NEBRASKA

Alternate Mathematics Instructional Supports for NSCAS Mathematics Extended Indicators Grade 5

for
Students with the Most Significant Cognitive Disabilities
who take the
Statewide Mathematics Alternate Assessment

NEBRASKA DEPARTMENT OF EDUCATION

Table of Contents

Overview

Introduction

Mathematics standards apply to all students, regardless of age, gender, cultural or ethnic background, disabilities, aspirations, or interest and motivation in mathematics (NRC, 1996).

The mathematics standards, extended indicators, and instructional supports in this document were developed by Nebraska educators to facilitate and support mathematics instruction for students with the most significant intellectual disabilities. They are directly aligned to the Nebraska's College and Career Ready Standards for Mathematics adopted by the Nebraska State Board of Education.

The instructional supports included here are sample tasks that are available to be used by educators in classrooms to help instruct students with significant intellectual disabilities.

The Role of Extended Indicators

For students with the most significant intellectual disabilities, achieving grade-level standards is not the same as meeting grade-level expectations, because the instructional program for these students addresses extended indicators.

It is important for teachers of students with the most significant intellectual disabilities to recognize that extended indicators are not meant to be viewed as sufficient skills or understandings. Extended indicators must be viewed only as access or entry points to the grade-level standards. The extended indicators in this document are not intended as the end goal but as a starting place for moving students forward to conventional reading and writing. Lists following "e.g." in the extended indicators are provided only as possible examples.

Students with the Most Significant Intellectual Disabilities

In the United States, approximately 1% of school-aged children have an intellectual disability that is "characterized by significant impairments both in intellectual and adaptive functioning as expressed in conceptual, social, and practical adaptive domains" (U.S. Department of Education, 2002 and American Association of Intellectual and Developmental Disabilities, 2013). These students show evidence of cognitive functioning in the range of severe to profound and need extensive or pervasive support. Students need intensive instruction and/or supports to acquire, maintain, and generalize academic and life skills in order to actively participate in school, work, home, or community. In addition to significant intellectual disabilities, students may have accompanying communication, motor, sensory, or other impairments.

Alternate Assessment Determination Guidelines

The student taking a Statewide Alternate Assessment is characterized by significant impairments both in intellectual and adaptive functioning which is expressed in conceptual, social, and practical adaptive domains and that originates before age 18 (American Association of Intellectual and Developmental Disabilities, 2013). It is important to recognize the huge disparity of skills possessed by students taking an alternate assessment and to consider the uniqueness of each child.

Thus, the IEP team must consider all of the following guidelines when determining the appropriateness of a curriculum based on Extended Indicators and the use of the Statewide Alternate Assessment.

- The student requires extensive, pervasive, and frequent supports in order to acquire, maintain, and demonstrate performance of knowledge and skills.
- The student's cognitive functioning is significantly below age expectations and has an impact on the student's ability to function in multiple environments (school, home, and community).
- The student's demonstrated cognitive ability and adaptive functioning prevent completion of the general academic curriculum, even with appropriately designed and implemented modifications and accommodations.
- The student's curriculum and instruction is aligned to the Nebraska College and Career Ready Mathematics Standards with Extended Indicators.
- The student may have accompanying communication, motor, sensory, or other impairments.

The Nebraska Department of Education's technical assistance documents "***IEP Team Decision Making Guidelines—Statewide Assessment for Students with Disabilities***" and "***Alternate Assessment Criteria/Checklist***" provide additional information on selecting appropriate statewide assessments for students with disabilities. School Age Statewide Assessment Tests for Students with Disabilities—Nebraska Department of Education.

Instructional Supports Overview

The mathematics instructional supports are scaffolded activities available for use by educators who are instructing students with significant intellectual disabilities. The instructional supports are aligned to the extended indicators in grades three through eight and in high school. Each instructional support includes the following components:

- Scaffolded activities for the extended indicator
- Prerequisite extended indicators
- Key terms
- Additional resources or links

The scaffolded activities provide guidance and suggestions designed to support instruction with curricular materials that are already in use. They are not complete lesson plans. The examples and activities presented are ready to be used with students. However, teachers will need to supplement these activities with additional approved curricular materials. The scaffolded activities adhere to research that supports instructional strategies for mathematics intervention, including explicit instruction, guided practice, student explanations or demonstrations, visual and concrete models, and repeated, meaningful practice.

Each scaffolded activity begins with a learning goal, followed by instructional suggestions that are indicated with the inner level, circle bullets. The learning goals progress from less complex to more complex. The first learning goal is aligned with the extended indicator but is at a lower achievement level than the extended indicator. The subsequent learning goals progress in complexity to the last learning goal, which is at the achievement level of the extended indicator.

The inner level, bulleted statements provide instructional suggestions in a gradual release model. The first one or two bullets provide suggestions for explicit, direct instruction from the teacher. From the teacher's perspective, these first suggestions are examples of "I do." The subsequent bullets are suggestions for how to engage students in guided practice, explanations, or demonstrations with visual or concrete models, and repeated, meaningful practice. These suggestions start with "Ask students to . . ." and are examples of moving from "I do" activities to "we do" and "you do" activities. Visual and concrete models are incorporated whenever possible throughout all activities to demonstrate concepts and provide models that students can use to support their own explanations or demonstrations.

The prerequisite extended indicators are provided to highlight conceptual threads throughout the extended indicators and show how prior learning is connected to new learning. In many cases, prerequisites span multiple grade levels and are a useful resource if further scaffolding is needed.

Key terms may be selected and used by educators to guide vocabulary instruction based on what is appropriate for each individual student. The list of key terms is a suggestion and is not intended to be an all-inclusive list.

Additional links from web-based resources are provided to further support student learning. The resources were selected from organizations that are research based and do not require fees or registrations. The resources are aligned to the extended indicators, but they are written at achievement levels designed for general education students. The activities presented will need to be adapted for use with students with significant intellectual disabilities.

Mathematics—Grade 5
Number

5.N.1 Numeric Relationships

5.N.1.a

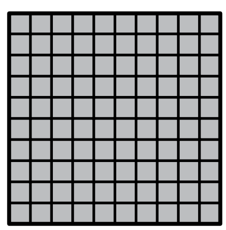
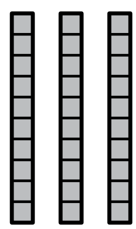
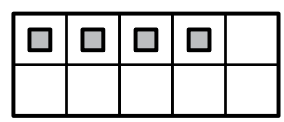
Read, write, and demonstrate multiple equivalent representations for multi-digit whole numbers and decimals through the thousandths place using standard form and expanded form.

Extended: Identify representations of whole numbers up to 200.

Scaffolding Activities for the Extended Indicator

❑ **Use base-ten blocks and base-ten mats to represent whole numbers up to 200.**

- Use base-ten blocks and a mat to demonstrate the connection between standard form and expanded notation. Indicate that the 1 in the hundreds column represents 1 hundred, the 3 in the tens column represents 3 tens, and the 4 in the ones column represents 4 ones.

Hundreds	Tens	Ones
		
1 hundred	3 tens	4 ones
134		

- Ask students to use base-ten blocks and a mat to represent other whole numbers up to 200, such as 192 and 85.
- Ask students to identify a whole number represented with base-ten blocks on the base-ten mat.

❑ **Represent a whole number up to 200 in expanded notation.**

- Using a table such as the one shown, display the number 146. Decompose the whole number in the table to show the word form and expanded notation: (1 × 100) + (4 × 10) + (6 × 1).

146		
1 hundred	4 tens	6 ones
(1 × 100) 1 group of size 100	(4 × 10) 4 groups of size 10	(6 × 1) 6 groups of size 1

- Ask students to fill in the missing information in the second row when given a whole number value up to 200 and the expanded notation.

124		
____ hundred	**____ tens**	**___ ones**
(1 × 100) 1 group of size 100	(2 × 10) 2 groups of size 10	(4 × 1) 4 groups of size 1

- Ask students to identify the missing values in expanded notation in the bottom row when given a whole number value up to 200 and the second row completed.

138		
1 hundred	3 tens	8 ones
(___ × 100) 1 group of size 100	**(___ × 10)** 3 groups of size 10	**(___ × 1)** 8 groups of size 1

Prerequisite Extended Indicators

MAE 4.N.1.a—Identify representations of whole numbers up to 100.

MAE 3.N.1.a—Read, write, and demonstrate whole numbers 1–20 that are equivalent representations, including visual models, standard forms, and word forms.

Key Terms

expanded notation, standard form, word form

Additional Resources or Links

http://tasks.illustrativemathematics.org/content-standards/2/NBT/A/1/tasks/1236

https://www.engageny.org/resource/grade-4-mathematics-module-1-topic-lesson-4

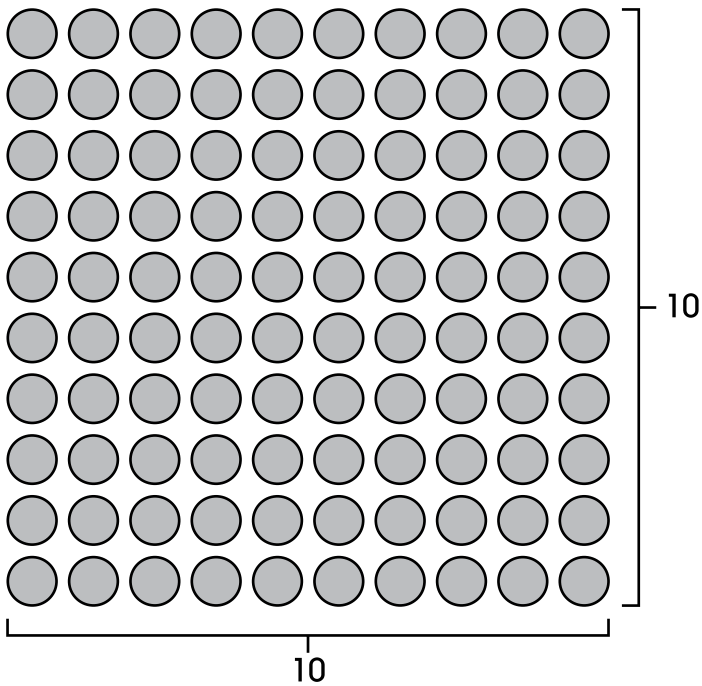
5.N.1.c

Use whole number exponents to denote powers of 10.

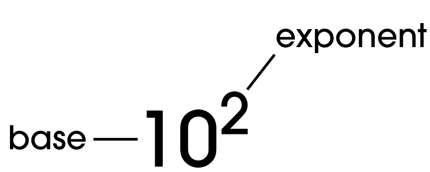
Extended: Represent 10, 100, 1,000, or 10,000 as a power of 10.

Scaffolding Activities for the Extended Indicator

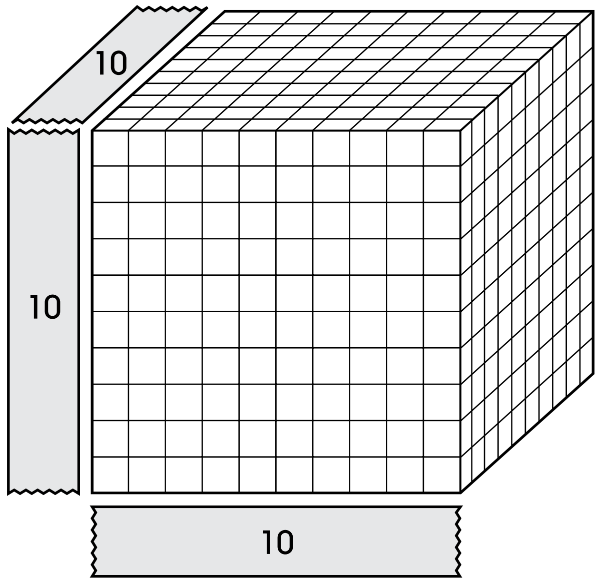
- ❑ **Use a model to show powers of 10 as multiplication.**
  - Show an array that represents 10 rows of 10 dots, which is equal to 100 and which may also be written as 10 × 10 (10 groups of 10).



Explain that 10 × 10 may be written another way: an exponent can be used. An exponent is a small number placed above and to the right of the base number, which is bigger. The exponent indicates how many times the base is a factor. For example, 10^2 means 10 is a factor two times, which is written as 10 × 10.



- Show a base-ten block that represents 1,000. Use tape to label all of the dimensions. Explain that the number of cubes can be expressed as 10 × 10 × 10. Indicate that 10 is a factor three times. Using exponents, 10 × 10 × 10 is written as 10^3 and is equal to 1,000.



- Show students a picture of a 10 × 10 array and ask them to represent the number of dots in the array as a power of 10.
- Ask students to match equivalent values when shown 10^2, 10^3, a 10 × 10 array, and a 10 × 10 × 10 cube.

❑ **Represent a multiplication expression as a power of 10.**

- Model determining the correct exponent and writing a power of 10.

$10 \times 10 \times 10 = 10^3$
10 × 10 × 10 × 10 = _______________
10 × 10 = _______________

To model the number 10 using exponents, the exponent of one is used. Since 10 is not being multiplied by another 10, the expression would be modeled by 10^1.

- Ask students to determine the correct exponent when given an expression of factors of 10.

❑ **Represent 10, 100, 1,000, and 10,000 as a power of ten.**

- Use a table to explain the connection between the number of zeros in 10, 100, 1,000, and 10,000 and the exponent that is used for the power of ten. For example, in 100 there are two zeros and the power of ten for 100 is 10^2. Refer to the models shown previously for 10^2 and 10^3.

Power of Ten	Expression	Number
10^1	10	10
10^2	10 × 10	100
10^3	10 × 10 × 10	1,000
10^4	10 × 10 × 10 × 10	10,000

- Demonstrate sorting cutout cards. For example, 10 × 10, 100, and 10^2 all belong in the same group because they all represent the same value.

10	10 × 10 × 10	10^1	1,000
10^3	10^2	100	10 × 10
10,000	10^4	10 × 10 × 10 × 10	

- Ask students to sort the cutout cards.
- Model representing 10, 100, 1,000, and 10,000 as powers of ten.

Number	Power of Ten
10,000	
10	
1,000	
100	

- Ask students to represent 10, 100, 1,000, and 10,000 as powers of ten.

Prerequisite Extended Indicator

MAE 4.N.4.a—Count by 2s, 5s, and 10s with numbers, models, or objects up to 50.

Key Terms

base, exponent, factor, power of ten

Additional Resources or Links

https://www.engageny.org/resource/grade-5-mathematics-module-1-topic-lesson-3

https://www.engageny.org/resource/grade-5-mathematics-module-1-topic-lesson-4

5.N.2 Fractions and Decimals

5.N.2.a

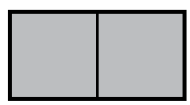
Generate equivalent forms of commonly used fractions and decimals (e.g., halves, fourths, fifths, tenths).

Extended: Use models to represent equivalent fractions with denominators up to 10 (e.g., $\frac{2}{4} = \frac{1}{2}$, $\frac{3}{3}$ = 1 whole).

Scaffolding Activities for the Extended Indicator

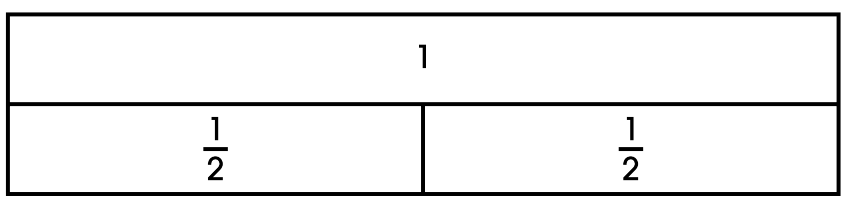
❑ **Identify when a fraction is equivalent to one whole.**

- Use models to show that two-halves are equivalent to one whole. For example, the following model of one whole rectangle is divided into halves that are shaded. Indicate that shading “two-halves” results in the entire whole being shaded, so $\frac{2}{2}$ = 1.



$\frac{2}{2}$

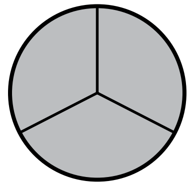
Show a variety of fraction models that represent that “two-halves” are equal to one whole. Another model is fraction strips, which use rectangles to compare fractional pieces to the whole. The following figure shows the whole, labeled with a 1, and then two halves that are the same size as the whole when put together.



- Ask students to select the model that represents one whole when given a model that represents $\frac{1}{2}$ and a model that represents $\frac{2}{2}$.

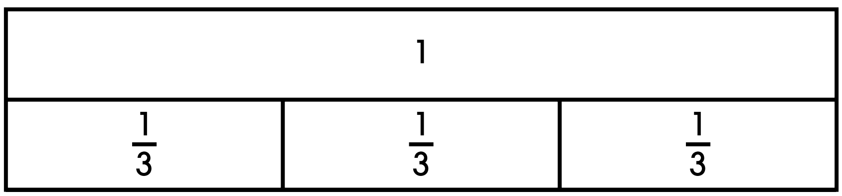
- Ask students to complete a model to represent one whole when given a model that represents $\frac{1}{2}$. For example, present a rectangle with one-half shaded and ask students to identify how to show one whole on the rectangle.

- Use models to show that three-thirds are equivalent to one whole. For example, the following circle model shows thirds, all shaded. Explain that "three-thirds" is the whole circle, so $\frac{3}{3} = 1$.

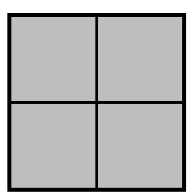


$\frac{3}{3}$

Fraction strips can be used to show the same result. This fraction strip is the same size as the fraction strip used previously and can show that $\frac{3}{3}$ is also equivalent to $\frac{2}{2}$, since they are both equal to 1.



- Ask students to select the model that represents one whole when given a model that represents $\frac{1}{3}$ and a model that represents $\frac{3}{3}$.
- Ask students to complete a model to represent one whole when given a model that represents $\frac{1}{3}$. For example, present the fraction strip model for $\frac{1}{3}$ and ask students to identify how to show one whole on the model.
- Use models to show that four-fourths are equivalent to one whole. For example, the following model of a large square is divided into fourths. Explain that when "four-fourths" is shaded, the model shows that $\frac{4}{4} = 1$.



$\frac{4}{4}$

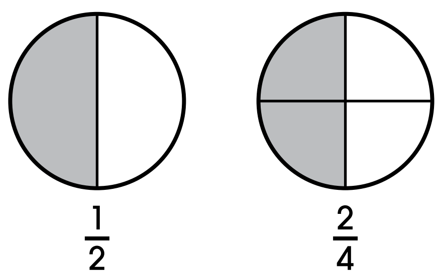
Fraction strips can be used to show the same result. Explain that since $\frac{2}{2}$, $\frac{3}{3}$, and $\frac{4}{4}$ are all equivalent to one whole, they are also all equivalent to each other.

1			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

- Continue showing students fraction models and fraction strips that represent one whole with denominators up to 10.
- Ask students to select the model that represents one whole when given a fraction model with a denominator up to 10.
- Ask students to complete a model to represent one whole when given a model that represents a fraction with a denominator up to 10. For example, present a fraction strip model for $\frac{1}{8}$ and ask students to identify how to show one whole on the model.

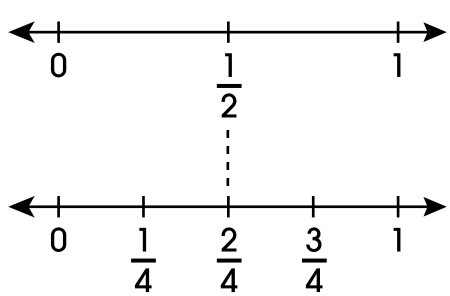
❑ **Identify when a fraction is equivalent to one-half.**

- Use models to show that two-fourths is equivalent to one-half. For example, the figure shown uses a circle as the whole.



Explain that the circle on the left is divided into two equal parts, or halves, with one shaded to represent $\frac{1}{2}$. The circle on the right is divided into four equal parts, or fourths, with two shaded to represent $\frac{2}{4}$. Indicate that the shaded portion of each circle is the same, so $\frac{1}{2}$ is equal to $\frac{2}{4}$.

Another way to demonstrate that two-fourths is equivalent to one-half is with number lines from 0 to 1.



The number lines are aligned so that the 0 and the 1 in both lines line up. The dashed line linking through both $\frac{1}{2}$ and $\frac{2}{4}$ shows that both fractions are in the same location on the number line, so they must be equivalent.

Fraction strips can also be used to show that $\frac{1}{2}$ and $\frac{2}{4}$ are equal. The figure shown is the same fraction strip that has been used in the previous examples. Explain that two $\frac{1}{4}$ strips take up the same amount of space as one $\frac{1}{2}$ strip. This figure is also a helpful way to show that $\frac{2}{2} = \frac{3}{3} = \frac{4}{4} = 1$.

1											
$\frac{1}{2}$						$\frac{1}{2}$					
$\frac{1}{3}$				$\frac{1}{3}$				$\frac{1}{3}$			
$\frac{1}{4}$			$\frac{1}{4}$			$\frac{1}{4}$			$\frac{1}{4}$		

- Repeat the process by using models, number lines, and fraction models to determine fractions equivalent to one half with denominators up to 10.
- Ask students to select the model that is equivalent to one half when provided with a fraction with a denominator up to 10.
- Ask students to complete a model to represent one-half when given a model that represents a fraction with a denominator up to 10. For example, present a fraction-strip model for $\frac{1}{8}$ and ask students to identify how to show one-half on the model.

❑ **Identify equivalent fractions with denominators up to 10.**

- Present a fraction strip to students as shown. Explain that the fraction strip can help identify equivalent fractions.

$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$	
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Pose a variety of different questions by using the same fraction strip. For example, what fraction is equivalent to $\frac{1}{4}$? Model shading the first cell containing $\frac{1}{4}$ in the top row and then shading the first two cells containing $\frac{1}{8}$ in the second row. Explain that both rows have been shaded the same amount, which makes them equivalent.

- Present the fraction $\frac{3}{4}$ and the fraction strip to students. Shade three of the $\frac{1}{4}$ strips to model $\frac{3}{4}$. Model counting the $\frac{1}{8}$s until you get to the same amount as three-fourths, which is six eighths. Model counting the $\frac{1}{8}$ fractions until you get to $\frac{6}{8}$. Demonstrate writing the 6 in the box to show that $\frac{3}{4}$ and $\frac{6}{8}$ are equivalent fractions.

$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$	
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$$\frac{3}{4} = \frac{\square}{8}$$

- Continue this process with a variety of fraction strips, number lines, and models with denominators up to 10.

- Ask students to identify equivalent fractions with denominators up to 10 by using models.

Prerequisite Extended Indicators

MAE 3.N.2.f—Use a model to compare unit fractions $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$.

MAE 3.N.2.e—Given a model, represent a whole number (1, 2, or 3) as a fraction with a denominator of 2, 3, or 4.

Key Terms

equivalent, fraction, fraction strip, number line

Additional Resources or Links

http://tasks.illustrativemathematics.org/content-standards/3/NF/A/3/tasks/1502

http://tasks.illustrativemathematics.org/content-standards/3/NF/A/3/tasks/2108

https://www.insidemathematics.org/sites/default/files/assets/classroom-videos/formative-re-engaging-lessons/4th-grade-math-understanding fractions/4th_grade_understanding_and_interpreting_fractions_lesson_plan.pdf

5.N.2.b

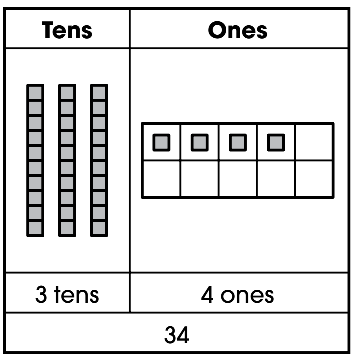
Represent and justify comparisons of whole numbers, fractions, mixed numbers, and decimals through the thousandths place using number lines, reasoning strategies, and/or equivalence.

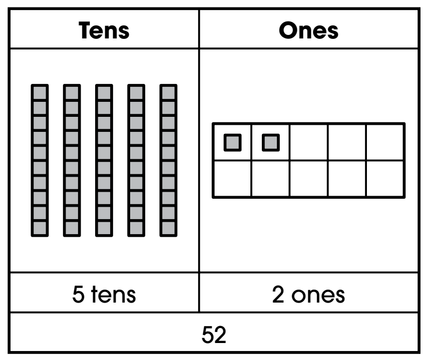
Extended: Use symbols <, >, and = to compare and order whole numbers up to 200.

Scaffolding Activities for the Extended Indicator

❑ **Compare whole numbers using symbols <, >, and = up to 200.**

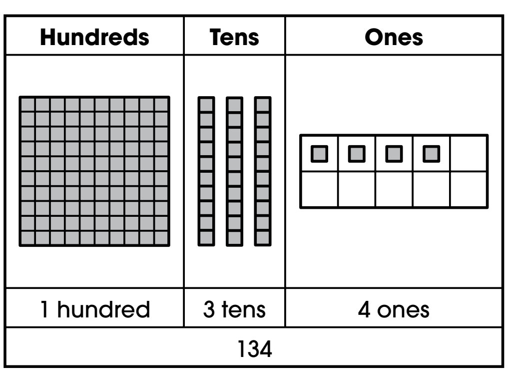
- Use base-ten blocks and mats to demonstrate the connection between standard form and expanded notation. For example, present the number 34. Indicate that the 3 in the tens column represents 3 tens and the 4 in the ones column represents 4 ones. Then, present the number 52 and indicate that the 5 in the tens column represents 5 tens and the 2 in the ones column represents 2 ones. Explain that since 34 has fewer tens than 52, 34 is less than 52.

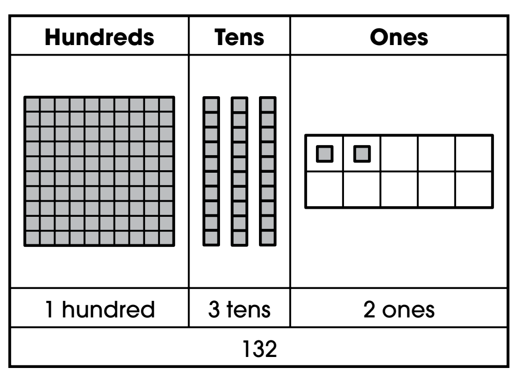




34 < 52

Similarly, present the number 134. Indicate that the 1 in the hundreds column represents 1 hundred, the 3 in the tens column represents 3 tens, and the 4 in the ones column represents 4 ones. Present the number 132 and indicate that the 1 in the hundreds column represents 1 hundred, the 3 in the tens column represents 3 tens, and the 2 in the ones column represents 2 ones. Explain that since both numbers have the same number of hundreds, 1 hundred, the next place to compare the values is the tens. Since both numbers have the same number of tens, 3 tens, the next place to compare the values is the ones. Compare the ones in each number; 4 ones is greater than 2 ones. Finally, explain that since 134 has the same hundreds and the same tens but more ones than 132, 134 is greater than 132.



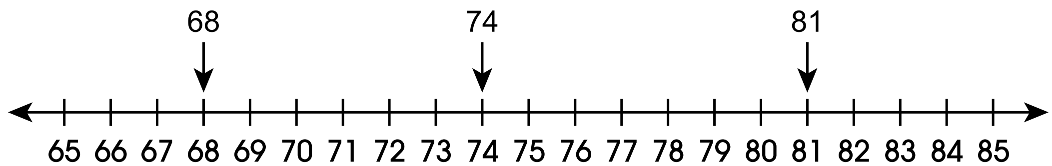


134 > 132

- Ask students to compare numbers by using the symbols <, >, and = when given values represented with base-ten blocks on mats.
- Ask students to represent two numbers on place-value mats and then compare the numbers by using the symbols <, >, or =.

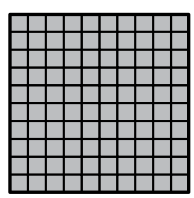
❑ **Order whole numbers up to 200.**

- Use a number line to indicate the location of the numbers 74, 68, and 81. Explain that the number with the least value is located farthest to the left on the number line (or closest to 0) and the number with the greatest value is located farthest to the right on the number line (or farthest from 0). Demonstrate writing the numbers in order from least to greatest by writing the numbers from left to right as they appear on the number line.



Numbers in order from least to greatest: 68, 74, 81

- Compare the place values of whole numbers to help order them. For example, write the numbers 184, 169, and 172 on a place-value mat. Explain that each number can be compared by its place value by using a process similar to comparing base-ten blocks.

Hundreds	Tens	Ones
		
1 1 1	8 6 7	4 9 2

The numbers in the hundreds places are all the same, 1. The numbers in the tens places are 8, 6, and 7. Since the tens place values are different, the numbers may be ordered without comparing the ones values. Therefore, the numbers in order from least to greatest are 169, 172, 184.

Continue to model comparing and ordering a variety of two- and three-digit whole-number combinations. Be sure to use examples in which the digit that is different is represented in all three place-value positions: hundreds, tens, and ones.

- Ask students to order three numbers up to 200 from least to greatest by using number lines or place-value mats.
- Ask students to order three numbers up to 200 from least to greatest without using number lines or other visual supports.

Prerequisite Extended Indicators

MAE 5.N.1.a—Identify representations of whole numbers up to 200.

MAE 4.N.1.b—Use symbols <, >, and = to compare whole numbers up to 50.

Key Terms

compare, greater than, greatest, least, less than, order, symbols

Additional Resources or Links

https://www.engageny.org/resource/grade-6-mathematics-module-3-topic-b-lesson-9

http://tasks.illustrativemathematics.org/content-standards/2/NBT/A/1

5.N.3 Operations with Fractions and Decimals

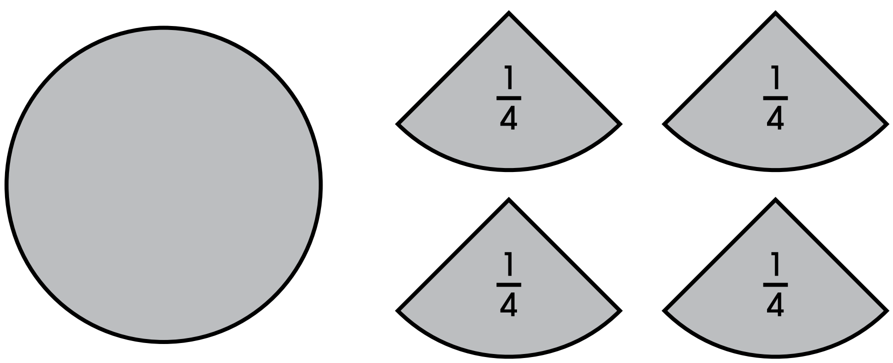
5.N.3.b

Multiply a whole number by a fraction or a fraction by a fraction, including mixed numbers, using visual fraction models and properties of operations.

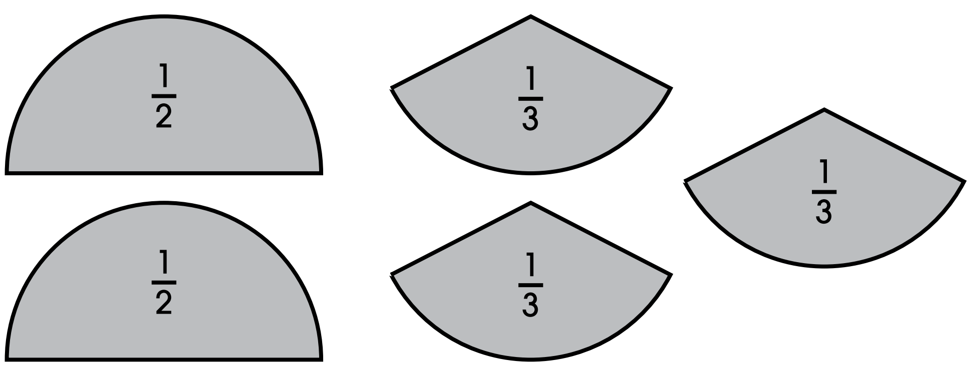
Extended: Use a visual model to multiply the fractions $\frac{1}{3}$, $\frac{1}{2}$, and $\frac{1}{4}$ by each other and by the whole numbers 2, 3, and 4.

Scaffolding Activities for the Extended Indicator

- ❑ **Use a fraction model to multiply fractions with a product of 1 or less.**
  - Use a fraction model that includes a template for 1 whole and 4 pieces that each represent $\frac{1}{4}$ to multiply fractions by 2, 3, and 4.

    Place 2 of the $\frac{1}{4}$ pieces on the 1 whole to represent $2 \times \frac{1}{4}$. Then show that 3 of the $\frac{1}{4}$ pieces cover $\frac{3}{4}$ of the whole, which represents $3 \times \frac{1}{4}$. Explain that it takes 4 of the $\frac{1}{4}$ pieces to cover the entire circle, so $4 \times \frac{1}{4}$ is the same as 1 whole. Follow this same process with pieces that are $\frac{1}{3}$ of the circle and $\frac{1}{2}$ of the circle.

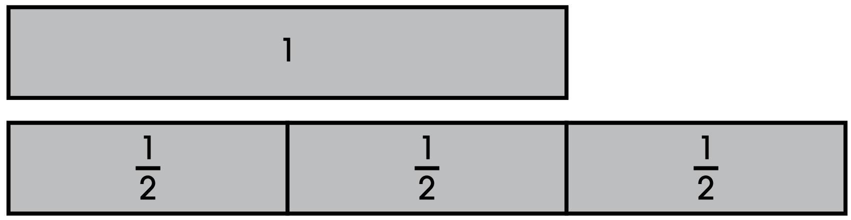
    

    Use the fraction pieces of various sizes to model the appropriate multiplication sentences (e.g., $2 \times \frac{1}{2} = 1$, $2 \times \frac{1}{3} = \frac{2}{3}$, and $3 \times \frac{1}{3} = 1$).

  - Ask students to multiply $\frac{1}{3}$, $\frac{1}{2}$, or $\frac{1}{4}$ by 2, 3, and 4 with products of 1 or less. Use manipulatives or visual representations of fraction models as needed.

5.N.3 Operations with Fractions and Decimals

- ❑ **Use a fraction model to multiply fractions with a product greater than 1.**



- Show that $3 \times \frac{1}{2}$ is greater than 1. This product can be written as $\frac{3}{2}$ or $1\frac{1}{2}$.
  Write $3 \times \frac{1}{2} = \frac{3}{2}$ and $3 \times \frac{1}{2} = 1\frac{1}{2}$.

  Repeat the process to represent $4 \times \frac{1}{2}$, which is equal to $\frac{4}{2}$ or 2 wholes. Give students the opportunity to layer the fraction pieces on top of the whole and identify when there are more fractional parts than will fit on top of 1 whole, which represents a product greater than 1.

  Repeat this same process with fraction strips or other manipulatives that represent $\frac{1}{3}$.

  Use the fraction pieces of various sizes to model the appropriate multiplication sentence (e.g., $4 \times \frac{1}{3} = \frac{4}{3}$ and $4 \times \frac{1}{3} = 1\frac{1}{3}$).

- Ask students to multiply $\frac{1}{3}$, $\frac{1}{2}$, or $\frac{1}{4}$ by 2, 3, and 4. Use manipulatives or visual representations of fraction models as needed.

Prerequisite Extended Indicators

MAE 4.N.3.c—Use visual models to add and subtract fractions with like denominators of halves, thirds, and fourths, limited to minuends and sums with a maximum of 1 whole.

MAE 3.N.2.e—Given a model, represent a whole number (1, 2, or 3) as a fraction with a denominator of 2, 3, or 4.

MAE 3.A.1.f—Identify multiplication equations, and use models (e.g., number lines, repeated addition, equal groups, arrays) to represent multiplication, limited to groups up to 20.

Key Terms

fraction, multiplication, product, whole number

Additional Resources or Links

http://tasks.illustrativemathematics.org/content-standards/4/NF/B/4/tasks/2076

https://www.engageny.org/resource/grade-4-mathematics-module-5-topic-g-overview/file/84606

https://www.mathlearningcenter.org/sites/default/files/pdfs/SecB4SUP-A10_NumMultWhlFrac-201309.pdf

5.N.3.c

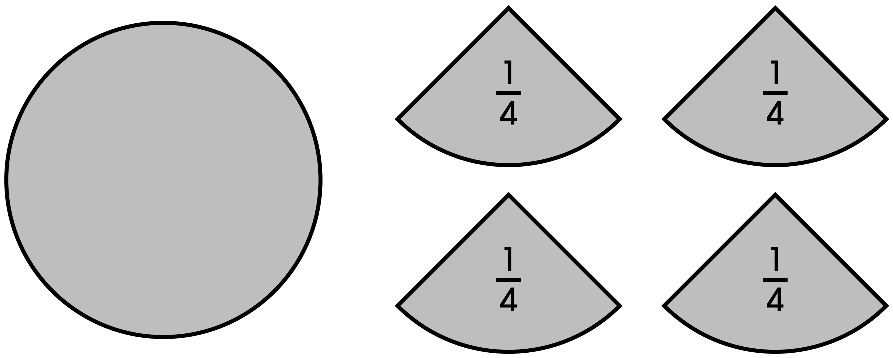
Divide a unit fraction by a whole number and a whole number by a unit fraction using visual fraction models and properties of operations.

Extended: Use a visual model to divide a whole number by $\frac{1}{3}$, $\frac{1}{2}$, or $\frac{1}{4}$ (e.g., 3 divided by $\frac{1}{2}$).

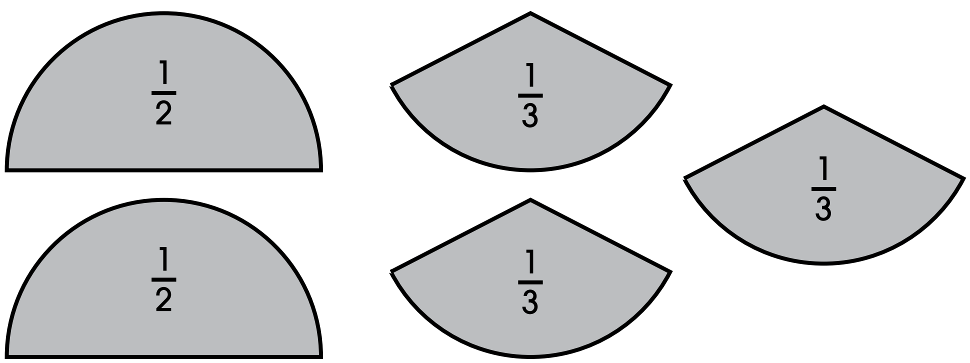
Scaffolding Activities for the Extended Indicator

❍ **Use a fraction model to divide 1 by $\frac{1}{3}$, $\frac{1}{2}$, and $\frac{1}{4}$.**

- Use a fraction model that includes one full circle to represent one whole and four pieces to represent four quarters when dividing 1 by $\frac{1}{4}$. Place the four $\frac{1}{4}$ pieces on the one whole to represent $1 \div \frac{1}{4}$. Show that four $\frac{1}{4}$ pieces are needed to cover the one whole, so $1 \div \frac{1}{4} = 4$.



Follow this process with pieces that are $\frac{1}{2}$ of the circle and $\frac{1}{3}$ of the circle.



Use the fraction pieces of various sizes to model the appropriate division sentences (e.g., $1 \div \frac{1}{2} = 2$ and $1 \div \frac{1}{3} = 3$).

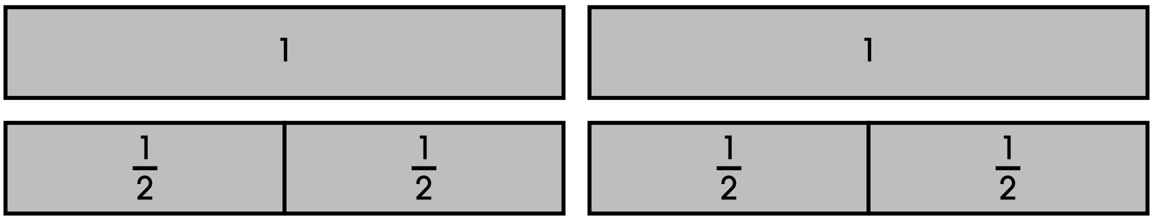
- Ask students to identify how many pieces of fraction size $\frac{1}{4}$ it takes to cover a whole. Repeat for $\frac{1}{3}$ and $\frac{1}{2}$.

- Ask students to use manipulatives or other visual representations of fraction models (e.g., number lines, paper folding, fraction rods, fraction strips) to divide 1 by $\frac{1}{3}$, $\frac{1}{2}$, and $\frac{1}{4}$.

5.N.3 Operations with Fractions and Decimals

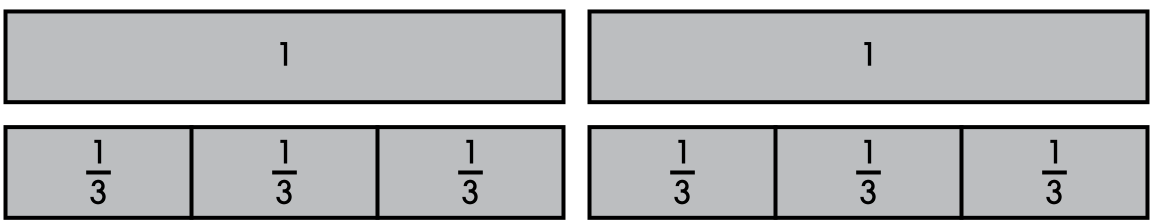
❍ **Use a fraction model to divide a whole number greater than 1 by $\frac{1}{3}$, $\frac{1}{2}$, and $\frac{1}{4}$.**

- Use fraction strips to demonstrate division of two wholes by $\frac{1}{2}$. Place two of the whole pieces above four of the $\frac{1}{2}$-size fraction pieces. Show students that four of the $\frac{1}{2}$ pieces are the same size as two of the whole pieces, so $2 \div \frac{1}{2} = 4$.



  Repeat the process to represent $3 \div \frac{1}{2}$, which is equal to 6 because six $\frac{1}{2}$ pieces are the same size as three whole pieces. Give students the opportunity to layer the fraction pieces on top of the wholes and to identify how many fraction pieces are needed to create the given number of wholes.

  Repeat this process with fraction strips or manipulatives of fraction size $\frac{1}{3}$. Use the fraction pieces to model the appropriate multiplication sentences (e.g., $2 \div \frac{1}{3} = 6$ and $3 \div \frac{1}{3} = 9$).



- Ask students how many pieces of fraction size $\frac{1}{4}$ are needed to cover two wholes. Repeat for $\frac{1}{3}$ and $\frac{1}{2}$.
- Ask students to use manipulatives or other visual representations of fraction models (e.g., number lines, paper folding, fraction rods, area models) to divide whole numbers greater than 1 by $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{2}$.

Prerequisite Extended Indicators

MAE 4.N.3.c—Use visual models to add and subtract fractions with like denominators of halves, thirds, and fourths, limited to minuends and sums with a maximum of 1 whole.

MAE 3.N.2.e—Given a model, represent a whole number (1, 2, or 3) as a fraction with a denominator of 2, 3, or 4.

MAE 4.A.1.c—Identify division equations, and use models (e.g., number lines, repeated addition, equal groups, arrays) to represent division without a remainder, limited to groups up to 20.

Key Terms

division, fourths, fraction, halves, thirds, whole number

Additional Resources or Links

https://www.mathlearningcenter.org/sites/default/files/pdfs/SecB5SUP-A12_DivFracWhlNum-201304.pdf

http://tasks.illustrativemathematics.org/content-standards/5/NF/B/7

5.N.3.d

Solve authentic problems involving addition, subtraction, and multiplication of fractions and mixed numbers with like and unlike denominators.

Extended: Use a visual model to solve authentic problems involving addition, subtraction, or multiplication of fractions.

Scaffolding Activities for the Extended Indicator

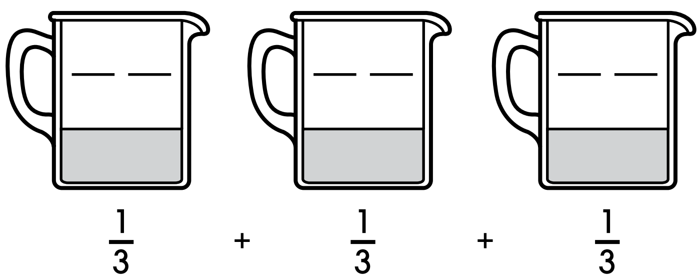
❑ **Solve authentic problems involving addition of fractions.**

- Use objects or visual models to demonstrate adding fractions.

  Present the problem shown below and demonstrate solving the problem by using an actual measuring cup or other visual model.

  Problem: Rita is making fruit punch. She puts $\frac{1}{3}$ cup of apple juice, $\frac{1}{3}$ cup of orange juice, and $\frac{1}{3}$ cup of cranberry juice in a glass.

  How much fruit punch is in the glass?



  Explain that $\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \frac{3}{3}$, or 1 cup in all.

- Continue to demonstrate solving a variety of authentic problems involving addition of fractions. Use objects or visual models such as circles or rectangles to show the part of the whole each fraction represents.

- Ask students to use objects or visual models to solve authentic problems involving addition of fractions.

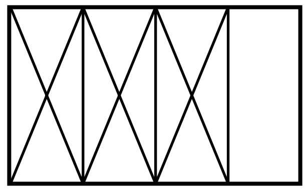
❑ **Solve authentic problems involving subtraction of fractions.**

- Use objects or visual models to demonstrate subtracting fractions.

  Present the problem shown below and a rectangle model divided into fourths. Explain that the rectangle represents 1 mile, with each part representing $\frac{1}{4}$ mile. Demonstrate crossing off three parts of the rectangle to show the distance already walked, which is $\frac{3}{4}$ mile.

  Problem: Jesse lives 1 mile away from school. He walks $\frac{3}{4}$ of the way to school and stops to tie his shoe.

What fraction of the mile does he have left to walk?



Emphasize to students that one mile is the same as $\frac{4}{4}$. Explain that $1 - \frac{3}{4} = \frac{1}{4}$ and Jesse has $\frac{1}{4}$ mile left to walk.

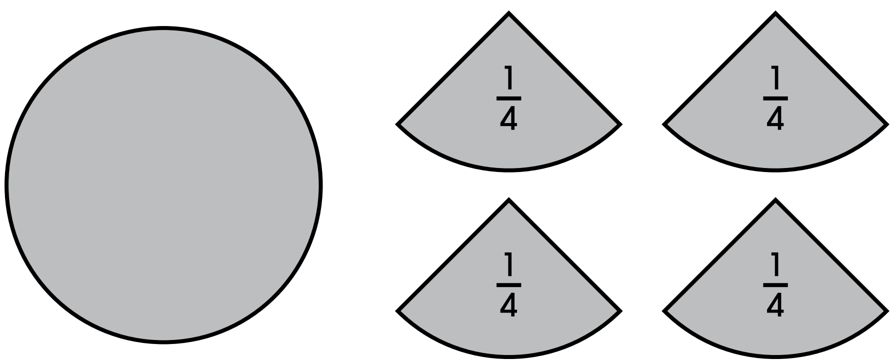
- Continue to demonstrate solving a variety of authentic problems involving subtraction of fractions. Use objects or visual models such as circles or rectangles to show the part of the whole each fraction represents.
- Ask students to use objects or visual models to solve authentic problems involving subtraction of fractions.

❑ **Solve authentic problems involving multiplication of fractions.**

- Use objects or visual models to demonstrate multiplying fractions.

Present the problem and the fraction model shown below. Explain that the circle represents 1 whole mile around the pond and each smaller piece represents $\frac{1}{4}$ of the mile around the pond.

Problem: The distance around the pond is one mile. Jason runs $\frac{1}{4}$ of a mile two times. How far has Jason run?



Place 2 of the $\frac{1}{4}$ pieces on the 1 whole to represent $2 \times \frac{1}{4}$.

Explain that $\frac{1}{4} \times 2 = \frac{1}{2}$.

- Continue to demonstrate solving a variety of authentic problems involving multiplication of fractions. Use objects or visual models such as circles or rectangles to show the part of the whole each fraction represents.
- Ask students to use objects or visual models to solve authentic problems involving multiplication of fractions.

Prerequisite Extended Indicators

MAE 5.N.3.b—Use a visual model to multiply the fractions $\frac{1}{3}$, $\frac{1}{2}$, and $\frac{1}{4}$ by each other and by the whole numbers 2, 3, and 4.

MAE 5.N.3.e—Use a visual model to add and subtract fractions with like denominators of halves, thirds, fourths, and fifths, limited to minuends and sums with a maximum of 1 whole.

Key Terms

denominator, fraction, numerator

Additional Resources or Links

http://tasks.illustrativemathematics.org/content-standards/4/NF/B/3/tasks/968

https://www.engageny.org/resource/grade-4-mathematics-module-5-topic-d-overview/file/77296

5.N.3.e

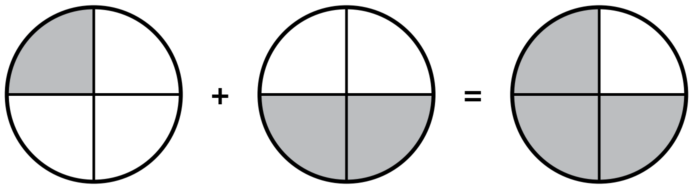
Add and subtract fractions and mixed numbers with unlike denominators without simplifying.

Extended: Use a visual model to add and subtract fractions with like denominators of halves, thirds, fourths, and fifths, limited to minuends and sums with a maximum of 1 whole.

Scaffolding Activities for the Extended Indicator

❑ **Add fractions with like denominators by using a visual model without regrouping.**

- Use models to demonstrate adding fractions with like denominators. For example, add $\frac{1}{4} + \frac{2}{4}$ by using a circle to represent the whole, with each whole divided into 4 equal parts. The model shows $\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$.

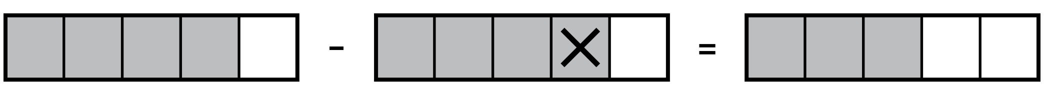
  Continue to demonstrate how to add fractions with like denominators by using a variety of shapes and models. Emphasize that the denominator stays the same when adding fractions with like denominators and only the numerators are added.

- Ask students to identify the sum (i.e., the answer) when given a visual model that represents adding two fractions with like denominators.

- Ask students to add fractions with like denominators by using a visual model without regrouping.

❑ **Subtract fractions with like denominators by using a visual model without regrouping.**

- Use models to demonstrate subtracting fractions with like denominators. Present the model shown for $\frac{4}{5} - \frac{1}{5}$. The first rectangle shows 4 of the 5 equal parts shaded, and then 1 of those fifths is removed, leaving the answer of $\frac{3}{5}$. So, $\frac{4}{5} - \frac{1}{5} = \frac{3}{5}$.

  Continue to demonstrate how to subtract fractions with like denominators by using a variety of shapes and models. Emphasize that the denominator stays the same when subtracting fractions with like denominators and only the numerators are subtracted.

- Ask students to identify the difference (i.e., the answer) when given a visual model that represents subtracting two fractions with like denominators.

- Ask students to subtract fractions with like denominators by using a visual model without regrouping.

Prerequisite Extended Indicators

MAE 4.N.3.c—Use visual models to add and subtract fractions with like denominators of halves, thirds, and fourths, limited to minuends and sums with a maximum of 1 whole.

MAE 3.N.2.e—Given a model, represent a whole number (1, 2, or 3) as a fraction with a denominator of 2, 3, or 4.

Key Terms

add, denominator, difference, fraction, numerator, subtract, sum

Additional Resources or Links

https://www.engageny.org/resource/grade-4-mathematics-module-5

https://www.insidemathematics.org/common-core-resources/3rd-grade

5.N.3.f

Solve authentic problems involving division of fractions by whole numbers and division of whole numbers by unit fractions.

Extended: Use a visual model to solve authentic problems involving division of whole numbers by the fractions $\frac{1}{3}$, $\frac{1}{2}$, or $\frac{1}{4}$.

Scaffolding Activities for the Extended Indicator

- ❑ **Solve authentic problems involving division of 1 whole by the fractions $\frac{1}{3}$, $\frac{1}{2}$, or $\frac{1}{4}$.**

  - Use objects or visual models to demonstrate dividing fractions.

    Present the problem and the fraction model shown below. Explain that the top bar represents one whole sheet of paper, and the smaller pieces represent the whole that has been divided into three equal parts.

    Problem: Shelly has one sheet of paper. She divides and cuts the paper into $\frac{1}{3}$ pieces. How many pieces of paper does she have now?

    Divide the whole into $\frac{1}{3}$ pieces.

    Explain that 1 divided by $\frac{1}{3}$ = 3.

  - Continue to demonstrate solving a variety of authentic problems involving division of 1 whole by the fractions $\frac{1}{3}$, $\frac{1}{2}$, or $\frac{1}{4}$. Use objects or visual models such as circles or rectangles to show the part of the whole each fraction represents.

  - Ask students to use objects or visual models to solve authentic problems involving division of 1 whole by the fractions $\frac{1}{3}$, $\frac{1}{2}$, or $\frac{1}{4}$.

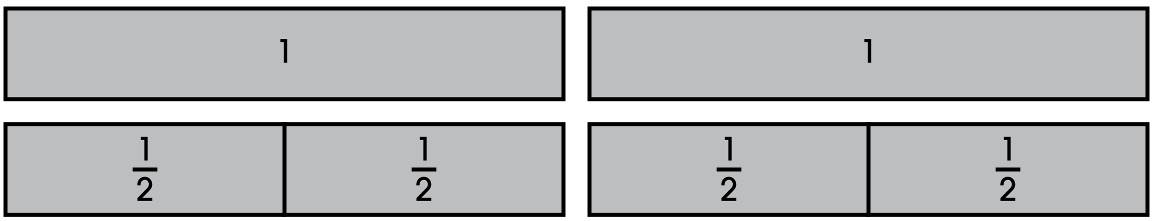
5.N.3 Operations with Fractions and Decimals

- **Solve authentic problems involving division of a whole number greater than 1 by the fractions $\frac{1}{3}$, $\frac{1}{2}$, or $\frac{1}{4}$.**

  - Use objects or visual models to demonstrate dividing fractions.

    Present the problem and the fraction model shown below. Demonstrate division of two wholes by $\frac{1}{2}$. Place two of the whole pieces above four of the $\frac{1}{2}$-size fraction pieces. Explain that four of the $\frac{1}{2}$ pieces are the same size as two of the whole pieces, so $2 \div \frac{1}{2} = 4$.

    Problem: Jerry walks two miles to school every day. He stops every $\frac{1}{2}$ mile to take a break. How many breaks does Jerry take?



    Divide the two wholes into $\frac{1}{2}$ pieces.

    Explain that 2 divided by $\frac{1}{2} = 4$.

  - Continue to demonstrate solving a variety of authentic problems involving division of fractions. Use objects or visual models such as circles or rectangles to show the part of the whole each fraction represents.

  - Ask students to use objects or visual models to solve authentic problems involving division of a whole number greater than one by the fractions $\frac{1}{3}$, $\frac{1}{2}$, or $\frac{1}{4}$.

Prerequisite Extended Indicators

MAE 5.N.3.b—Use a visual model to multiply the fractions $\frac{1}{3}$, $\frac{1}{2}$, and $\frac{1}{4}$ by each other and by the whole numbers 2, 3, and 4.

MAE 5.N.3.e—Use a visual model to add and subtract fractions with like denominators of halves, thirds, fourths, and fifths, limited to minuends and sums with a maximum of 1 whole.

MAE 5.N.3.d—Use a visual model to solve authentic problems involving addition, subtraction, or multiplication of fractions.

Key Terms

denominator, divided, model, numerator

Additional Resources or Links

https://im.kendallhunt.com/k5/families/grade-5/unit-3/family-materials.html

https://www.mathlearningcenter.org/sites/default/files/pdfs/SecB5SUP-A12_DivFracWhlNum-201304.pdf

5.N.3.g

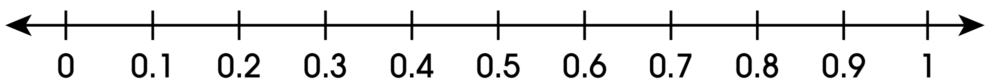
Add, subtract, multiply, and divide decimals to hundredths using strategies based on place value, properties of operations, and/or algorithms.

Extended: Add and subtract two decimal numbers without regrouping, limited to 0–10 with at most one decimal place (e.g., 5.2 + 3.7).

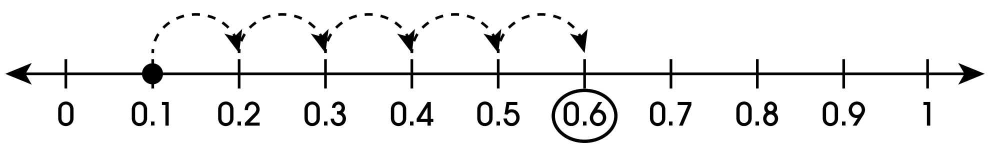
Scaffolding Activities for the Extended Indicator

❑ **Add numbers 0–1 with one decimal place without regrouping.**

- Use a number line to demonstrate adding tenths. Explain that a number line from 0 to 1 can be divided into ten equally sized intervals (or sections) called tenths, as shown.



The number line can be used to add numbers by starting at the first addend and using arrows to represent the second addend until the sum is found, a process that is identical to the one used with whole numbers. Demonstrate adding 0.1 + 0.5 by placing a point at 0.1 and then moving five intervals to the right. Each arrow represents adding one-tenth, so there are 5 of them for 0.5. They end at 0.6, so the sum of 0.1 and 0.5 is 0.6.



$0.1 + 0.5 = 0.6$

- Demonstrate using the standard algorithm for adding decimal numbers, such as 0.2 + 0.7. First, emphasize lining up the decimal points. It might be helpful to present the problem on grid paper.

$$\begin{array}{r} 0.2 \\ \underline{+\,0.7} \end{array}$$

With the decimal points properly aligned, each column of numbers can be added together to find the sum. Since 2 + 7 = 9, the number after the decimal point will be 9 in the sum. And for the ones place, 0 + 0 = 0. Explain that the decimal point in the answer also aligns with the other decimal points.

$$\begin{array}{r} 0.2 \\ \underline{+\,0.7} \\ 0.9 \end{array}$$

It may be helpful to demonstrate solving the same addition problem on a number line and comparing the answers.

- Ask students to add numbers from 0–1 with one decimal place by using a number line.
- Ask students to add numbers from 0–1 with one decimal place by using the standard algorithm.
- Add numbers 0–10 with one decimal place without regrouping.
- Demonstrate using the standard algorithm to add numbers 0–10 with one decimal place, such as 8.4 + 1.3. Explain the process of first adding the tenths together (the digits 4 and 3) to get 7 in the tenths place and then adding the ones together (the digits 8 and 1) to get 9 in the ones place. The final sum is 9.7.

$$\begin{array}{r} 8.4 \\ +\ 1.3 \\ \hline 9.7 \end{array}$$

It might be helpful to use visual supports, including but not limited to, writing the addition problem on grid paper, writing the addition problem on a place-value mat, or using base-ten blocks to represent the problem on a place-value mat. Demonstrate solving addition problems involving tenths by using a variety of numbers from 0–10 with one decimal place.

- Ask students to add numbers 0–10 with one decimal place when given visual supports.
- Ask students to add numbers 0–10 with one decimal place by using the standard algorithm.

❑ **Subtract numbers 0–10 with one decimal place without regrouping.**

- Demonstrate using the standard algorithm to subtract numbers 0–10 with one decimal place, such as 9.4 – 5.1. Explain the process of first subtracting the tenths (the digits 4 and 1) to get 1 in the tenths place and then subtracting the ones (the digits 9 and 5) to get 4 in the ones place. The final difference is 4.3.

$$\begin{array}{r} 9.4 \\ -\ 5.1 \\ \hline 4.3 \end{array}$$

Use visual supports (e.g., grid paper, place-value mats, base-ten blocks) as needed to demonstrate lining up the decimal points and subtracting one place-value column at a time. Demonstrate solving subtraction problems involving tenths by using a variety of numbers from 0–10 with one decimal place.

- Ask students to subtract numbers 0–10 with one decimal place when given visual supports.
- Ask students to subtract numbers 0–10 with one decimal place by using the standard algorithm.

Prerequisite Extended Indicators

MAE 4.N.1.d—Use decimal notation for fractions from 0 to 1 with a denominator of 10 (e.g., $\frac{2}{10}$ = .2), and identify those decimals on a number line from 0 to 1.

MAE 3.A.1.a—Add and subtract without regrouping, limited to maximum sum and minuend of 20.

Key Terms

add, decimal number, difference, place value, subtract, sum, tenth

Additional Resources or Links

https://www.mathlearningcenter.org/apps/number-pieces

https://www.insidemathematics.org/sites/default/files/materials/courtney%27s%20collection.pdf

5.A.1 Operations and Algebraic Thinking

5.A.1.a

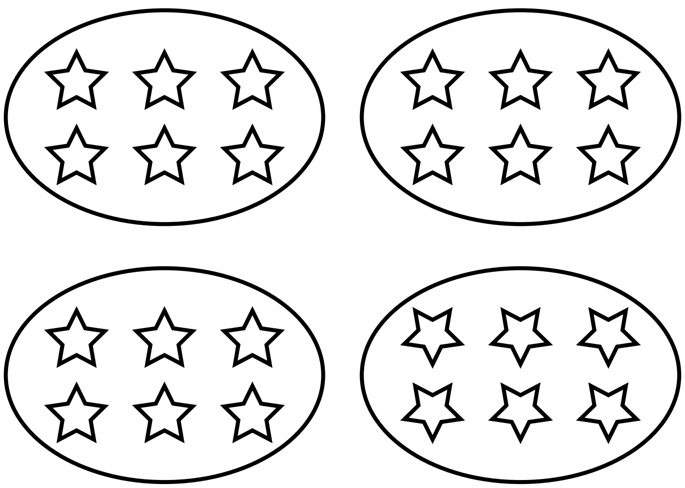
Multiply multi-digit whole numbers using an algorithm.

Extended: Multiply the numbers 1–9 by single-digit numbers and 10, and multiply two-digit numbers 11–20 by single-digit numbers 1–5.

Scaffolding Activities for the Extended Indicator

❑ **Multiply the numbers 1–9 by single-digit numbers.**

- Explain that 4 × 6 means 4 groups of 6. Use manipulatives in groups of 6 to model 4 × 6. Demonstrate finding the total (i.e., product) by counting the manipulatives and record the answer, 4 × 6 = 24.



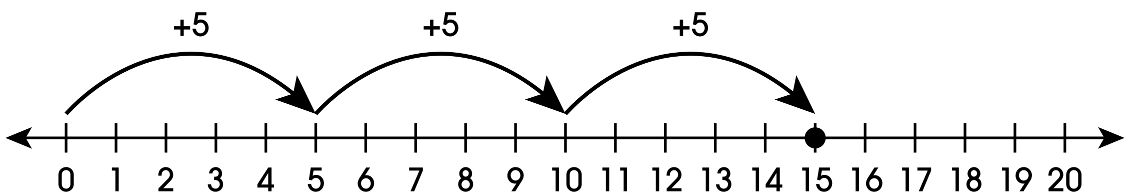
  Next, write the expression 6 × 4 and indicate that this math expression means 6 groups of 4. Show the same manipulatives in 6 groups of 4. Count the manipulatives to find the total (i.e., product) and record the answer, 6 × 4 = 24. Reinforce the idea that the product (i.e., answer) was the same for 6 × 4 and 4 × 6.

  Continue using manipulatives to demonstrate multiplication of numbers 1–9 by single-digit numbers.

- Ask students to multiply numbers 1–9 by single-digit numbers by using group representations.

- Explain that number lines can be used to solve multiplication problems. Present the equation 3 × 5 and the number line. Explain that the equation can be thought of as three jumps of 5. Model writing a jump from 0–5, from 5–10, and from 5–15. Indicate that after 3 jumps of 5, you land on 15 which is the answer to 3 × 5.

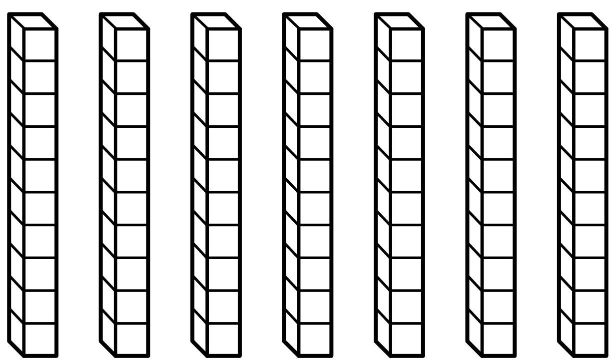
3 × 5



- Continue using a variety of number lines and a variety of multiplication equations to solve multiplication problems.
- Ask students to multiply numbers 1–9 by single-digit numbers by using number lines.

❑ **Multiply the numbers 1–9 by 10.**

- Explain that 7 × 10 means 7 groups of 10. Use manipulatives in groups of 10 to model 7 × 10. Demonstrate finding the total (i.e., product) by counting the manipulatives, skip counting by tens, or using repeat addition and record the answer, 7 × 10 = 70.



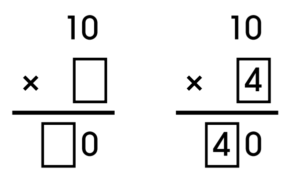
- Ask students to multiply the numbers 1–9 by 10 using manipulatives.

5.A.1 Operations and Algebraic Thinking

- Use a table with number sentences and products to show math patterns for multiplying one-digit whole numbers by 10. For example, present the following table. Emphasize the pattern of the products. Each one-digit whole number from the number sentence is now in the tens place of the product, and there is a zero in the ones place. Each row of the table can be made into an equation—for example, 8 × 10 = 80.

number sentence	product
1 × 10	10
2 × 10	20
3 × 10	30
4 × 10	40
5 × 10	50
6 × 10	60
7 × 10	70
8 × 10	80
9 × 10	90

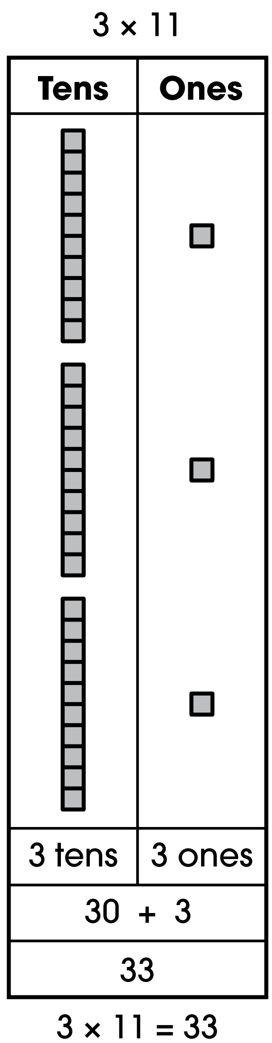
- Use a template as shown to demonstrate that the one-digit whole number is in the tens place in the product. Create the template with empty boxes and then demonstrate multiplying one-digit whole numbers by 10 by writing or placing cards with the one-digit whole number in the empty boxes.

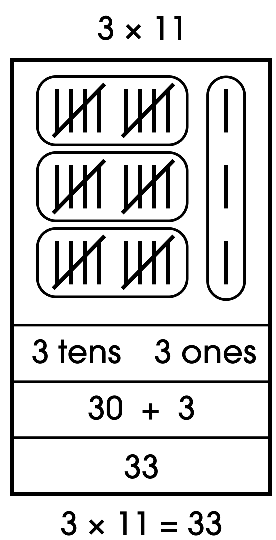


- Ask students to multiply numbers 1–9 by 10.

- [ ] **Multiply two-digit numbers 11–20 by single-digit numbers 1–5.**

  - Use drawings to represent 3 × 11. Use visuals of base-ten blocks to represent 3 groups of 11. Also use tally marks to represent 3 groups of 11 and then group the tens and ones. Explain that multiplication problems can be solved with the help of various types of drawings, as shown.

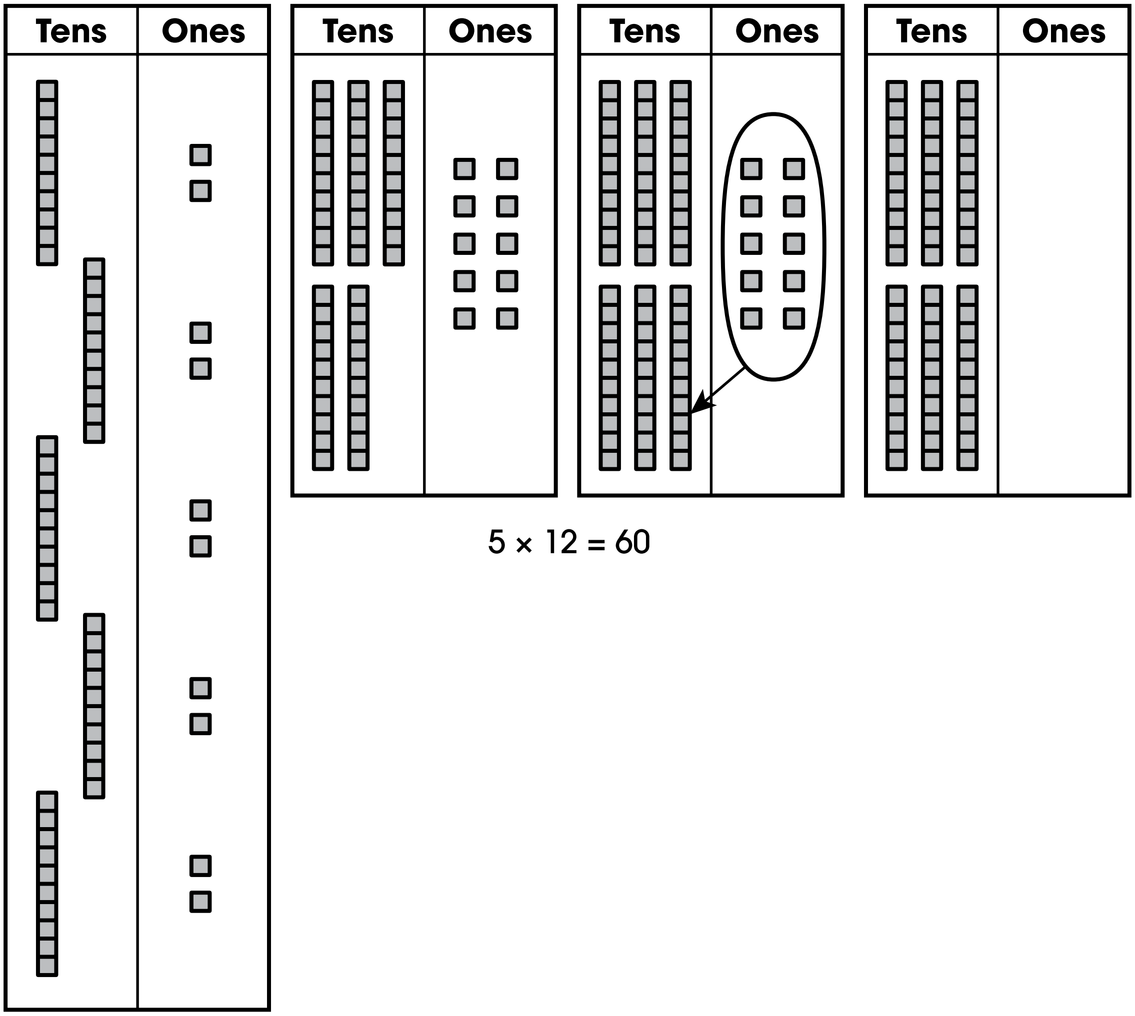




  - Ask students to use drawings to multiply numbers 11–20 by a single digit number 1–5.

5.A.1 Operations and Algebraic Thinking

- Use a place-value mat and base-ten blocks to model 5 × 12. First, represent 5 groups of 12. Next, combine the tens rods and unit cubes. Model regrouping (or exchanging) 10 unit cubes for 1 tens rod. Find the product by skip counting to 10 (and adding ones when applicable) or by placing the tens rods (and the unit cubes when applicable) on a hundreds chart.

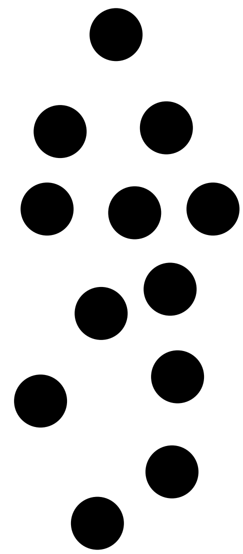


5 × 12 = 60

- Continue modeling other multiplication problems with numbers 11–20 by a single-digit number 1–5 (e.g., 11 × 5 and 12 × 3).
- Ask students to use a place-value mat and base-ten blocks to multiply numbers 11–20 by a single-digit number 1–5.

- Use a hundreds chart and tokens to model 15 × 4. Count out 15 tokens. Place the tokens on the hundreds chart. Highlight the number 15. Continue the same process three more times. Indicate the connection between 4 highlighted squares on the hundreds chart and counting to 15 a total of 4 times to find the answer: 15 × 4 = 60.

●	●	●	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



- Continue modeling other multiplication problems (e.g., 13 × 3 and 17 × 2).
- Ask students to use a hundreds chart and tokens to multiply numbers 11–20 by a single-digit number 1–5.

Prerequisite Extended Indicators

MAE 5.N.1.a—Identify representations of whole numbers up to 200.

MAE 4.A.1.a—Add and subtract numbers with regrouping, limited to two-digit addends and minuends.

MAE 4.A.1.b—Multiply 2s, 5s, and 10’s by a single-digit number with a maximum product of 100.

Key Terms

multiplication, ones, product, regrouping, tally, tens

Additional Resources or Links

https://www.engageny.org/resource/grade-3-mathematics-module-3-topic-f-lesson-19

https://www.engageny.org/resource/grade-4-mathematics-module-3-topic-b-lesson-5

https://www.engageny.org/resource/grade-4-mathematics-module-3-topic-c-lesson-7

5.A.1.b

Divide four-digit whole numbers by a two-digit divisor, with and without remainders, using strategies based on place value.

Extended: Divide a two-digit whole number by a single-digit whole number, limited to quotients with no remainders.

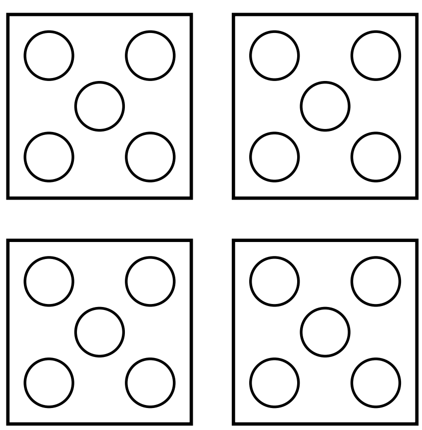
Scaffolding Activities for the Extended Indicator

❑ **Determine the size of a group when the number of groups is known.**

- Use manipulatives to demonstrate partition division using fair sharing. Demonstrate solving the following problem: “There are 20 cookies to share equally among 4 friends. How many cookies does each friend get?” Count out 20 manipulatives, and explain that they represent the whole set of 20 cookies. Next, explain that because the cookies will be shared equally among four friends, there will be four groups with the same number of cookies in each group. Demonstrate dividing the manipulatives into four groups. Count to show that there are five manipulatives in each group, and explain that this means each friend will get five cookies. Write the division equation that models the problem, 20 ÷ 4 = 5. Emphasize how each number in the division problem is represented in the model. The template shown can be used to represent the division problem.

There are 20 cookies to share equally among 4 friends. How many cookies does each friend get?

Division Equation: 20 ÷ 4 = 5



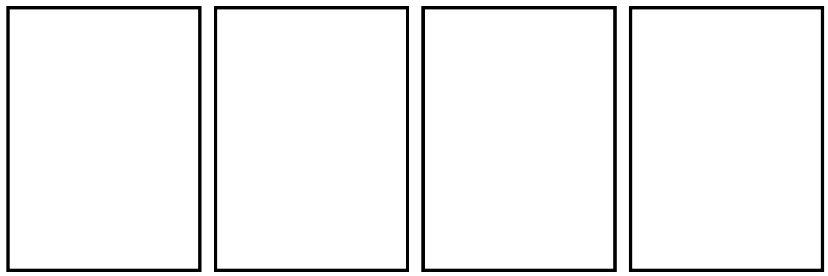
The 20 represents the total number of cookies.

The 4 represents the number of friends.

The 5 represents the number of cookies each friend gets.

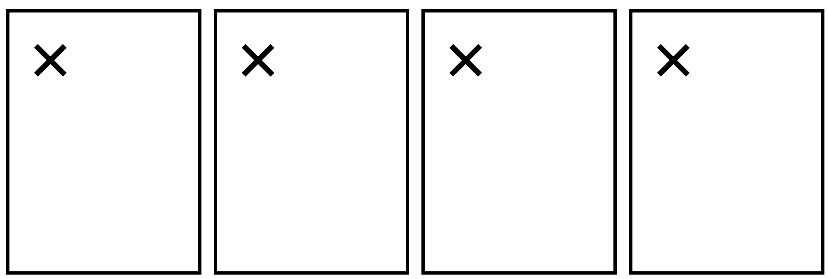
- Use a division mat to demonstrate partition division using fair sharing. Use the same problem: “There are 20 cookies to share equally among 4 friends. How many cookies does each friend get?” Draw four rectangles below the problem, and explain that each rectangle represents one friend.

  $20 \div 4 =$

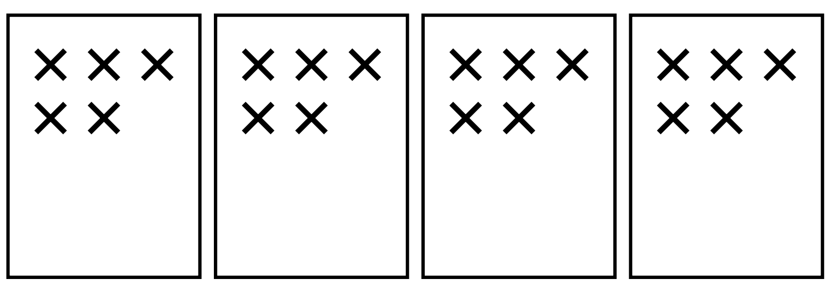
  Next, explain that each of the 20 cookies can be represented with an “x” as they are shared with the four friends. Mark one “x” in each rectangle.

  $20 \div 4 =$

  When each rectangle has one “x” marked, repeat, starting at the first rectangle and marking one more “x” in each rectangle. Continue marking x’s and counting the x’s as they are marked until all 20 cookies are represented. Write the answer to the problem, 5, and emphasize how each number in the division problem is represented in the model.

  $20 \div 4 =$

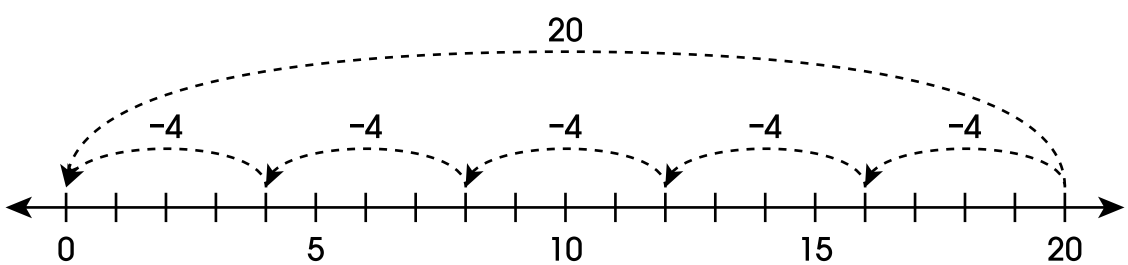
  Continue to demonstrate solving division problems with no remainder when the number of groups is given by using a variety of numbers and a model.

- Ask students to use manipulatives to solve a division problem with no remainder when the number of groups is given. For example, present the following problem: “There are 15 apples placed equally into 3 baskets. How many apples are in each basket?”

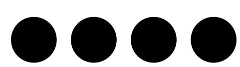
- Ask students to use a division mat or other drawing to solve a division problem with no remainder when the number of groups is given. For example, present the following problem: "There are 12 apples placed equally into 3 baskets. How many apples are in each basket?"

❑ **Determine the number of groups when the size of the group is known.**

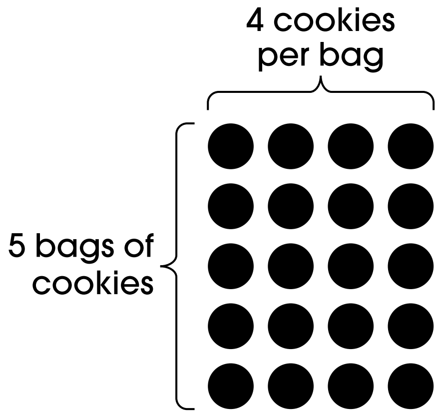
- Use a number line to demonstrate measurement division using repeated subtraction. Present the expression 20 ÷ 4 and the following problem: "There are 20 cookies to put into bags. There will be 4 cookies in each bag. How many bags are needed for the cookies?" Display a number line from 0 to 20. Point to the 20 and explain that 20 is the starting number because there are 20 cookies. Then "jump" four units to the left. Explain that one "jump" represents one bag and the four units represent the four cookies in each bag. "Jump" four more units to the left to represent another bag filled with four cookies. Continue "jumping" four units to the left until you reach 0. Explain that once you reach 0, all the cookies have been put into the bags. Count the five jumps to show that the 20 represents the total number of cookies, the four units within each "jump" represent the number of cookies in each bag, and the five "jumps" represent the number of bags that can be filled. Write the division equation that models the problem, 20 ÷ 4 = 5. Emphasize how each number in the division problem is represented in the model.



- Use an array to demonstrate measurement division. Present the expression 20 ÷ 4, and use the same problem: "There are 20 cookies to put into bags. There will be 4 cookies in each bag. How many bags are needed for the cookies?" Begin with a row of four dots, as shown, and explain that each row of four dots represents one bag filled with four cookies.



Continue adding dots to each row and counting the dots as they are drawn until all 20 dots have been added, representing the 20 cookies. The 20 dots are arranged in a five-by-four array. Show that the 20 dots represent the total number of cookies, the four columns represent the number of cookies in each bag, and the five rows represent the number of bags that can be filled. Write the division equation that models the problem, 20 ÷ 4 = 5. Emphasize how each number in the division problem is represented in the model.



Continue to demonstrate solving division problems with no remainder when the size of the group is given by using a variety of numbers and a model.

- Ask students to use a number line to solve a division problem with no remainder when the size of the group is given. For example, present the following problem: “There are 18 apples in baskets. Each basket has 6 apples. How many baskets are filled with apples?”
- Ask students to use an array to solve a division problem with no remainder when the size of the group is given. For example, present the following problem: “There are 9 apples in baskets. Each basket has 3 apples. How many baskets are filled with apples?”

Prerequisite Extended Indicators

MAE 4.A.1.c—Identify division equations, and use models (e.g., number lines, repeated addition, equal groups, arrays) to represent division without a remainder, limited to groups up to 20.

MAE 4.N.4.a—Count by 2s, 5s, and 10s with numbers, models, or objects up to 50.

Key Terms

array, divide, equal groups, factor, number line, quotient

Additional Resources or Links

https://www.insidemathematics.org/classroom-videos/formative-re-engaging-lessons/3rd-grade-math-interpreting-multiplication-and-division

https://www.engageny.org/resource/grade-4-math-represent-and-solve-division-problems-a-three-digit-dividend-4nbt6

5.A.1.c

Justify the reasonableness of computations involving whole numbers, fractions, and decimals.

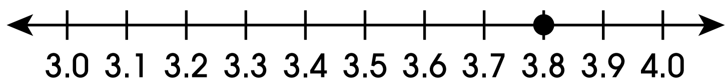
Extended: Estimate the sum of two decimal numbers, limited to 0–10 with at most one decimal place (e.g., 5.2 + 3.7 is about 9).

Scaffolding Activities for the Extended Indicator

❑ **Round a decimal number with tenths to the nearest whole number.**

- Introduce “estimate” as another word for rounding. Rounding numbers to the nearest whole number can help estimate the value of the number. Provide relevant examples of using the estimate of a decimal number in a real-world situation.

- Use a number line to demonstrate the location of a decimal number. For example, the number line shown has a point at 3.8.



  Just like a whole number can be rounded to the nearest multiple of 10, a decimal number can be rounded to the nearest whole by finding which whole number it is closest to on the number line. For the number 3.8, the two closest whole numbers are 3 and 4. Looking at the number line indicates that the point is closer to 4 than it is to 3, so 3.8 rounds to 4. Show students a variety of decimal numbers with tenths and demonstrate rounding them on the number line. Be sure to include a number with five-tenths to demonstrate that the digit 5 indicates the number will be rounded to the greater whole number. For example, 8.5 will round to 9, not 8.

- Ask students to round decimal numbers with tenths to the nearest whole number. Focus on the numbers 1.0 through 10.0.

❑ **Estimate the sum of two decimal numbers with one decimal place.**

- Use rounding of the addends to estimate a sum. Demonstrate that an addition problem can be estimated by first finding the whole numbers closest to the decimal numbers given. Present the problem 2.3 + 4.6.

2.3	2.3 is closer to 2
+ 4.6	4.6 is closer to 5

  Explain that rounding the decimal numbers helps estimate the sum (or the answer), and 2 + 5 = 7. So, 7 is the estimate of the sum. Show students a variety of addition problems.

- Ask students to estimate the sum of two decimal numbers that both have one decimal place. For example, show the following problem.

7.9	7.9 is about ________
+ 1.1	1.1 is about ________

Then give students three equations for the estimate of the sum: 7 + 1 = 8, 8 + 1 = 9, and 8 + 2 = 10. Students should identify 8 + 1 = 9 as the best estimate.

Prerequisite Extended Indicators

MAE 4.N.1.d—Use decimal notation for fractions from 0 to 1 with a denominator of 10 (e.g., $\frac{2}{10}$ = .2), and identify those decimals on a number line from 0 to 1.

MAE 3.A.1.b—Round one- and two-digit whole numbers to the nearest ten and estimate two-digit sums and differences to the nearest ten.

MAE 5.N.3.g—Add and subtract two decimal numbers without regrouping, limited to 0–10 with at most one decimal place (e.g., 5.2 + 3.7).

Key Terms

add, closest, decimal number, estimate, nearest, round, sum, tenth

Additional Resources or Links

https://www.engageny.org/resource/grade-4-mathematics-module-6-topic-d-overview

https://www.insidemathematics.org/common-core-resources/5th-grade

http://tasks.illustrativemathematics.org/content-standards/5/NBT/A/4/tasks/1804

5.A.1.d

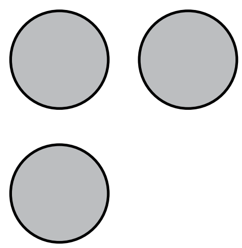
Solve authentic numerical or algebraic expressions using order of operations (excluding exponents).

Extended: Evaluate two-step numerical expressions involving addition or subtraction and multiplication using order of operations, limited to the digits 1–5 (e.g., 4 × (5 - 2), 4 + 2 × 3).

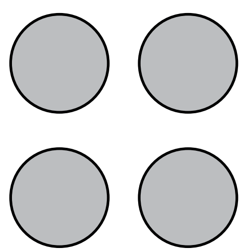
Scaffolding Activities for the Extended Indicator

❑ **Evaluate numerical expressions with addition and subtraction using numbers 1 through 5.**

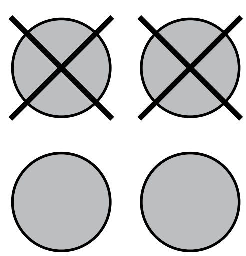
- Explain that a numerical expression (or math problem) can have more than one operation. The expression 3 + 1 – 2 has two operations, addition and subtraction. To solve this problem, first add and then subtract. Explain that when solving problems with more than one operation, there is a certain order to follow. When solving problems with addition and subtraction, solve left to right. If addition comes first left to right, add first. If subtraction comes first left to right, subtract first.
- Model evaluating 3 + 1 – 2 with manipulatives. Start with 3 tokens.



Add 1 more token.



Then, take 2 away and the answer is 2.



Count the number of tokens left, and the answer is 2.
Therefore, 3 + 1 – 2 = 2.

- Continue modeling how to evaluate numerical expressions by using manipulatives, number lines, calculators, or any other familiar counting or computation strategy while emphasizing that the order of operations is from left to right.

5 + 4	1 + 5 – 3	5 – 2 + 4	4 + 4 – 5

- Ask students to use a strategy to evaluate numerical expressions with addition and subtraction.

❑ **Evaluate numerical expressions with addition or subtraction and multiplication using numbers 1 through 5.**

- Explain that when a numerical expression (or math problem) has multiplication and addition only or multiplication and subtraction only, the multiplication is done first regardless of its location in the problem.
- Demonstrate identifying the multiplication part of the problem by highlighting, underlining, circling, etc.

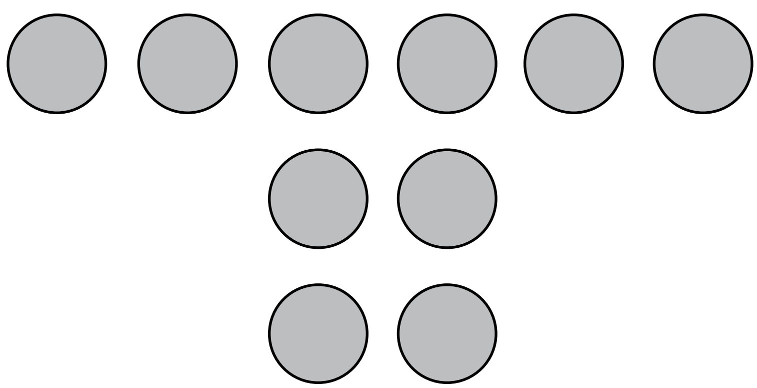
2 × 3 + 1	4 – 1 × 3	5 + 4 × 2	5 × 5 – 4

- Ask students to identify the multiplication part of the problem.

3 × 2 + 5	5 × 3 – 4	5 – 2 × 2	3 + 3 × 4

- Model evaluating 4 + 2 × 3 with manipulatives. Since multiplication is in the problem, it is the first step. Make two groups of three tokens (2 × 3).

Add 4 more tokens.



Count all the tokens, and the answer is 10.

Therefore, 4 + 2 × 3 = 10.

- Continue modeling how to evaluate numerical expressions by using manipulatives, number lines, calculators, or any other familiar counting or computation strategy while emphasizing that the order of operations is multiplication first, then the addition or subtraction.

4 × 2 + 1	4 × 5 – 3	3 – 1 × 2	2 + 4 × 3

- Ask students to use a strategy to evaluate numerical expressions with addition or subtraction and multiplication.

❑ **Evaluate a numerical expression with addition or subtraction and multiplication that includes parentheses using the numbers 1–5.**

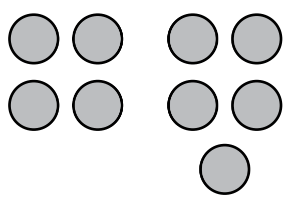
- Explain that when parentheses are used in a numerical expression, the operation within the parentheses is always evaluated first. Demonstrate identifying the parentheses and what is evaluated first by highlighting, underlining, or circling the first step in solving numerical expressions.

2 × (3 + 4)	(5 – 1) × 2	4 × (2 + 2)	4 – (2 + 1)

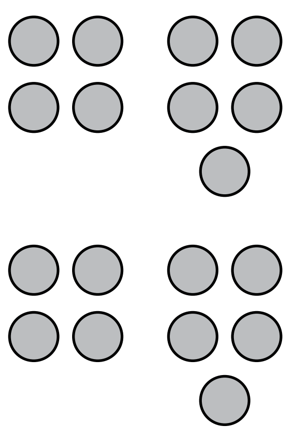
- Ask students to identify the parentheses and what is evaluated first by highlighting, underlining, or circling the first step in solving numerical expressions.

- Model solving (4 + 5) × 2. Explain that the operation within the parentheses is always the first operation within a numerical expression regardless of what expression is within them. In this case, 4 + 5 is within the parentheses and is therefore the first step to solve.

  Model starting with 4 tokens and then adding 5 more tokens.



  This gives a total of 9 tokens. The second step in the expression is to multiply by 2, so two sets of 4 + 5 are needed.



  Count the total number of tokens. The answer is 18. Therefore (4 + 5) × 2 = 18.

5.A.1 Operations and Algebraic Thinking

- Continue modeling how to solve numerical expressions that have parentheses.

(2 × 3) + 4	(5 – 1) × 2	4 × (2 + 2)	4 – (2 + 1)

- Ask students to evaluate numerical expressions that have parentheses.
- Ask students to solve numerical expressions created with the cutout number cards.

1	2	3	4
5	-	+	×
1	2	3	4
5	-	+	×
(	)		

Prerequisite Extended Indicators

MAE 4.A.1.b—Multiply 2s, 5s, and 10’s by a single-digit number with a maximum product of 100.

MAE 3.A.1.c—Solve one-step addition and subtraction equations using the digits 0–9, limited to equations with an unknown change or unknown result.

MAE 3.A.1.f—Identify multiplication equations, and use models (e.g., number lines, repeated addition, equal groups, arrays) to represent multiplication, limited to groups up to 20.

Key Terms

add, evaluate, multiply, numerical expression, operation, order of operations, parentheses, subtract

Additional Resources or Links

http://nlvm.usu.edu/en/nav/frames_asid_189_g_2_t_2.html?open=activities&from=category_g_2_t_2.html

(Note: Java required for website. Most recent version recommended, but not needed.)

https://www.nctm.org/Classroom-Resources/Illuminations/Lessons/Exploring-Krypto/

https://www.engageny.org/resource/grade-5-mathematics-module-2-topic-b-lesson-3

https://curriculum.illustrativemathematics.org/k5/teachers/grade-3/unit-3/lesson-20/lesson.html

https://www.engageny.org/resource/grade-3-mathematics-module-1

Mathematics—Grade 5
Geometry

5.G.1 Shapes and Their Attributes

5.G.1.a

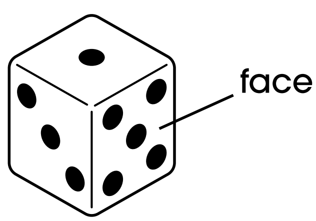
Identify and describe faces, edges, and vertices of rectangular prisms.

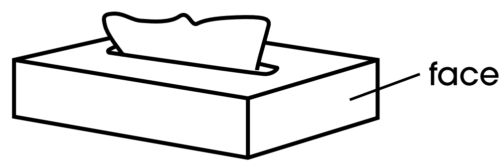
Extended: Identify the faces, edges, and vertices of cubes and other rectangular prisms.

Scaffolding Activities for the Extended Indicator

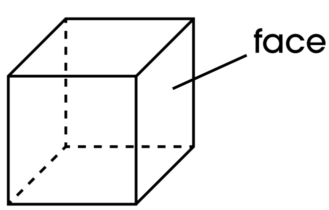
❑ **Identify the faces of a cube and other rectangular prisms.**

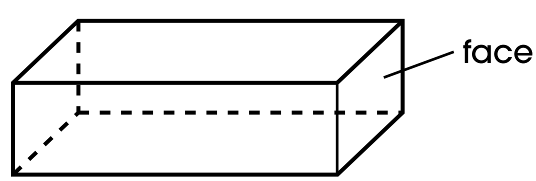
- Indicate the faces on an object that is in the shape of a cube or a rectangular prism. Explain that there are always six faces on a cube or rectangular prism, no matter how big or small it is. It might be helpful to cut out six squares for cubes or six rectangles for rectangular prisms that can be taped to each face of the cube or rectangular prism as each face is counted. Demonstrate counting the six faces on a variety of real-world objects and manipulatives in a variety of sizes.





Compare a real-world object that is a cube or a rectangular prism to a drawing and indicate the faces of the cube or rectangular prism on the drawing. Indicate that the dashed or faded lines in the drawing of a three-dimensional shape show the hidden sides of a three-dimensional shape when it is drawn on a piece of paper.

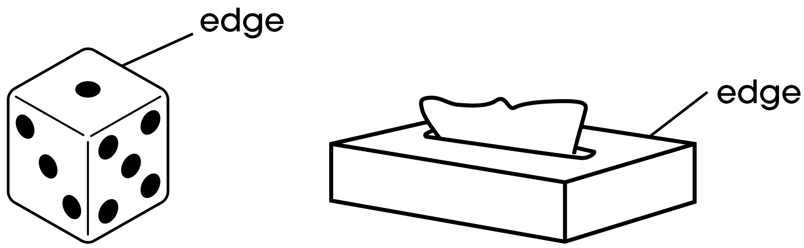




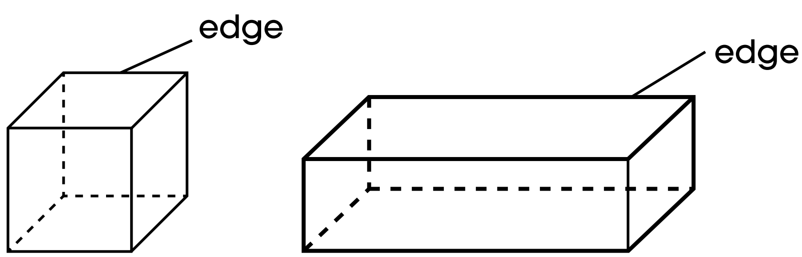
- Ask students to identify the six faces of a cube and of a rectangular prism on a three-dimensional object. For example, present six square sticky notes and ask students to place them on the six faces of a cube.
- Ask students to identify the faces of a cube and of a rectangular prism on a drawing.

- ❑ **Identify the edges of a cube and other rectangular prisms.**

  - Indicate the edges of a cube and of a rectangular prism on a manipulative or other object. Explain that an edge is the part where two faces meet. Explain that the edges on a cube are all the same length, and there are always twelve edges on a cube. Note that the edges on a rectangular prism are not all the same length, since some of their faces are different sizes, but there are still twelve edges on a rectangular prism. It might be helpful to use a model of a cube and rectangular prism that can be drawn on to highlight the edges. Another option is to precut sticky string and place sticky string on the edges of the objects.



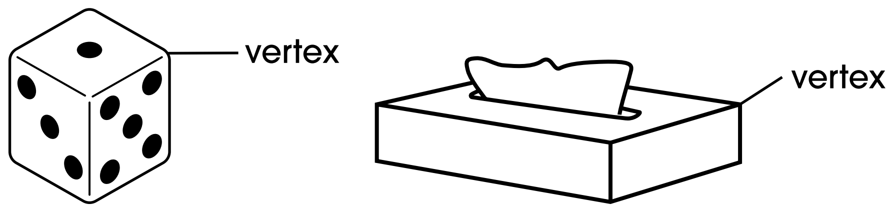
Compare the edges on a real-world object to the edges on a drawing of a cube or rectangular prism. Emphasize that there are twelve edges and explain that the dashed lines or faded lines indicate the hidden edges of a three-dimensional shape when it is drawn on a piece of paper.



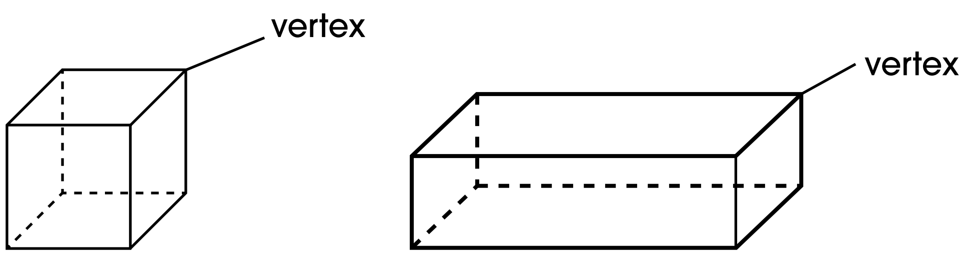
  - Ask students to identify the edges of a cube and of a rectangular prism on a three-dimensional object.
  - Ask students to identify the edges of a cube and of a rectangular prism on a drawing.

- ❑ **Identify the vertices of a cube and other rectangular prisms.**

  - Indicate the vertices of a cube and rectangular prism on a manipulative or other real-world object. Explain that a vertex is the part where three faces meet to make a corner. Note that there are eight vertices on a cube and eight vertices on a rectangular prism. It might be helpful to cover three faces of a figure with a sticky note and identify the corner where all three pieces of paper touch. Another option is to form eight small balls of clay to adhere to each vertex.



Compare the vertices on the real-world object to the vertices on a drawing of a cube and of a rectangular prism.



  - Ask students to identify the vertices of a cube and of a rectangular prism on a three-dimensional object.

  - Ask students to identify the vertices of a cube and of a rectangular prism on a drawing.

Prerequisite Extended Indicators

MAE 3.G.1.a—Identify two-dimensional shapes, circles, triangles, rectangles, or squares.

Key Terms

cube, edge, face, rectangular prism, three-dimensional, vertices, vertex

Additional Resources or Links

https://www.engageny.org/resource/grade-1-mathematics-module-5-topic-lesson-3/file/50211

https://www.insidemathematics.org/sites/default/files/materials/cutting%20a%20cube.pdf

5.G.1.b

Recognize volume as an attribute of solid figures that is measured in cubic units.

Identify the difference between two-dimensional (flat) and three-dimensional (solid) figures.

Scaffolding Activities for the Extended Indicator

❑ **Recognize that three-dimensional figures can be filled, and two-dimensional figures cannot be filled.**

- Use a common three-dimensional figure to demonstrate that there is space inside it. A shoebox is one example. Explain that the shoebox is a rectangular prism and is three-dimensional, meaning there is space inside of it that can be filled. Demonstrate filling the shoebox. Next, hold up a piece of paper. Explain that the piece of paper is a rectangle and is two-dimensional. Demonstrate looking at the piece of paper to try and see if it can be filled and determining that there is no height to it, so it cannot be filled.

  Repeat this process with various three-dimensional and two-dimensional figures found around the classroom.

- Ask students to identify three dimensional figures by recognizing they can be filled.
- Ask students to identify two-dimensional figures by recognizing they cannot be filled.

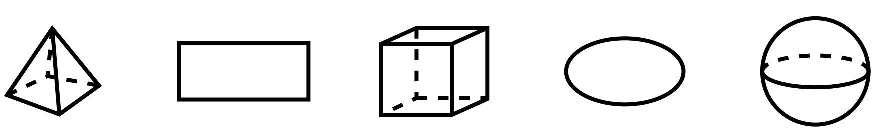
❑ **Recognize a variety of shapes as either flat or solid.**

- Present a three-dimensional figure to students, such as a cereal box. Demonstrate that there is space inside the box that can be filled, indicating it is a three-dimensional figure. Explain that three dimensional figures are called solid shapes. Demonstrate cutting a rectangle out of a piece of paper. Model looking at the shape from different viewpoints and determining that the shape cannot be filled and is two-dimensional. Explain that two-dimensional shapes are flat. Compare the flat shape to the solid shape by showing how much more space the solid shape takes up than the flat shape.

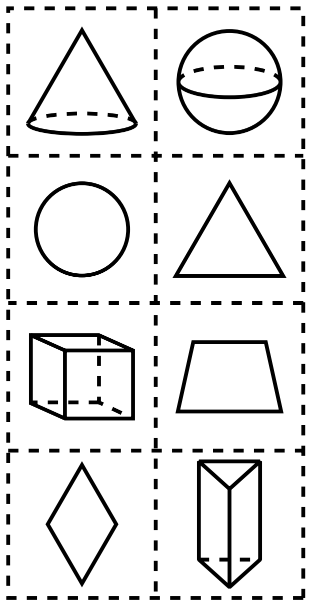
  Throughout the classroom, present various flat and solid figures and demonstrate how to determine if the real-world object is either flat or solid.

- Ask students to determine if a real-world object is a flat or solid figure.
- Present drawings of flat and solid figures to students as shown.

  Explain that additional faces, lines, and vertices are added to drawings to help show dimensionality, or the space a shape is taking up. If so, the drawing is to represent a solid shape. Model showing various solid figures represented on paper. Explain that two-dimensional shapes such as rectangles and ovals do not have the additional faces, lines, and vertices and therefore represent a flat shape. Present each shape and model the process of determining if a shape on paper represents a flat or solid shape.



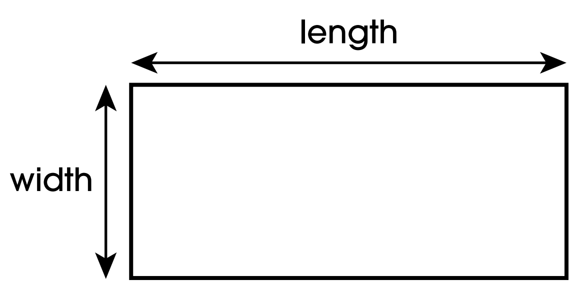
- Ask students to determine if a drawing of a figure is flat or solid by sorting.



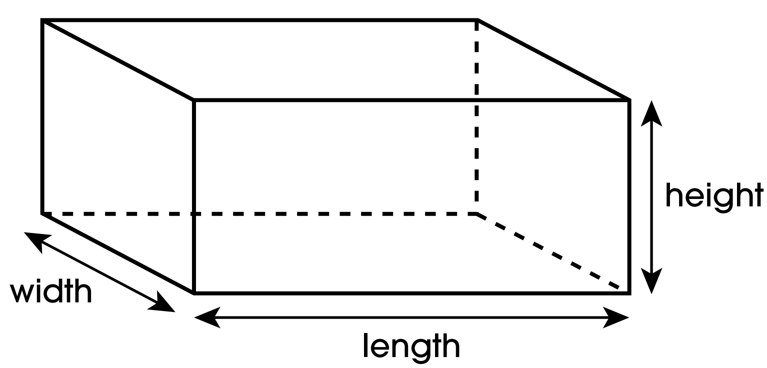
Flat Shapes	Solid Shapes

❑ **Recognize that two-dimensional shapes have length and width, and three-dimensional shapes have length, width, and height.**

- Present a two-dimensional rectangle to students. Identify the length and width of the rectangle. Explain that those are the two dimensions of the rectangle.



Present a three-dimensional rectangular prism to students. Identify the length, width, and height of the rectangular prism. Explain that those are the three dimensions of the rectangular prism.



Explain that by adding the dimension of height to a shape, it goes from two dimensional to three dimensional.

5.G.1 Shapes and Their Attributes

- Present various two-dimensional and three-dimensional shapes to students. Identify the length and width of two-dimensional shapes and put them in one category. Identify the length, width, and height of three-dimensional shapes and separate them into a different category.
- Ask students to identify the length and width on two-dimensional shapes.
- Ask students to identify the length, width, and height on three-dimensional shapes.

Prerequisite Extended Indicators

MAE 3.G.1.a—Identify two-dimensional shapes, circles, triangles, rectangles, or squares.

MAE 5.G.1.a—Identify the faces, edges, and vertices of cubes and other rectangular prisms.

Key Terms

dimensions, edge, face, fill, flat, height, length, rectangular prism, solid, three-dimensional, two-dimensional, vertices, vertex, width

Additional Resources or Links

http://nlvm.usu.edu/en/nav/frames_asid_129_g_2_t_3.html?open=activities&from=topic_t_3.html

https://www.nctm.org/Classroom-Resources/Illuminations/Lessons/Study-the-Solids/

https://www.mathlearningcenter.org/educators/free-resources/lessons-publications/bridges-1st-edition-activities/4

5.G.1.c

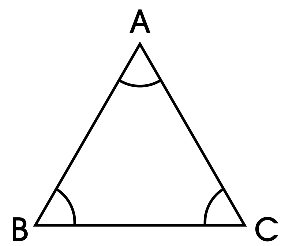
Justify the classification of two-dimensional figures in a hierarchy based on their properties.

Classify triangles as acute, right, or obtuse.

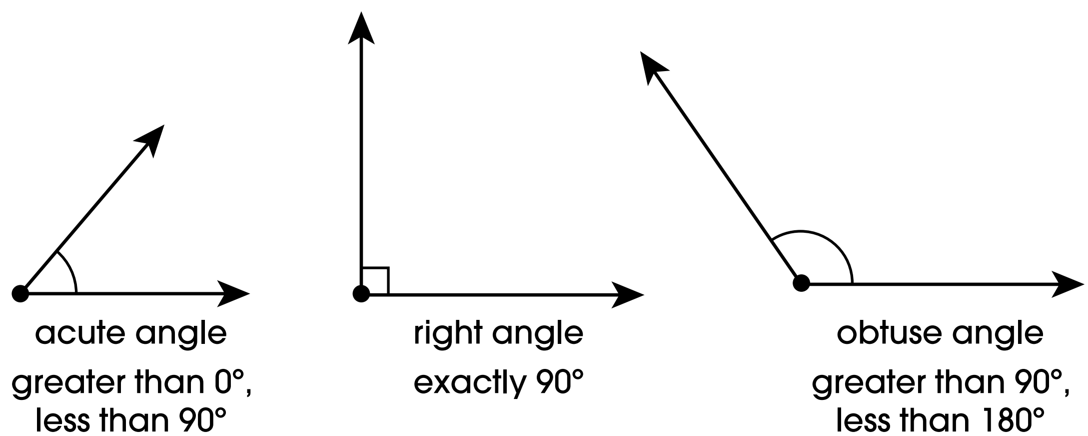
Scaffolding Activities for the Extended Indicator

❑ **Identify acute triangles.**

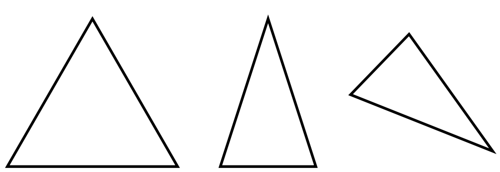
- Use manipulatives to show how to identify acute triangles. Use three pipe cleaners of the same length to demonstrate making a polygon with three sides. Identify the polygon as a triangle with three sides and three angles. Label the three angles.



Present a diagram showing an acute angle, a right angle, and an obtuse angle.



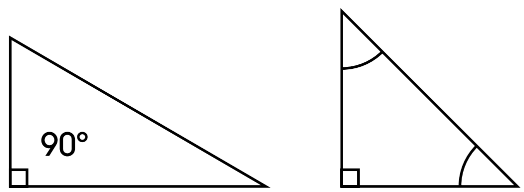
Identify the angles A, B, and C as being less than 90° and acute. Explain that a triangle that has three acute angles is called an acute triangle. Show different acute triangles.



- Ask students to identify acute triangles.

- ❑ **Identify right triangles.**

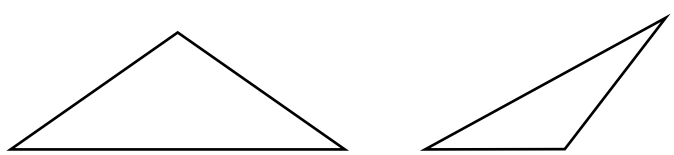
  - Use manipulatives to draw right triangles. Start with an index card, a pipe cleaner, and a piece of paper. Wrap the pipe cleaner around one of the corners of the index card. Remove the index card, place the pipe cleaner on the piece of paper, and trace along the pipe cleaner to draw a 90° angle. Draw the third side of the triangle with a straightedge. Label the right angle with the right-angle symbol and 90°. Explain that a triangle with one right angle is a right triangle. Be sure to show or create examples of both isosceles and scalene right triangles.



  - Ask students to identify right triangles.

- ❑ **Identify obtuse triangles.**

  - Use manipulatives to draw obtuse triangles. Start with an index card, a pipe cleaner, and a piece of paper. Wrap the pipe cleaner around one of the corners of the index card. Indicate that to create an obtuse triangle, an angle greater than 90° is needed. Demonstrate creating an angle greater than 90° with the pipe cleaner to make an obtuse angle. Trace the obtuse angle on the piece of paper. Draw the third side of the triangle with a straightedge. Other examples of manipulatives that can be used to form angles include two pieces of paper attached with a brass tack, a pipe cleaner inserted in 2 straws, or a bendable straw. Explain that an obtuse triangle has one angle that is greater than 90°. Be sure to show or create examples of both isosceles and scalene obtuse triangles.



  - Ask students to identify obtuse triangles.

❑ **Identify acute, right, and obtuse triangles.**

- Use triangle manipulatives, cutouts, or drawings and a checklist to demonstrate how to identify a triangle as an acute, right, or obtuse triangle. Create a checklist that includes the following questions:

  - ► Does the triangle have one right angle?
  - ► Does the triangle have one obtuse angle?
  - ► Does the triangle have three acute angles?

  Demonstrate comparing the angles of the triangle to diagrams of acute, right, and obtuse angles. Be sure to demonstrate with a variety of triangles for each category. Also, provide examples of right triangles in which the right angle is marked with the 90° symbol and examples in which the right angle is not identified.

- Ask students to identify a triangle as a right triangle, an obtuse triangle, or an acute triangle.

Prerequisite Extended Indicators

MAE 3.G.1.a—Identify two-dimensional shapes, circles, triangles, rectangles, or squares.

MAE 4.G.1.a—Identify points, lines, line segments, rays, angles, parallel lines, and intersecting lines.

MAE 4.G.1.b—Classify angles as acute, obtuse, or right.

Key Terms

acute angle, acute triangle, obtuse angle, obtuse triangle, right angle, right triangle, triangle

Additional Resources or Links

https://www.engageny.org/resource/grade-4-mathematics-module-4-topic-lesson-2

http://tasks.illustrativemathematics.org/content-standards/4/G/A/2/tasks/1273

5.G.2 Coordinate Geometry

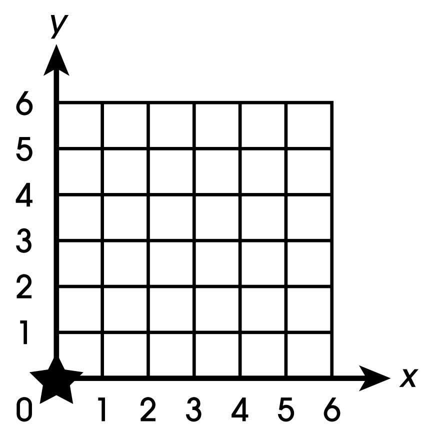
5.G.2.a

Identify the origin, *x* axis, and *y* axis of the coordinate plane.

Extended: Identify the origin, *x*-axis, and *y*-axis of a coordinate plane.

Scaffolding Activities for the Extended Indicator

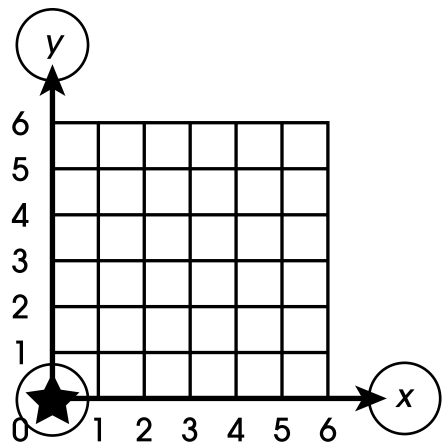
- ❑ **Identify the origin of a coordinate plane.**
  - Present a coordinate plane as shown. Explain that a coordinate plane is a tool used for graphing points, lines, and other objects. Explain that it is made up of two number lines, one horizontal and one vertical, that intersect at a point called an origin. Model identifying the star on the coordinate plane as the origin.



  - Present different-sized coordinate planes to students and a manipulative. Model putting the manipulative on the origin of each coordinate plane. Explain that regardless of the numbers and data on the coordinate plane, the origin will always be where the horizontal and vertical axes intersect.
  - Ask students to identify the origin of a coordinate plane.

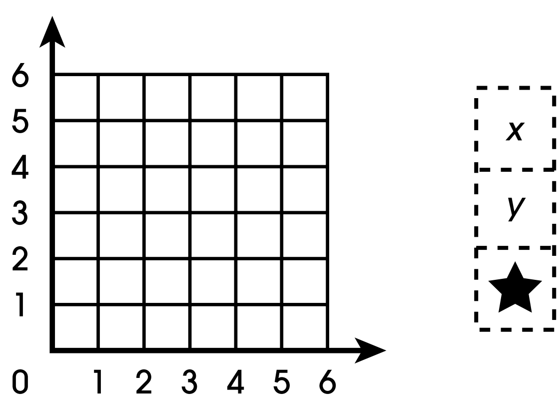
- **Identify the origin, *x*-axis, and *y*-axis of a coordinate plane.**

  - Present a coordinate plane as shown. Demonstrate identifying where the origin, *x*-axis, and *y*-axis are located. Explain that the horizontal axis goes from left to right and is labeled with an *x* for the *x*-axis. For this coordinate plane, it begins with the number 0 and goes to the number 6. Explain that the vertical axis goes up and down and is labeled with a "*y*" for the *y*-axis. For this coordinate plane, it begins with the number 0 and goes to the number 6. Last, indicate that the origin is marked with a star, showing where the two axes intersect, which is at 0.



  - Present different-sized coordinate planes to students. Model identifying the *x*-axis, *y*-axis, and origin on each coordinate plane. Explain that the *x*-axis is always the horizontal number line and the *y*-axis is always the vertical number line. Remind students that the origin is where the *x*-axis and *y*-axis intersect.

  - Use a variety of coordinate planes and label representations for the *x*-axis (*x*), *y*-axis (*y*), and origin (star). Model and involve students with identifying and labeling the three different parts of the coordinate plane.



  - Ask students to identify the *x*-axis, *y*-axis, and origin of a coordinate plane.

5.G.2 Coordinate Geometry

Prerequisite Extended Indicators

MAE 4.G.1.a—Identify points, lines, line segments, rays, angles, parallel lines, and intersecting lines.

Key Terms

coordinate plane, horizontal, intersection, number line, origin, vertical, *x*-axis, *y*-axis

Additional Resources or Links

https://www.engageny.org/resource/grade-5-mathematics-module-6-topic-overview

https://www.mathlearningcenter.org/educators/free-resources/lessons-publications/bridges-1st-edition-activities/3

5.G.2.b

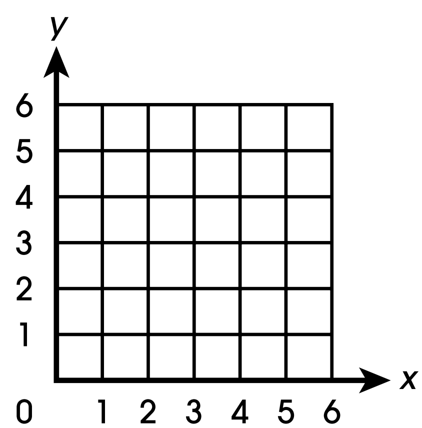
Graph and name points in the first quadrant of the coordinate plane using ordered pairs of whole numbers.

Extended: Identify the *x*- or *y*-coordinate of a point in the first quadrant of a coordinate plane.

Scaffolding Activities for the Extended Indicator

❑ **Identify numbers on the *x*- and *y*-axis on a coordinate plane.**

- Use a coordinate plane to demonstrate finding the *x*-axis and the *y*-axis. Explain that this coordinate plane shows only the first quadrant of a coordinate plane. Coordinate planes are made up of four quadrants. Explain that the *x*-axis and *y*-axis both range from 0 to 6 for this coordinate plane. Explain how the grid lines correspond with each number on each axis. Model identifying different numbers on the *x*-axis. For example, present the question, "Where is the number 2 on the *x*-axis?" Then point to the number 2 on the horizontal axis of the coordinate plane.



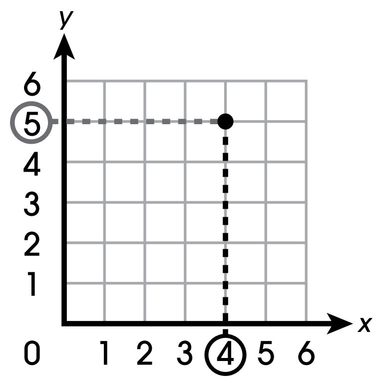
  Repeat this modeling with different values of the coordinate plane for both the *x*-axis and the *y*-axis.

- Ask students to identify given values on the *x*-axis and the *y*-axis on a coordinate plane.

5.G.2 Coordinate Geometry

❑ **Identify the *x*- and *y*-coordinates of a point on a coordinate plane.**

- Use a coordinate plane to demonstrate finding the *x*- and *y*-coordinates of a point. Explain to students to find the *x*-coordinate first. Color coordinating references to the *x*-axis and the *y*-axis can be helpful to some students. For example, trace vertical lines toward the *x*-axis in blue and circle the *x*-coordinate in blue. Likewise, trace horizontal lines toward the *y*-axis in red and circle the *y*-coordinate in red.



x-coordinate is 4

y-coordinate is 5

Explain that the *x*-coordinate is found by using the numbers along the horizontal or bottom axis. The *y*-coordinate is found by using the numbers along the vertical or left-side axis. Also make note of the *x* and *y* labels on the ends of the axes, which serve as reminders about which axis is which. Repeat the process of finding the coordinates for a variety of points in a variety of locations. Keep the points at whole-number locations and demonstrate identifying the locations by circling or highlighting the correct numbers on the axes. Avoid using the *x*, *y* notation at this level of instruction.

Ask students to identify the *x*- and *y*-coordinates of a point on a coordinate plane (without expecting the use of *x*, *y* notation).

Prerequisite Extended Indicators

MAE 5.G.2.a— Identify the origin, *x*-axis, and *y*-axis of a coordinate plane.

MAE 4.G.1.a—Identify points, lines, line segments, rays, angles, parallel lines, and intersecting lines.

Key Terms

coordinate plane, horizontal, intersection, origin, quadrant, vertical, *x*-axis, *x*-coordinate, *y*-axis, *y*-coordinate

Additional Resources or Links

http://tasks.illustrativemathematics.org/content-standards/5/G/A/1/tasks/489

https://www.engageny.org/resource/grade-5-mathematics-module-6-topic-lesson-3/file/69596

5.G.2.c

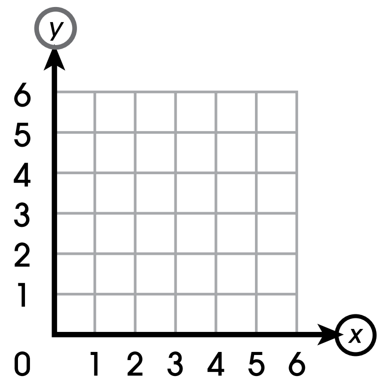
Form ordered pairs from authentic problems involving rules or patterns and graph the ordered pairs in the first quadrant on a coordinate plane and interpret coordinate values in the context of the situation.

Extended: Graph and name points in the first quadrant of a coordinate plane using ordered pairs of whole numbers.

Scaffolding Activities for the Extended Indicator

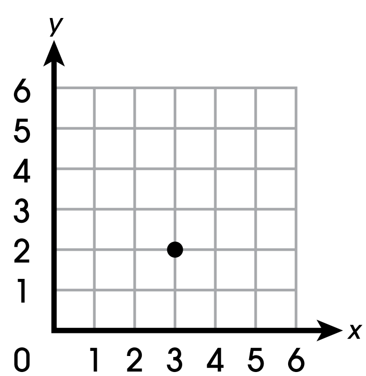
❑ **Identify the ordered pair of a point on a coordinate plane.**

- Use ordered-pair notation (*x*, *y*) to show the *x*- and *y*-coordinates of a point on a coordinate plane.



(*x*, *y*)

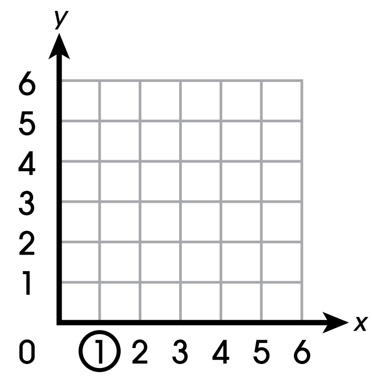
Be sure to point out that the axes have the labels *x* and *y* to remind students which number is the *x*-coordinate and which number is the *y*-coordinate. Ordered pairs are always in the form (*x*, *y*), so it is important to keep in mind which coordinate comes first.



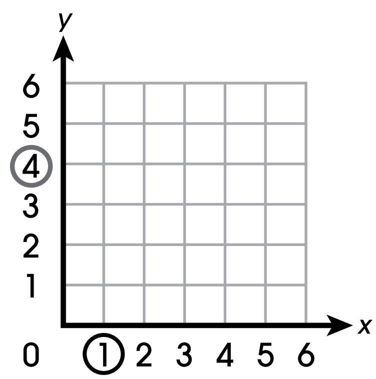
The point on the graph is located at the 3 on the *x*-axis and the 2 on the *y*-axis, so those are its coordinates. The ordered pair for the location of the point is (3, 2). Repeat this process with a variety of points in a variety of locations on the graph.

Ask students to use ordered pairs to show the locations of points on a graph.

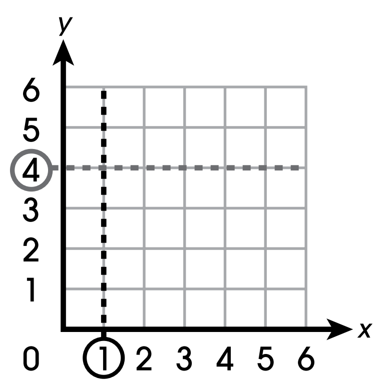
- ❑ **Identify the location of an ordered pair on a coordinate plane.**
  - Use an ordered pair to show students how to place a point in the correct location on a graph. For example, use the ordered pair (1, 4). Begin by locating the 1 on the *x*-axis.



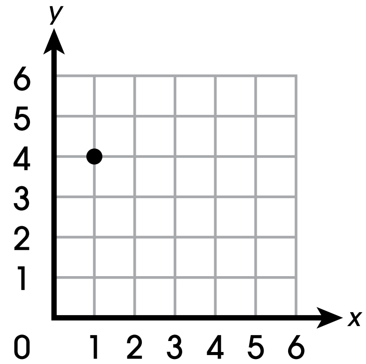
Then locate the 4 on the *y*-axis.



Follow the grid lines to find the location where they intersect.



A line drawn from both axes intersects at (1, 4), so that is where the point is placed.



Students commonly find the number on the axes and then place the point on an axis instead of following the grid lines to the appropriate point of intersection. Be sure to emphasize that the location of the point needs to align with **both** coordinates from the ordered pair.

- Ask students to find the location of an ordered pair on a coordinate plane.

Prerequisite Extended Indicators

MAE 4.G.1.a—Identify points, lines, line segments, rays, angles, parallel lines, and intersecting lines.

MAE 5.G.2.a—Identify the origin, *x*-axis, and *y*-axis of a coordinate plane.

MAE 5.G.2.b—Identify the *x*- or *y*-coordinate of a point in the first quadrant of a coordinate plane.

Key Terms

coordinate plane, horizontal, intersection, ordered pair, point, vertical, *x*-axis, *x*-coordinate, *y*-axis, *y*-coordinate

Additional Resources or Links

http://tasks.illustrativemathematics.org/content-standards/5/G/A/1/tasks/489

https://www.engageny.org/resource/grade-5-mathematics-module-6-topic-overview

5.G.3 Measurement

5.G.3.a

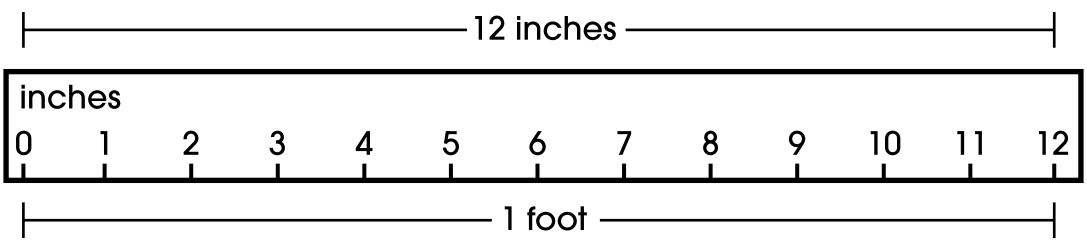
Generate conversions in authentic mathematical situations from larger units to smaller units and smaller units to larger units, within the customary and metric systems of measurement.

Extended: Generate simple conversions from larger units to smaller units and smaller units to larger units in authentic mathematical situations, limited to inches/feet, minutes/hour, and feet/yards.

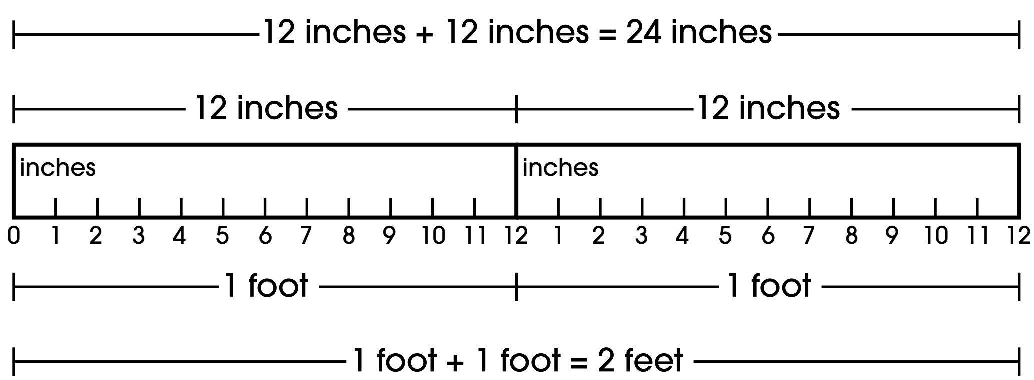
Scaffolding Activities for the Extended Indicator

❑ **Convert from a larger unit to a smaller unit, using a visual model.**

- Use a 12-inch ruler to demonstrate counting each inch on the ruler to show that it is 12 inches long. Explain that this length is equivalent to 1 foot.



Use two rulers to show that putting two rulers of 12 inches in length next to each other makes a total length of 24 inches. Demonstrate this by adding 12 + 12, counting on from 12 to count the 12 inches on the second ruler, or multiplying 12 × 2. Therefore, 2 feet equals 24 inches.



Repeat using three rulers to show that putting three rulers of 12 inches in length next to each other makes a total length of 36 inches. Demonstrate this by adding 12 + 12 + 12, counting on, or multiplying 12 × 3. Therefore, 3 feet equals 36 inches.

- Ask students to identify the length of 2 feet in inches when presented with a model of two 12-inch rulers and three choices as shown.

A. 12 inches
B. 24 inches
C. 36 inches

Repeat this process by using other conversions of larger units to smaller units with visual models, including hours to minutes and yards to feet.

- Ask students to convert larger units to smaller units by using visual models.

❑ **Convert from a larger unit to a smaller unit.**

- Use a conversion table to show how many minutes are in 1 hour.

Conversion Table	
1 hour	60 minutes

Explain that the hour is the larger unit and minutes are the smaller unit of measurement. State that 1 hour is equal to 60 minutes. Explain that you can figure out how many minutes are in different numbers of hours by using repeated addition or multiplication.

Present the question: How many minutes are in 3 hours? Model the following process.

State that we are trying to figure out the number of minutes that are in 3 hours. Make 3 circles, each representing one hour. Refer to the conversion table. Explain that each hour is equal to 60 minutes. Write 60 in each circle. Explain that since we are going from the larger unit to a smaller unit of measurement, the minutes need to be added together. Model solving the equation 60 + 60 + 60 = 180. Explain that repeated addition confirms that there are 180 minutes in 3 hours.

$$60 + 60 + 60 = 180$$

Next, show a similar process using the multiplication method by indicating that since there are 60 minutes in 1 hour and we want to know the number of minutes in 3 hours, 60 needs to be multiplied by 3.

$$60 \times 3 = 180$$

- Ask students to identify the number of minutes in 3 hours when presented with a conversion table and three choices as shown.

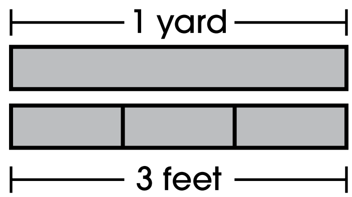
A. 20 minutes
B. 60 minutes
C. 180 minutes

Repeat this process using other conversions of larger units to smaller units, including feet to inches and yards to feet.

- Ask students to convert larger units of measurement to smaller units of measurement.

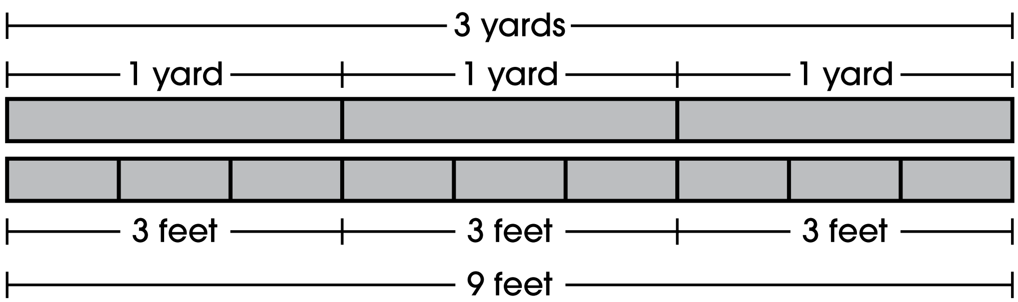
- ❑ **Convert from a small unit to a larger unit, using a visual model.**

- Use a visual model to represent a length of 3 feet being equivalent to 1 yard.



Model counting the number of feet shown in the model that make up 1 yard. Identify the feet as being a smaller unit of measurement and the yard being the larger unit of measurement.

- Use a visual model to represent a total length of 9 feet.



Explain that in order to convert the smaller units of feet to the larger units of yards, you will need to use repeated subtraction or division. Explain that in order to get from feet to yards, when using repeated subtraction, you want to continue subtracting until you get to 0 feet. Demonstrate finding the number of yards in 9 feet by using repeated subtraction as such: 9 – 3 = 6, 6 – 3 = 3, 3 – 3 = 0. Since there were 3 rounds of subtraction to equal 0, the answer is 3. This can also be shown by using division: 9 feet divided by 3 feet equals 3 yards.

Repeat by using different models showing 12 feet and 15 feet in length and converting to yards by using repeated subtraction or division.

- Ask students to identify the length of 9 feet in yards when presented with a model and three choices as shown.

A. 1 yard
B. 3 yards
C. 9 yards

Repeat this process by using other conversions of smaller units to larger units with visual models, including minutes to hours and inches to feet.

- Ask students to convert smaller units to larger units by using visual models.

- [ ] **Convert from a smaller unit to a larger unit.**

- Use a conversion table to show how many inches are in 1 foot.

Conversion Table	
12 inches	1 foot

Explain that the inches are the smaller unit and feet are the larger unit of measurement. State that 12 inches are equal to 1 foot. Explain that you can figure out how many feet make up different numbers of inches by using repeated subtraction or division.

Present the question: How many feet are there in 48 inches? Model the following process.

Explain that we are trying to figure out the number of feet that are in 48 inches. Set up the following repeated subtraction equations: 48 – 12 = 36, 36 – 12 = 24, 24 – 12 = 12, 12 – 12 = 0. Refer to the conversion table. Explain that 12 inches were subtracted from 48 inches 4 different times to equal 0, which means the answer is 4. There are 48 inches in 4 feet.

$$48 - \textcircled{12} = 36$$

$$36 - \textcircled{12} = 24$$

$$24 - \textcircled{12} = 12$$

$$12 - \textcircled{12} = 0$$

Next, show a similar process using the division method, indicating that there are 48 inches, and since there are 12 inches in 1 foot, 48 needs to be divided by 12 to determine the number of feet.

48 inches ÷ 12 inches = 4 feet

48 inches = 4 feet

- Ask students to convert 48 inches to feet when presented with a conversion table and three choices as shown.

A. 2 feet
B. 4 feet
C. 12 feet

Repeat this process using other conversions of smaller units to larger units, including minutes to hours and feet to yards.

- Ask students to convert smaller units of measurement to larger units of measurement.

Prerequisite Extended Indicator

MAE 4.G.2.c—Generate simple conversions from larger units to smaller units, using weeks/days, years/months, hours/minutes, or feet/inches.

MAE 4.A.1.a—Add and subtract numbers with regrouping, limited to two-digit addends and minuends.

MAE 5.A.1.a—Multiply the numbers 1–9 by single-digit numbers and 10, and multiply two-digit numbers 11–20 by single-digit numbers 1–5.

MAE 5.A.1.b—Divide a two-digit whole number by a single-digit whole number, limited to quotients with no remainders.

Key Terms

conversion, conversion table, divide, foot, hour, inch, minute, multiply, repeated addition, repeated subtraction, unit of measurement, yard

Additional Resources or Links

http://nlvm.usu.edu/en/nav/frames_asid_272_g_2_t_4.html?open=instructions&from=search.html?qt=ffeet

(Note: Java required for website. Most recent version recommended, but not needed.)

https://www.engageny.org/resource/grade-2-mathematics-module-7-topic-c-lesson-15

5.G.4 Area and Volume

5.G.4.c

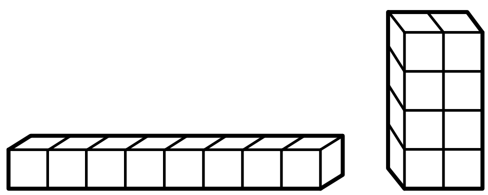
Use concrete models to measure the volume of rectangular prisms by counting cubic units.

Extended: Use concrete and/or visual models to measure the volume of rectangular prisms by counting unit cubes.

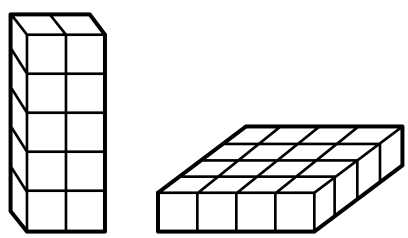
Scaffolding Activities for the Extended Indicator

❑ **Find the volume of a rectangular prism when one of the dimensions has a value of 1 unit.**

- Describe volume as the amount of space inside an object. Use real-life objects to demonstrate the space inside an object (for example, a box, a toilet paper tube, an empty soup can, or an ice cream cone).
- Use two sets of 8 unit cubes to model two rectangular prisms with a volume of 8 cubic units. Create a 1 × 1 × 8 rectangular prism and a 1 × 2 × 4 rectangular prism. Explain that each rectangular prism is made with 8 unit cubes, so the volume of each rectangular prism is 8 cubic units.



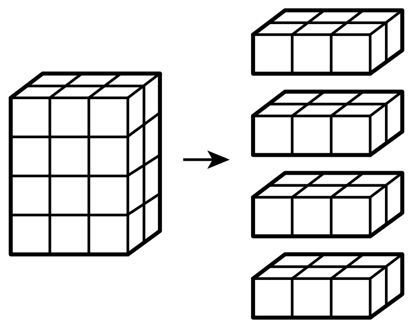
Continue to create other single-layer rectangular prisms with unit cubes and demonstrate finding the volume by counting the unit cubes.



- Ask students to identify the volume of single-layer rectangular prisms by counting the unit cubes. When appropriate, encourage students to use skip counting to find the total number of unit cubes.

5.G.4 Area and Volume

- ❑ **Find the volume of a rectangular prism by counting unit cubes.**
  - Use a small square or rectangular box to explain that volume can be found by filling the box with unit cubes. Demonstrate stacking unit cubes on top of one another and next to each other to fill the box. The number of cubes that fit into the box is the volume of the rectangular prism.
  - Use unit cubes to create a 2 × 3 × 4 rectangular prism. Demonstrate finding the volume by counting unit cubes. It might be helpful to glue together the unit cubes in each 1 × 2 × 3 layer to emphasize counting the unit cubes in layers. Another strategy is to use unit cubes of different colors for each layer of the rectangular prism. Reference the three dimensions as the length, width, and height of the rectangular prism.



  - Use manipulatives and drawings to demonstrate finding the volume of rectangular prisms by counting unit cubes. Demonstrate counting the number of cubes in one layer of the rectangular prism and using skip counting strategies to find the total number of cubes.
  - Ask students to determine the volume of a rectangular prism by counting unit cubes.

Prerequisite Extended Indicators

MAE 5.N.4.a— Count by 2s, 5s, and 10s with numbers, models, or objects up to 50.

MAE 5.G.1.a—Identify the faces, edges, and vertices of cubes and other rectangular prisms.

MAE 5.G.1.b—Identify the difference between two-dimensional (flat) and three-dimensional (solid) figures.

MAE 3.G.2.c—Find the area of a square or rectangle with whole-number side lengths by counting unit squares and showing that repeated addition is the same as multiplying the side lengths.

Key Terms

cube, face, height, layer, length, rectangle, rectangular prism, volume, width

Additional Resources or Links

https://www.engageny.org/resource/grade-5-mathematics-module-5-topic-lesson-1/file/67421

https://www.engageny.org/resource/grade-5-mathematics-module-5-topic-lesson-2/file/67431

5.G.4.d

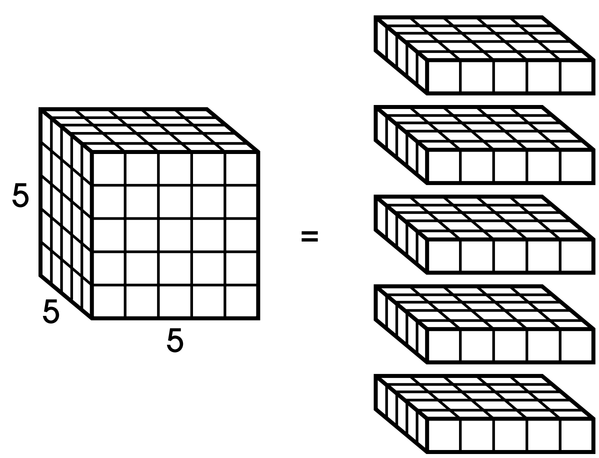
Find the volume of a rectangular prism with whole-number side lengths by modeling with unit squares and show that the volume can be additive and is the same as would be found by multiplying the area of the base times height.

Extended: Find the volume of a cube or another rectangular prism with whole-number side lengths by counting unit cubes and showing that repeated addition is the same as multiplying the side lengths (e.g., 9 + 9 + 9 = 27 unit cubes in a 3 × 3 × 3 cube).

Scaffolding Activities for the Extended Indicator

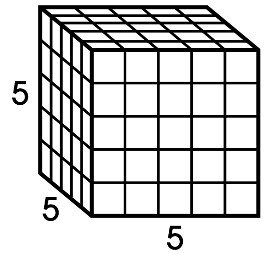
❑ **Find the volume of a cube by a) counting the number of unit cubes needed to fill the cube, b) showing that repeatedly adding the number of cubes on the base level is the same as the total number of unit cubes needed to fill the cube, and c) showing that multiplying the side lengths also equals the total number of unit cubes needed to fill the cube.**

- Describe the volume of a cube as the amount of space inside the cube. Present a cube to students. Demonstrate counting the sides and showing that with a cube, each side length is the same size. Explain that there are multiple ways to find the volume of a cube. The first way is to count the number of unit cubes needed to fill the cube. This can be done by separating the cube into layers and counting the unit cubes in each layer until all unit cubes have been counted. For example, this cube has side lengths of 5 units. Model skip counting the unit squares in each layer by 5s and stating that 125 unit cubes were counted, so the volume of the cube is 125 cubic units.

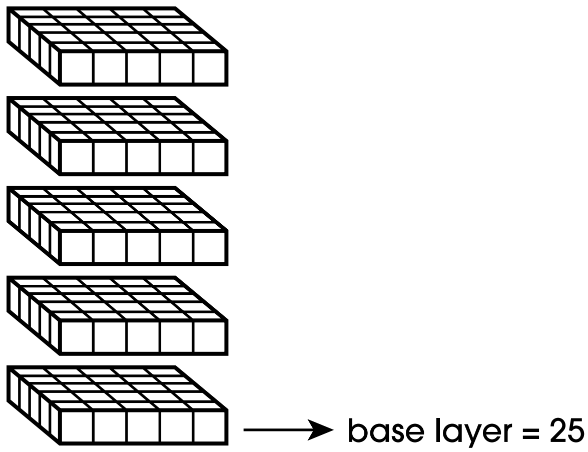


- Ask students to find the volume of the cube by counting the number of unit cubes needed to fill the cube.

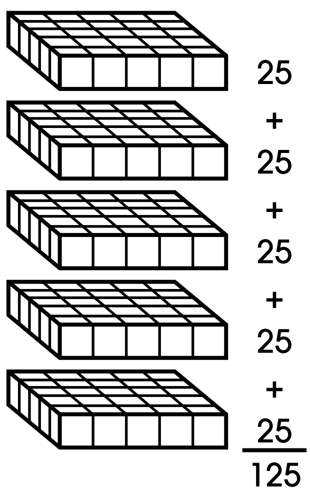
Present the cube with side lengths of 5 to students.



Explain that the volume of a cube can also be determined by using repeated addition. The first step is to count the unit squares in the base layer of the cube.

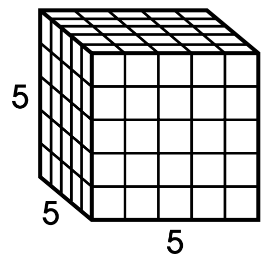


Next, the number of layers will need to be counted. In this cube there are 5 layers. The number 25 will need to be added together 5 times to determine the volume.



Indicate to students that the volume found by using repeated addition is the same volume that was discovered by counting the unit cubes.

- Ask students to find the volume of the cube by repeatedly adding the number of cubes on the base level.
- Present the cube with sides measuring 5 unit cubes to the students.



Explain that another way to find the volume of this cube is to multiply the lengths of each side by one another. The side lengths can be found by counting the unit cubes on each side or by looking at the numbers on each side of the cube.

Volume of a Cube

side × side × side

___ × ___ × ___

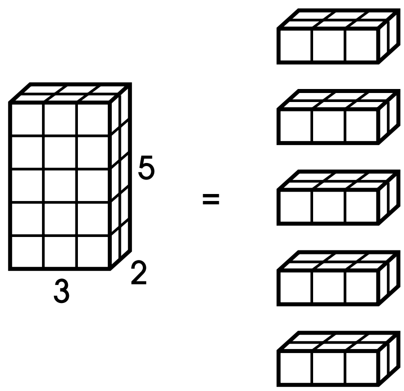
5 × 5 × 5 = 125

Indicate to students that the volume found by using the multiplication method is the same volume that was discovered by counting the unit cubes.

- Ask students to find the volume of cubes by multiplying the side lengths.
- Present various manipulatives and drawings of cubes of different sizes to students. Use counting, repeated addition of the unit cubes in the base layer, and multiplication of the side lengths to find the volume.
- Ask students to find the volume of cubes by counting and then finding the volume by using repeated addition and multiplication to verify the volume is the same using all methods.

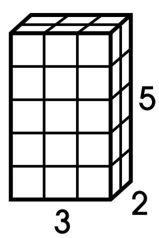
- [ ] **Find the volume of a rectangular prism by a) counting the number of unit cubes needed to fill the prism, b) showing that the number of cubes on the base level is the same as the total number of unit cubes needed to fill the prism, and c) showing that multiplying the side lengths also equals the total number of unit cubes needed to fill the prism.**

- Describe the volume of a rectangular prism as the amount of space inside the prism. Present a rectangular prism to students. Demonstrate counting the sides and showing that with a rectangular prism, the sides can vary in size. Explain that there are multiple ways to find the volume of a rectangular prism. The first way is to count the number of unit cubes needed to fill the prism. This can be done by separating the rectangular prism into layers and counting the unit cubes in each layer until all cubes have been counted. For example, this rectangular prism has side lengths of 5 units, 3 units, and 2 units. This prism can be broken down into layers to make counting the unit cubes easier. Model counting the unit cubes in each layer and emphasizing that 30 unit cubes were counted, so the volume of the rectangular prism is 30 cubic units.

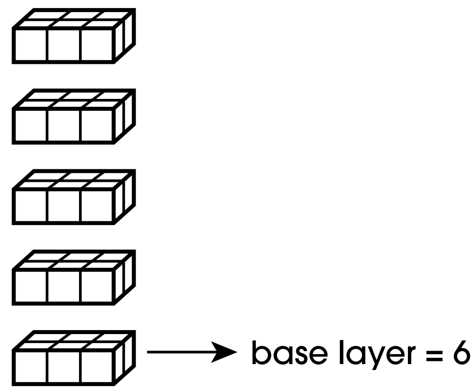


- Ask students to find the volume of the rectangular prism by counting the number of unit cubes needed to fill the rectangular prism.

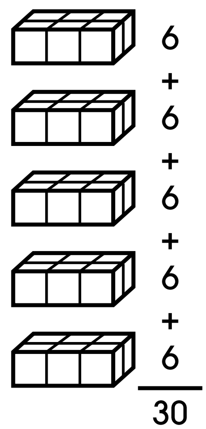
- Present the same rectangular prism to students.



Explain that the volume of a rectangular prism can also be determined by using repeated addition. The first step is to count the unit cubes in the base layer of the rectangular prism.

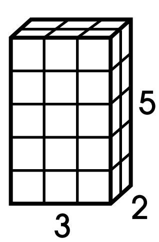


Next, the number of layers will need to be counted. In this rectangular prism there are 5 layers. The number 6 will need to be added together 5 times to determine the volume.



Indicate to students that the volume found by using repeated addition is the same volume that was determined by counting the unit cubes.

- Ask students to find the volume of the rectangular prism by repeatedly adding the number of cubes on the base level.
- Present the same rectangular prism to students.



Explain that another way to find the volume of this rectangular prism is to multiply the sides of each side by one another. These sides are also known as the length, width, and height. The side lengths can be found by counting the unit cubes on each side or by looking at the numbers on each side of the rectangular prism.

Volume of a Rectangular Prism

side × side × side

___ × ___ × ___

$\underline{3} \times \underline{2} \times \underline{5} = 30$

Indicate to students that the volume found by using the multiplication method is the same volume that was determined by counting the unit cubes and by using repeated addition.

- Ask students to find the volume of the rectangular prism by multiplying the side lengths.
- Present various manipulatives and drawings of different sized rectangular prisms to students. Use counting, repeated addition of the unit cubes in the base layer, and multiplication of the side lengths to find the volume.
- Ask students to find the volume of rectangular prisms by counting the unit cubes and then finding the volume by using repeated addition and multiplication to verify the volume is the same.

Prerequisite Extended Indicators

MAE 5.A.1.a—Multiply the numbers 1–9 by single-digit numbers and 10, and multiply two-digit numbers 11–20 by single-digit numbers 1–5.

MAE 5.G.1.b—Identify the difference between two-dimensional (flat) and three-dimensional (solid) figures.

MAE 5.G.4.c—Use concrete and/or visual models to measure the volume of rectangular prisms by counting unit cubes.

MAE 5.N.4.a—Count by 2s, 5s, and 10s with numbers, models, or objects up to 50.

Key Terms

cube, height, layer, length, multiplication, rectangle, rectangular prism, repeated addition, side, unit cubes, volume, width

Additional Resources or Links

https://www.engageny.org/resource/grade-5-mathematics-module-5-topic-lesson-1/file/67421

https://www.engageny.org/resource/grade-5-mathematics-module-5-topic-lesson-2/file/67431

5.G.4.e

Solve authentic problems by applying the formulas V = l × w × h and V = B × h for rectangular prisms to find volumes of rectangular prisms with whole number edge lengths.

Extended: Use visual models to solve authentic problems by counting unit cubes to find the volume of rectangular prisms.

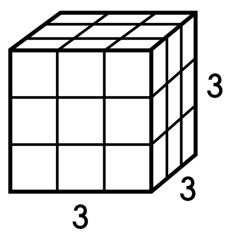
Scaffolding Activities for the Extended Indicator

- **Use an authentic situation (such as the number of cubic tissues boxes in a larger cube) to determine the volume of the larger cube.**
  - Use a large box in the shape of a cube to demonstrate a large cube. Explain that volume can be found by filling the box with smaller unit cubes. Demonstrate stacking cube-shaped tissue boxes on top of one another and next to each other to fill the large box. The number of smaller tissue box cubes that fit into the larger box is the volume of the cube.
  - Present a similar, authentic situation to students.

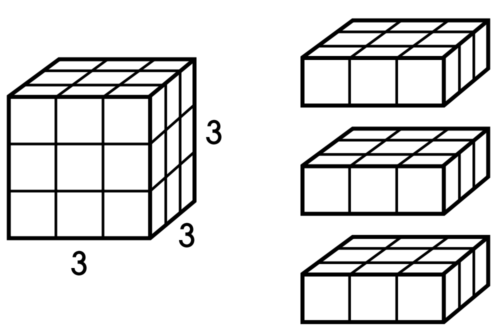
    A large box has equal sides of 3 feet.

    The large box is filled with smaller cubes that have equal sides of 1 foot.

    What is the volume of the large box?



Explain to students that the visual model can be used to help find the answer. Display the large cube broken down into layers, as shown. Explain that the height of the cube, 3 feet, indicates how many layers of unit cubes are in the cube. The number of cubes in each layer is found by finding the area of each layer, so in this cube, the area of each layer is three times three which is 9. Explain that it is easier to count all of the smaller unit cubes when the large cube is thought of as 3 layers that each have 9 smaller unit cubes. Model counting all the unit cubes in each layer.



Explain that there were 27 smaller cubes counted that fill up the space of the larger box, so the volume of the large box is 27. Since the original problem was used with the measurement of feet, the full answer is 27 cubic feet.

Repeat the process with cubes of various sizes made up of different numbers of smaller unit cubes.

- Ask students to use an authentic situation using smaller cubes to find the volume of a larger cube.

❑ **Use an authentic situation (such as the number of cubic tissue boxes in a larger rectangular prism) to determine the volume of the larger prism.**

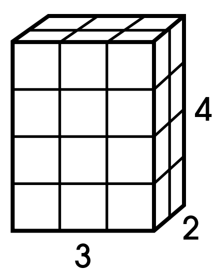
- Use a container in the shape of a rectangular prism to demonstrate a large rectangular prism. Explain that volume can be found by filling the container with smaller unit cubes. Demonstrate stacking cube-shaped blocks on top of one another and next to each other to fill the large container. The number of smaller blocks that fit into the larger container is the volume of the rectangular prism.

- Present a similar, authentic situation to students.

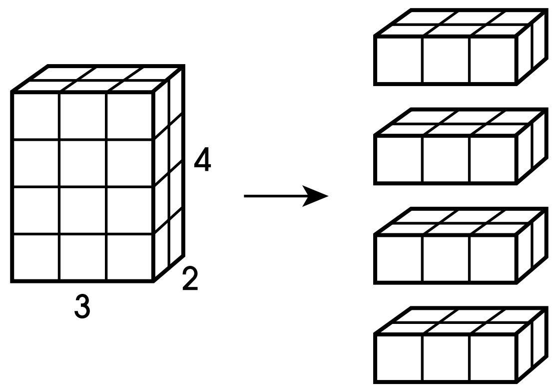
  A container has sides of 4 inches, 3 inches, and 2 inches.

  The container is filled with blocks in the shape of cubes that have equal sides of 1 inch.

  What is the volume of the large container?



Explain to students that the visual model can be used to help find the answer. Display the large container broken down into layers, as shown. Explain that the height of the prism, 4 inches, indicates how many layers of cubes are in the prism. The number of cubes in each layer is found by finding the area of each layer, so in this prism, the area of each layer is three times two which is 6. Explain that it is easier to count all of the smaller unit cubes when the large rectangular prism is thought of as 4 layers that each have 6 smaller unit cubes. Model counting all the unit cubes in each layer.



Explain that there were 24 smaller cubes counted that filled up the space of the larger container, so the volume of the large container is 24. Since the original problem was in inches, the answer would be 24 cubic inches.

Repeat the process with prisms of various sizes made up of different numbers of smaller unit cubes.

- Ask students to use an authentic situation using smaller cubes to find the volume of a larger prism.

Prerequisite Extended Indicators

MAE 5.N.4.a—Count by 2s, 5s, and 10s with numbers, models, or objects up to 50.

MAE 5.G.1.a—Identify the faces, edges, and vertices of cubes and other rectangular prisms.

MAE 5.G.1.b—Identify the difference between two-dimensional (flat) and three-dimensional (solid) figures.

MAE 3.G.2.c—Find the area of a square or rectangle with whole-number side lengths by counting unit squares and showing that repeated addition is the same as multiplying the side lengths.

MAE 5.G.4.c—Use concrete and/or visual models to measure the volume of rectangular prisms by counting unit cubes.

5.G.4 Area and Volume

Key Terms

cube, height, layer, length, prism, rectangle, rectangular prism, side, volume, width

Additional Resources or Links

https://www.engageny.org/resource/grade-5-mathematics-module-5-topic-lesson-1/file/67421

https://www.engageny.org/resource/grade-5-mathematics-module-5-topic-lesson-2/file/67431

Mathematics—Grade 5
Data

5.D.2 Analyze Data and Interpret Results

5.D.2.a

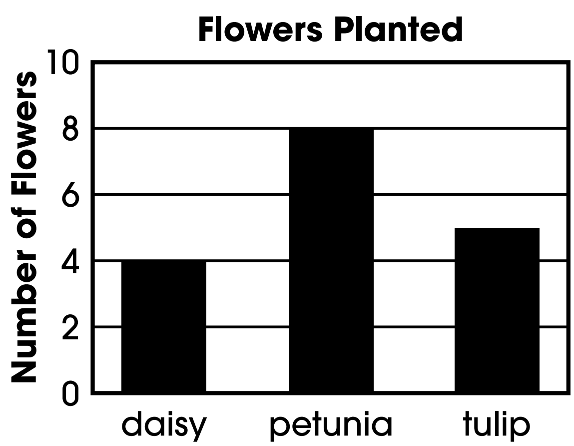
Represent, analyze, and solve authentic problems using information presented in one or more tables or line plots including whole numbers and fractions.

Extended: Represent data on tables, pictographs, bar graphs, and line plots.

Scaffolding Activities for the Extended Indicator

❑ **Identify the given representations of different data.**

- Present the bar graph as shown to students. Identify the title to determine that the graph is about different flowers that are planted. Identify each category represented by the bars and labels on the horizontal axis. Identify that the vertical axis increases by 2, showing the scale of 2. Explain that this information is necessary to represent and interpret the data.



Present the following question: Which bar in the graph shows that 4 daisies were planted? Model finding the daisy label at the bottom of the bar graph. Model counting up by twos to confirm that the first bar in the bar graph shows that 4 daisies were planted. Continue asking questions and modeling identifying given representations of different data. Other question examples include the following: How many petunias were planted? Which flower had 5 flowers planted?

- Present the data table as shown to students. Identify the title and column headings of the table to determine what the table is about. In this case, the table is describing the number of letters delivered each day, from Monday to Friday.

Number of Letters Delivered Each Day	
Day	**Number of Letters**
Monday	4
Tuesday	6
Wednesday	3
Thursday	8
Friday	7

- Present the following question: Which day of the week had 8 letters delivered? Model going to the Number of Letters column in the table and moving down the rows until the 8 is identified. Model moving from the 8 over to the column to the left to discover which day corresponds. The day of the week that had 8 letters delivered is Thursday.
- Repeat this process by using various displays of data including tables, pictographs, bar graphs, and line plots and asking questions and modeling responses in identifying given data representations.
- Ask students to identify the given representations of different data presented in various displays of data.

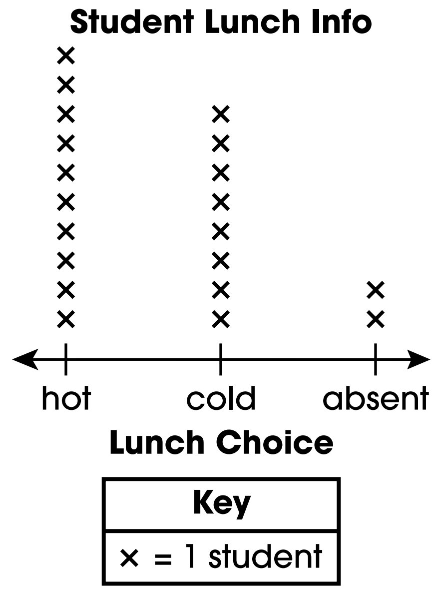
❑ **Match a data table with a pictograph, bar graph or line plot.**

- Present the data table as shown to students. Identify the title and column headings to students. Explain that the data represented in the table are showing how many students had a hot lunch or a cold lunch or were absent.

Student Lunch Info

Lunch Choice	Number of Students
hot	10
cold	8
absent	2

- Present the line plot as shown to students. Identify the title and label to students, showing that they correspond with the information shown in the data table.

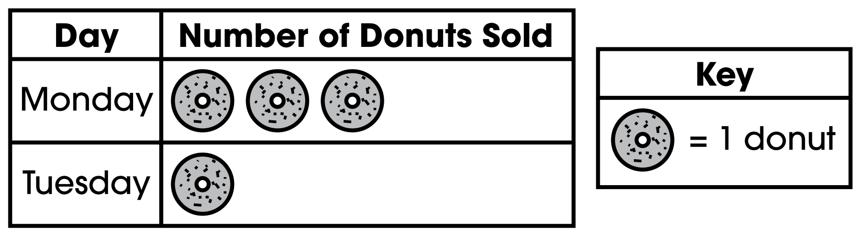


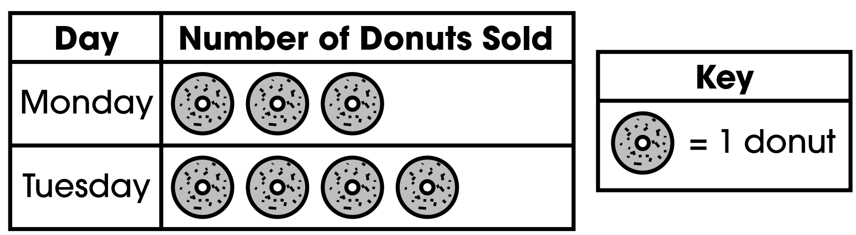
- Refer to the key and explain that 1 x represents 1 student on the line plot. Model counting the number of x's above the hot lunch option. Emphasize that there are 10 data points for hot lunch on the line plot. Then model pointing to the hot lunch row in the data table, indicating that there are also 10 hot lunches shown there as well. Explain to students that the data in the table match the data in the line plot for hot lunch. Continue modeling with the cold and absent data points.
- Present various data tables and various displays of data presented on pictographs, bar graphs, and line plots. Model matching the data table to the corresponding display of data.

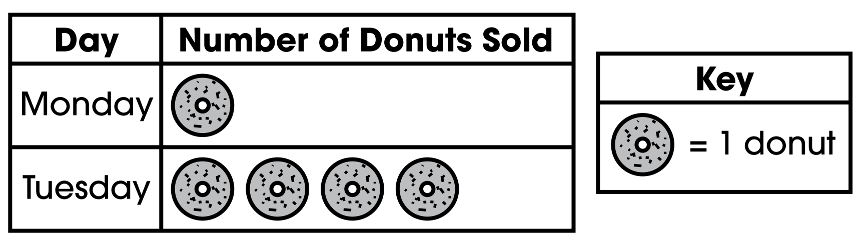
- Ask students which pictograph, bar graph, or line plot matches a given data table. For example:

  This is a data table about a donut sale. Which pictograph matches the data shown in the data table?

Donut Sale	
Day	**Number of Donut Sold**
Monday	3
Tuesday	4

A.


B.


C.


Prerequisite Extended Indicators

MAE 4.D.1.a—Identify and compare quantities in line plots, limited to two data points.

MAE 4.D.2.a—Solve problems with addition or subtraction of whole numbers using information from pictographs, bar graphs, and line plots.

MAE 3.D.1.a—Identify characteristics (e.g., title, labels, key, scale, quantities, categories) on a bar graph, pictograph, and circle graph.

MAE 3.D.1.b—Identify characteristics (e.g., title, labels, horizontal axis, quantities) on a line plot.

MAE 3.D.2.a—Identify and compare quantities in pictographs and bar graphs.

Key Terms

bar graph, data, data table, line graph, pictograph

Additional Resources or Links

https://www.insidemathematics.org/sites/default/files/materials/parking%20cars.pdf

https://www.engageny.org/resource/grade-3-mathematics-module-6-topic-lesson-1

THIS PAGE IS INTENTIONALLY BLANK

Alternate Mathematics
Instructional Supports
for
NSCAS Mathematics Extended Indicators
Grade 5