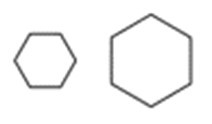
G2.1: Compose and decompose shapes and figures G2.1.1\_P Compose/decompose a larger two-

dimensional shape from a small number of given shapes (e.g., use the smaller shapes to make the larger shape).

shapes.

G2.1.1\_M Use a small number of given shapes to compose multiple, larger, two-dimensional shapes (e.g., identify which of these larger shapes can be made from the smaller shapes?) and decompose a larger shape into a given number of smaller shapes (e.g., draw one line on the triangle below to show how it can be cut into exactly two smaller triangles).

and similarity of two-dimensional shapes (e.g., when shown two shapes, explain how they are similar using mathematical or non-mathematical language, such as, "It got bigger and has been turned" or "It's been enlarged and rotated.").



G2.1.1\_E N/A

G3: POSITION AND DIRECTION

G3.1: Describe the position and direction of objects in space G3.1.1\_P Recognize that a map represents a physical

space, and use simple maps to recognize the position of objects (e.g., using a map of the classroom, identify which object is between the desk and the door).

G3.1.1\_M Accurately use the terms left and right, and use simple maps to describe locations using positional terms (e.g., answer, "Where is the teacher's desk?" with "To the [left] of the chalkboard.").

G3.1.1\_E Using a simple map, follow directions and/or give directions to a given location (e.g., using this map, if you are at the school, and you walk towards the tree and turn left, and walk forward again, where would you be?; Using this map, how do you get from the school to the green house?).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

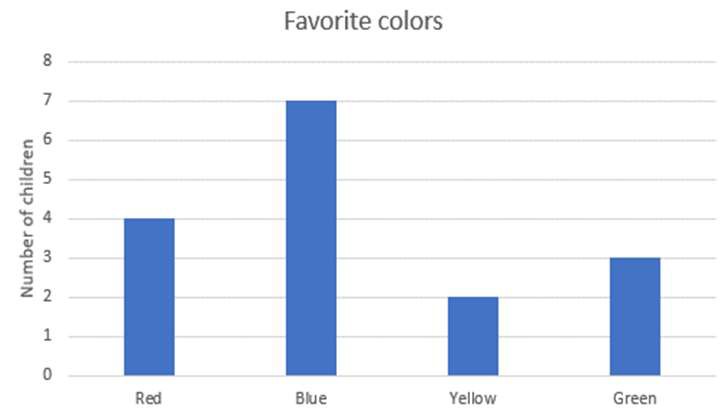
S: STATISTICS AND PROBABILITY

S1: DATA MANAGEMENT

S1.1: Retrieve and interpret data presented in displays S1.1.1\_P Compare between categories of a tally chart,

bar graph, or pictograph with up to four categories and a single-unit scale, using terms such as more than or less than (e.g., Which color was chosen less often than green on this bar graph?).

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| S1.1.2\_P | N/A | S1.1.2\_M | N/A | S1.1.2\_E | Complete missing information in a tally |
|  |  |  |  |  | chart, bar graph, or pictograph that |
|  |  |  |  |  | arranges data into categories and uses a |
|  |  |  |  |  | single-unit scale (e.g., add a row or column |
|  |  |  |  |  | to a partially completed pictograph). |
| S1.1.3\_P | N/A | S1.1.3\_M | N/A | S1.1.3\_E | Retrieve information from a tally chart, bar |
|  |  |  |  |  | graph, or pictograph with a multi-unit scale. |



A: ALGEBRA

S2: CHANCE AND PROBABILITY

Not applicable to grade 3

S1.2: Calculate and interpret central tendency—not applicable to grade 3

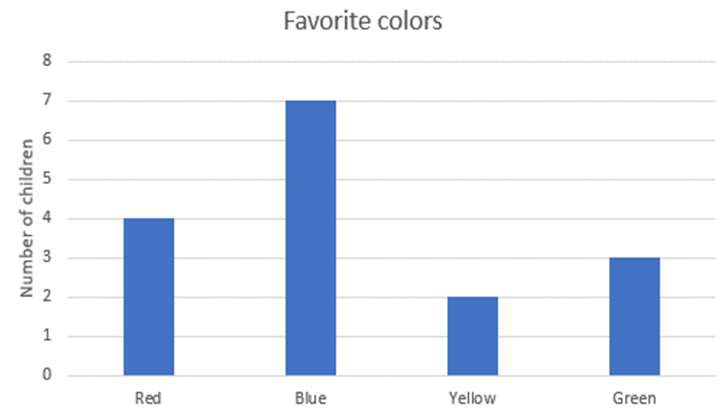
A1: PATTERNS

A1.1: Recognize, describe, extend, and generate patterns A1.1.1\_P Recognize repeating sets in a pattern and

use this to identify a missing element and extend the pattern (e.g., identify that □□ is

the repeating set in □□ □□ □□; identify the missing element in the following set

S1.1.1\_M Solve a problem involving the sum of or difference between two specified categories of a tally chart, bar graph, or pictograph with a single-unit scale (e.g., How many children like red and blue in this bar graph?).



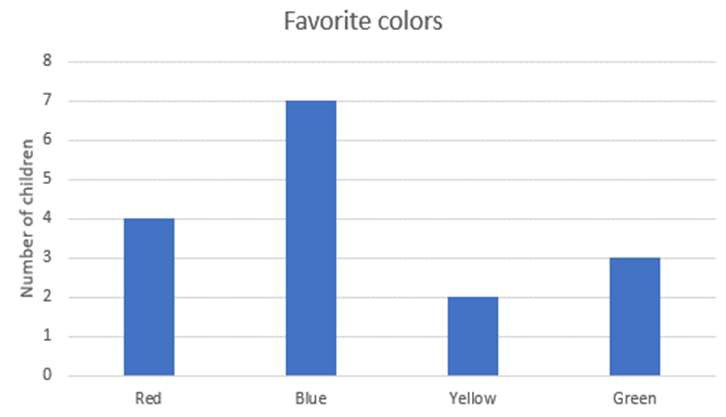
A1.1.1\_M Describe repeating patterns (e.g., explain that □□ repeats three times in the following set □□ □□ □□; explain that 1, 2, 3, 4 repeats three times in the following set 1, 2,

3, 4, 1, 2, 3, 4, 1, 2, 3, 4).

S1.1.1\_E Solve a problem involving more than two pieces of information from a tally chart, bar graph, or pictograph with a single-unit

scale (e.g., How many children were asked about their favorite color in this bar

graph?).



A1.1.1\_E Describe numerical patterns that increase or decrease by a constant value with a simple rule, and use this information to identify a missing element or extend the pattern (e.g., describe the pattern 6, 9, 12,

□□ □□

□□; when presented with

15 as going up by threes; identify the

missing element in the pattern 3, 7, 11, ,

□□ □□ □□, add two additional sets to the

pattern).

19; extend the pattern 6, 11, 16, 21).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

A2: EXPRESSIONS

Not applicable to grade 3

A3: RELATIONS AND FUNCTIONS

A3.1: Variation (ratio, proportion, and percentage)—not applicable to grade 3

A3.2: Demonstrate an understanding of equivalency

A3.2.1\_P N/A A3.2.1\_M Create a numerical expression using + or - to A3.2.1\_E Create a numerical expression using x or ÷

model a situation (e.g., represent the following in a number sentence: 3 people are on a bus, and 4 more get on).

A3.2.2\_P N/A A3.2.2\_M Find a missing value in real-world addition and subtraction problems within 20 (e.g., 3 people are on a bus. More people get on. There are now 7 people on the bus. How many people got on the bus?).

to model a situation (e.g., represent the following in a number sentence: 3 people get on the bus at each of 4 stops).

A3.2.2\_E Find a missing value in a number sentence using addition and subtraction of numbers within 100 (e.g., 23 + = 59).

A3.2.3\_P N/A A3.2.3\_M N/A A3.2.3\_E Represent real-world addition and subtraction problems within 20 using a number sentence with a symbol or blank to represent the missing value (e.g., 13 people are on a bus. More people get on. There are now 17 people on the bus. How many people got on the bus? Represent this situation with an addition or a subtraction sentence with a symbol or blank to represent the missing value).

A3.3: Solve equations and inequalities—not applicable to grade 3

A3.4: Interpret and evaluate functions—not applicable to grade 3

# Grade 4

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N: NUMBER AND OPERATIONS

N1: WHOLE NUMBERS

N1.1: Identify and count in whole numbers, and identify their relative magnitude

N1.1.1\_P Count in whole numbers up to 1,000. N1.1.1\_M Count in whole numbers up to 10,000. N1.1.1\_E Count in whole numbers greater than 10,000.

N1.1.2\_P Read and write whole numbers up to 1,000 in words and numerals.

N1.1.3\_P Compare and order whole numbers up to 1,000.

N1.1.2\_M Read and write whole numbers up to 10,000 in words and numerals.

N1.1.3\_M Compare and order whole numbers up to 10,000.

N1.1.2\_E Read and write whole numbers greater than 10,000 in words and numerals.

N1.1.3\_E Compare and order whole numbers up to 100,000.

N1.1.4\_P Skip count backwards by tens. N1.1.4\_M Skip count forwards and backwards by

hundreds.

N1.1.4\_E Skip count forwards and backwards by thousands.

N1.2: Represent whole numbers in equivalent ways

N1.2.1\_P Use place-value concepts for tens and ones (e.g., compose or decompose a two-digit whole number using a number sentence such as 35 = 3 tens and 5 ones, 35 =30 + 5, or using number bonds, determine the value of a digit in the tens and ones place).

N1.2.1\_M Use place-value concepts for hundreds, tens, and ones (e.g., compose or

decompose a three-digit whole number using a number sentence such as 254 = 2 hundreds, 5 tens, and 4 ones; 254 = 200 + 50 + 4; determine the value of a digit in the hundreds place).

N1.2.1\_E Use place-value concepts for thousands, hundreds, tens, and ones (e.g., compose or decompose a four-digit whole number using a number sentence such as 1383 = 1 thousand, 3 hundreds, 8 tens, and 3 ones;

1383 = 1000 + 300 + 80 + 3; determine the value of a digit in the thousands place).

N1.2.2\_P N/A N1.2.2\_M Round whole numbers to the nearest ten. N1.2.2\_E Round whole numbers to the nearest hundred.

N1.3: Solve operations using whole numbers

N1.3.1\_P Add and subtract within 100 (i.e., where the sum or minuend does not surpass 100), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 32 + 59; solve an addition or subtraction problem presented by images of bundles of tens and ones; use skips on a number line or on a hundreds grid to reason through or solve addition and subtraction problems).

N1.3.1\_M Add and subtract within 1,000 (i.e., where the sum or minuend does not surpass 1,000), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 550 + 250; 457 - 129; use hundreds grids, number lines, or multibase arithmetic blocks to reason through or solve addition and subtraction problems).

N1.3.1\_E Add and subtract beyond 1,000 (i.e., where the sum or minuend surpasses 1,000), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 1457 - 129; use number lines to reason through or solve addition and subtraction problems).

N1.3.2\_P Demonstrate fluency with multiplication facts N1.3.2\_M Demonstrate fluency with multiplication facts

N1.3.2\_E Demonstrate fluency with multiplication facts

up to 5 x 5 (i.e., 1 × 1 up to 5 × 5) and related division facts, including the relationship between them.

N1.3.3\_P Perform calculations involving two or more operations, within the limits for partially meets expectations described above, when order of operations is not a factor (e.g., 5 x 5

+ 19 = ; 72 - 9 - 15 = ).

up to 10 x 10 (i.e., 1 × 1 up to 10 × 10) and related division facts, including the relationship between them.

N1.3.3\_M Perform calculations involving two or more operations, within the limits for meets expectations described above, when order of operations is not a factor (e.g., 6 x 7 + 519 =

; 6 x 4 ÷ 8 = ).

up to 12 x 12 (i.e., 1 × 1 up to 12 × 12) and related division facts, including the relationship between them.

N1.3.3\_E Perform calculations involving two or more operations, within the limits for exceeds expectations described above, when order of operations is not a factor (e.g., 6 x 12 + 1542

= ; 12 x 9 - 19 = ).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| N1.4: Solve real-world problems involving whole numbers | | | |

N1.4.1\_P Solve simple real-world problems involving addition and subtraction of whole numbers within 100 (i.e., where the sum or minuend does not surpass 100) without regrouping, including problems involving measurement and currency units (e.g., There are 33 sheep in a field. 25 more sheep come into the field. How many sheep are in the field now?; There are 54 children in total in grade 3.

Thirteen are absent today. How many grade 3 children are at school today?).

N1.4.1\_M Solve simple real-world problems involving addition and subtraction of whole numbers within 100 (i.e., where the sum or minuend does not surpass 100) with and without regrouping, including problems involving measurement and currency units (e.g., There are 34 sheep in a field. 29 more sheep come into the field. How many sheep are in the

field now?; There are 54 children in total in grade 4. 7 are absent today. How many grade 4 children are at school today?).

N1.4.1\_E Solve simple real-world problems involving addition and subtraction of whole numbers within 1,000 (i.e., where the sum or minuend does not surpass 1,000) with and without regrouping, including problems involving measurement and currency units (e.g., There were 740 people living in a town. 83 more people come to live in the town. What is the total number of people living in the town now?; There are 750 people living in a town. Only 327 of them were born in the town. How many were born outside the town?).

N1.4.2\_P N/A N1.4.2\_M Solve simple real-world problems involving the multiplication of two whole numbers to 5, and associated division facts (e.g., Amina is putting fruit into bags. Each bag will contain 4 pieces of fruit. How many bags will Amina need for 20 pieces of fruit?; Amina has 5 bags. Each bag contains 4 pieces of fruit.

How many pieces of fruit are there in total?).

N2: FRACTIONS

N2.1: Identify and represent fractions using objects, pictures, and symbols, and identify relative magnitude

N1.4.2\_E Solve simple real-world problems involving the multiplication of two whole numbers to

10, and associated division facts (e.g., Amina is putting fruit into bags. Each bag will

contain 7 pieces of fruit. How many bags will Amina need for 28 pieces of fruit?; Amina has 4 bags. Each bag contains 7 pieces of fruit. How many pieces of fruit are there in total?).

N2.1.1\_P Identify unit and non-unit fractions with denominators up to 12 (e.g., 1/5; 4/7; 1/8; 9/10) represented as objects or pictures (as part of a whole or part of a set) and express them in fractional notation (e.g., shade 1/5 of this shape; indicate 5/6 of these objects when arranged in a 5 x 6 array).

N2.1.2\_P Compare and order fractions with the same denominators (e.g., 1/8; 3/8; 5/8).

N2.1.1\_M Identify and express everyday unit fractions (e.g., 1/2; 1/3; 1/4) as equivalent fractions when the fractional notations are accompanied by pictures or objects (e.g., 1/3

= ¨/6 when the task is supported by pictures; 1/2 = 3/¨).

N2.1.2\_M Compare and order everyday unit fractions

(e.g., 1/4; 1/3; 1/2).

N2.1.1\_E Identify and express proper fractions as equivalent fractions with denominators up to 12 (e.g., express a fraction in simplest form 6/9 = ¨/3; 2/10 = 1/¨; express a fraction as a multiple of another 4/5 = 8/¨).

N2.1.2\_E Compare and order fractions with different but related denominators up to 12 (e.g., 2/3 and 5/6).

N2.2: Solve operations using fractions

N2.2.1\_P Add and subtract proper fractions with the same denominator when fractions are represented with pictures (e.g., given an image of a rectangle divided into 5 equal parts, with 3 parts shaded one color and 1 part shaded another color, calculate the fraction of the rectangle that is shaded. Or, when presented with an image of an orange with 6 equal pieces, 2 of which are shaded, calculate the fraction that is not shaded).

N2.2.1\_M Add and subtract proper fractions with the same denominator when fractions are represented with symbols, and represent such additions with objects or pictures (e.g., 2/3 + 1/3; 3/5 - 1/5; add 2/5 and 1/5, or subtract 3/8 from 6/8 using fraction bars).

N2.2.1\_E Add and subtract proper fractions with different but related denominators when fractions are represented with symbols, and represent such additions with objects or pictures (e.g., 2/3 + 1/6; 7/8 - 1/4; add 1/6 and 1/3, or subtract 1/3 from 7/9 using fraction bars).

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N2.2.2\_P N/A N2.2.2\_M N/A N2.2.2\_E Represent the multiplication of a commonly used fraction and a whole number with objects or pictures (e.g., represent 3/4 x 12 by drawing 12 objects, dividing them into 4 equal groups, and coloring 3 of the groups).

N2.3: Solve real-world problems involving fractions

N2.3.1\_P N/A N2.3.1\_M Solve real-world problems involving addition and subtraction of proper fractions with the same denominators (e.g., Paola has 2/5 of a chocolate bar left. Her friend Carola has 1/5 of the same chocolate bar. Together, they have what fraction of the chocolate bar?; Paola ate 2/5 of a chocolate bar at recess. How much of the chocolate bar is left?).

N2.3.1\_E Solve real-world problems involving addition and subtraction of proper fractions with different but related denominators (e.g., Paola has 2/5 of a chocolate bar left. Her friend Carola has 3/10 of the same chocolate bar. Together, they have what fraction of the chocolate bar?; Paola has 2/3 of a chocolate bar left. If she gives her friend Carola 1/6 of what remains, what fraction of the chocolate bar will Paola have left?).

N3: DECIMALS

Not applicable to grade 4

N4: INTEGERS

Not applicable to grade 4

N5: EXPONENTS AND ROOTS

Not applicable to grade 4

N6: OPERATIONS ACROSS NUMBER

Not applicable to grade 4

M: MEASUREMENT

M1: LENGTH, WEIGHT, CAPACITY, VOLUME, AREA, AND PERIMETER

M1.1: Use non-standard and standard units to measure, compare, and order

M1.1.1\_P Use standard units to compare length and weight when provided the unit of measurement (e.g., identify that the pencil is one centimeter longer than the crayon).

M1.1.2\_P Use non-standard units to estimate or measure volume/capacity (e.g., fill a container with scoops of sand; which box would hold the most balls?).

M1.1.1\_M Select and use appropriate standard units to estimate, measure, and compare length and weight when measurements involve whole numbers only (e.g., choose centimeters instead of meters to measure a pencil; estimate the weight of the apple when given the following choices: a) 5g b) 200g c) 1kg d) 5kg).

M1.1.2\_M Select and use appropriate standard units to measure and compare capacity/volume when measurements involve whole numbers only (e.g., the measuring cups contain 200 ml of water and 100 ml of oil).

M1.1.1\_E Identify the relationship between the relative size of adjacent units within a standard system of measurement for length and weight (e.g., identify the number of millimeters in a centimeter).

M1.1.2\_E Identify the relationship between the relative size of adjacent units within a standard system of measurement for capacity/volume (e.g., identify the number of pints in a quart).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| M1.2: Solve problems involving measurement | | | |

M1.2.1\_P Solve problems, including real-world problems, involving the perimeter of a rectangle using concrete or pictorial representations of units (e.g., grid squares).

M1.2.1\_M Calculate the perimeter of a polygon. M1.2.1\_E Solve problems, including real-world

problems, involving the perimeter of a polygon.

M1.2.2\_P N/A M1.2.2\_M Solve problems, including real-world problems, involving the area of a rectangle using concrete or pictorial representations of units (e.g., grid squares or tiles).

M1.2.2\_E Solve problems, including real-world problems, involving the calculation of the area of a rectangle.

M2: TIME

M2.1: Tell time

M2.1.1\_P Tell time using an analog clock to the nearest half hour.

M2.1.1\_M Tell time using an analog clock to the nearest minute.

M2.1.1\_E Recognize equivalence between representations of time (e.g., digital, analog, and written; 15 minutes is a quarter of an hour).

M2.1.2\_P Recognize the number of hours in a day, minutes in an hour, and seconds in a minute.

M2.1.2\_M N/A M2.1.2\_E N/A

M2.2: Solve problems involving time

M2.2.1\_P Solve problems, including real-world problems, involving elapsed time in hours and half-hours (e.g., calculate the difference between 2:00 and 5:30 or the difference between 16:00 and 16:30).

M2.2.1\_M Solve problems, including real-world problems, involving elapsed time in minutes within an hour (e.g., calculate the difference between 3:42 and 3:56 or the difference between 16:35 and 16:52).

M2.2.1\_E Solve problems, including real word problems, involving elapsed time in minutes across hours (e.g., calculate the difference between 3:24 and 5:12 or the difference between 16:35 and 18:22), including problems involving schedules (i.e., timetables, agendas, itineraries).

M2.2.2\_P N/A M2.2.2\_M N/A M2.2.2\_E Solve problems, including real-world problems, involving the number of days in a week, months in a year, hours in a day, minutes in an hour, and seconds in a minute.

M3: CURRENCY

M3.1: Use different currency units to create amounts—subconstruct fully covered in grades 1-3. Questions involving currency are covered under the relevant real-world problem subconstructs (e.g., N1.4 for whole numbers, etc.)

G: GEOMETRY

G1: PROPERTIES OF SHAPES AND FIGURES

G1.1: Recognize and describe shapes and figures G1.1.1\_P Recognize and name two-dimensional

shapes and familiar three-dimensional figures in everyday life.

G1.1.1\_M Recognize and name two-dimensional shapes by a written or spoken description of their simple attributes (e.g., name a shape given a description of the number of sides or corners or the relative length of the sides, etc.).

G1.1.1\_E Recognize and name types of triangles (e.g., isosceles, scalene, equilateral, and right angle).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

G1.1.2\_P N/A G1.1.2\_M N/A G1.1.2\_E Recognize and name three-dimensional figures by their attributes (e.g., faces, edges, vertices).

G1.1.3\_P N/A G1.1.3\_M N/A G1.1.3\_E Recognize types of angles by their magnitude (e.g., right, straight, acute, obtuse).

G1.1.4\_P Identify a line of symmetry in two- dimensional shapes.

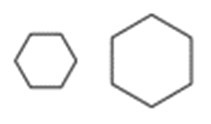
G2: SPATIAL VISUALIZATIONS

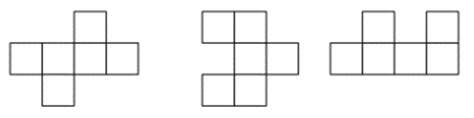
G2.1: Compose and decompose shapes and figures G2.1.1\_P Use a small number of given shapes to

compose multiple larger two-dimensional shapes (e.g., identify which of these larger shapes can be made from the smaller shapes?) and decompose a larger shape into a given number of smaller shapes (e.g., draw one line on the triangle below to show how it can be cut into exactly two smaller triangles).

G1.1.4\_M Recognize and describe the congruence and G1.1.4\_E N/A similarity of two-dimensional shapes (e.g.,

when shown two shapes, explain how they are similar using mathematical or non- mathematical language: "It got bigger and has been turned" or "It's been enlarged and rotated.").



G2.1.1\_M N/A G2.1.1\_E Identify the net of a cube or specific faces on the net of a cube (e.g., fold mentally to answer the question, which of these is the net of a cube?; identify opposite faces on a net).

G3: POSITION AND DIRECTION

G3.1: Describe the position and direction of objects in space G3.1.1\_P Accurately use the terms left and right, and

use simple maps to describe locations using positional terms (e.g., answer, "Where is the teacher's desk?" with "To the [left] of the chalkboard.").

G3.1.1\_M Use different kinds of simple maps (i.e., an alphanumeric map, grid map, or local equivalent) to give and follow 2-step directions to a given location (e.g., Using this map, if you are at the school, you walk towards the tree, and turn left. What would you be facing?; Using this map, how do you get from the school to the green house?).

G3.1.1\_E Use a grid map with compass directions when the grid dimensions are given in terms of the real-world distance (e.g., Which of these is closest to the distance between the park and Juan’s house? a) 100 meters b) 150 meters c) 200 meters d) 250 meters).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

S: STATISTICS AND PROBABILITY

S1: DATA MANAGEMENT

S1.1: Retrieve and interpret data presented in displays S1.1.1\_P Solve a problem involving the sum of or

difference between two specified categories of a tally chart, bar graph, or pictograph with a single-unit scale (e.g., How many children like red and blue in this bar graph?).

S1.1.1\_M Solve a problem involving more than two pieces of information from a tally chart, bar graph, or pictograph with a single-unit scale (e.g., How many children were asked about their favorite color in this bar graph?).

S1.1.1\_E Organize data and construct a tally chart, bar graph, or pictograph that arranges data into categories and uses a single- or multi-unit scale.

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S1.1.2\_P N/A S1.1.2\_M Complete missing information in a tally chart, S1.1.2\_E Compare by calculating differences between

bar graph, or pictograph that arranges data into categories and uses a single-unit scale (e.g., add a row or column to a partially completed pictograph).

S1.1.3\_P N/A S1.1.3\_M Retrieve information from a tally chart, bar graph, or pictograph with a multi-unit scale.

categories in a tally chart, bar graph, or pictograph with a multi-unit scale.

S1.1.3\_E N/A

S1.2: Calculate and interpret central tendency—not applicable to grade 4

S2: CHANCE AND PROBABILITY

Not applicable to grade 4

A: ALGEBRA

A1: PATTERNS

A1.1: Recognize, describe, extend, and generate patterns A1.1.1\_P Describe repeating patterns (e.g., explain

that □□ repeats three times in the following set □□ □□ □□; explain that 1, 2, 3, 4 repeats three times in the following set 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4).

A1.1.1\_M Describe numerical patterns that increase or decrease by a constant value with a simple rule, and use this information to identify a missing element or extend the pattern (e.g., describe the pattern 6, 9, 12, 15 as going up by threes; identify the missing element in the pattern 3, 7, 11, , 19; extend the pattern 6,

11, 16, 21).

A1.1.1\_E Describe numerical patterns that increase or decrease by a constant multiplier, and use this information to identify a missing element or extend the pattern (e.g., describe that the pattern 2, 4, 8, 16 starts at 2 and doubles or

that the pattern 20, 10, 5, 2.5 starts at 20 and halves; identify the missing element in the pattern 3, 6, , 24, 48; write the next 2

numbers in the pattern 80, 40, 20, 10).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| A2: EXPRESSIONS | | | |
| Not applicable to grade 4 | | | |

A3: RELATIONS AND FUNCTIONS

A3.1: Variation (ratio, proportion, and percentage)—not applicable to grade 4

A3.2: Demonstrate an understanding of equivalency A3.2.1\_P Create a numerical expression using + or -

to model a situation (e.g., represent the following in a number sentence: 3 people are on a bus, and 4 more get on).

A3.2.2\_P Find a missing value in real-world addition and subtraction problems within 20 (e.g., 3 people are on a bus. More people get on. There are now 7 people on the bus. How many people got on the bus?).

A3.2.1\_M Create a numerical expression using x or ÷ to model a situation (e.g., represent the following in a number sentence: 3 people get on the bus at each of 4 stops).

A3.2.2\_M Find a missing value in a number sentence using addition and subtraction of numbers within 100 (e.g., 23 + = 59).

A3.2.1\_E N/A

A3.2.2\_E N/A

A3.2.3\_P N/A A3.2.2\_M Represent real-world addition and subtraction problems within 20 using a number sentence with a symbol or blank to represent the missing value (e.g., 13 people are on a bus. More people get on. There are

now 17 people on the bus. How many people got on the bus? Represent this situation with an addition or a subtraction sentence).

A3.2.2\_E Represent real-world problems involving the multiplication of two whole numbers to 10 and related division facts, using a number sentence with a symbol or blank to represent the missing value (e.g. Paul has 3 bags of oranges. There are the same number of oranges in each bag. He has 18 oranges altogether. How many oranges are there in each bag? Represent the situation with a multiplication sentence).

A3.3: Solve equations and inequalities—not applicable to grade 4

A3.4: Interpret and evaluate functions—not applicable to grade 4

# Grade 5

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N: NUMBER AND OPERATIONS

N1: WHOLE NUMBERS

N1.1: Identify and count in whole numbers, and identify their relative magnitude

N1.1.1\_P Count in whole numbers up to 10,000. N1.1.1\_M Count in whole numbers up to any whole

number.

N1.1.1\_E N/A

N1.1.2\_P Read and write whole numbers up to 10,000 in words and numerals.

N1.1.3\_P Compare and order whole numbers up to 10,000.

N1.1.4\_P Skip count forwards and backwards by hundreds.

N1.1.2\_M Read and write whole numbers greater than 10,000 in words and numerals.

N1.1.3\_M Compare and order whole numbers up to 100,000.

N1.1.4\_M Skip count forwards and backwards by thousands.

N1.1.2\_E N/A

N1.1.3\_E Compare and order whole numbers greater than 100,000.

N1.1.4\_E N/A

N1.2: Represent whole numbers in equivalent ways N1.2.1\_P Use place-value concepts for hundreds,

tens, and ones (e.g., compose or decompose a three-digit whole number using a number sentence such as 254 = 2 hundreds, 5 tens, and 4 ones; 254 = 200 + 50 + 4; determine the value of a digit in the hundreds place).

N1.2.1\_M Use place-value concepts for thousands, hundreds, tens, and ones (e.g., compose or decompose a four-digit whole number using a number sentence such as 1,383 = 1 thousand, 3 hundreds, 8 tens, and 3 ones;

1383 = 1,000 + 300 + 80 + 3; determine the value of a digit in the thousands place).

N1.2.1\_E Use place-value concepts beyond the thousands (e.g., compose or decompose a 7-digit whole number using a number sentence such as 1,383,547 = 1 million, 3

hundred thousands, 8 ten thousands, 3

thousands, 5 hundreds, 4 tens and 7 ones;

1,383,547 = 1,000,000 + 300,000 + 80,000 +

3000 + 500 + 40 + 7; determine the value of a digit in the millions place).

N1.2.2\_P Round whole numbers to the nearest ten. N1.2.2\_M Round whole numbers to the nearest

hundred.

N1.2.2\_E Round whole numbers to the nearest thousand.

N1.3: Solve operations using whole numbers

N1.3.1\_P Add and subtract within 1,000 (i.e., where the sum or minuend does not surpass 1,000), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 550 - 250; 457 - 129; use hundreds grids, number lines, or multibase arithmetic blocks to reason through or solve addition and subtraction problems).

N1.3.2\_P Multiply, with and without regrouping, and divide, with no remainder, a two-digit number by a one-digit number (e.g., 42 x 4

= ; 42 x 6 = ; 80 ÷ 5 = ).

N1.3.3\_P Perform calculations involving two or more operations, within the limits for partially meets expectations described above, respecting the order of operations (e.g., 6 + 7 x 57 = ; 996 - 440 ÷ 8 = ).

N1.3.1\_M Add and subtract beyond 1,000 (i.e., where the sum or minuend surpasses 1,000), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 1457 - 129; use number lines to reason through or solve addition and subtraction problems).

N1.3.2\_M Multiply, with and without regrouping, and divide, with no remainder, any number by a one-digit number and multiply two, 2-digit numbers, with and without regrouping (e.g., 342 x 4 = ; 42 x 34 = ; 1380 ÷ 5 = ).

N1.3.3\_M Perform calculations involving two or more operations, within the limits for meets expectations described above, respecting the order of operations (e.g., 1754 + 53 x 53 = ; 4 x 9 x 8 = ).

N1.3.1\_E N/A

N1.3.2\_E Multiply any number by a two-digit number, with and without regrouping, and divide any number by a one-digit number, with remainder (e.g., 3427 x 68; 1380 ÷ 6 = ).

N1.3.3\_E Perform calculations involving two or more operations, within the limits for exceeds expectations described above, respecting the order of operations (e.g., 6584 + 2187 x 38 =

; 675 ÷ 9 x 652 = ).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| N1.4: Solve real-world problems involving whole numbers | | | |

N1.4.1\_P Solve simple real-world problems involving addition and subtraction of whole numbers within 100 (i.e., where the sum or minuend does not surpass 100) with regrouping, including problems involving measurement and currency units (e.g., There are 34 sheep in a field. 29 more sheep come into the field. How many sheep are in the field now?; There are 54 children in total in grade 5. 7 are absent today. How many grade 5 children are at school today?).

N1.4.2\_P Solve simple real-world problems involving the multiplication of 2 whole numbers to 5, and associated division facts (e.g., Amina is putting fruit into bags. Each bag will contain 4 pieces of fruit. How many bags will Amina need for 20 pieces of fruit?; Amina has 5 bags. Each bag contains 4 pieces of fruit.

How many pieces of fruit are there in total?).

N1.4.1\_M Solve simple real-world problems involving addition and subtraction of whole numbers within 1,000 (i.e., where the sum or minuend does not surpass 1,000) with and without regrouping, including problems involving measurement and currency units (e.g., There were 740 people living in a town. 83 more people come to live in the town. What is the total number of people living in the town now?; There are 750 people living in a town. Only 327 of them were born in the town. How many were born outside the town?).

N1.4.2\_M Solve simple real-world problems involving the multiplication of two whole numbers to 10, and associated division facts (e.g., Amina is putting fruit into bags. Each bag will contain 7 pieces of fruit. How many bags will Amina need for 28 pieces of fruit?; Amina has 4 bags. Each bag contains 7 pieces of fruit.

How many pieces of fruit are there in total?).

N1.4.1\_E Solve real-world problems involving combinations of any two or more of the four operations, including problems involving measurement and currency units and:

* + the addition and subtraction of whole numbers beyond 1,000, with and without regrouping
  + the multiplication and division of any number by a one-digit number, with and without regrouping (multiplication), and with and without a remainder (division)
  + the multiplication of two, 2-digit numbers.

N1.4.2\_E N/A

N2: FRACTIONS

N2.1: Identify and represent fractions using objects, pictures, and symbols, and identify relative magnitude N2.1.1\_P Identify and express everyday unit fractions N2.1.1\_M Identify and express proper fractions as

N2.1.1\_E Identify and express proper fractions as

(i.e., 1/2; 1/3; 1/4) as equivalent fractions represented as objects or pictures (e.g., 1/3

= **/6 when the task is supported by pictures; 1/2 = 3/**).

equivalent fractions with denominators up to 12 (e.g., express a fraction in simplest form 6/9 = **/3; 2/10 = 1/**; express as a multiple of another 4/5 = 8/**).

equivalent fractions (any denominator) (e.g., 13/25 = 26/50).

N2.1.2\_P N/A N2.1.2\_M N/A N2.1.2\_E Identify and express improper fractions as equivalent mixed numbers (or vice versa), with pictures or symbols (e.g., represent 9/6 as 1 3/6 or 1 1/2; use two arrays or rectangles and coloring to represent 9/6).

N2.1.3\_P Compare and order everyday unit fractions

N2.1.3\_M Compare and order fractions with different but N2.1.3\_E Compare and order proper fractions with

(e.g., 1/4; 1/3; 1/2).

related denominators up to 12 (e.g., 2/3 and 5/6).

different denominators (e.g., 1/4; 7/10; 5/6).

N2.2: Solve operations using fractions

N2.2.1\_P Add and subtract proper fractions with the same denominator (e.g., 2/3 + 1/3; 3/5 - 1/5).

N2.2.1\_M Add and subtract proper fractions with different but related denominators (e.g., 2/3 + 1/6; 7/8 - 1/4).

N2.2.1\_E Add and subtract improper fractions or mixed numbers with different but related denominators (e.g., 2 2/3 + 1 1/6; 25/4 + 5/12).

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N2.2.2\_P N/A N2.2.2\_M Multiply commonly-used fractions by whole numbers, or divide proper fractions by whole numbers, and represent such operations with objects or pictures (e.g., represent 3/4 x 12 with 3 by 4 grid with 3 of the columns colored in; or represent 3/4 divided by 2 as a 1 x 1 grid with one side divided into 4 equal parts and 3 blocks colored in and then other side

divided into 2 to produce 8 equal blocks with 6 colored in).

N2.2.2\_E Multiply and divide proper fractions and divide improper fractions by whole numbers, and represent such operations with pictures or symbols (e.g., 2/5 ÷ 3/5; 3/4 x 2/6; 7/5 ÷ 2; represent 3/4 x 1/2 as a rectangle split into 4 equal parts with 3 parts shaded and each of the 4 equal parts split into 2 equal sections. Note that the smaller shaded sections represent the answer).

N2.3: Solve real-world problems involving fractions N2.3.1\_P Solve real-world problems involving

addition and subtraction of proper fractions with the same denominator (e.g., Paola has 2/5 of a chocolate bar left. Her friend Carola has 1/5 of the same chocolate bar.

Together, they have what fraction of the chocolate bar?; Paola ate 2/5 of a chocolate bar at recess. How much of the chocolate bar is left?).

N2.3.1\_M Solve real-world problems involving addition and subtraction of proper fractions with different but related denominators (e.g., Paola has 2/5 of a chocolate bar left. Her friend Carola has 3/10 of the same chocolate bar.

Together, they have what fraction of the chocolate bar?; Paola has 2/3 of a chocolate bar left. If she gives her friend Carola 1/6 of what remains, what fraction of the chocolate bar will Paola have left?).

N2.3.1\_E Solve real-world problems involving addition and subtraction of improper fractions and mixed numbers with different but related denominators (e.g., Maya is cutting some oranges for a picnic. She cuts each orange into 8 equal pieces. She puts 25 pieces of orange onto a large plate and 11 pieces of orange onto a smaller plate. What is the smallest number of whole oranges Maya could have cut?; A tree is now 3 and a half meters tall. When it was planted, it was 1 and one quarter meters tall. By how many meters has the tree grown since it was planted?).

N2.3.2\_P N/A N2.3.2\_M Solve real-world problems involving the multiplication and division of a proper fraction and a whole number (e.g., Misha has half a pizza. If she shares it with her brother, what fraction of the original pizza will each receive?).

N2.3.2\_E Solve real-world problems involving the multiplication of two proper fractions or the division of an improper fraction or mixed number by a whole number (e.g., Misha has half a pizza. If she shares it equally with her brother, what fraction of the original pizza will each receive?).

N3: DECIMALS

N3.1: Identify and represent decimals using objects, pictures, and symbols, and identify relative magnitude

N3.1.1\_P Identify and represent decimal quantities to the tenths using objects or pictures (e.g., represent 0.8 by coloring 8 of 10 equal parts of a rectangle).

N3.1.1\_M Identify and represent quantities using decimal notation (i.e., symbols) up to the

tenths place (e.g., identify that 0.8 is 8 tenths).

N3.1.1\_E Identify and represent quantities using decimal notation up to the hundredths place (e.g., identify 0.65 is 65 hundredths).

N3.1.2\_P N/A N3.1.2\_M Compare and order decimal numbers up to the tenths place (e.g., sort the following decimals from high to low: 0.8, 0.3, 0.1).

N3.1.2\_E Compare and order decimal numbers up to the hundredths place (e.g., sort the following decimals from high to low: 0.8, 0.33, 0.08,

0.6).

N3.2: Represent decimals in equivalent ways (including fractions and percentages)

N3.2.1\_P Round decimal numbers to the nearest whole number (e.g., round 3.4 to 3).

N3.2.1\_M Round decimal numbers to the nearest tenths place (e.g., round 3.46 to 3.5).

N3.2.1\_E Round decimal numbers to the nearest hundredths place (e.g., round 3.456 to 3.46).

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N3.2.2\_P N/A N3.2.2\_M Identify and express fractions with denominators of 10 using decimal notation (e.g., 7/10 = 0.7).

N3.2.2\_E Identify and express fractions with denominators of 100 and everyday fractions, using decimal notation, and represent fractions with denominators of 100 as percentages (e.g., 3/4 = 0.75; 72/100 = 0.72

= 72%).

N3.3: Solve operations using decimals

N3.3\_P N/A N3.3\_M Add and subtract decimal numbers up to the tenths place. Create or identify concrete or picture models to represent such additions (e.g., 0.5 + 0.2).

N3.3\_E Add and subtract decimal numbers up to the hundredths place. Create or identify concrete or picture models to represent such additions (e.g., 3.41 + 5.3).

N3.4: Solve real-world problems involving decimals—not applicable to grade 5

N4: INTEGERS

Not applicable to grade 5

N5: EXPONENTS AND ROOTS

Not applicable to grade 5

N6: OPERATIONS ACROSS NUMBER

Not applicable to grade 5

M: MEASUREMENT

M1: LENGTH, WEIGHT, CAPACITY, VOLUME, AREA, AND PERIMETER

M1.1: Use non-standard and standard units to measure, compare, and order

M1.1.1\_P Select and use appropriate standard units to estimate, measure, and compare length and weight when measurements involve whole numbers only (e.g., choose centimeters instead of meters to measure a pencil; estimate the weight of the apple when given the following choices: a) 5g b) 200g c) 1kg d) 5kg).

M1.1.2\_P Select and use appropriate standard units to measure and compare capacity/volume when measurements involve whole numbers only (e.g., identify that the measuring cups contain 200 ml of water and 100 ml of oil).

M1.1.1\_ M

M1.1.2\_ M

Identify the relationship between the relative size of adjacent units within a standard system of measurement for length and weight (e.g., identify the number of millimeters in a centimeter).

Identify the relationship between the relative size of adjacent units within a standard system of measurement for capacity/volume (e.g., identify the number of pints in a quart).

M1.1.1\_E Make conversions between adjacent units of length and weight within a standard system of measurement (e.g., identify that the 16- centimeter pencil is 160 millimeters long).

M1.1.2\_E Make conversions between adjacent units of capacity/volume within a standard system of measurement (e.g., identify that there are four pints in a two-quart container).

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M1.1.3\_P N/A M1.1.3\_

M

Read scales to the nearest marked increment on a variety of measuring tools involving fractions and decimals to the tenths place, containing both labeled and unlabeled scale increments (e.g., read a kitchen scale containing increments expressed as fractions).

M1.1.3\_E Read scales to the nearest marked increment on a variety of measuring tools involving decimals to the hundredths place, containing both labeled and unlabeled scale increments (e.g., read a depth gauge in a dam with scale increments increasing in 25- centimeter intervals and labels expressed as decimal meters (e.g., 1.25, 1.5, 1.75, 2.0) when the needle is pointing directly at a marked increment of the scale).

M1.2: Solve problems involving measurement

M1.2.1\_P Calculate the perimeter of a polygon. M1.2.1\_

M

Solve problems, including real-world problems, involving the perimeter of a polygon.

M1.2.1\_E Solve problems, including real-world problems, involving comparing the perimeters of polygons.

M1.2.2\_P Solve problems, including real-world problems, involving the area of a rectangle using concrete or pictorial representations of units (e.g., grid squares or tiles).

M1.2.2\_ M

Solve problems, including real-world problems, involving the calculation of the area of a rectangle.

M1.2.2\_E Solve problems, including real-world problems, involving the area of compound shapes comprised of rectangles using concrete or pictorial representations of units (e.g., grid squares or tiles).

M2: TIME

M2.1: Tell time

M2.1.1\_P Tell time using an analog clock to the nearest minute.

M2.1.1\_ M

Recognize equivalence between representations of time (e.g., digital, analog, and written; 15 minutes is a quarter of an hour).

M2.1.1\_E N/A

M2.2: Solve problems involving time

M2.2.1\_P Solve problems, including real-world

M2.2.1\_

Solve problems, including real word problems, M2.2.1\_E Solve problems, including real-world

problems, involving elapsed time in minutes M within an hour (e.g., calculate the difference between 3:42 and 3:56 or the difference between 16:35 and 16:52).

M2.2.2\_P N/A M2.2.2\_

M

involving elapsed time in minutes across hours (e.g., calculate the difference between

3:24 and 5:12 or the difference between 16:35 and 18:22), including problems involving schedules (i.e., timetables, agendas, itineraries).

Solve problems, including real-world problems, involving the number of days in a week, months in a year, hours in a day, minutes in an hour, and seconds in a minute.

problems, involving elapsed time across a.m. and p.m. in countries that teach 12-hour time (e.g., calculate the difference between 10:30

* 1. and 3:15 p.m.). M2.2.2\_E N/A

M3: CURRENCY

M3.1: Use different currency units to create amounts—subconstruct fully covered in grades 1-3. Questions involving currency are covered under the relevant real-world problem subconstructs (e.g., N1.4 for whole numbers, etc.)

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

G: GEOMETRY

G1: PROPERTIES OF SHAPES AND FIGURES

G1.1: Differentiate shapes and figures by their attributes G1.1.1\_P Recognize and name two-dimensional

shapes by a written or spoken description of their simple attributes (e.g., name a shape given a description of the number of

sides or corners or the relative length of the sides, etc.).

G1.1.1\_M Recognize and name types of triangles (e.g., isosceles, scalene, equilateral, and right angle).

G1.1.1\_E Recognize and name types of quadrilaterals

(e.g., parallelogram; trapezium, etc.).

G1.1.2\_P N/A G1.1.2\_M Recognize and name three-dimensional figures by their attributes (e.g., faces, edges, vertices).

G1.1.3\_P N/A G1.1.3\_M Recognize types of angles by their magnitude

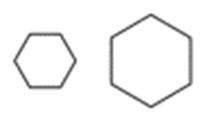
(e.g., right, straight, acute, obtuse).

G1.1.2\_E Identify parallel and perpendicular sides of shapes.

G1.1.3\_E N/A

G1.1.4\_P Recognize and describe the congruence and similarity of two-dimensional shapes (e.g., when shown two shapes, explain how they are similar using mathematical or non- mathematical language: "It got bigger and has been turned" or "It's been enlarged and rotated.").

G1.1.4\_M N/A G1.1.4\_E N/A

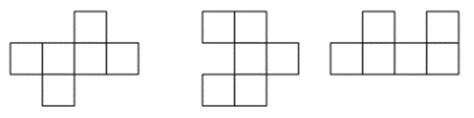


G2: SPATIAL VISUALIZATIONS

G2.1: Compose and decompose shapes and figures

G2.1.1\_P N/A G2.1.1\_M Identify the net of a cube or specific faces on the net of a cube (e.g., fold mentally to answer the question, which of these is the net of a cube?; identify opposite faces on a net).

G2.1.1\_E Identify front, top, and side views of a familiar three-dimensional figure (i.e. prism, cylinder, cone or pyramid) (e.g., identify that the top view of an upright cylinder is a circle).



G3: POSITION AND DIRECTION

G3.1: Describe the position and direction of objects in space G3.1.1\_P Use different kinds of simple maps (i.e., an

G3.1.1\_M Use a grid map with compass directions when G3.1.1\_E Locate and plot points on a plane in the first

alphanumeric map, grid map, or local equivalent) to give and follow 2-step directions to a given location (e.g., Using this map, if you are at the school, you walk towards the tree, and turn left. What would you be facing?; Using this map, how do you get from the school to the green house?).

the grid dimensions are given in terms of the real-world distance (e.g., Which of these is closest to the distance between the park and Juan’s house? a) 100 meters b) 150 meters c) 200 meters d) 250 meters).

quadrant of a Cartesian coordinate system.

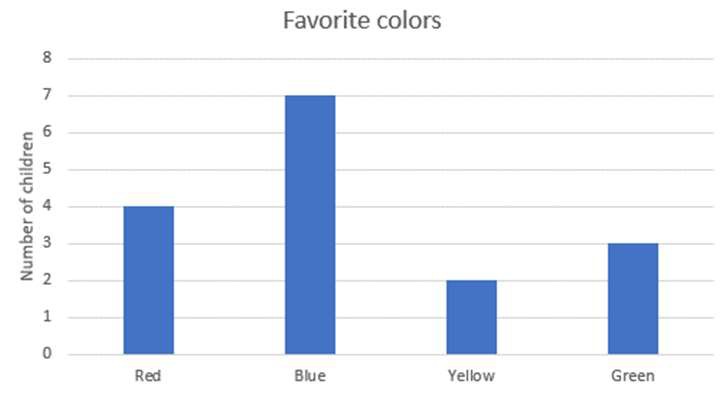
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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

S: STATISTICS AND PROBABILITY

S1: DATA MANAGEMENT

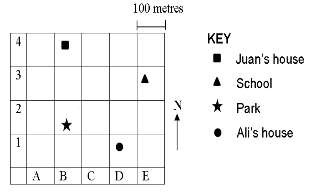
S1.1: Retrieve and interpret data presented in displays S1.1.1\_P Solve a problem involving more than two

pieces of information from a tally chart, bar graph, or pictograph with a single-unit scale (e.g., How many children were asked about their favorite color in this bar graph?).



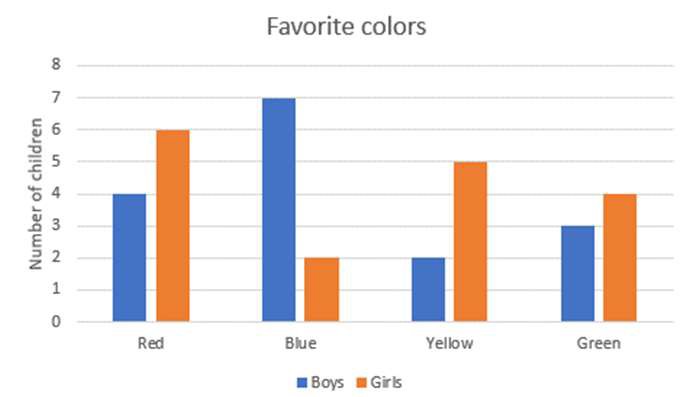
S1.1.2\_P Complete missing information in a tally chart, bar graph, or pictograph that arranges data into categories and uses a single-unit scale (e.g., add a row or column to a partially completed pictograph).

S1.1.1\_M Organize data and construct a tally chart, bar graph, or pictograph that arranges data into categories and uses a single- or multi-unit scale.



S1.1.2\_M Compare by calculating differences between categories in a tally chart, bar graph, or pictograph with a multi-unit scale.

S1.1.1\_E Retrieve information from data displays that arrange data into categories and sub- categories with a single- or multi-unit scale (e.g., How many girls liked green in this bar chart?).



S1.1.2\_E N/A

S1.1.3\_P Retrieve information from a tally chart, bar graph, or pictograph with a multi-unit scale.

S1.1.3\_M N/A S1.1.3\_E N/A

S1.2: Calculate and interpret central tendency—not applicable to grade 5

S2: CHANCE AND PROBABILITY

S2.1: Describe the likelihood of events in different ways S2.1.1\_P Identify the likelihood of an event

happening as certain or impossible (e.g., There are blue, green, red, and yellow marbles in a bag. Which color is impossible to choose? and the choices are a) blue b) green c) purple d) yellow e) red.).

S2.1.1\_M Identify the likelihood of an event happening as likely or unlikely (e.g., There are 9 blue, 1 red, 1 green, and 1 yellow marbles in a bag. Which color is likely to be selected?).

S2.1.1\_E Compare the likelihoods of two or more events happening, using descriptive words (e.g., Given a picture of a spinner with five equal colored sections—red, blue, yellow, green and purple—"If the spinner is spun 2 times, what is the chance that it will land on blue both times?" with answers a) impossible

b) unlikely c) likely d) certain).

S2.2: Identify permutations and combinations—not applicable to grade 5

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

A: ALGEBRA

A1: PATTERNS

A1.1: Recognize, describe, extend, and generate patterns A1.1.1\_P Describe numerical patterns that increase

or decrease by a constant value with a simple rule, and use this information to identify a missing element or extend the pattern (e.g., describe the pattern 6, 9, 12, 15 as going up by threes; identify the missing element in the pattern 3, 7, 11, , 19; extend the pattern 6, 11, 16, 21).

A1.1.1\_M Describe numerical patterns that increase or decrease by a constant multiplier, and use this information to identify a missing element or extend the pattern (e.g., describe that the pattern 2, 4, 8, 16 starts at 2 and doubles or

that the pattern 20, 10, 5, 2.5 starts at 20 and halves; identify the missing element in the pattern 3, 6, , 24, 48; write the next two

numbers in the pattern 80, 40, 20, 10).

A1.1.1\_E Generate a pattern from a given rule, or match a pattern to a given rule using any operation (e.g., start at 5 and increase by 3 to generate 5, 8, 11, 14, 17 . . .; match the

pattern 3, 6, 12, 24, … to one of these rules

* + 1. start at 3 and add 3, b) start at 3 and double, c) start at 3 and add 6, and d) start at 3 and halve).

A2: EXPRESSIONS

Not applicable to grade 5

A3: RELATIONS AND FUNCTIONS

A3.1: Variation (ratio, proportion, and percentage) - not applicable to grade 5

A3.2: Demonstrate an understanding of equivalency A3.2.1\_P Create a numerical expression using x or ÷

to model a situation (e.g., represent the following in a number sentence: 3 people get on the bus at each of 4 stops).

A3.2.1\_M N/A A3.2.1\_E N/A

A3.2.2\_P Find a missing value in a number sentence using addition and subtraction of numbers within 100 (e.g., 23 + = 59).

A3.2.3\_P Represent real-world addition and subtraction problems within 20 using a number sentence with a symbol or blank to represent the missing value (e.g., 13 people are on a bus. More people get on. There are now 17 people on the bus. How many people got on the bus? Represent this situation with an addition or a subtraction sentence).

A3.2.1\_M Find a missing value in a number sentence using multiplication and division within 100 (e.g., 7 x \_ = 35).

A3.2.3\_M Represent real-world problems involving the multiplication of two whole numbers to 10 and related division facts, using a number sentence with a symbol or blank to represent the missing value (e.g., Paul has 3 bags of oranges. There are the same number of oranges in each bag. He has 18 oranges altogether. How many oranges are there in each bag? Represent the situation with a multiplication sentence).

A3.2.1\_E Find a missing value in a number sentence using any one of the four operations (e.g., 3 x = 18).

A3.2.3\_E Represent real-world problems using a number sentence with one of the four operations (e.g., Abu has 5 identical water bottles that weigh a total of 15 pounds.

Represent the problem with 5 × = 15).

A3.3: Solve equations and inequalities—not applicable to grade 5

A3.4: Interpret and evaluate functions—not applicable to grade 5

# Grade 6

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N: NUMBER AND OPERATIONS

N1: WHOLE NUMBERS

N1.1: Identify and count in whole numbers, and identify their relative magnitude

N1.1.1\_P Count in whole numbers up to any whole number.

N1.1.1\_M N/A N1.1.1\_E N/A

N1.1.2\_P Read and write any whole number. N1.1.2\_M N/A N1.1.2\_E N/A

N1.1.3\_P Compare and order whole numbers up to 100,000.

N1.1.4\_P Skip count forwards and backwards by thousands.

N1.1.3\_M Compare and order any whole numbers. N1.1.3\_E N/A N1.1.4\_M N/A N1.1.4\_E N/A

N1.2: Represent whole numbers in equivalent ways N1.2.1\_P Use place-value concepts for thousands,

hundreds, tens, and ones (e.g., compose or decompose a 4-digit whole number using a number sentence such as 1,383 = 1 thousand, 3 hundreds, 8 tens, and 3 ones;

1,383 = 1,000 + 300 + 80 + 3; determine the value of a digit in the thousands place).

N1.2.2\_P Round whole numbers to the nearest hundred.

N1.2.1\_M Use place-value concepts beyond the thousands (e.g., compose or decompose a seven-digit whole number using a number sentence such as 1,383,547 = 1 million, 3

hundred thousands, 8 ten thousands, 3

thousands, 5 hundreds, 4 tens, and 7 ones;

1,383,547 = 1,000,000 + 300,000 + 80,000 +

3000 + 500 + 40 + 7; determine the value of a digit in the millions place).

N1.2.2\_M Round whole numbers to the nearest thousand.

N1.2.1\_E N/A

N1.2.2\_E Round whole numbers to any place value beyond the thousands place.

N1.3: Solve operations using whole numbers

N1.3.1\_P Add and subtract beyond 1,000 (i.e., where the sum or minuend surpasses 1,000), with and without regrouping, and represent these operations with objects, pictures, or symbols (e.g., 1457 - 129; use number lines to reason through or solve addition and subtraction problems).

N1.3.1\_M N/A N1.3.1\_E N/A

N1.3.2\_P Multiply, with and without regrouping, and divide, with no remainder, any number by a one-digit number and multiply two 2-digit numbers, with and without regrouping (e.g., 342 x 4 = ; 42 x 34 = ; 1380 ÷ 5 = ).

N1.3.3\_P Identify factors of whole numbers within 25 and multiples of whole numbers within 10 (e.g., find all factors of 24; find multiples of 8).

N1.3.4\_P Perform calculations involving two or more operations, within the limits for partially meets expectations described above, respecting the order of operations (e.g., 1754 + 53 x 53 = ; 4 x 9 x 8 = ).

N1.3.2\_M Multiply any number by a 2-digit number, with and without regrouping, and divide any

number by a 1-digit number, with and without a remainder (e.g., 3427 x 68; 1380 ÷ 6 = ).

N1.3.3\_M Identify factors of whole numbers within 100 and multiples of whole numbers within 20 (e.g., find all factors of 84; find multiples of 15).

N1.3.4\_M Perform calculations involving two or more operations, within the limits for meets expectations described above, respecting the order of operations (e.g., 6584 + 2187 x 38 = ; 675 ÷ 9 x 652 = ).

N1.3.2\_E Multiply any 2 numbers, with and without regrouping, and divide any number by a 2- digit number, with and without a remainder (e.g., 2342 x 1478; 3388 ÷ 15 = ).

N1.3.3\_E Identify factors of whole numbers beyond 100 and multiples of whole numbers beyond 20 (e.g., find factors of 125 or find multiples of 25).

N1.3.4\_E Perform calculations involving two or more operations, within the limits for exceeds expectations described above, respecting the order of operations (e.g., (6584 + 2187) x

318 = ; (9675 - 823) ÷ 19 = ).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| N1.4: Solve real-world problems involving whole numbers | | | |

N1.4.1\_P Solve simple real-world problems involving any one of the four operations, including problems involving measurement and currency units and:

* + - * addition and subtraction of whole numbers within 1,000 with and without regrouping
      * multiplications up to 10 × 10 and related divisions without remainders.

N1.4.1\_M Solve real-world problems involving combinations of any 2 or more of the 4 operations, including problems involving measurement and currency units and:

* + addition and subtraction of whole numbers beyond 1,000 with and without regrouping
  + multiplications and divisions of any number by a 1-digit number with and without regrouping (multiplication) and with and without a remainder (division)
  + multiplications of two 2-digit numbers.

N1.4.1\_E Solve real-world problems involving combinations of any 2 or more of the 4 operations, including problems involving measurement and currency units and:

* + addition and subtraction of any whole numbers
  + multiplication of any whole numbers
  + division of any whole number by a 2-digit number with and without a remainder.

N2: FRACTIONS

N2.1: Identify and represent fractions using objects, pictures, and symbols, and identify relative magnitude

N2.1.1\_P Identify and express proper fractions as equivalent fractions with denominators up to 12 (e.g., express a fraction in simplest form 6/9 = ¨/3; 2/10 = 1/¨; express as a multiple of another 4/5 = 8/¨).

N2.1.1\_M Identify and express proper fractions as equivalent fractions (any denominator) (e.g., 13/25 = 26/50).

N2.1.1\_E N/A

N2.1.2\_P N/A N2.1.2\_M Identify and express improper fractions as equivalent mixed numbers (or vice versa), with pictures or symbols (e.g., represent 9/6 as 1 3/6 or 1 1/2; use two arrays or rectangles and coloring to represent 9/6).

N2.1.2\_E N/A

N2.1.3\_P Compare and order fractions with different but related denominators up to 12 (e.g., 2/3 and 5/6).

N2.1.3\_M Compare and order proper and improper fractions with different, unrelated denominators (e.g., 1/4; 7/10; 5/6).

N2.1.3\_E N/A

N2.1.4\_P N2.1.4\_M Compare and order fractions and mixed numbers (e.g., 9/6, 1 1/3, 5/12, 2 1/2).

N2.1.4\_E N/A

N2.2: Solve operations using fractions

N2.2.1\_P Add and subtract proper fractions with

N2.2.1\_M Add and subtract improper fractions or mixed N2.2.1\_E Add and subtract improper fractions or mixed

different but related denominators (e.g., 2/3

+ 1/6; 7/8 - 1/4).

N2.2.2\_P Multiply commonly-used fractions by whole numbers, or divide proper fractions by whole numbers, and represent such operations with objects or pictures (e.g., represent 3/4 x 12 with a 3 x 4 grid with 3 of the columns colored in; represent 3/4 divided by 2 as a 1 x 1 grid with 1 side divided into 4 equal parts and 3 blocks colored in and the other side divided into 2 to produce 8 equal blocks with 6 colored in).

numbers with different but related denominators (e.g., 2 2/3 + 1 1/6; 25/4 + 5/12).

N2.2.2\_M Multiply and divide proper fractions and divide improper fractions by whole numbers, and represent such operations with pictures or symbols (e.g., 2/5 ÷ 3/5; 3/4 x 2/6; 7/5 ÷ 2; represent 3/4 x 1/2 as a rectangle split into 4 equal parts with 3 parts shaded and each of the 4 equal parts split into 2 equal sections. Note that the smaller shaded sections represent the answer).

numbers with different, unrelated denominators (e.g., 9/4 + 3/9; 3 1/6 - 2/5).

N2.2.2\_E Multiply and divide fractions (including proper and improper fractions and mixed numbers) (e.g., 3/4 x 7/6 = ; 2/3 x 3 1/4 = ; 4/5 ÷ 5/3 = ).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N2.3: Solve real-world problems involving fractions

N2.3.1\_P Solve real-world problems involving addition N2.3.1\_M Solve real-world problems involving addition

N2.3.1\_E Solve real-world problems involving the

and subtraction of proper fractions with different but related denominators (e.g., Paola has 2/5 of a chocolate bar left. Her friend Carola has 3/10 of the same chocolate bar. Together, they have what fraction of the chocolate bar?; Paola has 2/3

of a chocolate bar left. If she gives her friend Carola 1/6 of what remains, what fraction of the chocolate bar will Paola have left?).

N2.3.2\_P Solve real-world problems involving the multiplication and division of a proper fraction and a whole number (e.g., Misha has half a pizza. If she shares it equally with her brother, what fraction of the original pizza will each receive?).

and subtraction of improper fractions and mixed numbers with different but related denominators (e.g., Maya is cutting some oranges for a picnic. She cuts each orange into 8 equal pieces. She puts 25 pieces of orange onto a large plate and 11 pieces of orange onto a smaller plate. What is the smallest number of whole oranges Maya could have cut?; A tree is now 3 and a half meters tall. When it was planted, it was 1 and one quarter meters tall. By how many meters has the tree grown since it was planted?).

N2.3.2\_M Solve real-world problems involving the multiplication of two proper fractions or the division of an improper fraction or mixed number by a whole number (e.g., Misha has half a pizza. If she shares it equally with her brother, what fraction of the original pizza will each receive?).

addition and subtraction of proper and improper fractions and mixed numbers with unrelated denominators (e.g., A carpenter has a piece of wood that measures 15 and 7/8 ft. She only needs a piece that measures 10 and 5/12 ft. What is the length of the piece of wood she should cut off the long piece?).

N2.3.2\_E Solve real-world problems involving the multiplication and division of fractions (including proper and improper fractions and mixed numbers) (e.g., A cake needs 1 and a half cups of flour. How much is needed to make half a cake?; Dean has a piece of wood that is 3/4 of a foot in length. He needs to cut it into pieces that are 1/16th of a foot long. How many pieces can he cut?).

N3: DECIMALS

N3.1: Identify and represent decimals using objects, pictures, and symbols, and identify relative magnitude

N3.1.1\_P Identify and represent quantities using decimal notation (i.e., symbols) up to the tenths place (e.g., identify that 0.8 is 8 tenths).

N3.1.2\_P Compare and order decimal numbers up to the tenths place (e.g., sort the following decimals from high to low: 0.8, 0.3, 0.1).

N3.1.1\_M Identify and represent quantities using decimal notation up to the hundredths place (e.g., identify that 0.65 is 65 hundredths).

N3.1.2\_M Compare and order decimal numbers up to the hundredths place (e.g., sort the following decimals from high to low: 0.8, 0.33, 0.08,

0.6).

N3.1.1\_E Identify and represent quantities using decimal notation beyond the hundredths place (e.g., identify that 0.655 is 655 thousandths).

N3.1.2\_E Compare and order decimal numbers beyond the hundredths place (e.g., sort the following decimals from low to high: 0.821, 0.33, 0.08, 0.698, 0.7).

N3.2: Represent decimals in equivalent ways (including fractions and percentages)

N3.2.1\_P Round decimal numbers to the nearest tenths place (e.g., round 3.46 to 3.5).

N3.2.2\_P Identify and express fractions with denominators of 10 using decimal notation (e.g., 7/10 = 0.7).

N3.2.1\_M Round decimal numbers to the nearest hundredths place (e.g., round 3.456 to 3.46).

N3.2.2\_M Identify and express fractions with denominators of 100 and everyday fractions, using decimal notation, and represent fractions with denominators of 100 as percentages (e.g., 3/4 = 0.75; 72/100 = 0.72

= 72%).

N3.2.1\_E Round decimal numbers to any place value beyond the hundredths place (e.g., round 3.45619 to 3.4562).

N3.2.2\_E Identify and express fractions with any denominator using decimal notation and vice versa (e.g., 752/1000 = 0.752; 7/8 = 0.875).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N3.2.3\_P Compare and order decimals and proper fractions with denominators of 10 (e.g., place a list of decimals and fractions on a number line).

N3.2.3\_M Compare and order decimals (to the hundredths place) and proper fractions (e.g., place a list of decimals and proper fractions on a number line).

N3.2.3\_E Compare and order fractions, decimals, and percentages (e.g., place these numbers on a number line: 0.4, 1/2, 0.50%, 4/5, 0.25, 1/3,

0.25%).

N3.3: Solve operations using decimals

N3.3.1\_P Add and subtract decimal numbers up to the N3.3.1\_M Add and subtract decimal numbers up to the

N3.3.1\_E Add and subtract any positive decimal

tenths place. Create or identify concrete or picture models to represent such additions (e.g., 0.5 + 0.2).

hundredths place. Create or identify concrete or picture models to represent such additions (e.g., 3.41 + 5.3).

numbers.

N3.4: Solve real-world problems involving decimals

N3.4.1\_P N/A N3.4.1\_M Solve real-world problems involving the addition and subtraction of decimals to the tenths place (e.g., Diego has 3.2 meters of roof sheeting. If he buys another 1.4 meters, how many meters of roof sheeting will he have altogether? Aminata has 32.5 kg of grout for tiling. If she uses 12.1 kg for a new project, how many kgs of tile grout will she have left?).

N3.4.1\_E Solve real-world problems involving addition and subtraction of decimals beyond the tenths place (e.g., Aria has a height of 1.55 meters. Her mother has a height of 1.63 meters. How much taller than Aria is her mother? Adwoa has 1.64 meters of roof sheeting and another 1.4 meters. How many meters of roof sheeting does she have?).

N4: INTEGERS

Not applicable to grade 6

N5: EXPONENTS AND ROOTS

Not applicable to grade 6

N6: OPERATIONS ACROSS NUMBER

Not applicable to grade 6

M: MEASUREMENT

M1: LENGTH, WEIGHT, CAPACITY, VOLUME, AREA, AND PERIMETER

M1.1: Use non-standard and standard units to measure, compare, and order

M1.1.1\_P Identify the relationship between the relative M1.1.1\_M Make conversions between adjacent units of

M1.1.1\_E Make conversions between non-adjacent

size of adjacent units within a standard system of measurement for length and weight (e.g., identify the number of millimeters in a centimeter).

length and weight within a standard system of measurement (e.g., identify that the 16- centimeter pencil is 160 millimeters long).

units of length and weight within a standard system of measurement (e.g., convert kilometers to millimeters).

M1.1.2\_P Identify the relationship between the relative M1.1.2\_M Make conversions between adjacent units of

M1.1.2\_E Make conversions between non-adjacent

size of adjacent units within a standard system of measurement for capacity/volume (e.g., identify the number of pints in a quart).

capacity/volume within a standard system of measurement (e.g., identify that there are 4 pints in a 2-quart container).

units of capacity/volume within a standard system of measurement (e.g., convert pints to gallons).

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M1.1.3\_P Read scales to the nearest marked increment on a variety of measuring tools involving fractions and decimals to the tenths place, containing both labeled and unlabeled scale increments (e.g., kitchen scale containing increments expressed as fractions).

M1.1.3\_M Read scales to the nearest marked increment on a variety of measuring tools involving decimals to the hundredths place, containing both labeled and unlabeled scale increments (e.g., read a depth gauge in a dam with scale increments increasing in 25- centimeter intervals and labels expressed as decimal meters (e.g., 1.25, 1.5, 1.75, 2.0) when the needle is pointing directly at a marked increment of the scale).

M1.1.3\_E Read scales on a variety of measuring tools by reading between marked scale increments (interpolating) (e.g., read a

kitchen scale marked in grams and kilograms with some unlabeled scale markings and needle pointing between two unlabeled scale markings; measure an angle using a protractor/angle measurer).

M1.2: Solve problems involving measurement M1.2.1\_P Solve problems, including real-world

problems, involving the perimeter of a polygon.

M1.2.2\_P Solve problems, including real-world problems, involving the calculation of the area of a rectangle.

M1.2.1\_M Solve problems, including real-world problems, involving comparing the perimeters of polygons.

M1.2.2\_M Solve problems, including real-world problems, involving the area of compound shapes comprised of rectangles using concrete or pictorial representations of units (e.g., grid squares or tiles).

M1.2.1\_E Solve problems, including real-world problems, involving perimeter in which the unknown is a length (e.g., identify the fifth length in a picture of an irregular pentagon with 4 sides labeled with length and a given perimeter).

M1.2.2\_E Solve problems, including real-world problems, involving the calculation of the area of compound shapes comprised of rectangles (e.g., calculate the area of a compound L-shape given a picture with the lengths of all sides provided).

M2: TIME

M2.1: Tell time—subconstruct covered in grades 1-5 and is, therefore, assumed knowledge for grade 6

M2.2: Solve problems involving time

M2.2.1\_P Solve problems, including real-world problems, involving elapsed time in minutes across hours (e.g., calculate the difference between 3:24 and 5:12 or the difference between 16:35 and 18:22), including problems involving schedules (i.e., timetables, agendas, itineraries).

M2.2.1\_M Solve problems, including real-world problems, involving elapsed time across a.m. and p.m. in countries that teach 12-hour time (e.g., calculate the difference between 10:30

a.m. and 3:15 p.m.).

M2.2.1\_E N/A

M2.2.2\_P Solve problems, including real-world problems, involving the number of days in a week, months in a year, hours in a day, minutes in an hour, and seconds in a minute.

M2.2.2\_M N/A M2.2.2\_E N/A

Partially Meets Global Minimum Proficiency

M3: CURRENCY

Meets Global Minimum Proficiency

Exceeds Global Minimum Proficiency

M3.1: Use different currency units to create amounts—subconstruct fully covered in grades 1-3. Questions involving currency are covered under the relevant real-world problem

subconstructs (e.g., N1.4 for whole numbers, etc.)

G: GEOMETRY

G1: PROPERTIES OF SHAPES AND FIGURES

G1.1: Differentiate shapes and figures by their attributes G1.1.1\_P Recognize and name types of triangles

(e.g., isosceles, scalene, equilateral, and right angle).

G1.1.2\_P Recognize and name three-dimensional figures by their attributes (e.g., faces, edges, vertices).

G1.1.1\_M Recognize and name types of quadrilaterals

(e.g., parallelogram; trapezium, etc.).

G1.1.2\_M Identify parallel and perpendicular sides of shapes.

G1.1.1\_E N/A

G1.1.2\_E Use the defining attributes (i.e., type of angle, parallel and perpendicular lines) of complex two-dimensional shapes to classify them.

G1.1.3\_P Recognize types of angles by their magnitude (e.g., right, straight, acute, obtuse).

G1.1.3\_M N/A G1.1.3\_E Estimate the size of angles by comparing to reference/benchmark angles (e.g., estimate the size of a given angle with reference to the fact that it is smaller than a right angle and larger than 45°).

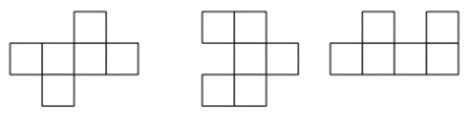
G1.1.4\_P N/A G1.1.4\_M N/A G1.1.4\_E N/A

G2: SPATIAL VISUALIZATIONS

G2.1: Compose and decompose shapes and figures

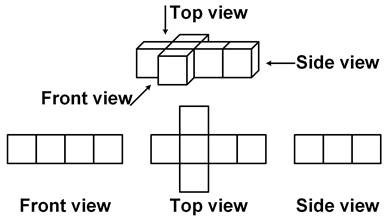
G2.1.1\_P Identify the net of a cube (e.g., fold mentally

G2.1.1\_M Identify front, top, and side views of a familiar G2.1.1\_E Identify alternate views of the same

to answer the question, which of these is the net of a cube?; identify opposite faces on a net).

three-dimensional figure (i.e., prism, cylinder, cone or pyramid) (e.g., identify that the top view of an upright cylinder is a circle).

compound or irregular three-dimensional shape, such as its front, top, and side view, a rotated view, or a view of a hidden side (e.g., label images (i), (ii), and (iii) as the front, top, and side view of the three-dimensional shape).

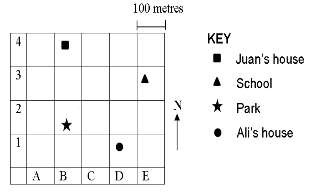


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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| G3: POSITION AND DIRECTION | | | |
| G3.1: Describe the position and direction of objects in space | | | |

G3.1.1\_P Use a grid map with compass directions when the grid dimensions are given in terms of the real-world distance (e.g., Which of these is closest to the distance between the park and Juan’s house? a) 100 meters b) 150 meters c) 200 meters d) 250 meters).

G3.1.1\_M Locate and plot points on a plane in the first quadrant of a Cartesian coordinate system.

G3.1.1\_E Draw shapes in the first quadrant of a Cartesian coordinate system, and find missing points (e.g., if (1,1), (1,3) and (1,2) are three corners of a rectangle, identify the fourth corner.).



G3.1.2\_P N/A G3.1.2\_M N/A G3.1.2\_E Identify horizontal and/or vertical distances between two points in the first quadrant of the Cartesian coordinate system (e.g., using the Cartesian coordinate system, identify how many horizontal and vertical units is (1,1) from (3,4)).

S: STATISTICS AND PROBABILITY

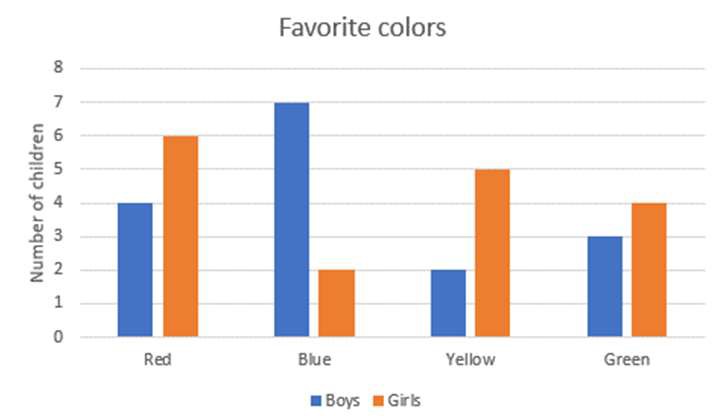
S1: DATA MANAGEMENT

S1.1: Retrieve and interpret data presented in displays S1.1.1\_P Organize data and construct a tally chart,

bar graph, or pictograph that arranges data into categories and uses a single- or multi- unit scale.

S1.1.1\_M Retrieve information from data displays that arrange data into categories and sub- categories with a single- or multi-unit scale (e.g., How many girls liked green in this bar chart?).

S1.1.1\_E Retrieve categorical data from pie charts and Venn diagrams and bivariate data from line graphs and dot plots.



S1.1.2\_P Compare by calculating differences between S1.1.2\_M N/A S1.1.2\_E N/A categories in a tally chart, bar graph, or

pictograph with a multi-unit scale.

S1.2: Calculate and interpret central tendency—not applicable to grade 6

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| S2: CHANCE AND PROBABILITY | | | |
| S2.1: Describe the likelihood of events in different ways | | | |

S2.1.1\_P Identify the likelihood of an event happening S2.1.1\_M Compare the likelihoods of two or more

S2.1.1\_E Calculate the probability of a simple event

as likely or unlikely (e.g., There are 9 blue, 1 red, 1 green, and 1 yellow marbles in a bag. Which color is likely to be selected?).

events happening, using descriptive words (e.g., Given a picture of a spinner with 5 equal colored sections—red, blue, yellow, green, and purple—the question is: "If the spinner is spun two times, what is the chance that it will land on blue both times?," and the possible answers are a) impossible

* + 1. unlikely c) likely d) certain).

happening, with the answer expressed as a fraction, decimal, or percentage (e.g., What is the probability of rolling a 6 on a standard number die?).

S2.2: Identify permutations and combinations—not applicable to grade 6

A: ALGEBRA

A1: PATTERNS

A1.1: Recognize, describe, extend, and generate patterns

A1.1.1\_P Describe numerical patterns that increase or A1.1.1\_M Generate a pattern from a given rule, or

A1.1.1\_E Recognize and extend non-linear patterns,

decrease by a constant multiplier, and use this to identify a missing element or extend the pattern (e.g., describe that the pattern 2, 4, 8, 16 starts at 2 and doubles or that the

pattern 20, 10, 5, 2.5 starts at 20 and halves; identify the missing element in the pattern 3, 6, , 24, 48; write the next two

numbers in the pattern 80, 40, 20, 10).

match a pattern to a given rule using any operation (e.g., start at 5 and increase by 3 to generate 5, 8, 11, 14, 17 . . .; match the

pattern 3, 6, 12, 24, … to one of these rules

1. start at 3 and add 3, b) start at 3 and double, c) start at 3 and add 6, and d) start at 3 and halve).

including squaring patterns, which may be supported by a visual representation (e.g., recognize that 1, 3, 6, 10 increases by 2,

then 3, then 4, when accompanied by dots or points arranged into triangles; extend the pattern 2, 4, 16, 25).

A2: EXPRESSIONS

Not applicable to grade 6

A3: RELATIONS AND FUNCTIONS

A3.1: Solve problems involving variation (ratio, proportion, and percentage)

A3.1.1\_P Represent real-world situations with a ratio (e.g., There are 15 boys and 20 girls in the class. What is the ratio of boys to girls?)

A3.1.1\_M Reason proportionally to answer real-world problems involving a unit ratio expressed informally (e.g., If Tulika needs 3 eggs for 1 cake, how many eggs does Tulika need for 5 cakes?).

A3.1.1\_E Reason proportionally to answer real-world problems involving a ratio (e.g., Purple paint is made from 2 parts blue paint to 3 parts red paint. I have 10 parts of blue paint. How many parts of red paint do I need?; or the ratio of teachers to students on a school trip must be 1:9. How many teachers are needed if there are 36 students?).

A3.2: Demonstrate an understanding of equivalency A3.2.1\_P Find a missing value in a number sentence

using addition and subtraction of numbers within 100 (e.g., 23 + = 59).

A3.2.1\_M Find a missing value in a number sentence using any one of the four operations (e.g., 3 x = 18).

A3.2.1\_E Find a missing value in a two-step number sentence using the four operations (e.g. 3 x

+ 4 = 22).

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A3.2.2\_P N/A A3.2.2\_M Represent real-world problems using a number sentence with one of the four operations (e.g., Abu has 5 identical water bottles that weigh a total of 15 pounds.

Represent the problem as 5 × = 15).

A3.2.2\_E Represent real-world problems using a two- step number sentence with any of the four operations (e.g., Some people got on a bus, doubling the number of passengers. At the next stop, 8 people got off, leaving 16 people on the bus. Represent the problem as 2x - 8

= 16).

A3.3: Solve equations and inequalities—not applicable to grade 6

A3.4: Interpret and evaluate functions—not applicable to grade 6

# Grade 7

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N: NUMBER AND OPERATIONS

N1: WHOLE NUMBERS—in grades 7 and 8, this construct is covered in N4: INTEGERS

N1.1: Identify and count in whole numbers, and identify their relative magnitude—subconstruct fully covered in grades 1-6 and is, therefore, assumed knowledge for grade 7

N1.2: Represent whole numbers in equivalent ways—subconstruct fully covered in grades 1-6 and is, therefore, assumed knowledge for grade 7

N1.3: Solve operations using whole numbers—see N4.2

N1.4: Solve real-world problems involving whole numbers—see N4.3

N2: FRACTIONS

N2.1: Identify and represent fractions using objects, pictures, and symbols, and identify relative magnitude

N2.1.1\_P Identify and express proper fractions as equivalent fractions (any denominator) (e.g., 13/25 = 26/50).

N2.1.2\_P Identify and express improper fractions as equivalent mixed numbers (or vice versa), with pictures or symbols (e.g., represent 9/6 as 1 3/6 or 1 1/2; use two arrays or rectangles and coloring to represent 9/6).

N2.1.1\_M N/A N2.1.1\_E N/A

N2.1.2\_M N/A N2.1.2\_E N/A

N2.1.3\_P Compare and order proper and improper fractions with different, unrelated denominators (e.g., 1/4; 7/10; 5/6).

N2.1.3\_M Compare and order positive and negative fractions (proper and improper) and mixed numbers (e.g., -2/3, 1/3, 5/6, -1 1/2, 5/9).

N2.1.3\_E N/A

N2.1.4\_P Compare and order fractions and mixed numbers (e.g., 9/6, 1 1/3, 5/12, 2 1/2).

N2.1.4\_M N/A N2.1.4\_E N/A

N2.2: Solve operations using fractions

N2.2.1\_P Add and subtract improper fractions or mixed numbers with different but related denominators (e.g., 2 2/3 + 1 1/6; 25/4 + 5/12).

N2.2.2\_P Multiply and divide proper fractions and divide improper fractions by whole numbers, and represent such operations with pictures or symbols (e.g., 2/5 ÷ 3/5; 3/4 x 2/6; 7/5 ÷ 2; represent 3/4 x 1/2 as a rectangle split into 4 equal parts with 3 parts shaded and each of the 4 equal parts split into 2 equal sections. Note that the smaller shaded sections represent the answer).

N2.2.1\_M Add and subtract improper fractions or mixed N2.2.1\_E N/A numbers with different, unrelated

denominators (e.g., 9/4 + 3/9; 3 1/6 - 2/5).

N2.2.2\_M Multiply and divide fractions (including proper N2.2.2\_E N/A and improper fractions and mixed numbers)

(e.g., 3/4 x 7/6 = ; 2/3 x 3 1/4 = ; 4/5 ÷ 5/3 = ).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| N2.3: Solve real-world problems involving fractions | | | |

N2.3.1\_P Solve real-world problems involving addition and subtraction of improper fractions and mixed numbers with different but related denominators (e.g., Maya is cutting some oranges for a picnic. She cuts each orange into 8 equal pieces. She puts 25 pieces of orange onto a large plate and 11 pieces of orange onto a smaller plate. What is the smallest number of whole oranges Maya could have cut?; A tree is now 3 and a half meters tall. When it was planted, it was 1 and one quarter meters tall. By how many meters has the tree grown since it was planted?).

N2.3.2\_P Solve real-world problems involving the multiplication of two proper fractions or the division of an improper fraction or mixed number by a whole number (e.g., Misha has half a pizza. If she shares it equally with her brother, what fraction of the original pizza will each receive?).

N2.3.1\_M Solve real-world problems involving the addition and subtraction of proper and improper fractions and mixed numbers with unrelated denominators (e.g., A carpenter has a piece of wood that measures 15 and 7/8 ft. She only needs a piece that measures 10 and 5/12 ft. What is the length of the piece of wood she should cut off the long piece?).

N2.3.2\_M Solve real-world problems involving the multiplication and division of fractions (including proper and improper fractions and mixed numbers) (e.g., A cake needs 1 and a half cups of flour. How much is needed to make half a cake?; Dean has a piece of wood that is 3/4 of a foot in length. He needs to cut it into pieces that are 1/16th of a foot long. How many pieces can he cut?).

N2.3.1\_E N/A

N2.3.2\_E N/A

N3: DECIMALS

N3.1: Identify and represent decimals using objects, pictures, and symbols, and identify relative magnitude

N3.1.1\_P Identify and represent quantities using decimal notation up to the hundredths place (e.g., identify that 0.65 is 65 hundredths).

N3.1.2\_P Compare and order decimal numbers up to the hundredths place (e.g., sort the following decimals from high to low: 0.8, 0.33, 0.08,

0.6).

N3.1.1\_M Identify and represent quantities using decimal notation beyond the hundredths place (e.g., identify that 0.655 is 655 thousandths).

N3.1.2\_M Compare and order decimal numbers beyond the hundredths place (e.g., sort the following decimals from low to high: 0.821, 0.33, 0.08, 0.698, 0.7).

N3.1.1\_E N/A

N3.1.2\_E N/A

N3.1.3\_P N/A N3.1.3\_M Compare and order positive and negative decimal numbers, including those beyond the thousandths place (e.g., compare

+0.821, -0.33, -0.08, +0.698, +0.7).

N3.1.3\_E N/A

N3.2: Represent decimals in equivalent ways (including fractions and percentages)

N3.2.1\_P Round decimal numbers to the nearest hundredths place (e.g., round 3.456 to 3.46).

N3.2.1\_M Round decimal numbers to any place value beyond the hundredths place (e.g., round 3.45619 to 3.4562).

N3.2.1\_E N/A

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N3.2.2\_P Identify and express fractions with denominators of 100 and everyday fractions, using decimal notation, and represent fractions with denominators of 100 as percentages (e.g., 3/4 = 0.75; 72/100 = 0.72

= 72%).

N3.2.3\_P Compare and order decimals (to the hundredths place) and proper fractions (e.g., place a list of decimals and proper fractions on a number line).

N3.2.2\_M Identify and express fractions with any denominator using decimal notation and vice versa (e.g., 752/1000 = 0.752; 7/8 = 0.875).

N3.2.3\_M Compare and order fractions, decimals, and percentages (e.g., place these numbers on a number line: 0.4, 1/2, 0.50%, 4/5, 0.25, 1/3,

0.25%).

N3.2.2\_E N/A

N3.2.3\_E Compare and order positive and negative decimals and fractions (e.g., place these numbers on a number line from -1 to +1: - 0.4, +1/2, -4/5, 0.25, -1/3, 3/4).

N3.2.4\_P N/A N3.2.4\_M Identify and express percentages as fractions with denominators of 10 or 100 or as decimals and vice versa (e.g., 80% = 80/100 or 8/10; 75% = 0.75).

N3.2.4\_E Identify and express percentages less than 1% and greater than 100% as fractions or mixed numbers and vice versa (e.g., 124% = 124/100; 0.2% = 2/1000).

N3.3: Solve operations using decimals

N3.3.1\_P Add and subtract decimal numbers up to the N3.3.1\_M Add and subtract any positive and negative

N3.3.1\_E N/A

hundredths place. Create or identify

concrete or picture models to represent such additions (e.g., 3.41 + 5.3).

decimal numbers.

N3.3.2\_P N/A N3.3.2\_M Multiply and divide a decimal number by a whole number.

N3.3.2\_E Multiply and divide two decimal numbers and divide a whole number by a decimal.

N3.4: Solve real-world problems involving decimals N3.4.1\_P Solve real-world problems involving the

addition and subtraction of decimals to the tenths place (e.g., Diego has 3.2 meters of roof sheeting. If he buys another 1.4 meters, how many meters of roof sheeting will he have altogether? Aminata has 32.5 kg of grout for tiling. If she uses 12.1 kg for a new project, how many kgs of tile grout will she have left?).

N3.4.1\_M Solve real-world problems involving addition and subtraction of decimals beyond the tenths place (e.g., Aria has a height of 1.55 meters. Her mother has a height of 1.63 meters. How much taller than Aria is her mother? Adwoa has 1.64 meters of roof sheeting and another 1.4 meters. How many meters of roof sheeting does she have?).

N3.4.1\_E N/A

N3.4.2\_P N/A N3.4.2\_M Solve real-world problems involving the multiplication or division of a decimal by a whole number (e.g., Misha buys 4 bags of sugar. Each bag holds 1.5 kg. How many kilos of sugar did he buy? Saira has 2.4 kg of sugar. She wants to separate the sugar into

3 bags of equal size. How many kgs should she put in each bag?).

N3.4.2\_E Solve real-world problems involving the multiplication or division of two decimal numbers (e.g., Pascal has seven .75-liter containers of olive oil. He sells half of them. How many liters of olive oil did he sell? Or Sheila buys a 4.5-liter barrel of olive oil. She sells them in 0.75-liter containers. How many containers can she make with the 4.5-liter barrel?).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| N4: INTEGERS | | | |
| N4.1: Identify and represent integers using objects, pictures, or symbols, and identify relative magnitude | | | |

N4.1.1\_P N/A N4.1.1\_M Compare and order integers (e.g., order the following from smallest to largest: -4, 6, -9,

2).

N4.1.1\_E N/A

N4.2: Solve operations using integers

N4.2.1\_P Multiply any positive integer by a two-digit number, with and without regrouping, and divide any positive integer by a one-digit number, with and without a remainder (e.g., 3427 x 68; 1380 ÷ 6 = ).

N4.2.2\_P Perform calculations involving two or more operations with positive integers, within the limits for partially meets expectations described above, respecting the order of operations (e.g., 6584 + 2187 x 38 = ; 675

÷ 9 x 652 = ).

N4.2.3\_P Identify factors of whole numbers within 100 and multiples of whole numbers within 20 (e.g., find all factors of 84; find multiples of 15).

N4.2.1\_M Multiply any two positive integers, with and without regrouping, and divide any integer by a two-digit number, with and without a remainder (e.g., 2342 x 1478; 3388 ÷ 15 =

).

N4.2.2\_M Perform calculations involving two or more operations with positive integers, within the limits for meets expectations described above, respecting the order of operations (e.g., (6584 + 2187) x 318 = ; (9675 - 823)

÷ 19 = ).

N4.2.3\_M Identify factors of whole numbers beyond 100 and multiples of whole numbers beyond 20 (e.g., find factors of 125 or find multiples of 25).

N4.2.1\_E N/A

N4.2.2\_E N/A

N4.2.3\_E Identify common factors and common multiples of two numbers (e.g., find the lowest common multiple and the greatest common factor of 12 and 16).

N4.2.4\_P N/A N4.2.4\_M Perform calculations involving operations with negative integers.

N4.2.4\_E N/A

N4.3: Solve real-world problems involving integers

N4.3.1\_P N/A N4.3.1\_M Solve real-world problems involving combinations of any 2 or more of the 4 operations, including problems involving measurement and currency units and:

* + addition and subtraction of any integers
  + multiplication of any positive integers
  + division of any positive integers by a positive 2-digit number with or without a remainder

(e.g., The temperature last night was -3 C. This morning it was +2 C. What was the change in temperature between last night and this morning?).

N4.3.1\_E Solve real-world problems involving the multiplication or division of two integers, including at least one negative integer (e.g., It is -8 degrees Celsius on Tuesday. On Wednesday, it is 3 times colder. What is the temperature on Wednesday?).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| N5: EXPONENTS AND ROOTS | | | |
| N5.1: Identify and represent exponents and roots using objects, pictures, or symbols, and identify relative magnitude | | | |

N5.1.1\_P N/A N5.1.1\_M Identify the square, cube, square root, and cube root of whole numbers using pictures and symbols, and represent a square or cube number using exponential notation (e.g., use square arrays or grids to represent square numbers or identify the square of a number; identify the square of 8 or the square root of 81; represent 64 as 82).

N5.1.1\_E N/A

N5.1.2\_P N/A N5.1.2\_M N/A N5.1.2\_E Identify and represent very large whole numbers using scientific notation and positive exponents (e.g., 600 = 6 x 102).

N5.1.3\_P N/A N5.1.3\_M N/A N5.1.3\_E Compare and order large numbers expressed in scientific notation (e.g., 3.1 x 105, 9.2 x 105, 2.7 x 103, 6.1 x 102).

N6: OPERATIONS ACROSS NUMBER

Not applicable to grade 7

M: MEASUREMENT

M1: LENGTH, WEIGHT, CAPACITY, VOLUME, AREA, AND PERIMETER

M1.1: Use non-standard and standard units to measure, compare, and order

M1.1.1\_P Make conversions between adjacent units of M1.1.1\_M Make conversions between non-adjacent

M1.1.1\_E Make conversions of units of length and

length and weight within a standard system of measurement (e.g., identify that the 16- centimeter pencil is 160 millimeters long).

units of length and weight within a standard system of measurement (e.g., convert kilometers to millimeters).

weight between different systems of measurement where the conversion factor is provided (e.g., convert 12 cm to inches given 1 inch is 2.54 cm, convert pounds to kilograms given 1 pound is 0.45 kg).

M1.1.2\_P Make conversions between adjacent units of M1.1.2\_M Make conversions between non-adjacent

M1.1.2\_E Make conversions of units of

capacity/volume within a standard system of measurement (e.g., identify that there are 4 pints in a 2-quart container).

M1.1.3\_P Read scales to the nearest marked increment on a variety of measuring tools involving decimals to the hundredths place, containing both labeled and unlabeled scale increments (e.g., read a depth gauge in a dam with scale increments increasing in 25- centimeter intervals and labels expressed as decimal meters (e.g., 1.25, 1.5, 1.75, 2.0) when the needle is pointing directly at a marked increment of the scale).

units of capacity/volume within a standard system of measurement (e.g., convert pints to gallons).

M1.1.3\_M Read scales on a variety of measuring tools by reading between marked scale increments (interpolating) (e.g., read a

kitchen scale marked in grams and kilograms with some unlabeled scale markings and needle pointing between two unlabeled scale markings; measure an angle using a protractor/angle measurer).

capacity/volume between different systems of measurement where the conversion factor is provided (e.g., convert 750 milliliters to pints given 1 pint is 473 mL).

M1.1.3\_E N/A

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| M1.2: Solve problems involving measurement | | | |

M1.2.1\_P Solve problems, including real-world problems, involving comparing the perimeters of polygons.

M1.2.2\_P Solve problems, including real-world problems, involving the area of compound shapes comprised of rectangles using concrete or pictorial representations of units (e.g., grid squares or tiles).

M1.2.1\_M Solve problems, including real-world problems, involving perimeter in which a length is unknown (e.g., identify the fifth length in a picture of an irregular pentagon with 4 sides labeled with length and a given perimeter).

M1.2.2\_M Solve problems, including real-world problems, involving the calculation of the area of compound shapes comprised of rectangles (e.g., calculate the area of a compound L-shape given a picture with the lengths of all sides provided).

M1.2.1\_E N/A

M1.2.2\_E Solve problems, including real-world problems, involving the calculation of the area of a triangle (e.g., work out the area of a triangle with base length and height given).

M1.2.3\_P N/A M1.2.3\_M N/A M1.2.3\_E Solve problems, including real-world problems, involving the calculation of the area of compound shapes comprising rectangles and triangles (e.g., calculate the area of a composite shape given a picture of the shape made up of a rectangle connected to a right-angled triangle with the lengths of all sides provided).

M1.2.4\_P N/A M1.2.4\_M N/A M1.2.4\_E Solve problems, including real-world problems, involving the calculation of the volume of a rectangular prism (e.g., calculate the volume in cubic centimeters of a box with a length of 10 cm, width of 10 cm, and height of 15 cm).

M2: TIME

M2.1: Tell time—subconstruct fully covered in grades 1-6 and is, therefore, assumed knowledge for grade 7

M2.2: Solve problems involving time

M2.2.1\_P Solve problems, including real-world problems, involving elapsed time across

a.m. and a.m. in countries that teach 12- hour time (e.g., calculate the difference between 10:30 a.m. and 3:15 p.m.).

M2.2.1\_M Solve problems, including real-world problems, involving conversion between 12- hour and 24-hour time (e.g., A ferry departs at 16:30 hours. It takes 2 hours and 15 minutes to reach its destination. At what time does the ferry arrive at its destination? Give your answer in a.m./p.m. time.).

M2.2.1\_E Solve problems, including real-world problems, involving time zones (e.g., When it is 4 p.m. on Tuesday in New York, it is 6 a.m. on Wednesday in Sydney. When it is 11 a.m. on Thursday in Sydney, what time and day is it in New York?).

M3: CURRENCY

M3.1: Use different currency units to create amounts—subconstruct fully covered in grades 1-3. Questions involving currency are covered under the relevant real-world problem subconstructs (e.g., N4.3 for integers, etc.)

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G: GEOMETRY

G1: PROPERTIES OF SHAPES AND FIGURES

G1.1: Differentiate shapes and figures by their attributes G1.1.1\_P Recognize and name types of quadrilaterals

(e.g., parallelogram; trapezium, etc.).

G1.1.1\_M N/A G1.1.1\_E N/A

G1.1.2\_P Identify parallel and perpendicular sides of shapes.

G1.1.2\_M Use the defining attributes (i.e., type of angle, parallel and perpendicular lines) of complex two-dimensional shapes to classify them.

G1.1.2\_E Recognize and name parts of the circle (i.e., radius, diameter, circumference) and identify the relationship between the radius and diameter.

G1.1.3\_P N/A G1.1.3\_M Estimate the size of angles by comparing to reference/benchmark angles (e.g., estimate the size of a given angle with reference to the fact that it is smaller than a right angle and larger than 45°).

G1.1.4\_P N/A G1.1.4\_M Recognize single‐step two-dimensional shape transformations expressed quantitatively (i.e., rotation by a given fraction of a turn, reflection along a given mirror line, or enlargement by a given scale factor).

G1.1.3\_E Know the angle sum of a triangle (e.g., determine the missing angle of a triangle where two angles are given).

G1.1.4\_E Describe and implement two-dimensional shape transformations (i.e., reflection, rotation, translation, enlargement/reduction).

G2: SPATIAL VISUALIZATIONS

G2.1: Compose and decompose shapes and figures G2.1.1\_P Identify front, top, and side views of a

familiar three-dimensional figure (i.e. prism, cylinder, cone, or pyramid) (e.g., identify that the top view of an upright cylinder is a

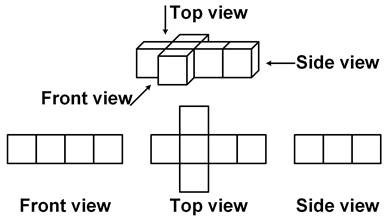
circle).

G3: POSITION AND DIRECTION

G3.1: Describe the position and direction of objects in space G3.1.1\_P Locate and plot points on a plane in the first

quadrant of a Cartesian coordinate system.

G2.1.1\_M Identify alternate views of the same compound or irregular three-dimensional shape, such as its front, top, and side view, a rotated view, or a view of a hidden side (e.g., label images (i), (ii), and (iii) as the front, top, and side view of the three-dimensional shape).



G3.1.1\_M Draw shapes in the first quadrant of a Cartesian coordinate system, and find missing points (e.g., if (1,1), (1,3), and (1,2) are three corners of a rectangle, identify the fourth corner).

G2.1.1\_E Identify the net of a familiar three- dimensional figure (i.e. prism, cylinder, cone, or pyramid) (e.g., fold or unfold mentally to answer the question, "What figure does this make when folded?"; "What figure does this make when unfolded?").

G3.1.1\_E Locate and plot points on a plane in all four quadrants of a Cartesian coordinate system.

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G3.1.2\_P N/A G3.1.2\_M Identify horizontal and/or vertical distances between two points in the first quadrant of the Cartesian coordinate system (e.g., using the Cartesian coordinate system, identify how many horizontal and vertical units is (1,1) from (3,4)).

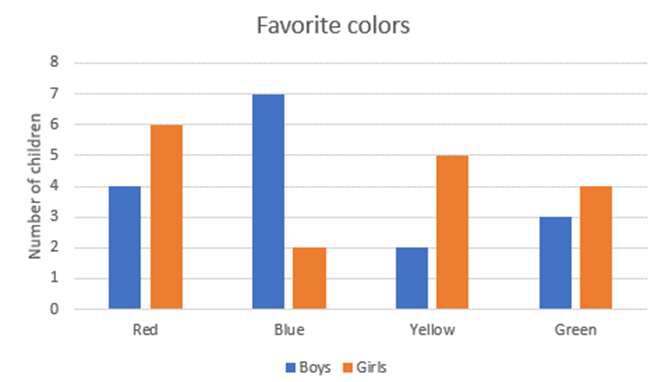
G3.1.2\_E N/A

S: STATISTICS AND PROBABILITY

S1: DATA MANAGEMENT

S1.1: Retrieve and interpret data presented in displays S1.1.1\_P Retrieve information from data displays that

S1.1.1\_M Retrieve categorical data from pie charts and S1.1.1\_E Organize data and construct pie charts and

arrange data into categories and sub- categories with a single- or multi-unit scale (e.g., How many girls liked green in this bar chart?).

Venn diagrams and bivariate data from line graphs and dot plots.

Venn diagrams (categorical data), and line graphs and dot plots (bivariate data) when some support is provided (e.g., construct a line graph when given labeled horizontal and/or vertical axes, or match a table to the correct pie chart given a range of pie chart options).

S1.2: Calculate and interpret central tendency

S1.2.1\_P Calculate the range for a set of data. S1.2.1\_M Solve problems, including real-world

problems, involving calculation of the mean, median, or mode of a set of data.

S1.2.1\_E Describe the effect of adding or removing a specific data value on the mean, median, or mode of a set of data (e.g., "What would be the effect of removing a score of 20 from the scores 20, 80, 70, and 75 on the mean?" with the possible answers being: a) it would increase; b) it would decrease; c) it would stay the same. The same question can be

asked about the effect on the median and the mode. Another example is: Juanita plays hockey and aims to achieve a mean of 3 goals per game by the end of the season.

Her goals for the first 4 games are shown: 2, 4, 1, 3. She has one more game to play this season. How many goals must she score in this game to achieve her aim?).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

S1.2.2\_P N/A S1.2.2\_M Compare key features of the distribution of two different but related sets of data (e.g., compare the heights of 10 grade 4 students to the heights of 10 grade 7 students with reference to minimum value, maximum value, and spread of the data).

S1.2.2\_E Compare the distribution of sub-categories within a set of data (e.g., compare temperatures in a 24-hour period split into day temperatures and night temperatures).

S2: CHANCE AND PROBABILITY

S2.1: Describe the likelihood of events in different ways S2.1.1\_P Compare the likelihoods of two or more

events happening, using descriptive words (e.g., Given a picture of a spinner with 5 equal colored sections—red, blue, yellow, green, and purple—the question is: "If the spinner is spun two times, what is the chance that it will land on blue both times?," and the possible answers are a) impossible,

1. unlikely, c) likely, and d) certain).

S2.1.1\_M Calculate the probability of a simple event happening, with the answer expressed as a fraction, decimal, or percentage, and place probability values or events on a continuum from 0 (impossible) to 1 (certain), with 0.5 meaning equal chance of occurring or not occurring. (e.g., What is the probability of rolling a 6 on a standard number die?).

S2.1.1\_E Find the expected number of occurrences of a specific independent outcome when a probability experiment is repeated many times (e.g., calculate the expected number of heads with 50 flips of a fair coin).

S2.2: Identify permutations and combinations—not applicable to grade 7

A: ALGEBRA

A1: PATTERNS

A1.1: Recognize, describe, extend, and generate patterns A1.1.1\_P Generate a pattern from a given rule, or

match a pattern to a given rule using any operation (e.g., start at 5 and increase by 3 to generate 5, 8, 11, 14, 17 . . .; match the

pattern 3, 6, 12, 24, … to one of these rules

1. start at 3 and add 3, b) start at 3 and double, c) start at 3 and add 6, and d) start at 3 and halve).

A1.1.1\_M Recognize and extend non-linear patterns, including squaring patterns, which may be supported by a visual representation (e.g., recognize that 1, 3, 6, 10 increases by 2,

then 3, then 4, when accompanied by dots or points arranged into triangles; extend the pattern 2, 4, 16, 25).

A1.1.1\_E Generate a non-linear pattern from a given rule using any operation (e.g., start at 1 and then increase by 1, 2, 3, 4 . . . to generate 1,

2, 4, 7, 11 or extend to 16, 22, 29).

A2: EXPRESSIONS

A2.1: Evaluate, model, and compute with expressions

A2.1.1\_P N/A A2.1.1\_M Use linear expressions to represent problem situations with a single variable (e.g., The cost of buying cinema tickets online is £12 per ticket plus a £2 booking fee. Write this as an expression where x is the number of tickets purchased).

A2.1.2\_P N/A A2.1.2\_M Add and subtract linear expressions (e.g., (3x + 4y) - (2x + 5y)).

A2.1.1\_E Use expressions to represent problem situations with multiple variables (e.g., Akeelah bought 4 blouses for x dollars and a wristwatch for y dollars. Represent this as an expression).

A2.1.2\_E Multiply and divide linear monomials, and simplify linear expressions by using the distributive property (e.g., multiply (3x)(5y); simplify 2x(3x + 4)).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| A3: RELATIONS AND FUNCTIONS | | | |
| A3.1: Solve problems involving variation (ratio, proportion, and percentage) | | | |

A3.1.1\_P Reason proportionally to answer real-world problems involving a unit ratio expressed informally (e.g., If Tulika needs 3 eggs for 1 cake, how many eggs does Tulika need for 5 cakes?).

A3.1.1\_M Reason proportionally to answer real-world problems involving a ratio (e.g., Purple paint is made from 2 parts blue paint to 3 parts red paint. I have 10 parts of blue paint. How many parts of red paint do I need?; The ratio of teachers to students on a school trip must be 1:9. How many teachers are needed if there are 36 students?).

A3.1.1\_E Solve proportions written as two equal ratios

(e.g., solve 2/3 = 10/x).

A3.1.2\_P N/A A3.1.2\_M Solve problems, including real-world problems, involving finding the percentages of a known quantity (e.g., 20% of 70 = ; A stadium holds 3,200 people. If the stadium is 80% full, how many people are in the stadium?).

A3.1.2\_E Solve problems, including real-world problems, involving percent increase or decrease (e.g., A shirt that normally costs 25 euros is on sale for 10% off. How much does it cost now?; A shirt cost 25 euros in November and then 20 euros in December. What is the percent decrease in cost?).

A3.2: Demonstrate an understanding of equivalency—subconstruct fully covered in grades 1-6 and is assumed knowledge for grade 7

A3.3: Solve equations and inequalities

A3.3.1\_P Represent and solve problems, including real-world problems, using an equation with one of the four operations (e.g., solve 3x = 18; Abu has 5 water bottles that weigh a total of 15 pounds. How much does each water bottle weigh? Represent the problem using an equation).

A3.3.1\_M Represent and solve problems, including real-world problems, using a two-step equation with any of the four operations (e.g., solve 3x + 4 = 22; Some people got on a bus, doubling the number of passengers. At the next stop, 8 people got off, leaving 16 people on the bus. Represent the situation as an equation, and solve to find the number of people on the bus originally).

A3.3.1\_E Represent and solve problems, including real-world problems, using more than two steps, including those that involve the distributive property, combining like terms,

etc. (e.g., solve 3x + 4 (x + 2) = 22; The older children get two more cookies than the younger children. If there are three younger children and four older children and 22 cookies were distributed, how many cookies did the younger children get?; Represent the situation as an equation and solve).

A3.3.2\_P N/A A3.3.2\_M N/A A3.3.2\_E Interpret equations and their solutions in terms of context (e.g., given an algebraic graph, such as a distance-time graph, interpret the slope as speed).

A3.4: Interpret and evaluate functions—not applicable to grade 7

GLOBAL PROFICIENCY FOR MATHEMATICS: GRADES 1 TO 9 92

# Grade 8

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N: NUMBER AND OPERATIONS

N1: WHOLE NUMBERS - in grades 7 and 8, this construct is covered in N4: INTEGERS

N1.1: Identify and count in whole numbers, and identify their relative magnitude—subconstruct fully covered in grades 1-6 and is, therefore, assumed knowledge for grade 8

N1.2: Represent whole numbers in equivalent ways—subconstruct fully covered in grades 1-6 and is, therefore, assumed knowledge for grade 8

N1.3: Solve operations using whole numbers—see N4.2

N1.4: Solve real-world problems involving whole numbers—see N4.3

N2: FRACTIONS

N2.1: Identify and represent fractions using objects, pictures, and symbols, and identify relative magnitude—subconstruct fully covered in grades 1-7 and is, therefore, assumed knowledge for grade 8

N2.2: Solve operations using fractions—subconstruct fully covered in grades 1-7 and is, therefore, assumed knowledge for grade 8

N2.3: Solve real-world problems involving fractions—subconstruct fully covered in grades 1-7 and is, therefore, assumed knowledge for grade 8

N3: DECIMALS

N3.1: Identify and represent decimals using objects, pictures, and symbols, and identify relative magnitude—subconstruct fully covered in grades 1-7 and is, therefore, assumed knowledge for grade 8

N3.2: Represent decimals in equivalent ways (including fractions and percentages)

N3.2.1\_P Round decimal numbers to any place value beyond the hundredths place (e.g., round 3.45619 to 3.4562).

N3.2.2\_P Identify and express fractions with any denominator using decimal notation and vice versa (e.g., 752/1000 = 0.752; 7/8 = 0.875).

N3.2.1\_M N/A N3.2.1\_E N/A

N3.2.2\_M N/A N3.2.2\_E N/A

N3.2.3\_P Compare and order fractions, decimals, and percentages (e.g., place these numbers on a number line: 0.4, 1/2, 0.50%, 4/5, 0.25, 1/3,

0.25%).

N3.2.4\_P Identify and express percentages as fractions with denominators of 10 or 100 or as decimals and vice versa (e.g., 80% = 80/100 or 8/10; 75% = 0.75).

N3.3: Solve operations using decimals

N3.2.3\_M Compare and order positive and negative decimals and fractions (e.g., place these numbers on a number line from -1 to +1: - 0.4, +1/2, -4/5, 0.25, -1/3, 3/4).

N3.2.4\_M Identify and express percentages less than 1% and greater than 100% as fractions or mixed numbers and vice versa (e.g., 124% = 1 24/100; 0.2% = 2/1000).

N3.2.3\_E N/A

N3.2.4\_E N/A

N3.3.1\_P Add and subtract any positive and negative decimal numbers.

N3.3.2\_P Multiply and divide a decimal number by a whole number.

N3.3.1\_M N/A N3.3.1\_E N/A

N3.3.2\_M Multiply and divide two decimal numbers and N3.3.2\_E N/A divide a whole number by a decimal.

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| N3.4: Solve real-world problems involving decimals | | | |

N3.4.1\_P Solve real-world problems involving addition and subtraction of decimals beyond the tenths place (e.g., Aria has a height of 1.55 meters. Her mother has a height of 1.63 meters. How much taller than Aria is her mother? Adwoa has 1.64 meters of roof sheeting and another 1.4 meters. How many meters of roof sheeting does she have?).

N3.4.1\_M N/A N3.4.1\_E N/A

N3.4.2\_P Solve real-world problems involving the multiplication or division of a decimal by a whole number (e.g., Misha buys 4 bags of sugar. Each bag holds 1.5 kg. How many kilos of sugar did he buy? Saira has 2.4 kg of sugar. She wants to separate it into three bags of equal size. How many kgs should she put in each bag?).

N3.4.2\_M Solve real-world problems involving the multiplication or division of two decimal numbers (e.g., Pascal has seven .75-liter containers of olive oil. He sells half of them. How many liters of olive oil did he sell?; Sheila buys a 4.5-liter barrel of olive oil. She sells it in 0.75-liter containers. How many containers can she make with the 4.5-liter barrel?).

N3.4.2\_E N/A

N4: INTEGERS

N4.1: Identify and represent integers using objects, pictures, or symbols, and identify relative magnitude—subconstruct fully covered in grade 7 and is, therefore, assumed knowledge for grade 8

N4.2: Solve operations using integers—subconstruct fully covered in grade 7 and is, therefore, assumed knowledge for grade 8

N4.2.1\_P Multiply any two positive integers, with and without regrouping, and divide any integer by a two-digit number, with and without a remainder (e.g., 2342 x 1478; 3388 ÷ 15 =

).

N4.2.2\_P Perform calculations involving two or more operations with positive integers, within the limits for meets expectations described above, respecting the order of operations (e.g., (6584 + 2187) x 318 = ; (9675 - 823)

÷ 19 = ).

N4.2.1\_M N/A N4.2.1\_E N/A

N4.2.2\_M N/A N4.2.2\_E N/A

N4.2.3\_P Identify factors of whole numbers beyond 100 and multiples of whole numbers beyond 20 (e.g., find factors of 125 or find multiples of 25).

N4.2.3\_M Identify common factors and common multiples of two numbers (e.g., find the lowest common multiple and the greatest common factor of 12 and 16).

N4.2.3\_E N/A

N4.2.4\_P Perform calculations involving operations with negative integers.

N4.2.4\_M N/A N4.2.4\_E N/A

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| N4.3: Solve real-world problems involving integers | | | |

N4.3.1\_P Solve real-world problems involving combinations of any two or more of the four operations, including problems involving measurement and currency units and:

* addition and subtraction of any integers
* multiplication of any positive integers
* division of any positive integers by a positive two-digit number with or without a remainder

(e.g., The temperature last night was -3 C. This morning it was +2 C. What was the change in temperature between last night and this morning?).

N4.3.1\_M Solve real-world problems involving the multiplication or division of two integers, including at least one negative integer (e.g., It is -8 degrees Celsius on Tuesday. On Wednesday, it is three times colder. What is the temperature on Wednesday?).

N4.3.1\_E N/A

N5: EXPONENTS AND ROOTS

N5.1: Identify and represent exponents and roots using objects, pictures, or symbols, and identify relative magnitude

N5.1.1\_P Identify the square, cube, square root, and cube root of whole numbers using pictures and symbols, and represent a square or cube number using exponential notation (e.g., use square arrays or grids to represent square numbers or identify the square of a number; identify the square of 8 or the square root of 81; represent 64 as 82).

N5.1.1\_M N/A N5.1.1\_E N/A

N5.1.2\_P N/A N5.1.2\_M Identify and represent very large whole numbers using scientific notation and positive exponents (e.g., 600 = 6 x 102).

N5.1.3\_P N/A N5.1.3\_M Compare and order large numbers expressed in scientific notation (e.g., 3.1 x 105, 9.2 x 105, 2.7 x 103, 6.1 x 102).

N5.1.2\_E Identify and represent very small numbers using scientific notation and negative exponents (e.g., 0.065 is 6.5 x 10-2).

N5.1.3\_E Compare and order large and small numbers expressed in scientific notation (e.g., 3.1 x 105, 9.2 x 10-5, 2.7 x 103; 6.1 x 10-2).

N5.2: Solve operations involving exponents and roots

N5.2.1\_P N/A N5.2.1\_M N/A N5.2.1\_E Multiply and divide quantities expressed in exponential notation, including scientific notation (e.g., 35 ÷ 32 or 43 x 42).

N6: OPERATIONS ACROSS NUMBER

N6.1: Solve operations involving integers, fractions, decimals, percentages, and exponents

N6.1.1\_P Perform calculations involving two or more operations with integers, decimals, and fractions, within the limits for partially meets expectations described above, respecting the order of operations.

N6.1.1\_M Perform calculations involving two or more operations of integers, decimals, and fractions, within the limits for meets expectations described above, respecting the order of operations.

N6.1.1\_E Perform calculations involving two or more operations of integers, decimals, and fractions and exponents, within the limits for exceeds expectations described above, respecting the order of operations.

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

M: MEASUREMENT

M1: LENGTH, WEIGHT, CAPACITY, VOLUME, AREA, AND PERIMETER

M1.1: Use non-standard and standard units to measure, compare, and order

M1.1.1\_P Make conversions between non-adjacent units of length and weight within a standard system of measurement (e.g., convert kilometers to millimeters).

M1.1.1\_ M

Make conversions of units of length and weight between different systems of measurement when the conversion factor is provided (e.g., convert 12 cm to inches given 1 inch is 2.54 cm, or convert pounds to kilograms given 1 pound is 0.45 kg).

M1.1.1\_ E

N/A

M1.1.2\_P Make conversions between non-adjacent

M1.1.2\_

Make conversions of units of capacity/volume M1.1.2\_

N/A

units of capacity/volume within a standard M system of measurement (e.g., convert pints

to gallons).

between different systems of measurement E where the conversion factor is provided (e.g., convert 750 milliliters to pints given 1 pint is

473 mL).

M1.2: Solve problems involving measurement M1.2.1\_P Solve problems, including real-world

problems, involving perimeter in which the unknown is a length (e.g., identify the fifth length in a picture of an irregular pentagon with four sides labeled with length and a given perimeter).

M1.2.1\_ M

N/A M1.2.1\_

E

Solve problems, including real-world problems, involving the calculation of the circumference of a circle given the diameter or radius and vice versa.

M1.2.2\_P Solve problems, including real-world problems, involving the calculation of the area of compound shapes comprised of rectangles (e.g., calculate the area of a compound L-shape given a picture with the lengths of all sides provided).

M1.2.2\_ M

Solve problems, including real-world problems, involving the calculation of the area of a triangle (e.g., work out the area of a triangle with base length and height given).

M1.2.2\_ E

Solve problems, including real-world problems, involving the calculation of the area of a circle given the diameter or radius and vice versa.

M1.2.3\_P N/A M1.2.3\_

M

M1.2.4\_P N/A M1.2.4\_

M

Solve problems, including real-world problems, involving the calculation of the area of compound shapes comprising rectangles and triangles (e.g., calculate the area of a composite shape given a picture of the shape made up of a rectangle connected to a right-angled triangle with the lengths of all sides provided).

Solve problems, including real-world problems, involving the calculation of the volume of a rectangular prism (e.g., calculate the volume in cubic centimeters of a box with a length of 10 cm, width of 10 cm, and height of 15 cm).

M1.2.3\_ E

M1.2.4\_ E

Solve problems, including real-world problems, involving the calculation of the surface area of a familiar polyhedron (i.e., a rectangular prism, square-based pyramid, triangular prism) (e.g., calculate the surface area in square centimeters of a box with a length of 10 cm, width of 10 cm, and height of 15 cm).

Solve problems, including real-world problems, involving calculating the volume of a non-rectangular prism, given its dimensions (e.g., calculate the volume of a regular triangular prism, with the length of

one side of the base and its height provided).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| M2: TIME | | | |
| M2.1: Tell time—subconstruct fully covered in grades 1-5 and is, therefore, assumed knowledge for grade 8 | | | |

M2.2: Solve problems involving time

M2.2.1\_P Solve problems, including real-world

M2.2.1\_

Solve problems, including real-world

M2.2.1\_

Solve problems, including real-world

problems, involving conversion between 12- M hour and 24-hour time (e.g., A ferry departs

at 1630 hours. It takes 2 hours and 15 minutes to reach its destination. At what time does the ferry arrive at its destination? Give your answer in am/pm time).

problems, involving time zones (e.g., When it E is 4 p.m. on Tuesday in New York, it is 6 a.m. on Wednesday in Sydney. When it is 11 a.m.

on Thursday in Sydney, what time and day will it be in New York?).

problems, involving conversion between years, months, weeks, days, hours, fractions of hours or minutes (e.g., Ali spends 2 hours per week practicing piano. How many days per year does he spend practicing piano?).

M3: CURRENCY

M3.1: Use different currency units to create amounts—subconstruct fully covered in grades 1-3. Questions involving currency are covered under the relevant real-world problem subconstructs (e.g., N4.3 for integers, etc.)

G: GEOMETRY

G1: PROPERTIES OF SHAPES AND FIGURES

G1.1: Differentiate shapes and figures by their attributes G1.1.1\_P Use the defining attributes (i.e., type of

angle, parallel and perpendicular lines) of complex two-dimensional shapes to classify them.

G1.1.2\_P Estimate the size of angles by comparing to reference/benchmark angles (e.g., estimate the size of a given angle with reference to the fact that it is smaller than a right angle and larger than 45°).

G1.1.3\_P Recognize single‐step, two-dimensional shape transformations expressed quantitatively (i.e., rotation by a given fraction of a turn, reflection along a given mirror line, or enlargement by a given scale factor).

G1.1.1\_M Recognize and name parts of the circle (i.e., radius, diameter, circumference) and identify the relationship between the radius and diameter.

G1.1.2\_M Use the angle sum of a triangle to solve problems (e.g., determine the missing angle of a triangle where two angles are given).

G1.1.3\_M Describe and implement two-dimensional shape transformations (i.e., reflection, rotation, translation, enlargement/reduction).

G1.1.1\_E N/A

G1.1.2\_E Use the angle relationships associated with intersecting lines, and with parallel lines intersected by a transverse line to solve problems (e.g., calculate missing angles on a diagram with parallel and intersecting lines).

G1.1.3\_E Describe and implement sequential two- dimensional shape transformations (i.e., reflection, rotation, translation, enlargement/reduction).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| G2: SPATIAL VISUALIZATIONS | | | |
| G2.1: Compose and decompose shapes and figures | | | |

G2.1.1\_P Identify alternate views of the same compound or irregular three-dimensional shape, such as its front, top, and side view, a rotated view, or a view of a hidden side (e.g., label images (i), (ii), and (iii) as the front, top, and side view of the three- dimensional shape).

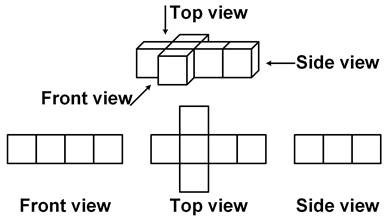
G3: POSITION AND DIRECTION

G3.1: Describe the position and direction of objects in space G3.1.1\_P Draw shapes in the first quadrant of a

Cartesian coordinate system, and find missing points (e.g., if (1,1), (1,3), and (1,2) are three corners of a rectangle, identify the fourth corner).

G3.1.2\_P Identify horizontal and/or vertical distances between two points in the first quadrant of the Cartesian coordinate system (e.g., using the Cartesian coordinate system, identify how many horizontal and vertical units is (1,1) from (3,4)).

G2.1.1\_M Identify the net of a familiar three- dimensional figure (i.e. prism, cylinder, cone, or pyramid) (e.g., fold or unfold mentally to answer the question, "What figure does this make when folded?"; "What figure does this make when unfolded?").



G3.1.1\_M Locate and plot points on a plane in all four quadrants of a Cartesian coordinate system.

G3.1.2\_M

N/A

G2.1.1\_E Identify a cross-section of a familiar three- dimensional figure (i.e. prism, cylinder, cone, or pyramid) (e.g., identify that the cross section of a cylinder that is not parallel to the base is an ellipse).

G3.1.1\_E Draw shapes in all four quadrants of a Cartesian coordinate system, and find missing points (e.g., If (1,2), (-3,2), and (-3,-

2) are three corners of a square, what is the fourth corner?).

G3.1.2\_E Describe and implement a single transformation (i.e., reflection, rotation, translation, enlargement/reduction) of a two- dimensional shape in all four quadrants of a Cartesian coordinate system.

S: STATISTICS AND PROBABILITY

S1: DATA MANAGEMENT

S1.1: Retrieve and interpret data presented in displays

S1.1.1\_P Retrieve categorical data from pie charts and S1.1.1\_M Organize data and construct pie charts and

S1.1.1\_E N/A

Venn diagrams and bivariate data from line graphs and dot plots.

Venn diagrams (categorical data), and line graphs and dot plots (bivariate data) when some support is provided (e.g., construct a line graph when given labeled horizontal and/or vertical axes, or match a table to the correct pie chart given a range of pie chart options).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| S1.2: Calculate and interpret central tendency | | | |

S1.2.1\_P Solve problems, including real-world problems, involving calculation of the mean, median, or mode of a set of data.

S1.2.2\_P Compare key features of the distribution of two different but related sets of data (e.g., compare the heights of 10 grade 4 students to the heights of 10 grade 7 students with reference to minimum value, maximum value, and spread of the data).

S1.2.1\_M Describe the effect of adding or removing a specific data value on the mean, median, or mode of a set of data (e.g., "What would be the effect of removing a score of 20 from the scores 20, 80, 70, and 75 on the mean?" with the possible answers being: a) it would increase, b) it would decrease, c) it would stay the same. The same question can be asked about the effect on the median and the mode. Another example is: Juanita plays hockey and aims to achieve a mean of 3 goals per game by the end of the season.

Her goals for the first four games are shown: 2, 4, 1, 3. She has one more game to play this season. How many goals must she score in this game to achieve her aim?).

S1.2.2\_M Compare the distribution of sub-categories within a set of data (e.g., compare temperatures in a 24-hour period split into day temperatures and night temperatures).

S1.2.1\_E Determine and compare the mean, median, and mode for different sets of data and choose which is most appropriate in a given context (e.g., determine why the median is more appropriate than the mean as a representation of house prices in a given area).

S1.2.2\_E Recognize the effect of outliers in a set of data on the mean and median.

S1.2.3\_P N/A S1.2.3\_M N/A S1.2.3\_E Identify desirable characteristics of sampling methods that will enable the mean of a sample to be as close as possible to the mean of a population (e.g., Anoush wants to determine the mean number of siblings each student in her school has. She decides to ask a sample of students. For which of these samples will the mean of the sample be closest to the mean of the whole school: a)

The first 10 students she sees in the corridor,

1. All the students on her football team, c) 50 grade 7 students selected randomly, or d) 50 students from various grade levels selected randomly?).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| S2: CHANCE AND PROBABILITY | | | |
| S2.1: Describe the likelihood of events in different ways | | | |

S2.1.1\_P Calculate the probability of a simple event happening, with the answer expressed as a fraction, decimal, or percentage, and place probability values or events on a continuum from 0 (impossible) to 1 (certain), with 0.5 meaning equal chance of occurring or not occurring. (e.g., What is the probability of rolling a 6 on a standard number die?).

S2.1.1\_M Find the expected number of occurrences of a specific independent outcome when a probability experiment is repeated many times (e.g., calculate the expected number of heads with 50 flips of a fair coin).

S2.1.1\_E Calculate probabilities of different outcomes for compound events containing two simple events when they can be listed as a discrete sample space (e.g., calculate the chance of rolling a sum of 7 when rolling two standard number dice).

S2.2: Identify permutations and combinations

S2.2.1\_P N/A S2.2.1\_M N/A S2.2.1\_E Systematically count all the possible outcomes (sample space) for a situation involving a compound event comprised of two simple events with replacement (e.g., calculate all of the possible outcomes when selecting a marble from a bag containing 5 marbles, then selecting a second marble after putting the first marble back in the bag)

and without replacement (e.g., calculate all of the possible outcomes when selecting a card randomly from a set containing 1 yellow, 1 blue, 1 red, and 1 green card, then selecting a second card without putting the first card back into the set).

A: ALGEBRA

A1: PATTERNS

A1.1: Recognize, describe, extend and generate patterns—subconstruct fully covered in grades 1-7 and is, therefore, assumed knowledge for grade 8

A2: EXPRESSIONS

A2.1: Evaluate, model, and compute with expressions A2.1.1\_P Use linear expressions to represent problem

situations with a single variable (e.g., The cost of buying cinema tickets online is £12 per ticket plus a £2 booking fee. Write this as an expression where x is the number of tickets purchased).

A2.1.2\_P Add and subtract linear expressions (e.g., (3x + 4y) - (2x + 5y)).

A2.1.1\_M Use expressions to represent problem situations with multiple variables (e.g., Akeelah bought 4 blouses for x dollars and a wristwatch for y dollars. Represent this as an expression).

A2.1.2\_M Multiply and divide linear monomials, and simplify linear expressions by using the distributive property (e.g., multiply (3x)(5y); simplify 2x(3x + 4)).

A2.1.1\_E N/A

A2.1.2\_E Multiply two binomial linear expressions

(e.g., multiply (3x 4y)(2x + 5y)).

A2.1.3\_P N/A A2.1.3\_M Evaluate and simplify exponential expressions using the Laws of Exponents (e.g., evaluate 2x3 when x = 7; simplify (2x3)2).

A2.1.3\_E Factor linear and exponential expressions using the greatest common factor (e.g., factor 4x2+ 8xy - 6x to 2x(2x + 4y - 3)).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

A3: RELATIONS AND FUNCTIONS

A3.1: Solve problems involving variation (ratio, proportion, and percentage)

A3.1.1\_P Reason proportionally to answer real-world problems involving a ratio (e.g., Purple paint is made from 2 parts blue paint to 3 parts red paint. I have 10 parts of blue paint. How many parts of red paint do I need?; The ratio of teachers to students on a school trip must be 1:9. How many teachers are needed if there are 36 students?).

A3.1.2\_P Solve problems, including real-world problems, involving finding the percentages of a known quantity (e.g., 20% of 70 = ; A stadium holds 3,200 people. If the stadium is 80% full, how many people are in the stadium?).

A3.1.1\_M Solve proportions written as two equal ratios

(e.g., solve 2/3 = 10/x).

A3.1.2\_M Solve problems, including real-world problems, involving percent increase or decrease (e.g., A shirt that normally costs 25 euros is on sale for 10% off. How much does it cost now?; A shirt cost 25 euros in November and then 20 euros in December. What is the percent decrease in cost?).

A3.1.1\_E Write a proportion as two equal ratios to model a proportional relationship (e.g., write 2/3 = 10/x to represent a problem that says, "Purple paint is made from 2 parts blue paint to 3 parts red paint. If I have 10 parts of blue paint. How many parts of red paint do I need?").

A3.1.2\_E Solve problems, including real-world problems, involving percentages where the percentage and final quantity are known, but the initial quantity is not (e.g., Ana paid $8 for a belt that was on sale. The price had been reduced by 20%. What was the original price of the belt?).

A3.2: Demonstrate an understanding of equivalency—subconstruct fully covered in grades 1-6 and is assumed knowledge for grade 8

A3.3: Solve equations and inequalities

A3.3.1\_P Represent and solve problems, including real-world problems, using a two-step equation with any of the four operations (e.g., solve 3x + 4 = 22; Some people got on a bus, doubling the number of passengers. At the next stop, 8 people got off, leaving 16 people on the bus. Represent as an equation, and solve to find the number of people on the bus originally).

A3.3.1\_M Represent and solve problems, including real-world problems, using more than two steps, including those that involve the distributive property, combining like terms,

etc. (e.g., solve 3x + 4 (x + 2) = 22; The older children get two more cookies than the younger children. If there are three younger children and four older children and 22 cookies were distributed, how many cookies did the younger children get?; Represent as 3x + 4 (x + 2) = 22) and solve).

A3.3.1\_E Represent and solve problems, including real-world problems, using two linear

equations (e.g., If 3x + 4y = 24 and 4x + 3y = 22, solve for x and y; Or, Andre has more money than Bob. If Andre gives Bob $20, they would have the same amount. If Bob gave Andre $22, Andre would then have twice as much as Bob. Represent as two linear equations, and work out how much each of them actually has.).

A3.3.2\_P N/A A3.3.2\_M Interpret equations and their solutions in terms of context (e.g., given an algebraic graph, such as a distance-time graph, interpret the slope as speed).

A3.3.2\_E Graph linear equations, including those of the form y = k and x = k and calculate the slope of a line from a table, equation, graph, or ordered pairs. Identify the x- and y- intercepts of the graphed line of an equation (e.g., graph y = 5x + 2; graph y = 4; graph x

= 4; in the equation y = 3x + 2, identify what the slope is; given a coordinate at (2,4) and a coordinate of (3,7), solve for the slope).

A3.4: Interpret and evaluate functions—not applicable to grade 8

GLOBAL PROFICIENCY FOR MATHEMATICS: GRADES 1 TO 9 102

# Grade 9

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

N: NUMBER AND OPERATIONS

N1: WHOLE NUMBERS

N1.1: Identify and count in whole numbers, and identify their relative magnitude—subconstruct fully covered in grades 1-6 and is, therefore, assumed knowledge for grade 9

N1.2: Represent whole numbers in equivalent ways—subconstruct fully covered in grades 1-6 and is, therefore, assumed knowledge for grade 9

N1.3: Solve operations using whole numbers—subconstruct fully covered in grades 1-6 and is, therefore, assumed knowledge for grade 9

N1.4: Solve real-world problems involving whole numbers—subconstruct fully covered in grades 1-6 and is, therefore, assumed knowledge for grade 9

N2: FRACTIONS

N2.1: Identify and represent fractions using objects, pictures, and symbols, and identify relative magnitude—subconstruct fully covered in grades 1-7 and is, therefore, assumed knowledge for grade 9

N2.2: Solve operations using fractions—subconstruct fully covered in grades 1-7 and is, therefore, assumed knowledge for grade 9

N2.3: Solve real-world problems involving fractions—subconstruct fully covered in grades 1-7 and is, therefore, assumed knowledge for grade 9

N3: DECIMALS

N3.1: Identify and represent decimals using objects, pictures, and symbols, and identify relative magnitude—subconstruct fully covered in grades 1-7 and is, therefore, assumed knowledge for grade 9

N3.2: Represent decimals in equivalent ways (including fractions and percentages)—subconstruct fully covered in grades 1-8 and is, therefore, assumed knowledge for grade 9

N3.3: Solve operations using decimals—subconstruct fully covered in grades 1-8 and is, therefore, assumed knowledge for grade 9

N3.4: Solve real-world problems involving decimals—subconstruct fully covered in grades 1-8 and is, therefore, assumed knowledge for grade 9

N4: INTEGERS

N4.1: Identify and represent integers using objects, pictures, or symbols, and identify relative magnitude—subconstruct fully covered in grade 7 and is, therefore, assumed knowledge for grade 9

N4.2: Solve operations using integers—subconstruct fully covered in grades 7-8 and is, therefore, assumed knowledge for grade 9

N4.3: Solve real-world problems involving integers—subconstruct fully covered in grades 7-8 and is, therefore, assumed knowledge for grade 9

N5: EXPONENTS AND ROOTS

N5.1: Identify and represent exponents and roots using objects, pictures, or symbols, and identify relative magnitude

N5.1.1\_P Identify and represent very large whole numbers using scientific notation and positive exponents (e.g., 600 = 6 x 102).

N5.1.1\_M Identify and represent very small numbers using scientific notation and negative exponents (e.g., 0.065 is 6.5 x 10-2).

N5.1.1\_E N/A

N5.1.2\_P Compare and order large numbers expressed in scientific notation (e.g., 3.1 x 105, 9.2 x 105, 2.7 x 103, 6.1 x 102).

N5.1.2\_M Compare and order large and small numbers N5.1.2\_E N/A expressed in scientific notation (e.g., 3.1 x

105, 9.2 x 10-5, 2.7 x 103, 6.1 x 10-2).

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| N5.2: Solve operations involving exponents and roots | | | |

N5.2.1\_P N/A N5.2.1\_M Add and subtract quantities expressed in exponential notation (e.g., 32 + 35 = , including scientific notation).

N5.2.2\_P N/A N5.2.2\_M Multiply and divide quantities expressed in exponential notation, including scientific notation (e.g., 35 ÷ 32 or 43 x 42).

N5.2.1\_E N/A N5.2.2\_E N/A

N6: OPERATIONS ACROSS NUMBER

N6.1: Solve operations involving integers, fractions, decimals, percentages, and exponents

N6.1.1\_P Perform calculations involving two or more operations of integers, decimals, and fractions, within the limits for partially meets expectations described above, respecting the order of operations.

N6.1.1\_M Perform calculations involving two or more operations of integers, decimals, fractions, and exponents, within the limits for meets expectations described above, respecting the order of operations.

N6.1.1\_E N/A

M: MEASUREMENT

M1: LENGTH, WEIGHT, CAPACITY, VOLUME, AREA, AND PERIMETER

M1.1: Use non-standard and standard units to measure, compare, and order—subconstruct fully covered in grades 1-8 and is, therefore, assumed knowledge for grade 9

M1.2: Solve problems involving measurement

M1.2.1\_P N/A M1.2.1\_M Solve problems, including real-world problems, involving the calculation of the circumference of a circle given the diameter or radius and vice versa.

M1.2.1\_E Use the trigonometric ratios sine, cosine, and tangent to calculate an unknown angle of a right-angled triangle given two side lengths, or an unknown side length given an angle and one side length.

M1.2.2\_P Solve problems, including real-world problems, involving the calculation of the area of a triangle (e.g., work out the area of a triangle with base length and height given).

M1.2.3\_P Solve problems, including real-world problems, involving the calculation of the area of compound shapes comprising rectangles and triangles (e.g., calculate the area of a composite shape given a picture of the shape made up of a rectangle

connected to a right-angled triangle with the lengths of all sides provided).

M1.2.4\_P Solve problems, including real-world problems, involving the calculation of the volume of a rectangular prism (e.g., calculate the volume in cubic centimeters of

a box with a length of 10 cm, width of 10 cm, and height of 15 cm).

M1.2.2\_M Solve problems, including real-world problems, involving the calculation of the area of a circle given the diameter or radius and vice versa.

M1.2.3\_M Solve problems, including real-world problems, involving the calculation of the surface area of a familiar polyhedron (i.e., a rectangular prism, square-based pyramid, triangular prism) (e.g., calculate the surface area in square centimeters of a box with a length of 10 cm, width of 10 cm, and height of 15 cm).

M1.2.4\_M Solve problems, including real-world problems, involving calculating the volume of a non-rectangular prism, given its dimensions (e.g., calculate the volume of a regular triangular prism, with the length of

one side of the base and its height provided).

M1.2.2\_E N/A

M1.2.3\_E N/A

M1.2.4\_E N/A

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

M1.2.5\_P N/A M1.2.5\_M Solve problems, including real-world problems, involving application of Pythagoras' theorem.

M1.2.5\_E N/A

M2: TIME

M2.1: Tell time—subconstruct fully covered in grades 1-5 and is, therefore, assumed knowledge for grade 9

M2.2: Solve problems involving time

M2.2.1\_P Solve problems, including real-world problems, involving time zones (e.g., When it is 4 p.m. on Tuesday in New York, it is 6

a.m. on Wednesday in Sydney. When it is 11 a.m. on Thursday in Sydney, what time and day will it be in New York?).

M2.2.1\_M Solve problems, including real-world problems, involving conversion between years, months, weeks, days, hours, fractions of hours or minutes (e.g., Ali spends 2 hours per week practicing piano. How many days per year does he spend practicing piano?).

M2.2.1\_E N/A

M3: CURRENCY

M3.1: Use different currency units to create amounts—subconstruct fully covered in grades 1-3. Questions involving currency are covered under the relevant real-world problem subconstructs (e.g., N4.3 for integers, etc.)

G: GEOMETRY

G1: PROPERTIES OF SHAPES AND FIGURES

G1.1: Differentiate shapes and figures by their attributes

G1.1.1\_P Recognize and name parts of the circle (i.e., G1.1.1\_M N/A G1.1.1\_E N/A radius, diameter, circumference) and identify

the relationship between the radius and diameter.

G1.1.2\_P Use the angle sum of a triangle to solve problems (e.g., determine the missing angle of a triangle where two angles are given).

G1.1.3\_P Describe and implement two-dimensional shape transformations (i.e., reflection, rotation, translation, enlargement/reduction).

G1.1.2\_M Use the angle relationships associated with intersecting lines, and with parallel lines intersected by a transverse line to solve problems (e.g., calculate missing angles on a diagram with parallel and intersecting lines).

G1.1.3\_M Describe and implement sequential two- dimensional shape transformations (i.e., reflection, rotation, translation, enlargement/reduction).

G1.1.2\_E Use congruence and similarity criteria to prove relationships in geometric figures and/or prove theorems about triangles.

G1.1.3\_E N/A

G2: SPATIAL VISUALIZATIONS

G2.1: Compose and decompose shapes and figures G2.1.1\_P Identify the net of a familiar three-

dimensional figure (i.e. prism, cylinder, cone, or pyramid) (e.g., fold or unfold mentally to answer the question, "What figure does this make when folded?"; "What figure does this make when unfolded?").

G2.1.1\_M Identify a cross-section of a familiar three- dimensional figure (i.e. prism, cylinder, cone, or pyramid) (e.g., identify that the cross section of a cylinder that is not parallel to the base is an ellipse).

G2.1.1\_E N/A

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| G3: POSITION AND DIRECTION | | | |
| G3.1: Describe the position and direction of objects in space | | | |

G3.1.1\_P Locate and plot points on a plane in all four quadrants of a Cartesian coordinate system.

G3.1.1\_M Draw shapes in all four quadrants of a Cartesian coordinate system, and find missing points (e.g., If (1,2), (-3,2), and (-3,-

2) are three corners of a square, what is the fourth corner?).

G3.1.1\_E N/A

G3.1.2\_P N/A G3.1.2\_M Describe and implement a single transformation (i.e., reflection, rotation, translation, enlargement/reduction) of a two- dimensional shape in all four quadrants of a Cartesian coordinate system.

G3.1.2\_E Describe and implement sequential transformations (i.e., reflection, rotation, translation, enlargement/reduction) of a two- dimensional shape in all four quadrants of a Cartesian coordinate system.

S: STATISTICS AND PROBABILITY

S1: DATA MANAGEMENT

S1.1: Retrieve and interpret data presented in displays S1.1.1\_P Organize data and construct pie charts and

Venn diagrams (categorical data), and line graphs and dot plots (bivariate data) when some support is provided (e.g., construct a line graph when given labeled horizontal and/or vertical axes, or match a table to the correct pie chart given a range of pie chart options).

S1.1.1\_M Understand, describe, and use relationships within displays of bivariate data (e.g., describe the strength of association shown in a scatter plot, or a linear relationship

between two functionally related variables).

S1.1.1\_E Retrieve and interpret data represented in different ways, including in box plots, stem- and-leaf plots, and frequency tables of grouped data.

S1.2: Calculate and interpret central tendency

S1.2.1\_P Describe the effect of adding or removing a specific data value on the mean, median, or mode of a set of data (e.g., "What would be the effect of removing a score of 20 from the scores 20, 80, 70, and 75 on the mean?" with the possible answers being: a) it would increase, b) it would decrease, c) it would stay the same. The same question can be asked about the effect on the median and the mode. Another example is: Juanita plays hockey and aims to achieve a mean of 3 goals per game by the end of the season.

Her goals for the first four games are shown: 2, 4, 1, 3. She has one more game to play this season. How many goals must she score in this game to achieve her aim?).

S1.2.2\_P Compare the distribution of sub-categories within a set of data (e.g., compare temperatures in a 24-hour period split into day temperatures and night temperatures).

S1.2.1\_M Determine and compare the mean, median, and mode for different sets of data and choose which is most appropriate in a given context (e.g., determine why the median is more appropriate than the mean as a representation of house prices in a given area).

S1.2.2\_M Recognize the effect of outliers in a set of data on the mean and median.

S1.2.1\_E Determine the mean, median, or mode of grouped data (e.g., a frequency table with heights arranged into ranges 151cm to 155 cm, 156 cm to 160 cm, 161 cm to 165 cm,

166 cm to 170 cm).

S1.2.2\_E

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

S1.2.3\_P S1.2.3\_M Identify desirable characteristics of sampling methods that will enable the mean of a sample to be as close as possible to the mean of a population (e.g., Anoush wants to determine the mean number of siblings each student in her school has. She decides to ask a sample of students. For which of these samples will the mean of the sample be closest to the mean of the whole school: a)

The first 10 students she sees in the corridor,

b) All the students on her football team, c) 50 grade 7 students selected randomly, or d) 50 students from various grade levels selected randomly?).

S1.2.3\_E Determine the median, quartiles, range, and interquartile range from a box plot or stem- and-leaf plot, and construct a box plot from a stem-and-leaf plot.

S2: CHANCE AND PROBABILITY

S2.1: Describe the likelihood of events in different ways

S2.1.1\_P Find the expected number of occurrences of S2.1.1\_M Calculate probabilities of different outcomes

S2.1.1\_E Solve real-world problems associated with

a specific independent outcome when a probability experiment is repeated many times (e.g., calculate the expected number of heads with 50 flips of a fair coin).

for compound events containing two simple events, when they can be listed as a discrete sample space (e.g., calculate the chance of rolling a sum of 7 when rolling two standard number dice).

compound events (e.g., solve problems that require analyzing multi-player games of chance to determine fairness, i.e., whether

all players have an equal chance of winning).

S2.1.2\_P S2.1.2\_M Use a wide range of representations such as S2.1.2\_E N/A tree diagrams and two-way tables to explore

possible outcomes of chance events and experiments involving multiple compound events (containing 2 or more simple events).

S2.2: Identify permutations and combinations

S2.2.1\_P N/A S2.2.1\_M Systematically count all the possible outcomes (sample space) for a situation involving a compound event comprised of two simple events with replacement (e.g., calculate all of the possible outcomes when selecting a marble from a bag containing 5 marbles, then selecting a second marble after putting the first marble back in the bag) and without replacement (e.g., calculate all of the possible outcomes when selecting a card randomly from a set containing one yellow, one blue, one red, and one green card, then selecting a second card without putting the first card back into the set).

S2.2.1\_E Distinguish between situations involving permutations, where order of selection matters (e.g., codes or personal identification numbers) and situations involving combinations, where order of selection does not matter (e.g., possible sums from rolling two six-sided dice), and enumerate all possibilities systematically in contexts involving a limited number of outcomes.

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |

A: ALGEBRA

A1: PATTERNS

A1.1: Recognize, describe, extend, and generate patterns—subconstruct fully covered in grades 1-7 and is, therefore, assumed knowledge for grade 9

A2: EXPRESSIONS

A2.1: Evaluate, model, and compute with expressions A2.1.1\_P Use expressions to represent problem

situations with multiple variables (e.g., Akeelah bought 4 blouses for x dollars and a wristwatch for y dollars. Represent this as

an expression).

A2.1.1\_M N/A A2.1.1\_E N/A

A2.1.2\_P Multiply and divide linear monomials, and simplify linear expressions by using the distributive property (e.g., multiply (3x)(5y); simplify 2x(3x + 4)).

A2.1.3\_P Evaluate and simplify exponential expressions using the Laws of Exponents (e.g., evaluate 2x3 when x = 7; simplify (2x3)2).

A2.1.2\_M Multiply two binomial linear expressions

(e.g., multiply (3x 4y)(2x + 5y)).

A2.1.3\_M Factor linear and exponential expressions using the greatest common factor algebraically (e.g., factor 4x2+ 8xy - 6x to 2x(2x + 4y - 3)).

A2.1.2\_E Factor quadratic trinomial expressions into two binomial linear expressions (e.g., factor x2 - 3x - 18 to (x - 6)(x + 3)).

A2.1.3\_E Add and subtract monomial and polynomial expressions with exponents, and evaluate polynomial expressions (e.g., add (3x2 4x - 7) + (-6x2 + 5x - 1); evaluate 3x2 4y3 - 7) when x = -2 and y = 2).

A3: RELATIONS AND FUNCTIONS

A3.1: Solve problems involving variation (ratio, proportion, and percentage)

A3.1.1\_P Solve proportions written as two equal ratios A3.1.1\_M Write a proportion as two equal ratios to

A3.1.1\_E N/A

(e.g., solve 2/3 = 10/x).

A3.1.2\_P Solve problems, including real-world problems, involving percent increase or decrease (e.g., A shirt that normally costs 25 euros is on sale for 10% off. How much does it cost now?; A shirt cost 25 euros in November and then 20 euros in December. What is the percent decrease in cost?).

model a proportional relationship (e.g., write 2/3 = 10/x to represent a problem that says, "Purple paint is made from 2 parts blue paint to 3 parts red paint. If I have 10 parts of blue paint. How many parts of red paint do I need?").

A3.1.2\_M Solve problems, including real-world problems, involving percentages where the percentage and final quantity are known, but the initial quantity is not (e.g., Ana paid $8 for a belt that was on sale. The price had been reduced by 20%. What was the original price of the belt?).

A3.1.2\_E N/A

A3.2: Demonstrate an understanding of equivalency—subconstruct fully covered in grades 1-6 and is, therefore, assumed knowledge for grade 9

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|  | Partially Meets Global Minimum Proficiency | Meets Global Minimum Proficiency | Exceeds Global Minimum Proficiency |
| A3.3: Solve equations and inequalities | | | |

A3.3.1\_P Represent and solve problems, including real-world problems, using more than two steps, including those that involve the distributive property, combining like terms, etc. (e.g., solve 3x + 4 (x + 2) = 22; The older children get 2 more cookies than the younger children. If there are 3 younger children and 4 older children and 22 cookies were distributed, how many cookies did the younger children get?; Represent as 3x + 4 (x + 2) = 22) and solve.

A3.3.2\_P Interpret equations and their solutions in terms of context (e.g., given an algebraic graph, such as a distance-time graph, interpret the slope as speed).

A3.3.3\_P Solve one-step inequalities (e.g., x + 5 < 12).

A3.3.1\_M Represent and solve problems, including real-world problems, using two linear

equations (e.g., If 3x + 4y = 24 and 4x + 3y = 22, solve for x and y; Or, Andre has more money than Bob. If Andre gives Bob $20, they would have the same amount. If Bob gave Andre $22, Andre would then have twice as much as Bob. Represent as two linear equations, and work out how much each of them actually has).

A3.3.2\_M Graph linear equations, including those of the form y = k and x = k and calculate the slope of a line from a table, equation, graph, or ordered pairs. Identify the x- and y- intercepts of the graphed line of an equation (e.g., graph y = 5x + 2; graph y = 4; graph x

= 4; in the equation y = 3x + 2, identify what the slope is; given a coordinate at (2,4) and a coordinate of (3,7), solve for the slope).

A3.3.3\_M Solve multi-step inequalities (e.g., x + 5 (x - 2) > 2).

A3.3.1\_E Solve quadratic equations that have one or two rational solutions, and graph quadratic equations where the quadratic coefficient is positive (e.g., solve x2 + 5x + 6 = 0; graph y

= 3x2 + 5x - 2).

A3.3.2\_E Construct equations when given two points or the slope and a point (e.g., construct the equation when given the points (1, 5) and (3, 9); construct the equation when given the point (1, 5) and the slope of 2).

A3.3.3\_E Graph the solution of an inequality on a number line (e.g., graph the solution to x + 5 (x - 2) > 2 on a number line).

A3.3.4\_P N/A A3.3.4\_M N/A A3.3.4\_E Interpret solutions of inequalities in context (e.g., A girl went to the store with $20 to buy sacks of flour and beans. Each sack of flour cost $3. She spent $4 on beans. What is the maximum number of sacks of flour she could buy?).

A3.4: Interpret and evaluate functions

A3.4.1\_P Identify a function presented as ordered pairs or in an x-y table (e.g., when

presented with the following ordered pairs: (- 1, 0), (2, 6), (3, 8), (4, 10), identify the function).

A3.4.1\_M Identify a function presented in a graph, either as a set of points or as a continuous line (curved or straight).

A3.4.1\_E Evaluate linear functions (e.g., f(x) = 2x + 5; find f(2)).

A3.4.2\_P N/A A3.4.2\_M N/A A3.4.2\_E Identify or describe characteristics, such as the rate of change, outputs, intercepts, and maxima/minima of a functional relationship between two quantities (e.g., when presented with the following ordered pairs: (- 1, 0), (2, 6), (3, 8), (4, 10), identify the rate of

change and intercepts).

GLOBAL PROFICIENCY FOR MATHEMATICS: GRADES 1 TO 9 110

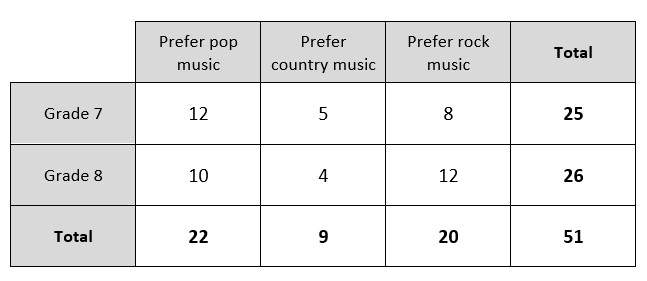
# GLOSSARY

|  |  |
| --- | --- |
| Term | Definition |
| 24-hour time | A standard way of expressing time, based on a 24-hour clock, where 0000 is midnight, 1200 is midday and 2359 is one minute to midnight. |
| Adjacent units | Units within a measurement system that vary by one degree of magnitude. If all the units within that measurement system were to be listed in order of magnitude (e.g. mm, cm, m, km), adjacent units would sit next to each other. For example, centimeters to millimeters are adjacent units; but centimeters to kilometers are not adjacent units. |
| Area | A measure of the space within a two-dimensional shape, measured in square units (e.g., square millimeters, square centimeters, square meters, square kilometers). |
| Attributes | A characteristic of an object or geometric shape; for example, sides, edges, vertices, angles, faces. |
| Binomial linear expressions | A mathematical expression that has two terms and no exponents; for example, 3x + 5 or 6x + 13y. When graphed, these expressions make straight lines rather than arcs. |
| Bivariate data | Data consisting of two sets of values (variables) where each variable from one set is paired with a variable from the other set. For example, age in years graphed against height in centimeters. |
| Box plot | A data display showing the values for median, first quartile, and third quartile of a data set, plotted along a number line. These three values are enclosed within a rectangle or box. Two horizontal lines then extend out from the box, often called "whiskers," with the line on the left stopping at the minimum value in the data set, and the line on the right stopping at the maximum value for number set. |
| Cartesian coordinate system | A system in which the location of a point is given by coordinates that represent its distances from perpendicular lines that intersect at a point called the origin. |
| Categorical data | Data that are arranged into categories. |
| Combination | A listing or count of all the possible selections from a set of options, where order does not matter. For example, how many different combinations of ice cream flavors are possible when selecting two scoops from a choice of chocolate, strawberry, vanilla, banana, and mint? |
| Commonly used fractions | Fractions that are used frequently in everyday life; for example, halves, quarters, and thirds. |
| Composite shapes | Composite shapes can be visualized as being comprised of multiple simple shapes in varying orientations, e.g., an "L-shaped" irregular hexagon comprised of a rectangle oriented horizontally joined to a rectangle oriented vertically or a "house shaped" irregular pentagon comprised of a square with a triangle sitting on top of the square. |
| Compound event | A combination of two or more simple events involving probability, for example, flipping two coins or rolling a standard number cube then turning a spinner. |
| Compound shapes/figures | A compound shape/figure is a complex shape/figure made up of two or more simple shapes/figures. |
| Congruence | Two shapes are said to be congruent if it is possible to superimpose one of them on the other so that they coincide. |
| Curved line | A smooth, gradually bending line, for example part of the edge of a circle. Curved lines can be open or closed. |
| Diameter | The distance of a line joining two points on the boundary of a circle and passing through the center of the circle. |
| Different but related denominators | When one denominator is a multiple of the other. For example the fractions 1/4 and 1/12 have different but related denominators. |
| Distributive property | The idea that multiplying the sum of two or more addends by a number will give the same result as multiplying each addend individually by the number and then adding the products together. For example, if given 4(x+5), you can distribute the 4 to both the x and the 5 to get 4x+20, and this will be the same result as if you were to add x+5 and then multiply the sum by 4. |
| Enlargement/reduction | A type of transformation that changes the size of an object. |
| Everyday fractions | Fractions used commonly in daily life, including 1/2, 1/3, 2/3, 1/4, and 3/4. Everyday unit fractions include 1/4, 1/3, and 1/2. |
| Exponential expressions | A mathematical expression consisting of a constant raised to some power (exponent). |
| Extrapolating | Deducing the value of a point beyond a given scale or pattern by continuing the pattern or scale. |
| Fluency | The ability to retrieve information quickly and accurately. |

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| Term | Definition |
| Fraction bars | A mathematical manipulative that provides a visual illustration of the relative size of different unit fractions and their relationship to each other and to a common whole, denoted by a bar representing 1. |
| Function | A relation from a set of inputs to a set of possible outputs where each input is related to exactly one output. |
| Functionally related variables | Variables that are related to each other by a rule or function, such that, when we know the value of one variable, we can calculate or determine the value of the other variable. For example, number of weeks and number of days are functionally related to each other by the rule "one week is equal to seven days." So if a data set gives number of weeks, e.g., 1, 2, 3, 4, 5, another functionally related data set can be generated showing corresponding number of days, e.g., 7, 14, 21, 28, 35. |
| Greatest common factor | The greatest number that is a factor of two (or more) other numbers, meaning the number (factor) can be divided into the two or more other numbers evenly, without a remainder. For example, the greatest common factor of 24, 48, and 60 is 12. |
| Grid map | A map on which a network of horizontal and vertical lines are superimposed, for locating points. |
| Grouped data | When raw numerical data are sorted and put into groups of similar measurements in a frequency table, they are called grouped data; for example, arranging the ages of survey respondents into age ranges such as 0-4 years, 5-9 years, 10-14 years, and 15-19 years and placing these in the first column of a frequency table, with a count of the number of individual responses that fall into each age range, called "frequency," in the second column of the table. |
| Improper fractions | A fraction that is great than one, with the numerator greater than the denominator; for example, 5/4 or 10/8. |
| Integers | Whole numbers and negative numbers, but not fractions. |
| Interpolating | Deducing the value of a point on a scale between two labelled points by using the relative distance between the labelled points and that point. |
| Interquartile range | The difference between the upper quartile and the lower quartile in an ordered data set. |
| Labelled scale increments | Increments or markings on a measurement scale that are accompanied by a number label, e.g., a major mark on a kitchen scale with the label "1 kg" directly beneath it. |
| Laws of Exponents | The laws that govern how to solve problems containing exponents. For example, when multiplying like bases, the base stays the same and the exponents get added together. When raising a base with a power to another power, the base stays the same and the exponents are multiplied. When dividing like bases, the base stays the same and the denominator exponent is subtracted from the numerator exponent. |
| Line graph | A type of graph that is used to present bivariate data, where both sets of data are continuous variables (variables that are measured, not counted, e.g., height, length, mass, temperature, and time). A line is plotted on a pair of axes, with any given point on the plotted line having a horizontal component representing the value of a variable from one set and a vertical component representing the value of a variable from the other set. |
| Line of symmetry | A line that can be drawn on a shape to divide it into two equal halves (where one is the mirror image of the other). |
| Linear expressions | A mathematical expression that only has one variable in it and no exponents; for example, mx + b. When graphed, these expressions make straight lines rather than arcs. |
| Linear monomial | A mathematical expression with only one term and no exponents; for example, 3x or 7y. When graphed, these expressions make straight lines rather than arcs. |
| Lower quartile | The value midway between the minimum value and the median in an ordered data set. |
| Lowest common multiple | The lowest number that is a multiple of two or more given numbers. For example, the lowest common multiple of 3, 6, and 12 is 24. |
| Map | A diagrammatic representation of a physical space. |
| Mean | A measure of central tendency in statistics, calculated by adding all values in a data set and dividing by the number of values in the data set. |
| Median | A measure of central tendency in statistics, determined by ordering all values in a data set from smallest to largest, then finding the value that lies in the middle of the ordered set. |
| Minuend | The minuend is the first number in a subtraction. It is the number from which another number (the subtrahend) is subtracted. Minuend − subtrahend = difference. |

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| Term | Definition |
| Mixed numbers | A whole number and a proper fraction represented together; for example, 1 3/4 or 2 1/6. |
| Mode | A measure of central tendency in statistics, determined by identifying the most frequently occurring value in a set of data. |
| Monomial | A mathematical expression with only one term; for example, 12y or 3x2. |
| Multi-unit scale | A scale where each unit represents a multiple value; for example, each unit on the scale represents 10 items or 20 items. |
| Multibase arithmetic blocks | Wooden or plastic blocks used to help promote an understanding of the number system. They give a concrete representation of numbers, emphasizing the place-value aspect. |
| Multiplicand | The number to be multiplied is the "multiplicand." In 8 × 32, the multiplicand is 32. |
| Multiplier | The number by which another number is multiplied. In 8 × 32, the multiplier is 8. |
| Net | A two-dimensional pattern of a three-dimensional figure that can be folded to form the figure. |
| Non-adjacent units | Units within a measurement system that vary by more than one degree of magnitude. If all the units within that measurement system were to be listed in order of magnitude (e.g. mm, cm, m, km or mg, g, kg, tons), non-adjacent units would have other intermediate units between them. For example, centimeter and kilometer are non-adjacent units, as are grams and tons. |
| Non-linear patterns | An increasing or decreasing number pattern where the relationship between terms in the pattern is not a constant value. The Fibonacci sequence of 1, 2, 3, 5, 8, 13, 21... is an example of a non-linear pattern. It increases according to a set rule (i.e., each term is the sum of the two previous terms), but not by a constant value. In contrast, a pattern like 2, 4, 6, 8, 10... is a linear pattern. The difference between the terms is a constant value: 2. |
| Non-unit fractions | Fractions with a numerator of greater than one. |
| Number bond | The pairs of numbers, that when added, give a particular number. For example, the number bonds for 6 are 5 and 1, 6 and 0, 2 and 4, and 3 and 3. |
| Ordered pairs | A composition of the x-coordinate and the y-coordinate on a graph, usually written as (x, y). |
| Outlier | A point in a set of data that varies significantly from the other points in the data set. |
| Parallel lines | Two straight lines in a plane that do not intersect at any point. |
| Perimeter | The distance around the boundary of a two-dimensional shape, calculated by adding the length of all sides. |
| Permutation | A listing or count of all the possible arrangements of a set of items, where sequence of the items in the set matters; for example, the number of different 4-digit codes that can be made using only the digits 0, 1, 2, 3, 4, 5, and 6 without repeating any digits. |
| Perpendicular lines | Two straight lines at right angles to each other. |
| Pie chart | A diagram used to present data arranged into categories, showing a circle is divided into sections, with each section representing a category as a proportion of the entire set of data. |
| Plane | A two-dimensional surface. |
| Polygon | A two-dimensional closed shape with sides that are all straight lines and an equal number of angles as there are sides; for example, a square, triangle, or rectangle. |
| Polygon (regular and irregular) | A two-dimensional shape bounded by three or more straight lines. A regular polygon has equal side lengths and angles. All other polygons are irregular. |
| Polyhedron | A three-dimensional shape comprised of multiple faces that are all polygons. |
| Polynomial expressions | An expression that is a monomial or the sum (or difference) of two or more monomials. |
| Prism | A three-dimensional shape (polyhedron) comprised of faces that are polygons, with two of these faces (called bases) that are identical and all other faces being parallelograms. |
| Proper fractions | A fraction that is less than one, with the numerator less than the denominator; for example, 1/2 or 4/5 |

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| Term | Definition |
| Pythagoras' Theorem | A theorem stating that the square of the length of the hypotenuse of a right triangle is equal to the sum of the squares of the lengths of the other sides. |
| Quadrant | The four regions into which a plane is divided by the axes of a Cartesian coordinate system. |
| Quadratic equations | An equation containing a single variable of degree 2 (the square of the variable). Its general form is ax2 + bx + c = 0, where x is the variable and a, b, and c are constants (a ≠ 0). |
| Quadratic trinomial expressions | A mathematical expression of the form: a x 2 + b x + c, where x is a variable and a, b and c are non-zero constants. The constant a is called the leading coefficient, b is called the linear coefficient, and c is called the additive constant. |
| Quadrilaterals | A four-sided polygon. |
| Quartiles | In an ordered list of data, the data values that separate the data into quarters. The lower quartile is the value of the middle point between the minimum value and the median and the upper quartile is the value midway between the median and the maximum value. |
| Radius | The distance from a point on the boundary of a circle to the center of the circle. |
| Range | The difference between the minimum and maximum values in a dataset. |
| Rate of change | A rate that describes how one quantity changes in relation to another quantity. For example, if x is the independent variable and y is the dependent variable, then the rate of change = change in y / (change in x). |
| Rectangular array | An arrangement of objects into rows and columns that form a rectangle. Each row has the same number of objects. Each column has the same number of objects. The number of objects in each row is different from the number of objects in each column. |
| Reflection | A type of transformation where each point in a shape appears at an equal distance on the opposite side of a given line—the line of reflection. |
| Repeating patterns | Patterns made up of a core set of terms that repeat themselves. The pattern "circle square circle circle square circle circle square circle…" is a repeating pattern. The core elements that repeat are "circle square circle." |
| Rotation | A type of transformation where each point in a shape is turned around a center or axis but remains the same distance from the center or axis. |
| Scatter plot | A type of graph that is used to present bivariate data, showing a series of points plotted on a pair of axes. Each point on the graph represents a pair of values, with the horizontal component of the point showing the value of a variable from one set of data and the vertical component of the point showing the value of a variable from the other set of data (e.g., a scatter plot graphing ages of children along the horizontal axis against heights of children along the vertical axis). |
| Similarity | Two shapes are said to be similar if they are the same shape but different sizes. |
| Single-unit scale | A scale where each unit represents one of something; e.g., 1, 2, 3, 4, 5, 6. |
| Slope | The ratio of the vertical changes between two points, often called the rise, to the horizontal change between the same two points, often called the run. |
| Square array | An arrangement of objects into rows and columns that form a square. Each row has the same number of objects. Each column has the same number of objects. The number of objects in each row is the same as the number of objects in each column. |
| Stem-and-leaf plot | A diagram used to order and summarize multi-digit data, where the first column (called the stem) contains all digits in the number apart from the last digit, and the second column (the "leaf") contains the last digits of each number, and each leaf is placed next its corresponding "stem" and ordered from smallest to largest. Stem-and-leaf plots are useful for efficiently determining median, quartiles, and interquartile range of multi-digit data. |
| Straight line | The path of shortest distance between two points. |
| Strength of association | The degree to which the values of two variables vary or change together. |
| Subtrahend | The subtrahend is the second number in a subtraction. It is the number subtracted from another number (the minuend). Minuend − subtrahend = difference. |



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| Term | Definition |
| Sum | The aggregate of two or more numbers, magnitudes, or quantities, as determined by the process of addition. For example, the sum of 6 and 8 is 14. |
| Surface area | The total area of the surface of a 3D shape, e.g., the area of all the faces on a polyhedron added together. |
| Time zones | Variations in standard time, which vary based on geographical regions. |
| Translation | A type of transformation where each point in a shape moves by a set distance horizontally and vertically. |
| Transverse lines | A straight line that cuts across two or more (usually parallel) lines. |
| Tree diagram | A tool used in mathematics to help calculate the number of possible outcomes in a series of events or a problem, and to list these possible outcomes in a systematic way. In probability, tree diagrams are used to represent a sequence of events, with each possible outcome in each event represented as a branch on a tree, and the probability of each outcome written as a probability along each branch. |
| Two-way table | A type of frequency table used to depict the relationships between two categorical variables, with each cell in a two-way table representing a count that is an intersection of the two categorical variables. For example, when trying to depict the favorite music type out of pop, country, and rock for children in grade 7 and grade 8, music type will be listed in row headers and grade level in columns, with counts of each in the remaining cells. The last column and the last row in two-way tables often give total counts (frequencies); for example, the total of the first row would be total number of students from grade 7 who answered the question and the first column total would be total students in both grades 7 and grade 8 who chose pop (see attached image of two-way table example). |
| Unit fractions | A fraction with a numerator of 1. |
| Unit ratio | A two-term ratio expressed with a second term of one. |
| Unlabeled scale increments | Increments or markings on a measurement scale that are not accompanied by a number label, but whose label can be deduced by other labelled increments on the scale, e.g., an unlabeled increment between 1 centimeter and 2 centimeters on a ruler is known to be 1.5 without needing the associated number label. |
| Upper quartile | The value midway between the median and the maximum value in an ordered data set. |
| Venn diagram | A diagram that uses counts within circles (often overlapping circles) to represent the relationships between different sets of data (e.g., the results of a survey about two different sports, with one circle representing each sport, circles overlapping with numbers in the overlap showing students that play both sports, numbers outside circles showing students playing neither sport, and numbers in one circle but not another showing students that play only one of the two sports). |
| X-intercept | The point at which the graph crosses the x-axis. |
| Y-intercept | The point at which the graph crosses the y-axis. |