NEBRASKA

Alternate Mathematics Instructional Supports for NSCAS Mathematics Extended Indicators Grade 7

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

NEBRASKA DEPARTMENT • OF EDUCATION •

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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 7
MA 7.1 Number

MA 7.1.2 Operations

MA 7.1.2.a

Solve problems using proportions and ratios (e.g., cross products, percents, tables, equations, and graphs).

Extended: Given a fraction $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$, write the corresponding percentage.

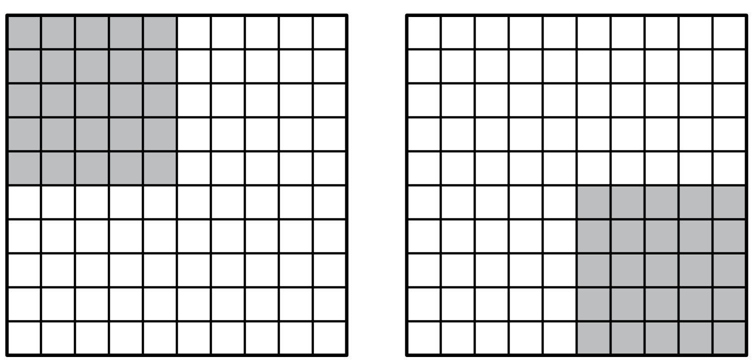
Scaffolding Activities for the Extended Indicator

❑ **Recognize percentages as representing a part of a whole divided into 100 parts.**

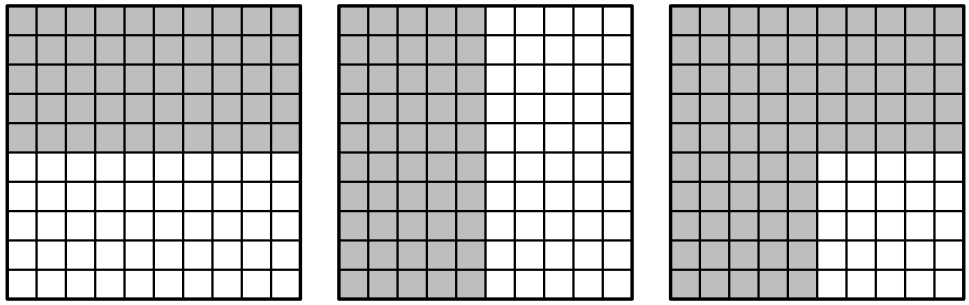
- Introduce the concept of percentage as a part of something using real-life objects as models. Discuss relevant examples of percentages in a familiar context.
- Use base ten blocks and a hundreds grid to demonstrate the concept of percentage as a part of a whole 100. Place 9 base ten rods and 10 unit cubes on a hundreds grid and indicate that 100 percent of the grid is covered. (Note: use the term percent and the percent symbol, %, interchangeably.) Remove 1 base ten rod and 5 unit cubes. Remind students that 100 is the whole and that now 85 parts of the whole (85 out of 100) are covered, which represents 85 percent. Continue demonstrating percentage as parts of 100 by using different combinations of base ten blocks and unit cubes.
- Ask students to show 8 percent by covering 8 squares on the hundreds grid with 8 unit cubes.

❑ **Identify 25, 50, and 75 percent on a hundreds grid.**

- Use a hundreds grid to model 25 percent. Highlight or cover 25 unit squares on a hundreds grid. Identify the covered section of the grid as 25 percent. Count the unit squares to reinforce the idea that 25 out of 100 squares are covered, which represents 25 percent. Demonstrate different ways a cutout square can be placed on the hundreds grid and cover 25 percent.



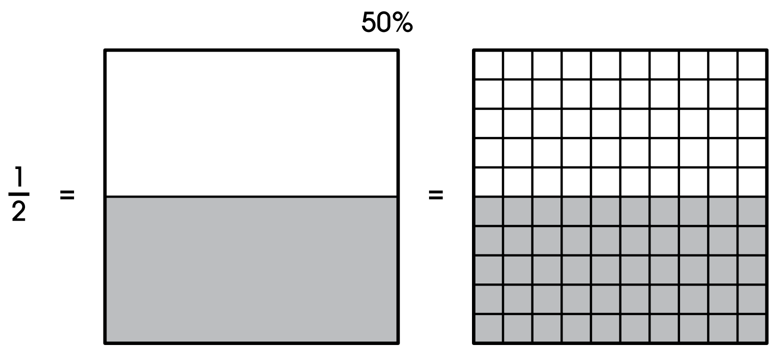
Repeat the same process to represent 50 percent and 75 percent on a hundreds grid.



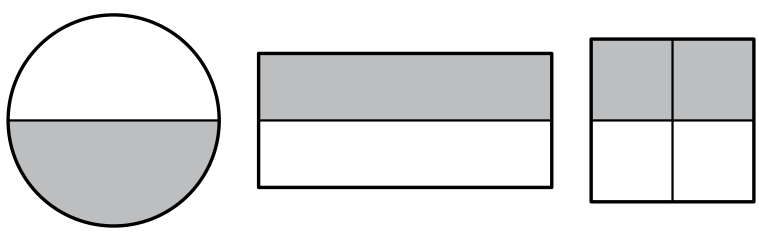
- Ask students to identify 25, 50, and 75 percent on a hundreds grid.

❑ **Identify other visual models that represent 25, 50, and 75 percent.**

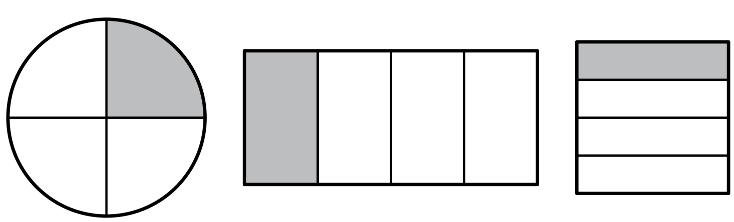
- Demonstrate that $\frac{1}{2}$ of a square is the same as $\frac{1}{2}$ of a 100 square grid, which is 50 squares. Continue to reinforce the idea that 50 out of 100 equals $\frac{1}{2}$, which equals 50 percent.



Show other circle, rectangle, and square fractional models without grids that equal 50 percent.



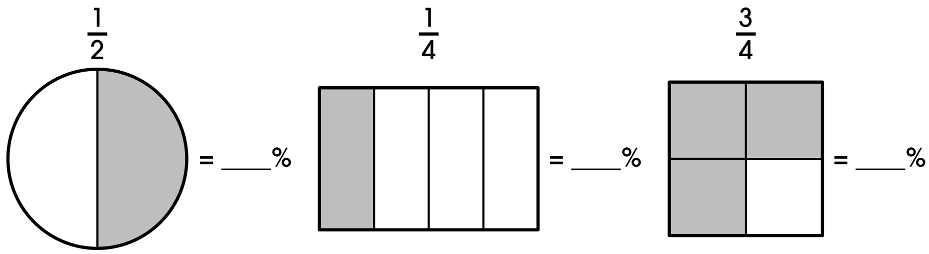
- Repeat the same process to demonstrate that $\frac{1}{4}$ of a square is the same as $\frac{1}{4}$ of a 100 square grid, which is 25 squares and represents 25 percent. Show other circle, rectangle, and square fractional models without grids that equal 25 percent.



- Repeat the process to demonstrate that $\frac{3}{4}$ of a square is the same as $\frac{3}{4}$ of a 100 square grid, which is 75 squares and represents 75 percent. Show other circle, rectangle, and square fractional models without grids that equal 75 percent.
- Ask students to identify fractional models without grids that represent 25 percent, 50 percent, and 75 percent.

❑ **Given the fractions $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$, identify the corresponding percentage.**

- Demonstrate identifying the correct percentage when given the fractions $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$.



- Ask students to identify the correct percentage when given the fractions $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$.

Prerequisite Extended Indicators

MAE 6.1.1.d—Convert halves, fourths, and tenths to decimals using a model.
MAE 4.1.1.h—Identify decimals on a number line from 0 to 1 (tenths only).
MAE 3.1.1.i—Use a model to compare unit fractions one-half, one-third, and one-fourth.

Key Terms

fraction, percent, percentage

Additional Resources or Links

https://www.engageny.org/resource/grade-7-mathematics-module-4-topic-overview

https://www.engageny.org/resource/grade-6-mathematics-module-1-topic-d-lesson-24

MA 7.1.2.b

Add, subtract, multiply, and divide rational numbers (e.g., positive and negative fractions, decimals, and integers).

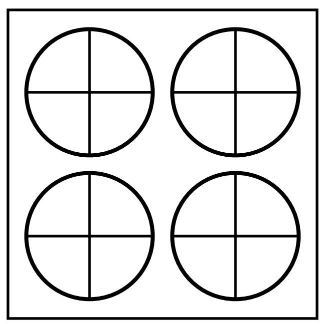
Extended: Add and subtract positive rational numbers with like denominators up to 10 without regrouping.

Scaffolding Activities for the Extended Indicator

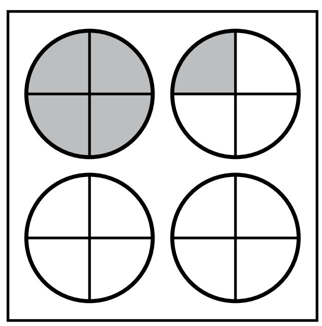
❑ **Add fractions and mixed numbers with like denominators up to 10 without regrouping.**

- Use models to add fractions. Present a fraction strip and the addition sentence $\frac{3}{8} + \frac{2}{8} =$ ______. First shade 3 parts, and then shade 2 more parts. Count the total parts shaded, 5. Write the answer to the addition sentence $\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$.

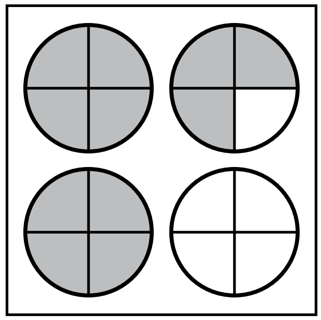
Present the addition sentence $1\frac{1}{4} + 1\frac{2}{4} =$ ______. Use a template and fraction pieces to model the addition problem. Start with a template with four circles divided into fourths.



Place the fraction pieces on the template to represent $1\frac{1}{4}$.



Next, add the fraction pieces that represent $1\frac{2}{4}$ to the template. Be sure to place the two-fourths in the circle that the first fourth was placed in and emphasize that there is still room for two more fourths in the circle.

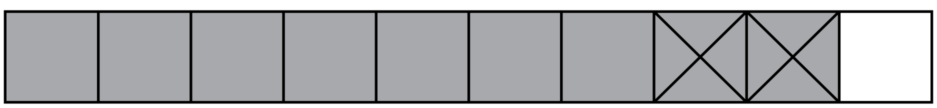


Find the sum of all the pieces, 1 + 1 = 2 plus $\frac{3}{4} = 2\frac{3}{4}$.

- Ask students to use a model to add fractions and mixed numbers with like denominators without regrouping.

❑ **Subtract fractions and mixed numbers with like denominators up to 10 without regrouping.**

- Use models to subtract fractions. Present a fraction strip and the subtraction sentence $\frac{9}{10} - \frac{2}{10} =$ ______. First shade in $\frac{9}{10}$, and then cross off two parts to subtract $\frac{2}{10}$. Count the remaining shaded parts, $\frac{7}{10}$. Write the answer to the subtraction sentence $\frac{9}{10} - \frac{2}{10} = \frac{7}{10}$.



Present the subtraction sentence $2\frac{3}{4} - 1\frac{2}{4} =$ ______. Use a template and fraction pieces to model the subtraction problem. Start with the same template with four circles divided into fourths used for the addition problem. Place the fraction pieces on the template to represent $2\frac{3}{4}$. Then take away $1\frac{2}{4}$ to model the subtraction and show the fractional pieces remaining, $1\frac{1}{4}$, as the answer.

- Ask students to use a model to subtract fractions and mixed numbers with like denominators without regrouping.

Prerequisite Extended Indicators

MAE 5.1.2.h—Add and subtract fractions with like denominators using a visual model without regrouping.

MAE 4.1.2.f—Add and subtract halves to halves, thirds to thirds, fourths to fourths, and fifths to fifths . . . to a whole.

Key Terms

addition, denominator, difference, fraction, mixed number, numerator, subtraction, sum, whole number

Additional Resources or Links

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

http://tasks.illustrativemathematics.org/content-standards/4/NF/B/3/tasks/831

MA 7.1.2.d

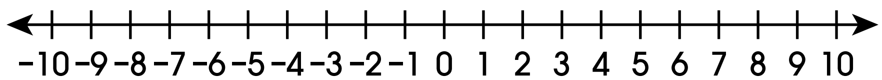
Use multiple strategies to add, subtract, multiply, and divide integers.

Extended: Add positive and negative integers (–10 to 10).

Scaffolding Activities for the Extended Indicator

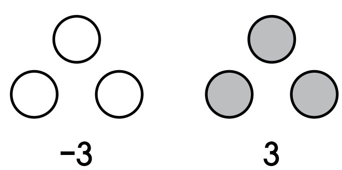
❑ **Add opposite integers.**

- Use a number line to demonstrate what the word “opposite” means in the context of integers. Present the number line as shown and explain that each positive whole number has an opposite negative number. For example, the opposite of 2 is –2. Explain that opposite numbers are the same distance from 0, just on opposite sides of the number line. That is, opposites have the same absolute value. Continue to indicate other number pairs that are opposites.

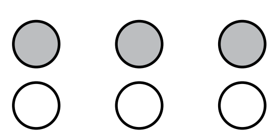


- Use tokens of two different colors to represent positive and negative integers. In this example, white tokens represent negative integers and gray tokens represent positive integers.

Demonstrate how to add opposite integers using the tokens. Present a set of tokens as shown to represent –3 + 3.



Since positive and negative integers are opposites, each gray token cancels out a white token. This can be shown by pairing up one gray token with one white token until there are no tokens left to make pairs. Since all the tokens pair in this way, with no tokens remaining, the equation –3 + 3 = 0 can be written.



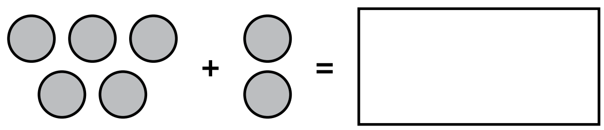
It might be helpful to use the number line to demonstrate what is meant by “cancel out.” For example, indicate starting at 0 on a number line and move 1 to the right to represent the gray token (+1). Then move back 1 to the left to represent the white token (–1) to land back at 0. This process can be repeated with three gray tokens and three white tokens. Purchased or created number line slider boards can be useful to demonstrate adding opposite integers.

Continue modeling adding opposite integers with tokens and number lines until students recognize the result is always zero.

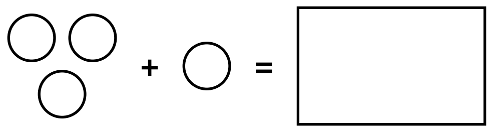
- Ask students to add opposite integers using tokens or a number line.
- Ask students to add opposite integers without using a model or manipulatives.

❑ **Add integers with the same sign.**

- Use tokens of two different colors to represent adding integers. Start with adding two positive integers, such as 5 + 2. Demonstrate counting out 5 gray tokens, then count out 2 more gray tokens, move all the tokens to the empty box to represent addition, and count to find the total: 5 + 2 = 7.

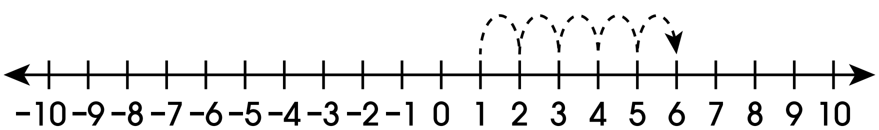


Use the same process to add two negative integers, such –3 + –1. Demonstrate counting out 3 white tokens, then count out 1 more white token, move all the tokens to the empty box to represent addition, and count to find the total: –3 + –1 = –4.

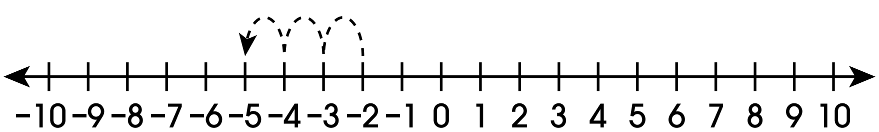


Continue to model adding integers from –10 to 10 with the same sign, either positive or negative, using tokens.

- Use a number line to demonstrate adding two positive integers, such as 1 + 5. Model starting at 1 and then moving 5 units to the right to show 1 + 5 = 6.



Use the same process to demonstrate adding two negative integers, such as –2 + –3. Model starting at –2 and then moving 3 units to the left to show –2 + –3 = –5.



Note that the arrow above the number line is now pointing to the left since it represents adding a negative number. Show a variety of problems adding integers with the same sign on a number line. Emphasize that positive numbers go to the right and negative numbers go to the left when adding.

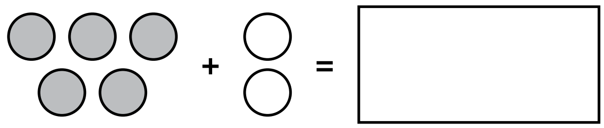
Continue to model adding integers from –10 to 10 with the same sign, either positive or negative, using a number line.

- Ask students to add two positive integers using tokens or a number line.

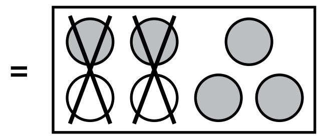
- Ask students to add two negative integers using tokens or a number line.

❑ **Add integers with different signs.**

- Use tokens of two different colors to model adding integers with different signs, such as 5 + –2. Demonstrate counting out 5 gray tokens, and then count out 2 white tokens.

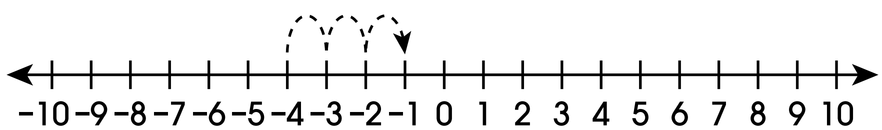


Move all the tokens to the empty box to represent addition. Pair up each gray token with a white token and cancel out or take away the pairs. Count the number of tokens remaining and indicate that 5 + –2 = 3.

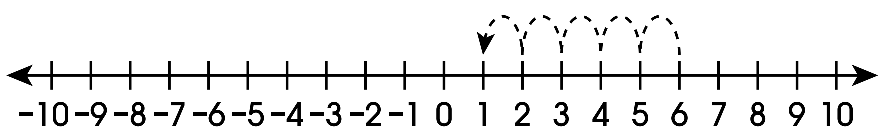


Continue to demonstrate solving a variety of addition problems with a positive integer and a negative integer using manipulatives. Be sure to include problems in which the sum is positive, as in 5 + –2 = 3, and problems in which the sum is negative, as in –4 + 1 = –3.

- Use a number line to model adding integers with different signs, such as –4 + 3. Model starting at –4 and moving three units to the right to show that –4 + 3 = –1. Explain that since 3 is positive, the adding arrow will be pointing to the right, just like the positive numbers are on the right side of zero.



The same process can be used to add a negative integer to a positive integer, such as 6 + –5 = 1. This time the adding arrow points to the left because –5 is negative.



Continue to demonstrate solving a variety of addition problems with a positive integer and a negative integer on a number line.

- Ask students to identify the answer to an addition problem of integers with different signs when given the problem and solution represented with tokens or on a number line.
- Ask students to add integers with different signs using tokens or a number line.

Prerequisite Extended Indicators

MAE 6.1.1.i—Identify the absolute value of an integer –10 to 10.

MAE 6.1.1.g—Identify models of integers –10 to 10 using drawings, words, manipulatives, number line and symbols.

MAE 3.1.2.a—Add and subtract, through 20 without regrouping.

Key Terms

absolute value, add, integer, negative, number line, opposite, positive

Additional Resources or Links

https://curriculum.illustrativemathematics.org/MS/teachers/1/7/index.html

https://www.engageny.org/resource/mathematics-fluency-support-grades-6-8

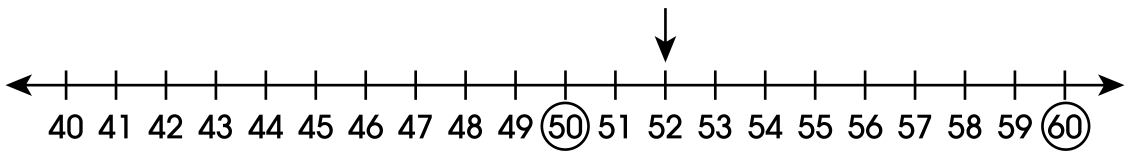
MA 7.1.2.e

Estimate and check reasonableness of answers using appropriate strategies and tools.

Extended: Estimate addition and subtraction results to the nearest 10 up to 100.

Scaffolding Activities for the Extended Indicator

- **Round one- and two-digit numbers to the nearest 10.**
  - Use a number line to demonstrate rounding numbers to the nearest multiple of 10. For example, the number 52 is between 50 and 60.



    Since 52 is closer to 50 than to 60, the number 52 rounds to 50. Explain that the digit 5 in the ones place indicates that the number should round to the greater multiple of 10. For example, 55 rounds to 60. Show students a variety of examples, rounding the numbers 1 through 100 to the nearest 10.

  - Ask students to round various one- and two-digit numbers to the nearest ten using a number line from 0 to 100, or a section of a number line from 0 to 100. Be sure to include examples with a 5 in the ones place.

- **Estimate addition results to the nearest 10 up to 100.**
  - Use rounding of the addends to estimate a sum. Demonstrate that an addition problem can be estimated by first finding the multiple of 10 closest to the numbers given. Present the problem 27 + 58.

27	27 is closest to 30
+ 58	58 is closest to 60

    Explain that rounding of the addends helps to estimate the sum because 30 + 60 is easier to add. The estimate of 27 + 58 is about 30 + 60 = 90. Show students a variety of addition problems, keeping the sum at 100 or less. Continue to use number lines as needed for support to round numbers.

  - Ask students to estimate addition results to the nearest 10 up to 100. For example, present the following figure.

41	41 is about ______
+ 33	33 is about ______

Then give students these three equations for the possible estimate of the sum: 40 + 30 = 70, 50 + 30 = 80, and 50 + 40 = 90. Students should identify that 40 + 30 = 70 is the best estimate for this sum.

- ❑ **Estimate subtraction results to the nearest 10 up to 100.**

  - Use rounding to estimate the difference of two numbers. Demonstrate that a subtraction problem can be estimated by first finding the multiple of 10 closest to the numbers given. For example, find the difference of 89 and 22.

89	89 is closest to 90
– 22	22 is closest to 20

Explain that rounding numbers helps to estimate the difference because 90 – 20 is easier to subtract. The estimate of 89 – 22 is about 90 – 20 = 70. Show students a variety of subtraction problems, keeping the numbers at 100 or less. Continue to use number lines as needed for support to round numbers.

  - Ask students to estimate subtraction results to the nearest 10 up to 100. For example, show the following figure.

54	54 is about ______
– 13	13 is about ______

Then give students these three equations for the possible estimate of the difference: 50 – 10 = 40, 50 – 20 = 30, and 60 – 10 = 50. Students should identify that 50 – 10 = 40 is the best estimate for this difference.

Prerequisite Extended Indicators

MAE 5.1.1.c—Round whole numbers to the nearest tens place up to 200.

MAE 4.1.1.g—Round a 2-digit number, 1–100, to the nearest ten using a number line.

MAE 3.1.2.a—Add and subtract, through 20 without regrouping.

MAE 3.1.1.c—Identify a number closer to a given number on a number line, 1–20.

Key Terms

add, addends, difference, estimate, round, subtract, sum

Additional Resources or Links

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

http://nlvm.usu.edu/en/nav/frames_asid_154_g_2_t_1.html?from=category_g_2_t_1.html

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

Mathematics—Grade 7
MA 7.2 Algebra

MA 7.2.1 Algebraic Relationships

MA 7.2.1.a

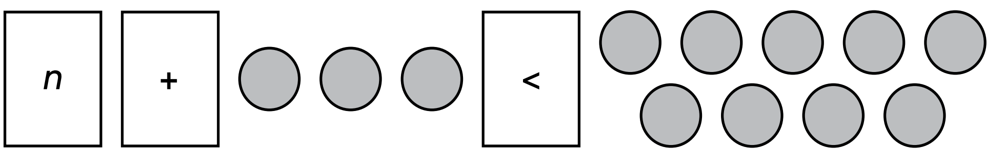
Describe and create an inequality from words and pictures (e.g., one-step, one-variable).

Extended: Identify a solution to a given inequality.

Scaffolding Activities for the Extended Indicator

- ❑ **Identify a solution to a one-step inequality with addition or subtraction using manipulatives.**

  - Use models, like manipulatives or drawings, to demonstrate finding solutions to a one-step inequality. For example, the inequality $n + 3 < 9$ can be represented with tokens, a card with the variable n on it, a card with a plus sign on it, and a card with the less than symbol on it.

    Explain the inequality will be solved by first thinking about the equation $n + 3 = 9$ and using the part-part-whole model (see MAE 6.2.2.e). Present the model as shown. Demonstrate counting 6 tokens from 3 to get 9 to determine that $n = 6$.

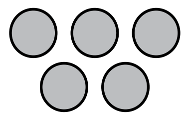
9	
n	3

    Next, explain that since the inequality needs to be less than 9, the solution for n needs to be less than. Make changes to the part-part-whole model as shown.

total < 9	
$n < 6$	3

Possible solutions to this inequality are the numbers 5, 4, 3, and so on. Emphasize that an inequality can have more than one solution. Use manipulatives to demonstrate identifying one solution to an inequality. Also, demonstrate listing all the whole number solutions to an inequality.

$n < 6$



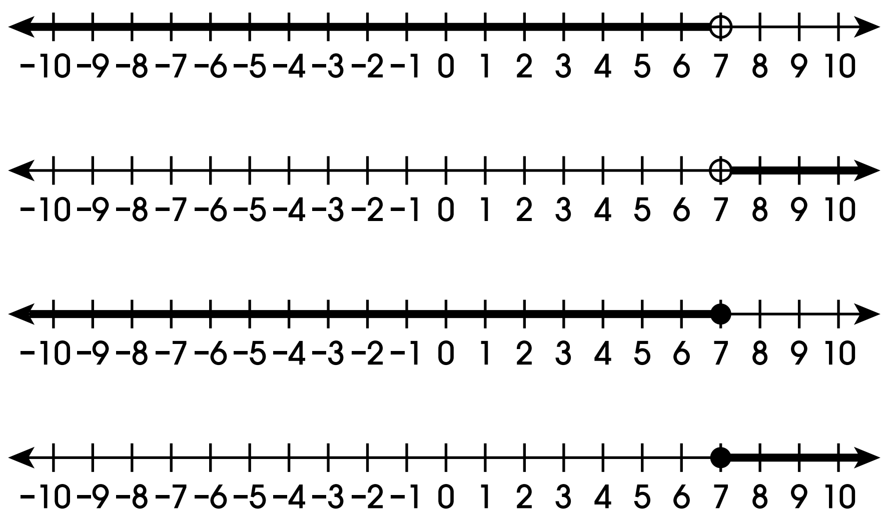
$n = 5$

Continue to demonstrate solving one-step addition and subtraction inequalities using manipulatives or drawings, the part-part-whole method modeled in MAE 6.2.2.e, and cards with the +, –, <, >, ≤, and ≥ symbols. Be sure to emphasize that an inequality can have more than one solution. Demonstrate identifying one solution to an inequality. Also, demonstrate listing all the whole number solutions to an inequality.

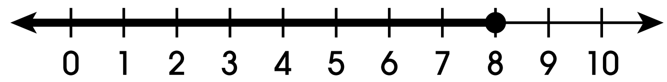
- Ask students to identify one possible solution to a one-step inequality with addition or subtraction when given the solution stated as an inequality.
- Ask students to identify all the whole number solutions to a one-step inequality with addition or subtraction when given the solution stated as an inequality.

❑ **Identify a solution to a given inequality using a number line.**

- Explain that an inequality can be represented on a number line. Demonstrate the solutions to the inequalities $n < 7$, $n > 7$, $n \leq 7$, and $n \geq 7$ on number lines as shown. Emphasize that the solutions on these number lines show **all** the possible solutions to each inequality, not just one solution.



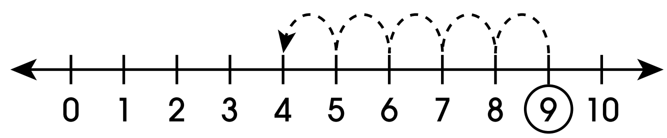
The inequality $n - 3 \leq 5$ can be represented on a number line by first finding the inequality's boundary, $n = 8$, since $8 - 3 = 5$. Other numbers that are less than 8, such as 7, 6, or 5, can be substituted in for n. Instead of attempting to list all the possible solutions for n, a number line can be used as shown.



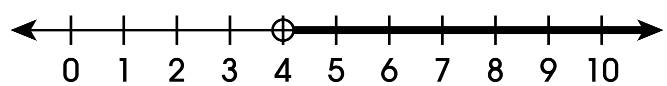
Explain that the closed point at 8 indicates that 8 is included in the solution set, which shows $n \leq 8$. The solutions can be verified by choosing any of the numbers included in the shaded arrow and substituting them in for n in the original inequality. Demonstrate substituting 4 in for the value of n as shown. The result is a true statement that 1 is less than or equal to 5, so 4 is a correct solution to $n - 3 \leq 5$.

$$n - 3 \leq 5$$
$$4 - 3 \leq 5$$
$$1 \leq 5$$

The number line can also be helpful in determining the correct solutions, since a number line can be used to count up or count down, depending on if the inequality involves addition or subtraction. Present the inequality $n + 5 > 9$. To find the boundary of the inequality, start with $n + 5 = 9$ and demonstrate locating 9 on the number line. Next, count down 5 to find the inequality's boundary, $n = 4$.



The number line is used to find the inequality's boundary, 4, for n, but n is not equal to 4. If $4 + 5 = 9$, then a number greater than 4 plus 5 must be greater than 9 because $n + 5$ must be greater than 9. Therefore, the solution to this inequality is $n > 4$. Demonstrate graphing the solution $n > 4$ on a number line as shown.



Continue to demonstrate solving a variety of one-step addition and subtraction inequalities using number lines and then representing the solutions on number lines.

- Ask students to identify one possible solution to a one-step inequality when given the solution set graphed on a number line.
- Ask students to solve a one-step inequality with addition or subtraction using manipulatives or a number line.

Prerequisite Extended Indicators

MAE 6.2.2.g—Identify a solution to an inequality on a number line (–10 to 10).

MAE 6.2.2.e—Solve a one-step equation using addition and subtraction.

MAE 6.1.1.h—Compare and order integers (–10 to 10) on a number line.

MAE 4.1.1.f—Use symbols <, >, and = to compare whole numbers up to 40.

Key Terms

greater than, greater than or equal to, inequality, less than, less than or equal to, solution, variable

Additional Resources or Links

https://www.map.mathshell.org/download.php?fileid=1608

https://nysed-prod.engageny.org/resource/grade-6-mathematics-module-4-topic-h-lesson-33/file/44721

MA 7.2.1.b

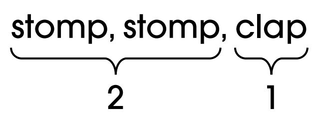
Represent real-world situations with proportions.

Extended: Identify a ratio between two quantities using a model.

Scaffolding Activities for the Extended Indicator

❑ **Identify a ratio between two quantities from a pattern.**

- Use a pattern of foot stomping and hand clapping to demonstrate a ratio. For example, model the pattern stomp, stomp, clap, stomp, stomp, clap, stomp, stomp, clap, and so on. Then explain the ratio of stomps to claps using the figure shown.

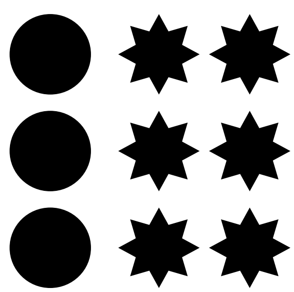


  Make note that there are 2 stomps to every 1 clap, so the ratio of stomps to claps is 2 to 1, or 2:1. It is **not** correct to list the ratio as 1:2. Be sure to emphasize that the order of the numbers is important in ratios. Since the stomp was listed first in “stomps to claps,” the number of stomps must be listed first. A different ratio can be made for claps to stomps, which would be 1:2.

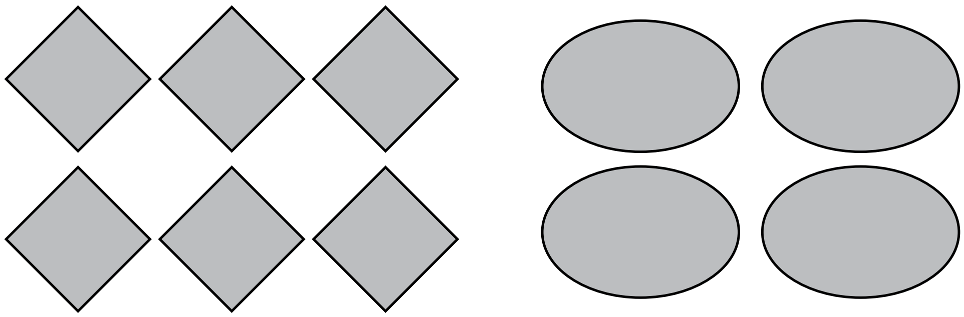
- Ask students to identify a ratio written with a colon when given the same ratio in word form.
- Ask students to identify a ratio from a given pattern.

❑ **Identify a ratio between two quantities using a model.**

- Use manipulatives to demonstrate finding a ratio of quantities. For example, the figure shown has 3 circles and 6 stars. To find a ratio, the order of the ratio is needed. If the ratio is circles to stars, the quantity of circles is listed first (3:6).



Continue to demonstrate how to find the ratio between two quantities using a variety of models. Progress from demonstrating with manipulatives in which the order of manipulatives is reversed to model different ratios to demonstrating with drawings in which two ratios are identified from the same figure. For example, using the figure shown, demonstrate the ratio of diamonds to ovals (6:4) and the ratio of ovals to diamonds (4:6).



- Ask students to identify a ratio between two quantities using manipulatives.
- Ask students to identify a ratio between two quantities given a drawing.

Prerequisite Extended Indicators

MAE 6.2.2.f—Find a missing number in a table with the ratio of 1:2, 1:3, or 1:10.

MAE 6.2.3.d—Solve real-world problems using ratios up to 1:3.

Key Terms

order, pattern, quantity, ratio

Additional Resources or Links

http://tasks.illustrativemathematics.org/content-standards/6/RP/A/1/tasks/2158

https://nysed-prod.engageny.org/resource/grade-6-mathematics-module-1-topic-lesson-2

MA 7.2.2 Algebraic Processes

MA 7.2.2.b

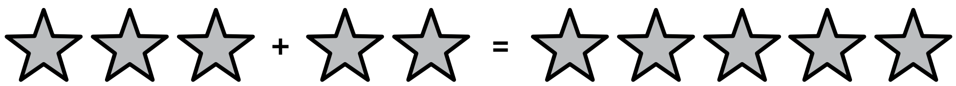
Use factoring and properties of operations to create equivalent algebraic expressions (e.g., $2x + 6 = 2(x + 3)$).

Extended: Identify equivalent expressions with one variable ($2n + 3n$ is the same as $5n$).

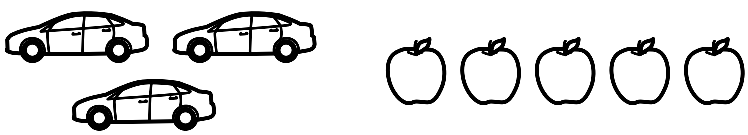
Scaffolding Activities for the Extended Indicator

❑ **Represent like terms with manipulatives.**

- Use similar objects to demonstrate that groups of the same objects can be combined. A group of three stars can be combined with (or added to) a group of two stars to make a group of five stars.



- Show students objects that are not the same. Since cars and apples are different, they cannot be combined or added together to get one group of similar objects.



- Use manipulatives around the classroom (e.g., crayons, markers, erasers, pens, pencils, paper clips) to continue modeling combining like objects.

  4 crayons + 2 crayons = ?
  2 pencils + 5 markers = ? (cannot combine)
  3 erasers + 2 erasers = ?
  1 paper clip + 3 pens = ? (cannot combine)

- Ask students to combine groups of real-life objects, math manipulatives, and pictures of objects.

❑ **Combine like terms.**

- Explain that, like objects and pictures, variables in math expressions can be combined when they are the same. A variable replaces an unknown number in a math expression. The variable, n, is used in the math expression $2n + 3n$. Since the variable n is the same in both parts (or terms) of the math expression, the $2n$ can be added to the $3n$. Since $2 + 3 = 5$, $2n + 3n = 5n$.

- Explain that for the same reason cars and apples cannot be combined, different variables cannot be combined. For example, $4p + 3w$ cannot be combined because the variables are different.

- Model identifying expressions with like terms that can be combined.

$4p + 3p$	$8y + 2b$	$2m + 4k$
$3w + 7t$	$2n + 5n$	$3w + 4w$

- Ask students to identify like terms.

$2m + 4b$	$5w + 4w$	$3a + 5a$
$7n + 2h$	$4k + 2w$	$8m + 2m$
$2y + 7w$	$3y + 4y$	$9b + 4b$

- Model combining like terms using a familiar counting strategy, addition strategy, or calculator. Continue to emphasize why the terms can be combined.

$3b + 4b =$ ______	$2m + 4m =$ ______
$5w + 5w =$ ______	$6y + 3y =$ ______

- Ask students to combine like terms.

$2n + 7n =$ ______	$3a + 5a =$ ______
$4y + 4y =$ ______	$2d + 4d =$ ______
$8w + 2w =$ ______	$3m + 2m =$ ______

Prerequisite Extended Indicator

MAE 3.1.2.a—Add and subtract, through 20 without regrouping.

Key Terms

addition, combine, expression, number sentence, term, variable

Additional Resources or Links

http://nlvm.usu.edu/en/nav/frames_asid_161_g_1_t_1.html?from=category_g_1_t_1.html

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

https://www.engageny.org/resource/grade-7-mathematics-module-3-topic-lesson-6

MA 7.2.2.c

Given the value of the variable(s), evaluate algebraic expressions (including absolute value).

Extended: Given the positive integer value of the single variable, evaluate an addition or subtraction expression.

Scaffolding Activities for the Extended Indicator

❑ **Evaluate addition expressions for a given variable value.**

- Present the expression 16 + x on cards. Explain that x is called a variable and represents a number in math expressions. Consider demonstrating with manipulatives and/or relating the expression to a real-world scenario such as, “There are sixteen cars in a group and more cars are going to be added to the group. The number to be added is not yet known, and the unknown number to be added is represented with a variable, such as x.”

16	+	x

  Demonstrate that the x can be replaced with any number by writing numbers on cards and covering the variable card with a numerical value card. Show x = 1 by covering the x with the card and emphasizing that the value of x is now 1. Repeat the process with other numerical values such as 2 and 3.

16	+	1
16	+	2
16	+	3

  Repeat the process with different numbers to demonstrate that x can have any value. Emphasize that the variable can only be replaced by a numerical value, not by other math symbols (e.g., <, >, +, ÷).

- Continue to model replacing the variable with a numerical value and evaluating one-step addition expressions. Be sure to include examples with the variable as the first addend and the variable as the second addend. For example, model evaluating 5 + x and x + 5. Model evaluating the expressions using appropriate computation strategies including, but not limited to, manipulatives, pictures, number lines, and calculators.

- Present a set of cards labeled with both numerical values and math symbols and a one-step addition algebraic expression. Ask students to identify the cards that could be used to replace the variable.
- Ask students to evaluate one-step addition expressions for a given value of the variable.

❑ **Evaluate subtraction expressions for a given variable value.**

- Use numerical value and symbol cards to demonstrate how to evaluate a subtraction expression. Present the expression 9 – *x* on cards. Consider demonstrating with manipulatives and/or relating the expression to a real-world scenario such as, “Avery has nine pencils and gives some of them away. The number of pencils he will give away is unknown. The unknown number is represented by *x*.”

9	–	*x*

Explain that *x* is a variable that can represent any number value. Demonstrate taking the *x* card away and replacing it with a numerical value card of 7. Evaluate the expression 9 – 7 to get 2.

9	–	7	= 2

Remove the number 7 card and replace it with the *x*. Repeat the process using different numerical value cards to demonstrate that the variable *x* can be any number.

- Continue to model replacing the variable with a numerical value and evaluating one-step subtraction expressions. Be sure to include examples with the variable as the minuend and the variable as the subtrahend. For example, model evaluating 15 – *x* and *x* – 2. Model evaluating the expressions using appropriate computation strategies including, but not limited to, manipulatives, pictures, number lines, and calculators.
- Present three cards that show a one-step subtraction expression with a variable. Then present a selection of cards with numerical values and symbols (e.g., <, >, +, ÷) written on them and ask students to identify the cards that could be used to replace the variable.
- Ask students to evaluate one-step subtraction expressions for a given value of the variable.

Prerequisite Extended Indicators

MAE 6.2.2.e—Solve a one-step equation using addition and subtraction.

MAE 3.2.2.b—Solve a one-step equation for sums and differences 0–9.

Key Terms

addition, evaluate, expression, subtraction, value, variable

Additional Resources or Links

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

https://www.engageny.org/resource/grade-6-mathematics-module-4-topic-f-lesson-18

MA 7.2.2.d

Solve two-step equations involving rational numbers which include the integers.

Extended: Solve a one-step equation using multiplication.

Scaffolding Activities for the Extended Indicator

❑ **Identify a variable as an unknown number in a multiplication sentence.**

- Show a variety of multiplication sentences with the unknown number as the product. Use real-life objects or a visual model (e.g., tally marks, array of stars, or dots) to demonstrate how to identify the missing information.

3 × 4 = ______	2 × 7 = ______	5 × 4 = ______
The missing number is equal to three groups of four.	The missing number is equal to two groups of seven.	The missing number is equal to five groups of four.

- Explain that sometimes the missing number is in the beginning or middle of the multiplication sentence. Use real-life objects or a visual model (e.g., tally marks, array of stars, or dots) to demonstrate how to rephrase the multiplication sentence into a question.

5 × ______ = 25	______ × 4 = 12	______ × 3 = 6
What is the size of the group if five groups are needed to equal 25?	How many groups of four are needed to equal twelve?	How many groups of three are needed to equal six?

- Explain that a variable may be used instead of a blank to show a missing number. A variable is a letter that represents the unknown number. A number and a variable are often shown side-by-side, without the operator ×, to show multiplication. Repeat the process of modeling how to identify the missing information using multiplication sentences with a variable. Be sure to use examples with the variable as the product, the first factor, and the second factor, as well as with no operator between the multiplicand and variable.

$9 \times w = 18$	$3n = 15$	$4 \times 5 = w$
$2n = 16$	$4w = 8$	$6 \times n = 24$

- Ask students to identify the missing information in multiplication sentences with a variable.

❑ **Solve a multiplication equation using a variable.**

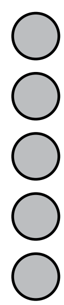
- Present the problem $w \times 4 = 12$. Use a question model. How many groups of 4 are needed to equal 12? Use manipulatives or draw an array to solve the problem. First, make one row of 4.

Count the stars, 4, and identify that more stars are needed. With multiplication more stars are added by repeatedly adding **groups** of stars. In this case, we repeatedly add groups of 4 stars.

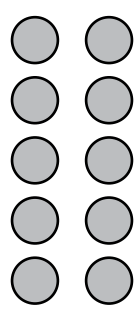
Continue to repeatedly add one group of 4 stars after another until the total number of stars equal 12.

Three rows (or groups) of 4 equal 12 which is the answer to the question model. Therefore, 3 is the missing number, $w = 3$ and $3 \times 4 = 12$.

- Repeat the process with the variable as the second factor. Present the problem $5w = 10$. Use a question model. What is the size of the group if 5 groups are needed to equal 10? Use manipulatives or draw an array to solve the problem. First, make a column of 5.



- Count the tokens, 5, and identify that more tokens are needed. Indicate that the size of the group must be greater than 1 because there are not enough tokens to equal 10. Increase the size of the group to 2 by adding another column of 5. Count. Now there are 10. If each group is size 2, then 5 groups makes 10.



Count the number of tokens, 10. If each group is the size of 2 tokens, then 5 groups make 10, which is the answer to the question model. Therefore, 2 is the missing number, $w = 2$ and $5 \times 2 = 10$.

- Ask students to use arrays to solve one-step multiplication equations with variables.

Prerequisite Extended Indicator

MAE 3.1.2.c—Use a model to show multiplication as repeat addition with a product no greater than 20.

Key Terms

equation, multiplication, multiply, variable

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.engageny.org/resource/grade-6-mathematics-module-4-topic-g-lesson-28

MA 7.2.2.e

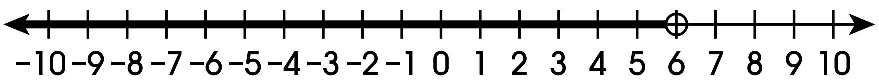
Solve one-step inequalities involving integers and rational numbers and represent solutions on a number line.

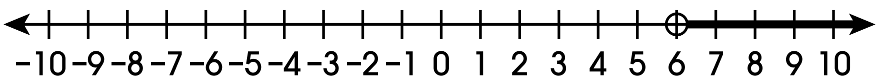
Extended: Identify a solution to an inequality involving multiplication using a number line (–10 to 10).

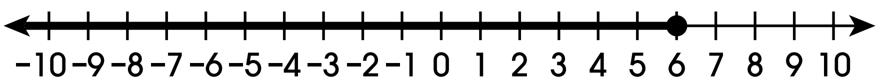
Scaffolding Activities for the Extended Indicator

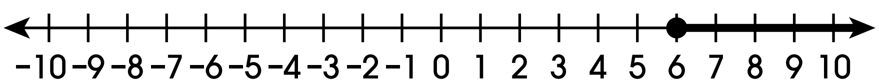
❑ **Identify a solution to a one-step inequality involving multiplication using a number line.**

- Use number lines to model graphing inequalities. Explain that inequalities can be represented on number lines. Demonstrate the solutions to the inequalities $n < 6$, $n > 6$, $n \leq 6$, and $n \geq 6$ on number lines as shown.





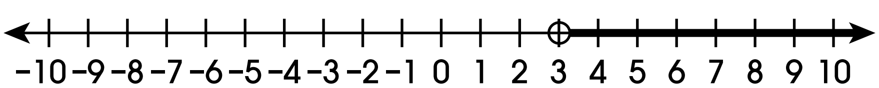




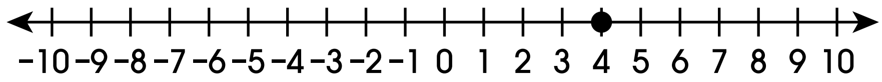
- Demonstrate that when solutions to inequalities are graphed on number lines, **all** the possible solutions to each inequality are shown or represented. Present the inequality $2n > 6$. Explain that this inequality can be solved by finding the boundary of the inequality by first thinking about $2n = 6$ and “2 groups of what size is equal to 6.” The answer is $n = 3$ because $2 \times 3 = 6$. Indicate that this value of n can now be applied to the solution of the inequality $2n > 6$ as $n > 3$. The solution is any number greater than 3 because for any number greater than 3, $2 \times n$ is greater than 6.

  It might be helpful to use manipulatives to represent the solution. For example, show that 2 groups of 3 is equal to 6 but not greater than 6, so 3 is not a solution. However, 2 groups of 4 is greater than 6 and 2 groups of 5 is greater than 6. Be sure to emphasize that the solution to this inequality is all numbers greater than 3.

  Use a number line to show all the solutions to the inequality $2n > 6$.

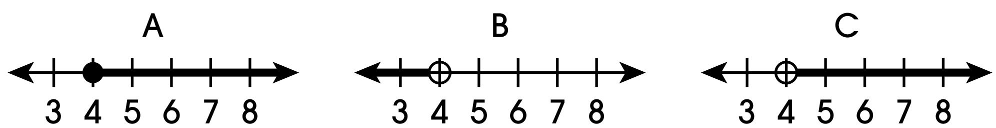


Also, use a number line to show one solution to the inequality $2n > 6$.



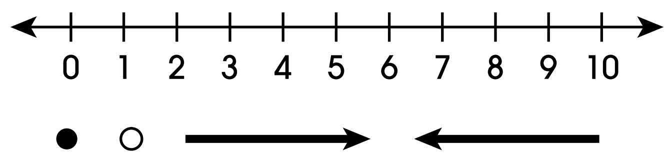
Continue to demonstrate solving one-step inequalities involving multiplication using manipulatives as needed and representing the solutions on number lines.

- Ask students to identify a number line that represents the solution to a one-step inequality involving multiplication when given a choice of three number lines and the solution. For example, present the equation $6x < 24$, the solution $x < 4$, and three choices of number lines as shown. Ask students which number line matches the solution $x < 4$.



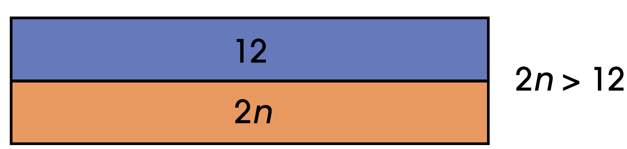
Students can match the graph to the inequality $x < 4$ or test shaded numbers from the graph in the inequality. For example, graph C must be incorrect because 5 is shaded but 6×5 is not less than 24.

- Ask students to graph the given solution to an inequality. For example, present the inequality $3y \geq 15$, the solution $y \geq 5$, and a number line, an open point, a closed point, and arrows pointing in both directions as shown. Ask students to graph the solution $y \geq 5$.

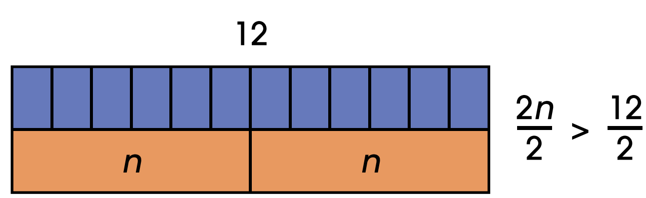


❑ **Identify a solution to a one-step inequality involving multiplication using a bar model, algebra tiles, or connecting cubes.**

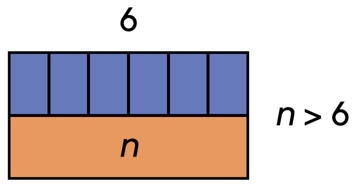
- Model solving a one-step inequality using a bar model, algebra tiles, or connecting cubes. For example, present the inequality $2n > 12$ and the figure shown. Be sure to emphasize that $2n > 12$ can be solved by first finding the boundary of the inequality and thinking about $2n = 12$ as represented in the bar model.



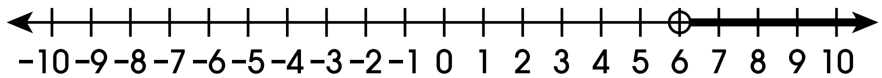
Explain that to solve for n, the bar model must be divided by 2.



The result shows n is equal to 6, which can now be represented as the solution $n > 6$.

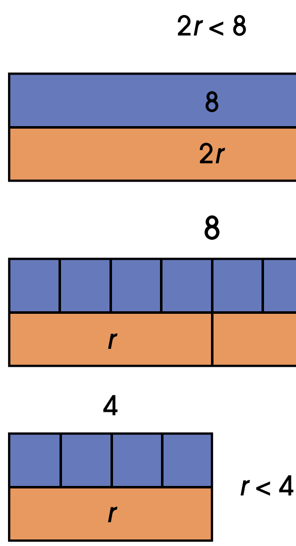


Then, demonstrate plotting the solution on a number line, paying particular attention to the direction of the arrow and whether the circle is open or closed.



Continue to demonstrate solving one-step inequalities involving multiplication using a bar model, algebra tiles, or connecting cubes and representing the solutions on number lines.

- Ask students to graph the solution to a one-step inequality with multiplication when given the inequality and the solution represented with a bar model, algebra tiles, or connecting cubes. For example, present the inequality $2r < 8$ and the figure shown. Ask students to graph the solution on a number line.



- Ask students to solve a one-step inequality involving multiplication using a bar model, algebra tiles, or connecting cubes and plot the solution on a number line.

Prerequisite Extended Indicators

MAE 7.2.2.d—Solve a one-step equation using multiplication.

MAE 7.2.1.a—Identify a solution to a given inequality.

MAE 6.2.2.g—Identify a solution to an inequality on a number line (–10 to 10).

Key Terms

greater than, greater than or equal to, inequality, less than, less than or equal to, number line, solution

Additional Resources or Links

https://www.engageny.org/resource/grade-6-mathematics-module-4-topic-h-lesson-34/file/44746

https://www.engageny.org/resource/grade-6-mathematics-module-4-topic-g-lesson-24

https://apps.mathlearningcenter.org/number-line/

https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Algebra-Tiles/

MA 7.2.3 Applications

MA 7.2.3.b

Write a two-step equation to represent real-world problems involving rational numbers in any form.

Extended: Identify a one-step linear equation containing a positive integer that represents a solution to a real-world problem.

Scaffolding Activities for the Extended Indicator

- ❑ **Identify a one-step addition or subtraction equation containing an unknown number that represents a solution to a real-world problem.**
  - Use a real-world example to explain that a variable is a letter that stands in for an unknown number in an equation. For example, in the situation of having 6 juice boxes and drinking 2 of them, the equation can be represented as 6 – 2 = ___. Or, using the variable *n* for the number of boxes remaining, the equation can be written as 6 – 2 = *n*.
  - Ask students to identify a one-step addition or subtraction equation that uses a variable to represent the unknown number in a real-world problem. For example, in the situation of having 7 eggs and needing a total of 12 eggs to make a recipe, which equation represents the situation?

    $7 - n = 12$ **OR** $7 + n = 12$

    Students should choose 7 + *n* = 12 because the unknown number is how many more eggs are needed and more indicates that addition is needed to solve the problem. The unknown number of eggs needed to get to 12 is represented with the variable *n* in the addition equation.
- ❑ **Identify a one-step addition, subtraction, or multiplication equation containing an unknown that represents a solution to a real-world problem.**
  - Use a real-world example to demonstrate an equation involving multiplication. For example, tickets to a movie cost $4 each. How much will 3 tickets cost?

    $\$4 \times 3 = c$

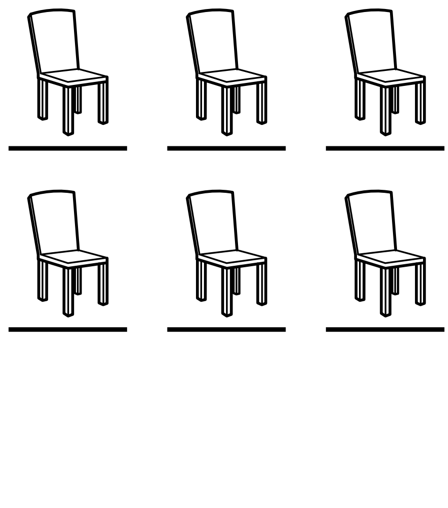
    Explain that the total cost is represented by the variable *c*, and since the number of tickets is 3, the cost of $4 is multiplied by 3. If appropriate, make the connection between skip-counting and multiplication to help decide when a real-world problem involves multiplication.

- Show other one-step equations where the unknown is represented by a variable and in a variety of positions in the equation. Some examples are shown.

$$9 + a = 15$$
$$7 + 3 = b$$
$$6 - d = 0$$
$$10 - 7 = f$$
$$5 \times g = 20$$
$$2 \times 3 = h$$

  Use a variety of relevant real-world scenarios to connect the equations to familiar situations. Use picture representations for support when appropriate.

- Ask students to identify a one-step equation that represents the solution to a real-world problem. For example, a classroom needs 9 chairs for a group to sit in. There are already 6 chairs in the classroom. How many more chairs are needed?



  Students can be given a variety of equations to choose from, such as $9 - 9 = c$, $6 + c = 9$, and $6 \times 9 = c$. The equation in this example is identified as $6 + c = 9$.

Prerequisite Extended Indicator

MAE 3.2.3.b—Identify a one-step equation that represents a real-world problem with a variable limited to addition or subtraction with sums and differences 0–9.

Key Terms

equation, integer, solution, variable

Additional Resources or Links

https://www.insidemathematics.org/sites/default/files/materials/digging%20dinosaurs.pdf

https://nysed-prod.engageny.org/resource/grade-6-mathematics-module-4-topic-f-overview

MA 7.2.3.c

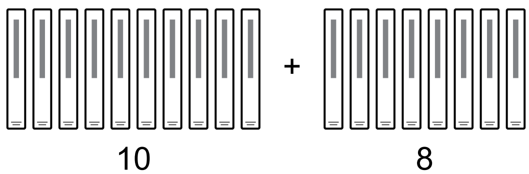
Solve real-world problems with equations that involve rational numbers in any form.

Extended: Solve a one-step linear equation using a positive integer that represents a solution to a real-world problem.

Scaffolding Activities for the Extended Indicator

❑ **Solve a one-step addition equation that represents a real-world problem.**

- Use a model to demonstrate how to represent a real-world problem with an equation. Present the following scenario: "There are 10 books on a shelf, and 8 more books are added to the shelf. How many total books are on the shelf?"

  Explain that the equation $10 + 8 = b$, where the variable b is the total number of books on the shelf, can be used to solve the problem. Demonstrate how to find the solution, which is the value that can be substituted into the equation in place of the b. Use counting or addition to show that $10 + 8 = 18$. Indicate that the answer is 18 books on the shelf, since $b = 18$.

- Demonstrate solving a variety of addition equations that represent real-world problems. Be sure to include problems in which one of the addends is missing, for example $5 + x = 27$.
- Ask students to identify an addition equation that represents a real-world problem when given two or more choices of addition equations.
- Ask students to solve a one-step addition equation that represents a real-world problem.

❑ **Solve a one-step subtraction equation that represents a real-world problem.**

- Use an equation to model a real-world problem that involves subtraction. Present the following scenario: "There are 45 cars in a parking lot at the beginning of the day, and 35 of the cars leave at the end of the day. How many cars remain in the parking lot?" The number of cars remaining in the parking lot can be represented with the variable c.

  $$45 – 35 = c$$

  Demonstrate how to solve the equation and find the answer to the problem. For this example, subtract 35 from 45 to get 10, so $c = 10$. That means there are 10 cars remaining in the parking lot.

- Demonstrate solving a variety of subtraction equations that represent real-world problems. Be sure to include problems in which the subtrahend is missing, for example $12 – d = 2$.
- Ask students to identify a subtraction equation that represents a real-world problem when given two or more choices of subtraction equations.

- Ask students to solve a one-step subtraction equation that represents a real-world problem.

❑ **Solve a one-step multiplication equation that represents a real-world problem.**

- Use an equation to model a real-world problem that involves multiplication. Present the following scenario: "Apples cost $2 for one pound. To make a certain recipe, 5 pounds of apples are needed. What is the total cost of the apples?" To find the total cost of the apples, use an equation like the one shown, where *a* is the total cost of the apples.

$$2 \times 5 = a$$

  Explain that the answer to a multiplication problem is called the product. Demonstrate using an appropriate computation method to solve the problem (e.g., skip counting, repeated addition, using a calculator). For this example, the product of 2 and 5 is 10, so $a = 10$. The total cost of the apples is $10.

- Demonstrate solving a variety of multiplication equations that represent real-world problems. Be sure to include problems in which a factor is missing, for example $2 \times g = 20$.
- Ask students to identify a multiplication equation that represents a real-world problem when given two or more choices of multiplication equations.
- Ask students to solve a one-step multiplication equation that represents a real-world problem.

Prerequisite Extended Indicators

MAE 7.2.3.b—Identify a one-step linear equation containing a positive integer that represents a solution to a real-world problem.

MAE 7.2.2.d—Solve a one-step equation using multiplication.

MAE 6.2.2.e—Solve a one-step equation using addition and subtraction.

Key Terms

add, difference, multiply, product, subtract, sum

Additional Resources or Links

https://www.insidemathematics.org/sites/default/files/materials/diminishing%20return.pdf

http://tasks.illustrativemathematics.org/content-standards/6/EE/B/7/tasks/1107

https://nysed-prod.engageny.org/resource/grade-6-mathematics-module-4-topic-g-lesson-26

MA 7.2.3.d

Solve real-world problems with inequalities.

Extended: Identify an inequality that represents a solution to a real-world problem using a model.

Scaffolding Activities for the Extended Indicator

❑ **Identify a graphical representation of a solution to a real-world problem involving the inequalities > or <.**

- Explain that an inequality is a statement that represents two quantities that are not equal and that the solution to an inequality is any value that makes the inequality true. State that the inequality symbol "opens" to the greater value. Present a table as shown to display two inequalities and word forms that may be used to describe them.

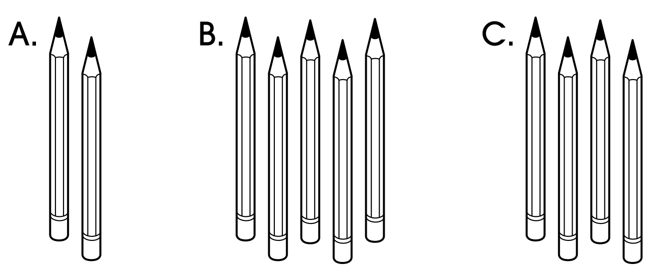
$x > 4$	$x < 4$
x is greater than 4. *x* is more than 4.	*x* is less than 4. *x* is fewer than 4.

Demonstrate identifying solutions to the inequality $x > 4$. The inequality symbol opens to the *x*, so any solution to the inequality must be a value for *x* that is greater than or more than 4. List possible solutions to the inequality $x > 4$ (e.g., 5, 15, 100).

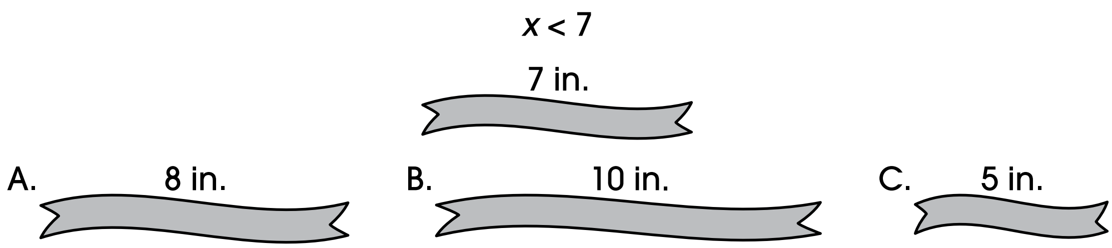
Demonstrate identifying solutions to the inequality $x < 4$. The inequality symbol opens to the 4, so any solution to the inequality must be a value for *x* that is less than or fewer than 4. List possible solutions to the inequality $x < 4$ (e.g., 3, 2, 1).

Explain that inequalities can be used to represent solutions to real-world problems. Refer to the inequality $x > 4$ and explain that this inequality can be used to represent the following problem: "Nina has more than 4 pencils. How many pencils could Nina have?" Present three options as shown and describe each option, explaining why the quantity may or may not correctly answer the problem. Be sure to emphasize why C is not the correct option.

$x > 4$



- Ask students to identify the model that represents the solution to the inequality $x < 7$ in the following word problem: “Jake has a piece of ribbon that is less than 7 inches long. How many inches long could his piece of ribbon be?”



- Ask students to identify the inequality that represents the solution to a word problem. For example, present the problem “The number of coins Kiara has is greater than 3. How many coins could Kiara have?” and the student should identify $x > 3$ as the solution.

  A. $x > 3$
  B. $x = 3$
  C. $x < 3$

❑ **Identify a graphical representation of a solution to a real-world problem involving the inequalities ≥ or ≤.**

- Present a table as shown to display two inequalities and word forms that may be used to describe them.

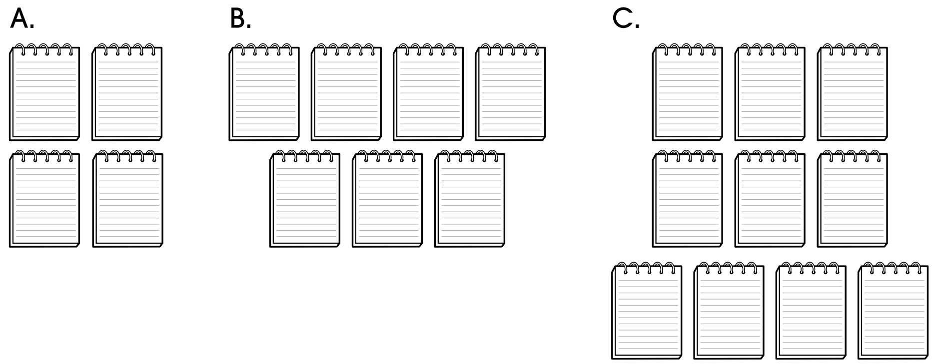
$x \geq 6$	$x \leq 6$
x is greater than or equal to 6. *x* is at least 6.	*x* is less than or equal to 6. *x* is at most 6.

Demonstrate identifying solutions to the inequality $x \geq 6$. The inequality symbol opens to the *x*, so any solution to the inequality can be greater than 6. Explain that the bar under the symbol means that the solution could also be equal to 6. List possible solutions to the inequality $x \geq 6$ (e.g., 6, 10, 20).

Demonstrate identifying solutions to the inequality $x \leq 6$. The inequality symbol opens to the 6 and has a bar underneath, so any solution to the inequality must be less than 6 or equal to 6. List possible solutions to the inequality $x \leq 6$ (e.g., 6, 4, 0). Emphasize that 6 is a possible solution to both the inequalities $x \geq 6$ and $x \leq 6$.

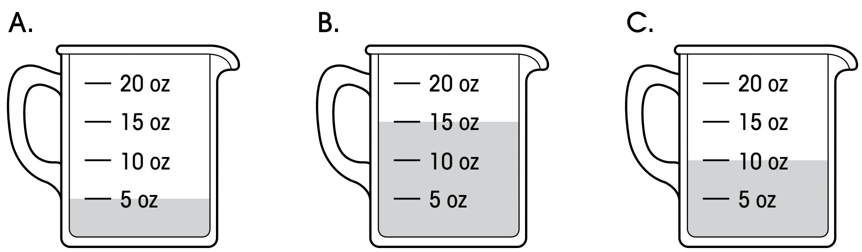
Refer to the inequality $x \leq 6$ and explain that this inequality can be used to represent the following problem: “Eduardo keeps at most 6 notebooks in his backpack. How many notebooks could Eduardo have in his backpack?” Present three options as shown and describe each option, explaining why the quantity may or may not correctly answer the problem.

$x \leq 6$



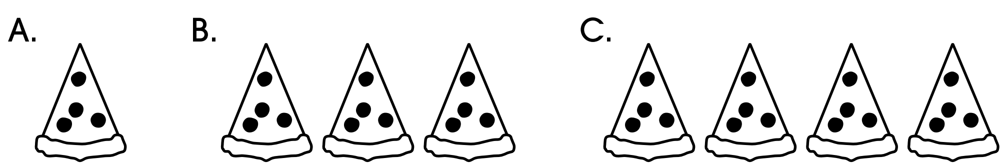
- Ask students to identify the model that represents the solution to the inequality $x \geq 12$ in the following word problem: “Mae pours at least 12 ounces of water into a measuring cup. How many ounces of water could Mae pour into the measuring cup?”

$x \geq 12$

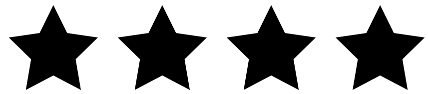


- Ask students to identify more than one model that represents a solution to the inequality $x \leq 3$ in the following word problem: “Craig orders a pizza. He wants to eat 3 or fewer slices of pizza. How many slices of pizza could Craig eat?”

$x \leq 3$



- Ask students to identify the inequality statement that is true in the following scenario, “Jason draws stars, as shown.”

  Which statement is true?

  A. Jason drew less than 2 stars.
  B. Jason drew less than 4 stars.
  C. Jason drew less than 5 stars.

Prerequisite Extended Indicators

MAE 7.2.2.e—Identify a solution to an inequality involving multiplication using a number line (–10 to 10).

MAE 7.2.1.a—Identify a solution to a given inequality.

MAE 6.2.2.g—Identify a solution to an inequality on a number line (–10 to 10).

Key Terms

equal, greater than, inequality, less than, solution

Additional Resources or Links

https://curriculum.illustrativemathematics.org/MS/students/1/7/8/index.html

https://www.engageny.org/resource/grade-6-mathematics-module-4-topic-h-lesson-33

https://www.engageny.org/resource/grade-6-mathematics-module-3-topic-b-lesson-10

MA 7.2.3.e

Use proportional relationships to solve real-world problems, including percent problems (e.g., % increase, % decrease, mark-up, tip, simple interest).

Extended: Identify the percent for a discount problem (10%, 25%, or 50%).

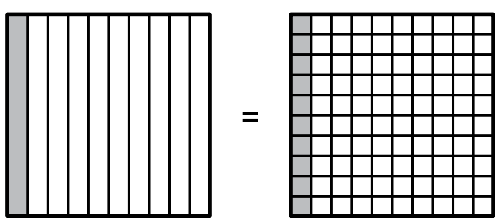
Scaffolding Activities for the Extended Indicator

❑ **Identify the percent in the context of a discount problem.**

- Use a story problem to describe how percent is used for a discounted price. For example, a shop has a sign in the window that reads "All Shoes 25% Off." Discuss the meaning of 25% as the percent discount for shoes. Other examples could include 50% off clearance items or 10% off soap. Refer to other examples of signs or advertisements that use percent as a discount.
- Ask students to identify the percent sign in a number, such as 25%.
- Ask students to identify the percent discount in a figure, as shown.

❑ **Identify the fractions equivalent to 10%, 25%, and 50%.**

- Use a model to demonstrate the fractions that are equivalent to 10%, 25%, and 50%. For example, the following model shows a square with 1 of 10 parts of the whole shaded and a square with 10 of 100 parts of the whole shaded. Explain that the amount shaded is the same in both models and is equal to 10%, $\frac{1}{10} = \frac{10}{100}$ =10%.



- Use models to demonstrate that 50% = $\frac{1}{2}$ and 25% = $\frac{1}{4}$. (See MAE 7.1.2.a.)
- Ask students to identify the fractions equivalent to 10%, 25%, and 50% using models and without using models.
- Ask students to complete a table with fractions equivalent to 10%, 25%, and 50%.

Percent Equivalencies

Percent	10%	25%	50%
Fraction			

- ❑ **Identify the percent for a discount problem.**

  - Use a story problem to demonstrate how to find the percent discount. For example, tickets to a movie cost $10, but there is a sale going on for $1 off per ticket. Explain that $1 off per $10 can also be written as 10% because it is the same as the fraction $\frac{1}{10}$, where the numerator, 1, is the discount, and the denominator, 10, is the original price.

    Continue to model how to identify 10%, 25%, or 50% as the discount amount. For example, a store has a half-price sale on books. The original price of a book is $20, and the sale price is $10. Explain that half price is the same as the fraction $\frac{1}{2}$ off, which is 50%.

  - Ask students to identify the percent for a discount problem when the fraction of the discount is given, as shown.

  - Ask students to identify the percent for a discount problem when the original price and the discount amount are given, as shown.

Prerequisite Extended Indicators

MAE 7.1.2.a—Given a fraction $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$, write the corresponding percentage.

MAE 6.1.1.d—Convert halves, fourths, and tenths to decimals using a model.

Key Terms

discount, fraction, percent, sale

Additional Resources or Links

https://www.map.mathshell.org/lessons.php?unit=7100&collection=8

https://www.map.mathshell.org/tasks.php?unit=MA01&collection=9

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

MA 7.2.3.f

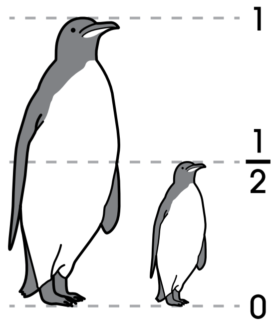
Solve real-world problems involving scale drawings using a proportional relationship.

Extended: Identify the measure of a scale drawing using the scale of $\frac{1}{4}$, $\frac{1}{3}$, or $\frac{1}{2}$.

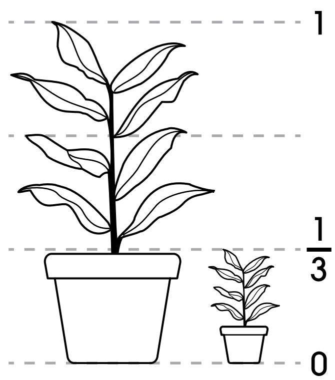
Scaffolding Activities for the Extended Indicator

- ❑ **Identify the scale in a scale drawing with a scale of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$.**

  - Use a drawing of something simple (e.g., a sketch of an animal) and a scale of $\frac{1}{2}$ to create the same drawing that is $\frac{1}{2}$ the size of the original. For example, use paper with grids or lines to demonstrate the scale drawing shown. Explain that the smaller penguin is $\frac{1}{2}$ the size of the original penguin, so the scale of the drawing is $\frac{1}{2}$.

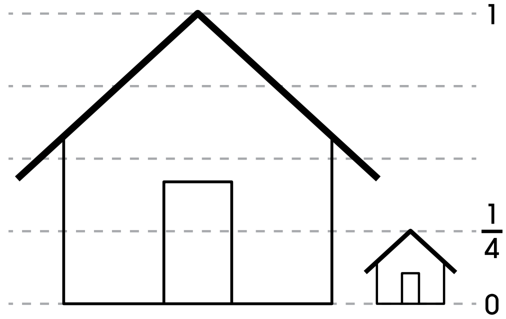


Show a scale drawing with a scale of $\frac{1}{3}$. The smaller plant is $\frac{1}{3}$ the size of the original plant, so the scale of this drawing is $\frac{1}{3}$.



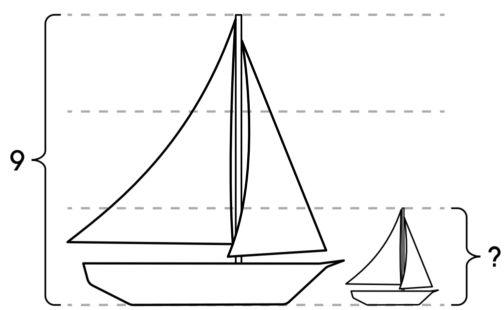
Show a variety of scale drawings using scales of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$.

- Ask students to identify the scale in a scale drawing. For example, show students the following scale drawing and ask them to choose the correct scale: $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$.



❑ **Identify the measure of a scale drawing.**

- Use drawings that include measurements to demonstrate finding a missing measurement in a scale drawing. For example, the original figure shown here has a height of 9 units and the scale is $\frac{1}{3}$.



The height of the scale drawing, shown with a question mark, is $\frac{1}{3}$ of the 9 units, which is 3 units.

Demonstrate finding the missing measurement using an appropriate computation method. One strategy is to draw 9 lines to represent the original figure. Next, divide the 9 lines between the three sections of the scale drawing. This could also be done with 9 manipulatives. Other strategies include counting the three sections of the drawing and then calculating 9 ÷ 3, with or without a calculator.

- Continue to demonstrate finding the missing measure of a scale drawing using a variety of drawings with the original figure represented as a whole-number multiple of the denominator of the scale $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$.
- Ask students to identify the measure of a scale drawing when given the measure of the original figure and the measure of the scale drawing.
- Ask students to identify the missing measure of a scale drawing when given the scale drawing on a grid with the scale of $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$ labeled and the measure of the original figure labeled.

Prerequisite Extended Indicators

MAE 6.2.2.f—Find a missing number in a table with the ratio of 1:2, 1:3, or 1:10.

MAE 6.2.3.d—Solve real-world problems using ratios up to 1:3.

Key Terms

measure, scale, scale drawing, unit

Additional Resources or Links

https://www.map.mathshell.org/lessons.php?unit=7210&collection=8

https://www.map.mathshell.org/lessons.php?unit=7310&collection=8

https://www.engageny.org/resource/grade-7-mathematics-module-1-topic-d-lesson-16

MA 7.3.1 Characteristics

MA 7.3.1.a

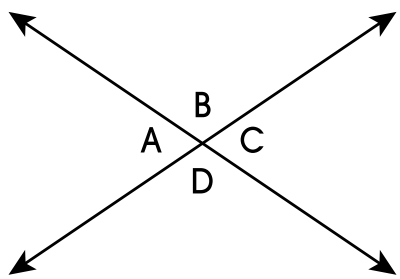
Apply and use properties of adjacent, complementary, supplementary, and vertical angles to find missing angle measures.

Extended: Identify a pair of congruent angles in two intersecting lines.

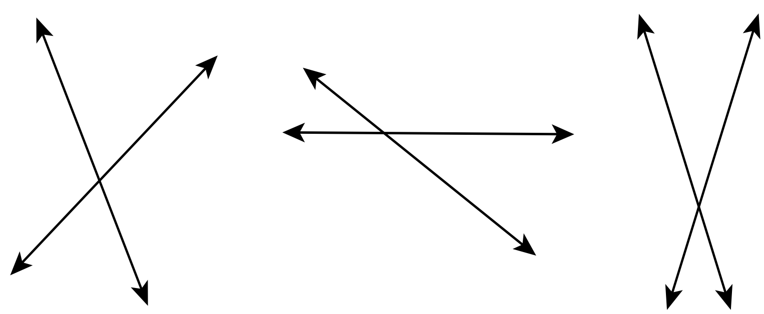
Scaffolding Activities for the Extended Indicator

❑ **Identify the four angles made by intersecting lines.**

- Use two intersecting lines to show the four angles formed by two intersecting lines. In the figure shown, the angles are labeled A, B, C, and D.



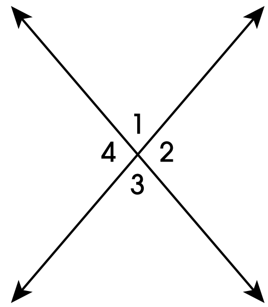
  Explain that an angle is made by two rays, so the lines in the figure make four different angles by using the lines as rays. Show a variety of intersecting lines and make note of the four different angles made with each figure. Some examples are shown.



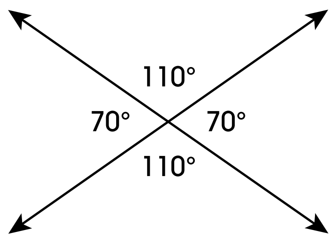
- Ask students to identify the four angles made by intersecting lines. The angles can be labeled with letters as shown or with the numbers 1 through 4.

❑ **Identify a pair of congruent angles in two intersecting lines.**

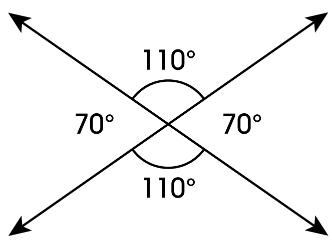
- Use two intersecting lines to show opposite angles. In the figure shown, the opposite angles are 1 and 3 and 2 and 4.



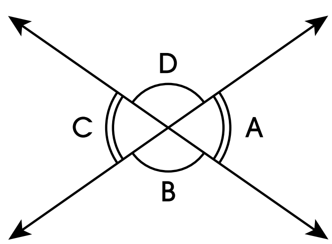
- Ask students to identify the opposite angles in a figure of two intersecting lines.
- Use two intersecting lines with angle measurements labeled to show that opposite angles are equal in size.



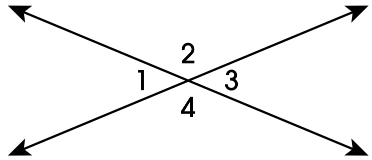
Equal angle measurements can also be called congruent, so the opposite angles in two intersecting lines are congruent. This is true for any two intersecting lines. Mark the congruent angles with symbols, as shown.



Repeat this process with a variety of intersecting lines, always showing the angle measurements and identifying the congruent, opposite angles. Then move on to intersecting lines without the angle measurements given and only a letter or number to label each angle.



- Ask students to identify a pair of congruent angles in two intersecting lines. For example, ask students to find which angle is congruent to angle 1 in the figure shown.



Students should determine that angle 3 is congruent to angle 1.

Prerequisite Extended Indicators

MAE 4.3.1.c—Identify parallel and intersecting lines.

MAE 4.3.1.b—Compare larger and smaller angles.

Key Terms

angle, congruent, intersect, line, opposite, pair, ray

Additional Resources or Links

https://www.engageny.org/resource/grade-7-mathematics-module-6-topic-lesson-2

https://curriculum.illustrativemathematics.org/MS/teachers/2/7/1/index.html

MA 7.3.3 Measurement

MA 7.3.3.a

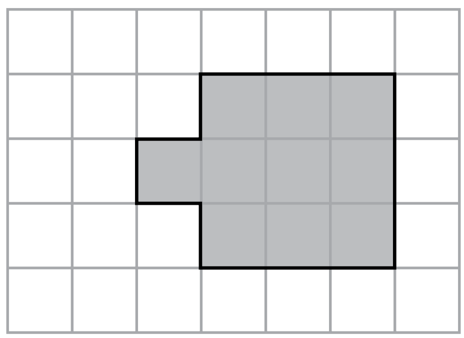
Solve real-world problems involving perimeter and area of composite shapes made from triangles, quadrilaterals, and polygons.

Extended: Find the perimeter of two adjoining rectangles by counting unit lengths.

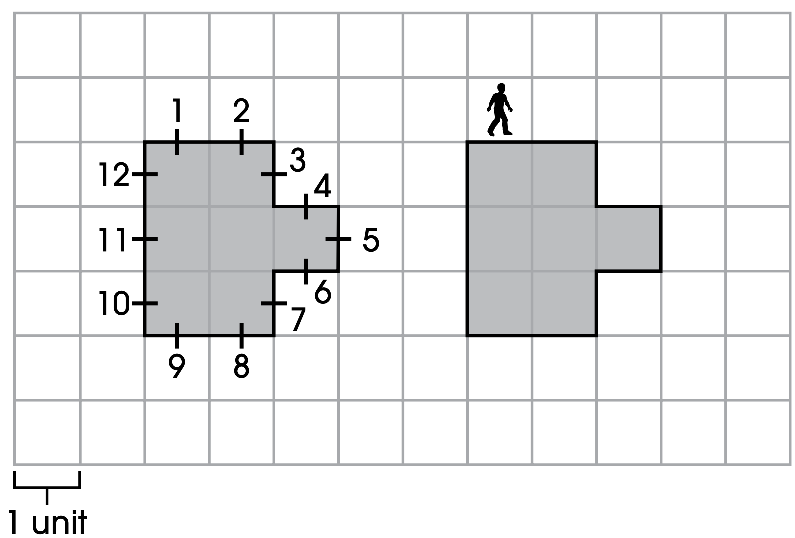
Scaffolding Activities for the Extended Indicator

❑ **Find the perimeter of two adjoining rectangles using grid paper.**

- Use two rectangular figures (such as cutouts or pattern blocks) that match up with whole-unit lengths on grid paper to model two adjoining rectangles.



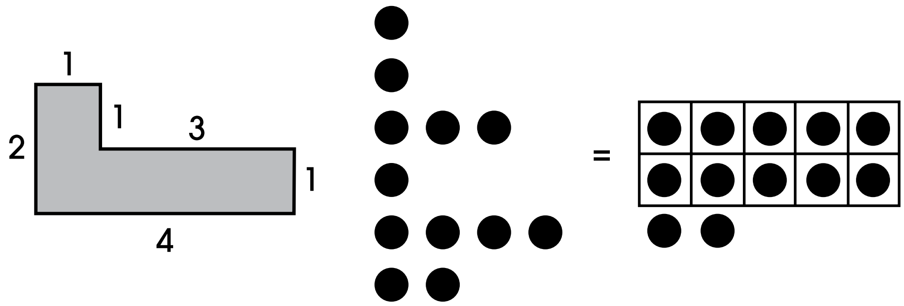
Describe the perimeter as the distance along the outside edge of the whole shape. Make a mark on one corner of the composite shape to represent a starting point. Count each square unit along the outside of the figure to find the perimeter of the shape. Another method is to use painter's tape to tape out the perimeter of a rectangle on a tiled floor.



- Ask students to find the perimeter of two adjoining rectangles by counting square units.

❑ **Find the perimeter of two adjoining rectangles given the side lengths.**

- Present a composite shape of two adjoining rectangles with all the side lengths labeled. Demonstrate a counting strategy (e.g., making tally marks, using manipulatives, using a calculator) to identify each of the side lengths and find the total.



- Ask students to find the perimeter of two adjoining rectangles when given the side lengths.

Prerequisite Extended Indicators

MAE 3.3.3.a—Find the perimeter of a rectangle given the side lengths and a figure.

MAE 3.3.1.a—Identify the number of sides or angles in a regular polygon.

MAE 3.1.2.a—Add and subtract, through 20 without regrouping.

Key Terms

add, perimeter, side, side length, sum, total

Additional Resources or Links

https://www.engageny.org/resource/grade-3-mathematics-module-7-topic-c-lesson-10

https://www.engageny.org/resource/grade-3-mathematics-module-7-topic-c-lesson-12

http://nlvm.usu.edu/en/nav/frames_asid_172_g_2_t_3.html?open=activities&from=category_g_2_t_3.html

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

MA 7.3.3.b

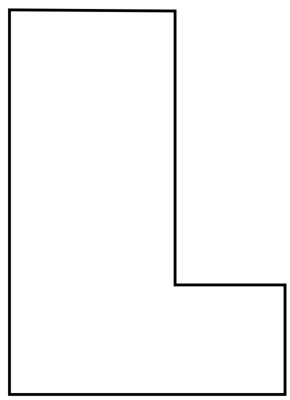
Solve real-world problems involving surface area and volume of composite shapes made from rectangular and triangular prisms.

Extended: Find the area of two adjoining rectangles by counting unit squares.

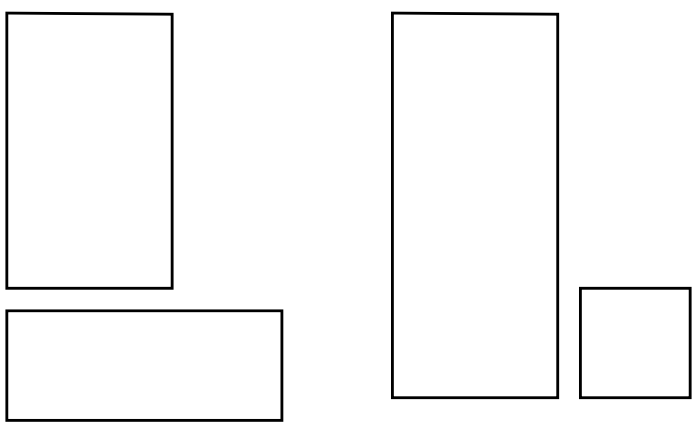
Scaffolding Activities for the Extended Indicator

❑ **Decompose adjoining rectangles into two separate rectangles.**

- Use composite shapes made of adjoining rectangles to demonstrate how to separate the shapes into individual rectangles. For example, present adjoining rectangles such as the following.

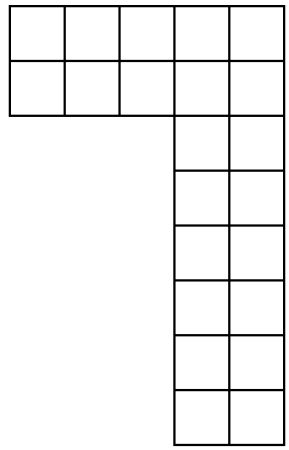


Show multiple ways that the shape may be decomposed.

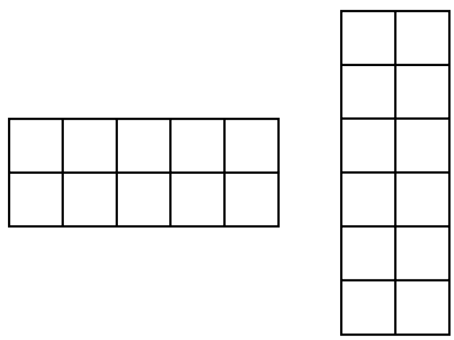


- Continue to demonstrate decomposing adjoining rectangles into two smaller rectangles by first using manipulatives (e.g., several cutouts of an adjoining rectangle in different colors that can then be cut apart or decomposed in different ways) and then progressing to adjoining rectangles drawn on grid paper that can be highlighted in various color combinations to represent the smaller rectangles.
- Ask students to decompose shapes made of adjoining rectangles into smaller rectangles.

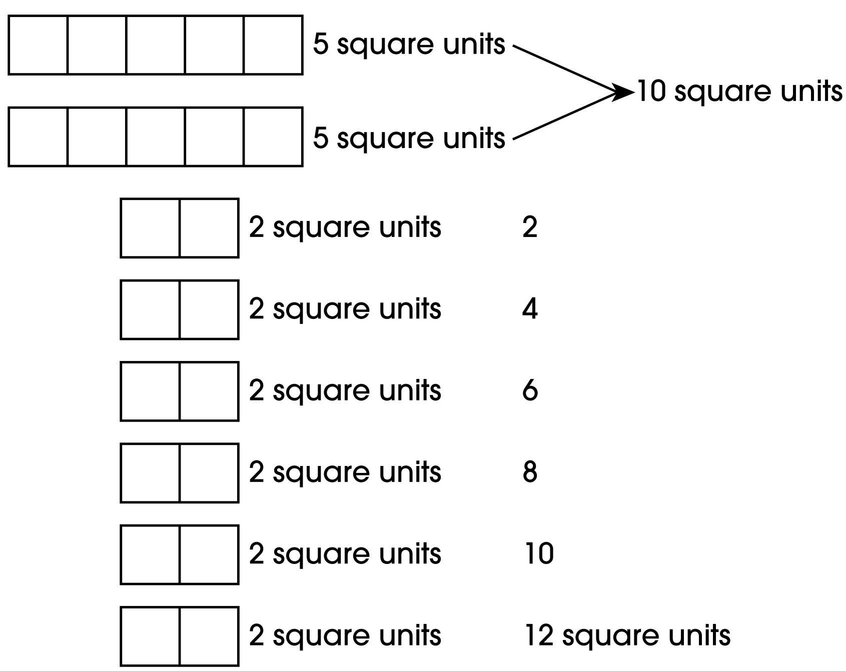
- **Find the area of two adjoining rectangles by counting whole-number unit squares.**
  - Present two adjoining rectangles set on a grid as shown. Explain that the area is the number of square units that cover a shape.



Demonstrate dividing the composite figure into two separate rectangles.



Demonstrate different ways to group the values to find the area of each rectangle.



Demonstrate combining the areas of the two rectangles to determine the total area of the composite shape.

$$\begin{array}{r} 10 \text{ square units} \\ + \ 12 \text{ square units} \\ \hline 22 \text{ square units} \end{array}$$

- Continue to demonstrate finding the area of two adjoining rectangles shown on a grid using appropriate computation strategies including, but not limited to, counting individual unit squares, skip-counting, repeated addition, or using a calculator.
- Ask students to find the area of two adjoining rectangles shown on a grid.

Prerequisite Extended Indicators

MAE 4.3.3.a—Identify the area of a rectangle by counting unit squares.

MAE 3.3.1.b—Identify two-dimensional shapes, circles, triangles, rectangles, or squares from a collection of circles, rectangles, and squares.

Key Terms

area, grid, rectangle, total, unit square

Additional Resources or Links

https://www.engageny.org/resource/grade-3-mathematics-module-4-topic-lesson-2

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

MA 7.3.3.c

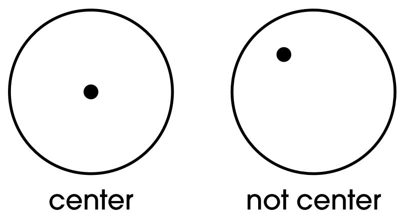
Determine the area and circumference of circles both on and off the coordinate plane.

Extended: Identify the center and radius of a circle.

Scaffolding Activities for the Extended Indicator

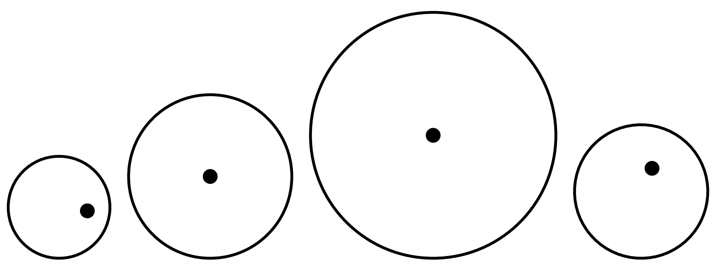
❑ **Identify the center of a circle.**

- Describe a circle as a round figure with no corners. Show examples of circles. Explain that a point can be placed at the very center, or middle, of a circle. Identify the center of a circle using examples and non-examples. To determine whether a point is at the center of a circle, cut three pieces of string so that their lengths match the distances from the point to three different locations on the edge of the circle. If the three pieces of string are the same length, the point is at the center of the circle. If the three pieces of string are different lengths, the point is not at the center of the circle.



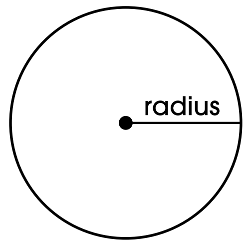
- Ask students to identify whether a point on a circle is at the center based on the lengths of three pieces of string that are cut to match the distance from the point to three different locations on the edge of the circle.

- Present a set of circles as shown. Ask students to identify all the circles that show a point at the center.

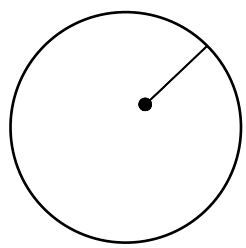


- ❑ **Identify the radius of a circle.**

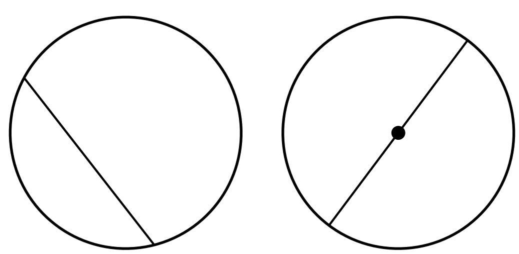
  - Describe the radius of a circle as the distance from the center of the circle to the edge. Demonstrate drawing the radius of a circle by first placing a point at the center of the circle and then drawing a line to one edge of the circle with a straight edge. Demonstrate drawing the radius on several circles of different sizes in different locations on the circles. Emphasize that the radius of a circle is always a straight line and that the radius of the circle only touches the edge of the circle in one place.



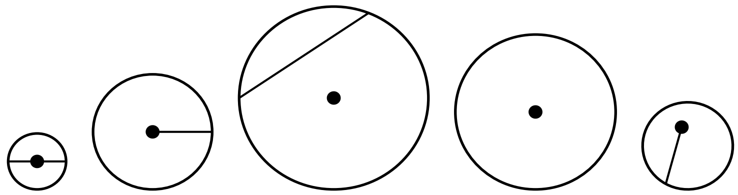
Demonstrate non-examples and explain why each line drawn is not a radius. For example, place a point that is not at the center of the circle and then draw a line to the edge. Explain that the line is not a radius because the point was not at the center of the circle.



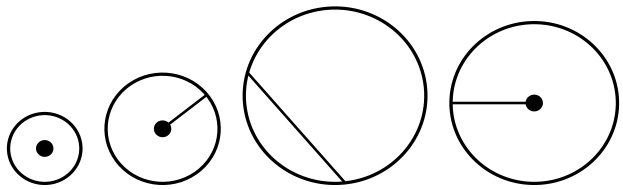
Repeat the process by drawing lines that represent other non-examples. For example, draw a line from one edge of a circle to the other edge of the circle without going through the center. Explain that the line is not a radius because the line does not touch the center. Demonstrate drawing a line from one edge of the circle through the center to the other side of the circle. Explain that the line is not a radius because the line touches the edge of the circle in two places.



- Demonstrate identifying a circle with a radius. Present the following figures, and model answering a series of questions to determine whether a radius is shown on each circle. For example, ask the question “Is there a line on the circle?” If there is, ask the questions “Does the line touch the center of the circle?” and “Does the line only touch the edge of the circle in one location?”



- Ask students to identify whether the line drawn on a circle is a radius.
- Present a set of circles as shown. Ask students to identify all the circles that show a radius.



Prerequisite Extended Indicator

MAE 3.3.1.b—Identify two-dimensional shapes, circles, triangles, rectangles, or squares from a collection of circles, rectangles, and squares.

Key Terms

center, circle, edge, length, middle, radius

Additional Resources or Links

https://www.engageny.org/resource/grade-7-mathematics-module-3-topic-c-lesson-16

https://curriculum.illustrativemathematics.org/MS/students/2/3/2/index.html

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Mathematics—Grade 7
MA 7.4 Data

MA 7.4.2 Analysis and Applications

MA 7.4.2.a

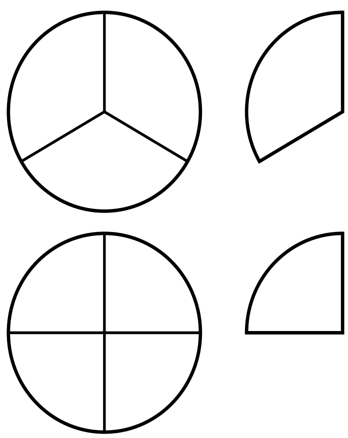
Solve problems using information presented in circle graphs.

Extended: Solve problems with thirds and fourths of a circle using a circle graph.

Scaffolding Activities for the Extended Indicator

❑ **Recognize thirds and fourths of circles.**

- Use circle manipulatives or cutouts to model thirds and fourths. Explain that when a circle is divided into three equal pieces, the pieces are called “thirds,” and when a circle is divided into four equal pieces, the pieces are called “fourths.” Emphasize that $\frac{1}{3}$ of a circle is larger than $\frac{1}{4}$ of a circle. It may also be helpful to reference the right angle at the vertex of $\frac{1}{4}$ of a circle and the obtuse angle at the vertex of $\frac{1}{3}$ of a circle to differentiate between the shapes and sizes of the fractional pieces.

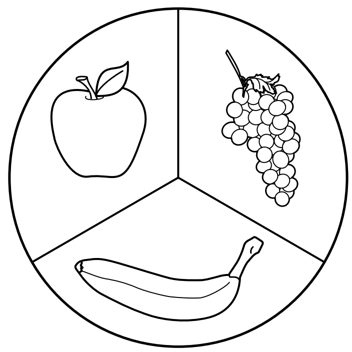


- Ask students to identify a circle divided into thirds and a circle divided into fourths when shown a collection of circles.
- Ask students to identify which fractional piece is larger or smaller when comparing thirds and fourths.

- ❑ **Solve problems with thirds and fourths of a circle using a circle graph.**

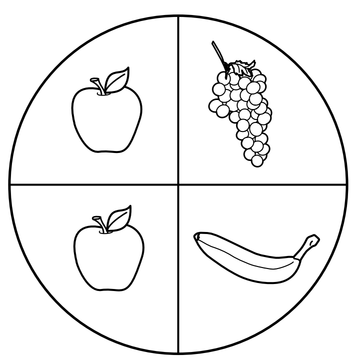
  - Explain that the fractional pieces in a circle graph represent a quantity or an amount compared to the whole. Present a circle graph depicting students' favorite fruits where $\frac{1}{3}$ like apples, $\frac{1}{3}$ like grapes, and $\frac{1}{3}$ like bananas. In this circle graph, each fruit was selected equally by the students because all the fractional pieces are equal. Guide students in answering the question "What fraction of the students picked grapes for a favorite fruit?" Repeat the question for apples and bananas.

Students' Favorite Fruit

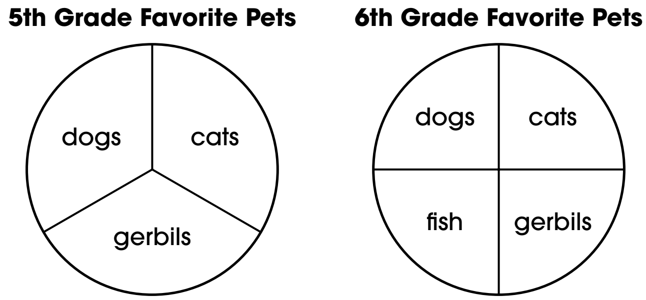


Present a similar graph in which $\frac{2}{4}$ of the students like apples, $\frac{1}{4}$ like grapes, and $\frac{1}{4}$ like bananas. Explain that the fractional pieces are all equal, but since two fractional pieces show an apple, more students like apples than bananas or grapes. Guide students in answering questions: What fruit do most students like the best? What fraction of the students picked apples as the favorite fruit? What fraction of the students picked bananas as the favorite fruit?

Students' Favorite Fruit



- Present two circle graphs as shown to demonstrate comparisons that can be made between the information in two circle graphs. Point out that one circle graph is divided into fourths and one circle graph is divided into thirds. Since thirds are larger than fourths, comparisons can be made between the information in the two circle graphs. Guide students in answering questions that compare information on the two circle graphs: In which class does a larger fraction of students like dogs?



  Continue to present a variety of circle graphs divided into thirds or fourths. Be sure to use questions that address identifying the fractional part, comparing the size of fractional parts, and adding fractional parts with like denominators.

- Ask students to identify information presented in circle graphs divided into thirds and fourths.

Prerequisite Extended Indicators

MAE 5.1.1.d—Use models to identify equivalent fractions between thirds, fourths, halves, and one whole.

MAE 4.2.3.b—Solve addition real-world problems with halves and fourths.

MAE 4.1.2.f—Add and subtract halves to halves, thirds to thirds, fourths to fourths, and fifths to fifths . . . to a whole.

MAE 3.1.1.i—Use a model to compare unit fractions one-half, one-third, and one-fourth.

Key Terms

circle graph, fourths, fraction, thirds

Additional Resources or Links

https://www.engageny.org/resource/grade-2-mathematics-module-8/file/15916

MA 7.4.3 Probability

MA 7.4.3.c

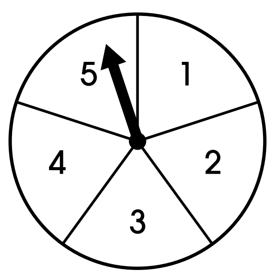
Find theoretical probabilities for independent events.

Extended: Identify the probability of an event as always, sometimes, or never.

Scaffolding Activities for the Extended Indicator

❑ **Determine that an event can have different outcomes.**

- Demonstrate scenarios with manipulatives and drawings to identify the basic probability of outcomes. Use red and black tokens to define and demonstrate possible outcomes. For example, place one black token and one red token on a table. Pick up one of the tokens. Explain that picking up one token is an event and that the color of that token is an outcome of the event. Repeat with the other color token. Emphasize that there are two possible outcomes for this event because there are two different color tokens.
- Continue to demonstrate determining the possible outcomes for an event by presenting a collection of manipulatives of three different colors or three different shapes. Explain that in this scenario there are three possible outcomes determined by the three different colors or shapes. Indicate each of the three possible outcomes if one manipulative is chosen at a time.
- Demonstrate determining the number of possible outcomes using a spinner. For example, present a spinner or a drawing of a spinner and indicate the number of possible outcomes. In this example, there are five possible outcomes.



- Continue to demonstrate determining the possible outcomes and the number of possible outcomes using real-life scenarios (e.g., choice of different color shirts or shoes) and other manipulatives.
- Ask students to determine the possible outcomes for an event (e.g., drawing objects from a bag, spinning a spinner, rolling a numbered cube).
- Ask students to determine the number of possible outcomes for an event (e.g., drawing objects from a bag, spinning a spinner, rolling a numbered cube).

- **Identify the probability of an event as always, sometimes, or never.**

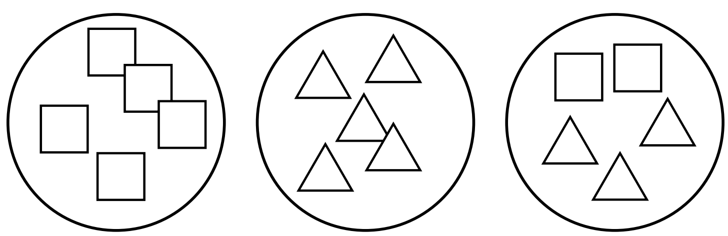
  - Use manipulatives to demonstrate event probability. For example, use a chart, an opaque bag, and five each of yellow, blue, and green marbles to create scenarios to demonstrate the probability of always, sometimes, and never. Record the results in a table as shown for the following scenarios.

Turn	Yellow	Blue	Green
1			
2			
3			
4			
5			

To demonstrate the probability of always and never, put only yellow marbles in the bag. Pick one marble at a time from the bag and record the results in the table. Return the marble to the bag and repeat at least three more times. Conclude that if the marbles are all yellow, the results will always be yellow. Extend the thinking to include that if the marbles are all yellow, the result will never be blue. The result will also never be green. If needed, repeat the entire demonstration using the blue marbles.

To demonstrate the probability of sometimes, put the same amounts of blue, yellow, and green marbles in the bag. Pick one marble from the bag and record the result in the table. Return the marble to the bag and repeat until all the colors have been drawn. Conclude that if there are three colors of marbles in the bag, sometimes the result of the draw will be blue, sometimes it will be yellow, and sometimes it will be green.

  - Demonstrate determining the probability of an event as always, sometimes, or never using drawings that represent three different scenarios. For example, present the groups of shapes shown and discuss the probability of drawing a square from each group. Explain that the probability of drawing a square is “always” if the group only includes squares. The probability is “never” if the group does not have squares. The probability is “sometimes” if the group includes squares and triangles.



  - Discuss real-life situations that occur always, sometimes, or never. For example, Avery rides his bike to school one day a week. The name of the day he rides always ends in the letter *y*, sometimes begins with the letter *T*, and never begins with the letter *B*.

  - Ask students to identify the probability of an event as always, sometimes, or never when shown a collection of colored manipulatives in a bag. For example, place all blue marbles in the bag and ask students to determine whether the marble selected will always, sometimes, or never be blue.

- Ask students to select a scenario that represents always, sometimes, or never when given drawings of three different scenarios. For example, present three drawings, with the first drawing showing a group of circles, the second showing a group of rectangles, and the third showing a group of circles and rectangles. Ask students to identify which drawing represents the probability of sometimes selecting a circle.

Prerequisite Skill

Identify objects as same or different.

Key Terms

always, event, never, outcome, probability, sometimes

Additional Resources or Links

https://www.engageny.org/resource/grade-7-mathematics-module-5-topic-lesson-1/file/61366

https://www.engageny.org/resource/grade-7-mathematics-module-5-topic-lesson-3/file/61411

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Alternate Mathematics
Instructional Supports
for
NSCAS Mathematics Extended Indicators
Grade 7

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