Prelude

Welcome to *Inspiring Connections Course 1*!

The Prelude will get you ready to learn mathematics this year. Throughout this course, you will work in teams to understand and solve challenging problems in a variety of contexts. The Prelude gives you an opportunity to start thinking about what it means to be a productive team member. Expect to spend time developing an academic mindset through journaling and goal-setting, while building relationships with your teacher and classmates.

In this class, you will work on tables, vertical non-permanent surfaces (VNPSs), and devices. Each day, you will need your Mathematician's Notebook and your device. Your Mathematician's Notebook is where you will write down ideas, draw pictures, create graphs, work through problems, document solutions, and take notes that you can look back on later. The Mathematician's Notebook also includes some images, tables, and texts to help you work. To see an entire lesson, refer to the text on your device. There, you will be able to see entire lessons, images, eTools, links to further resources, and more!

Did you know that math is a social activity? But how can you understand what others are thinking? How can you make sure they understand your thinking? Get ready to explore these questions as you get to know your classmates and teacher in this Prelude!

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0.1.6 How can the team build this together?
0.1.7 What do we need to work together?

Learning Targets

A learning target is a statement describing what you will learn in the lesson, and it is written in the form "I can…." You will see a list of learning targets at the beginning of each chapter. These learning targets also appear in the Reflection & Practice when they are introduced. The first time you see a new topic, you might reflect on your work and decide you have not reached that learning target yet. But after you have spent some time working with your teammates, asking questions, and practicing with the topic, you might realize that you can do it!

Revisit the list of learning targets throughout the chapter and year. Make notes to yourself when you notice improvement or when you struggle with a particular problem. Write down relevant problem numbers and what steps you might take to reach the learning target. An example is shown for the learning target in Lesson 0.1.5.

Lesson	Learning Target	N—Not yet, W—Working on it, Y—Yes, I can! Include comments or a plan for improvement.
0.1.5	I can multiply using the area model.	W: Problem 0-39: Ask my teacher about this one. Problem 0-46: I think I got it! Check with my teammate to see if they got the same solution.

Each chapter after the Prelude concludes with a section called Chapter Closure. Several of the learning targets appear again in a Chapter Closure section. You will see a learning target in a Chapter Closure after you have had a number of opportunities to engage with the topic. The learning targets may be in the chapter where you first see them or they may be from a previous chapter. At this point, reflect on your understanding again. You should feel more confident in this topic. If you need more support, a table in the Chapter Closure lists where to get the information and practice necessary to become confident with the topic.

Prelude Learning Targets

Lesson	Learning Target	N—Not yet, W—Working on it, Y—Yes, I can! Include comments or a plan for improvement.
0.1.1	I can identify the responsibilities of each team role. I can read and create a bar graph.	
0.1.2	I can communicate effectively with my teammates. I can identify and extend patterns.	
0.1.3	I can ask mathematical questions. I can use examples and pictures to write a convincing argument.	
0.1.4	I can explain the difference between a growth mindset and a fixed mindset. I can order fractions.	
0.1.5	I can explain my class's definition of respect. I can multiply using an area model.	
0.1.6	I can work with my teammates to solve challenging problems.	
0.1.7	I can explain my class's agreed-upon expectations for behavior when working in teams.	

Visualizing Information

0.1.1 Who are my classmates?

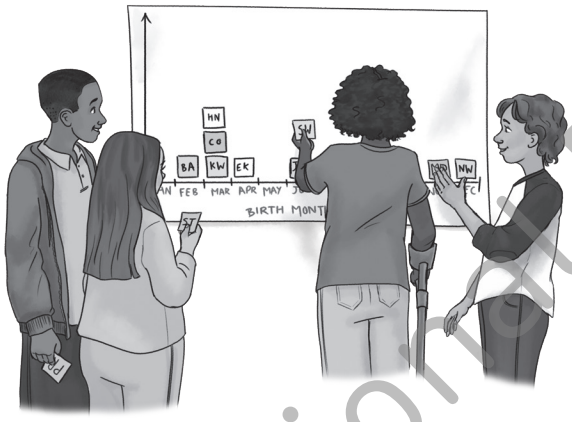
Launch

Obtain a sticky note from your teacher. On the front of your sticky note, write your initials. On the back, write your answer to the following question.

Do you think someone in your class has the same birthday as you?

Explore

0-1.



0-3.

Representative

- Reports the team's thinking to the class
- Answers questions asked of the team

Investigator

- Asks teacher questions
- Makes sure team justifies their work

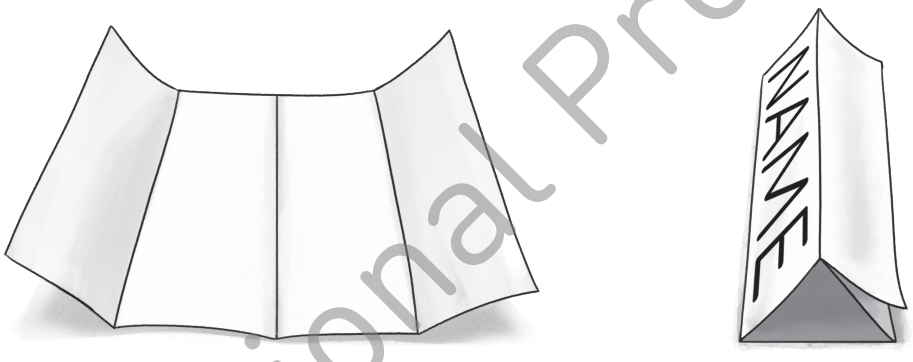
Coordinator

- Tracks tasks and time
- Helps team agree on a method or solution

Organizer

- Collects and returns materials
- Makes sure all team members record their work

First Name of Team Member (alphabetical)	Team Role
	Representative
	Investigator
	Coordinator
	Organizer



Closure

Teams function well when everyone fulfills their team role. The Organizer played an important role in today's lesson. What duties did the Organizer have that helped the team complete the lesson?

In what ways did your team function well today? What behaviors did you notice that contributed to your team's success? Think about these questions as a team and be prepared to discuss them with the class.

Reflection & Practice

At the end of each lesson, you will see a section labeled "Reflection & Practice." This section contains problems for you to practice your skills with and questions for you to reflect on your learning with.

There are four types of problems in the Reflection & Practice:

- brief problems that will help you think about how numbers work through visualization and problem-solving;
- problems related to what you learned in that day's lesson;
- problems reviewing content from previous lessons; and
- reflection questions to check-in with yourself and your learning.

Each of these will support your mathematical learning. There will not be many problems, so attempt all of them and do your best.

0-4.

Complete parts (a) through (c) in your head, and write your answer for part (d).

a. 12×1

b. 6×2

c. 3×4

d. What do you notice? How would you explain the results?

0-5.

I can identify the responsibilities of each team role.

Four students worked together as a team to solve a complex problem. Each student made a statement during class. Match each statement to a team role. Refer to the list of team roles in Lesson 0.1.1.

a. *"I will call the teacher over to ask our question."*

b. *"If we all agree on this method, we can begin to solve the problem."*

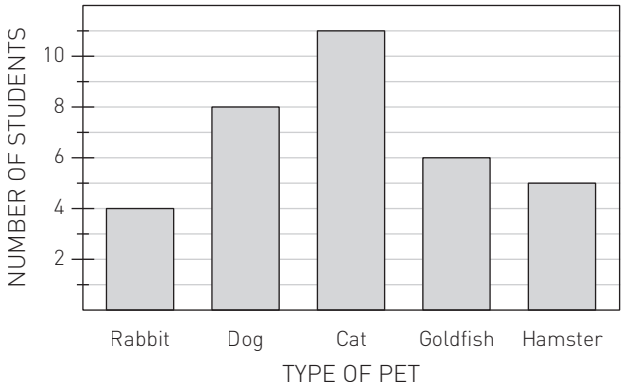
c. *"Since I will be reporting our solution to the rest of the class, let me make sure I completely understand what you are saying."*

d. *"We all need to write down our work for this problem."*

0-6.

I can read and create a bar graph.

In today's lesson, you made a birthday bar graph. Last year, students asked everyone, *"What type of pets do you own?"* They made a bar graph of the answers.



a. What was the most common response? Explain.

b. Which types of pets were less popular than goldfish?

c. How many people had rabbits?

0-7.

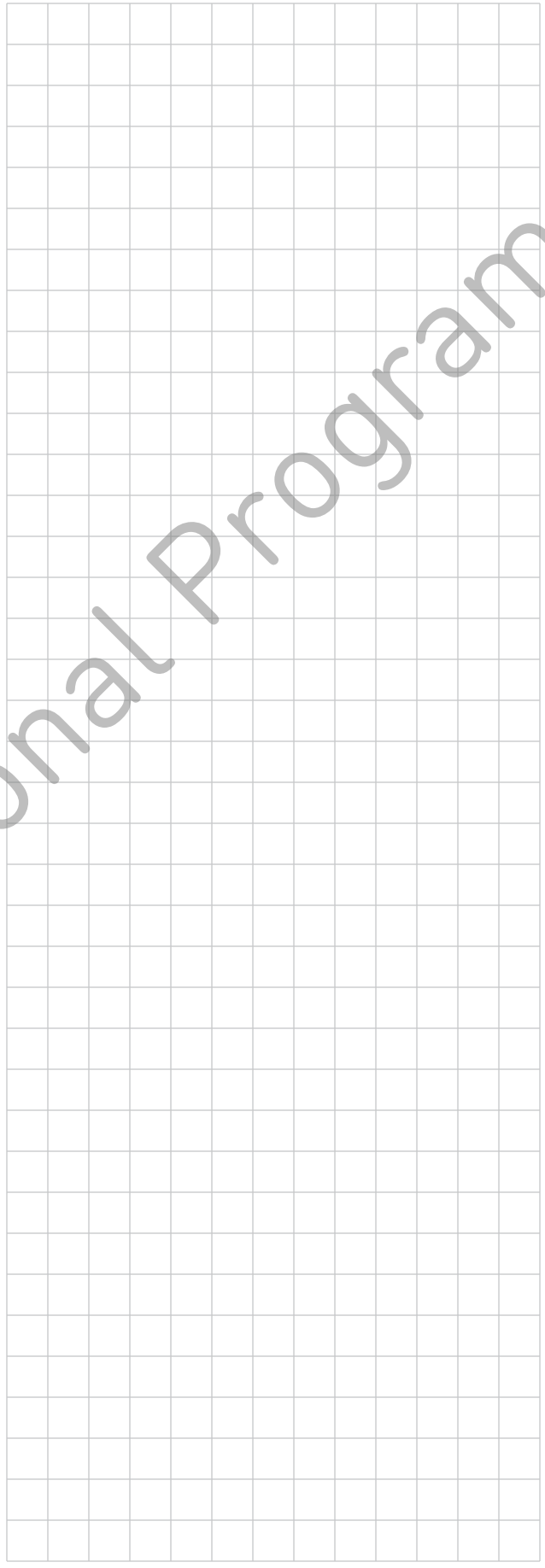
Deshawn asked each student in the class, "*Which juice do you like most: orange, apple, or grape?*" 5 chose orange juice, 10 chose apple juice, and 7 chose grape juice. Create a bar graph to display this data.

Reflection & Practice continues on page 8.

0-8.

A mathography is a lot like a biography. While a biography describes your entire life history, a mathography focuses on the mathematics in your life. Use the following prompts to help you begin your mathography:

- What is a math topic you enjoy?
- Write about a time when you struggled in math but eventually overcame it and understood something new.
- Describe yourself to your teacher. What do you want them to know about you? You may wish to include things like how many siblings you have, who you live with, your favorite subjects in school, and your hobbies.



0.1.2 Describing and Extending Patterns
How do I work collaboratively?

Launch

Every lesson in this course has a Launch activity, many of which are Math Chats. Math Chats provide an organized way for every student to have a chance to think and share. Today, you will participate in a *Dot Talk* with your class. Be prepared to follow your teacher's instructions on how to participate in this Math Chat.

Explore

0-10.

FIGURE 1

FIGURE 2

FIGURE 3

Figure 10 has _____ dots. Figure 10 looks like _____.

Representative:

Investigator:

Coordinator:

Organizer:

Closure

Your team will participate in an Exhibit Visit and examine other teams' vertical non-permanent surfaces (VNPSs). As your team is reviewing each VNPS, answer the following questions.

a. How is this team's work similar to your team's work?

b. How is this team's work different from your team's work?

c. What do you wish this team had done differently?

d. What did this team do that you wish you had done?

Reflection & Practice

0-13.

Patterns can be seen in shapes and diagrams as well as with numbers. Consider this as you complete the following parts.

a. Perform these calculations in your head.

45 – 20

44 – 19

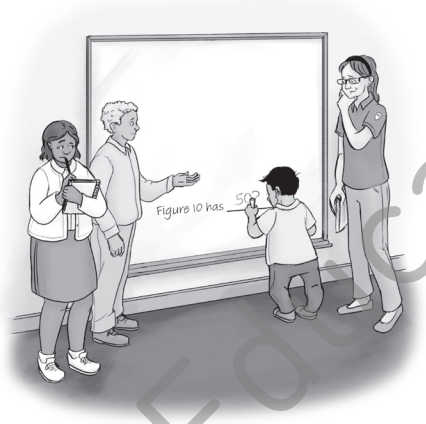
54 – 29

b. What do you notice about the mental arithmetic you just did?

0-14.

I can communicate effectively with my teammates.

Aliyah's team is working to discover the number of dots in Figure 10 of a dot arrangement. Her teammate has written "50?" on the team's vertical non-permanent surface. What could Aliyah say or do to help her team move forward?



0-15.

I can identify and extend patterns.

Four students on a team wondered about the figures shown. Respond to each student in any order.

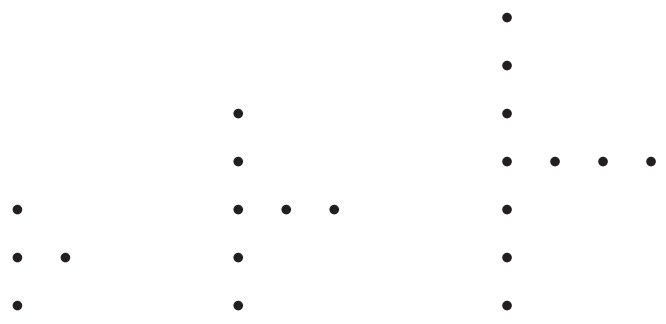


FIGURE 1 FIGURE 2 FIGURE 3

R: Describe the arrangement of dots in each figure.

I: How many dots are in Figure 30?

C: Sketch Figure 4 and Figure 5.

O: Which figure will have 301 dots?

0-16.

Problem 0-15 is an example of a type of problem that you will see throughout this course. In these types of problems, four students wonder about a single context. They each create a question or problem based on this context. You can respond to the four parts in any order.

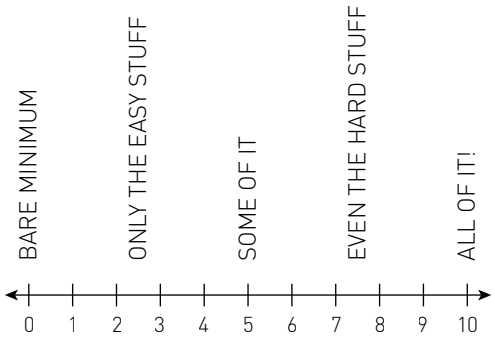
In problem 0-15, four students wondered about a sequence of figures. Mathematical wonder is an important part of the learning process. Refer again to the figures in problem 0-15. What do you wonder about these figures? Write at least one mathematical question.

Reflection & Practice continues on page 14.

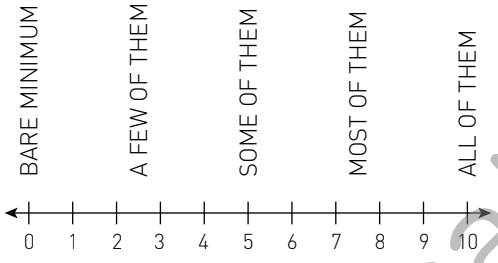
0-17.

Think about your academic goals as you complete the following tasks. For parts (a) and (b), place an X on the number line to show your answer to each question. Then complete part (c).

a. How much of the math in this course do you hope to learn this year?



b. How many Reflection & Practice assignments do you hope to complete this year?



c. What will you do to meet your learning goals this year? Answer by completing as many of the following sentence frames as possible. Each of your responses should be different.

In class, I will _____ .

In class, I will _____ .

In class, I will _____ .

At school, I will _____ .

At school, I will _____ .

At school, I will _____ .

At home, I will _____ .

At home, I will _____ .

At home, I will _____ .

Mathematical Communication

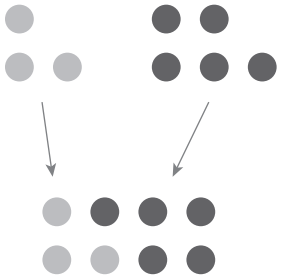
0.1.3 What questions can I ask?

Launch

Today, your teacher has a *Which One Is Unique?* activity planned. Be prepared to follow your teacher's instructions on participating in this Math Chat.

Explore

0-18.

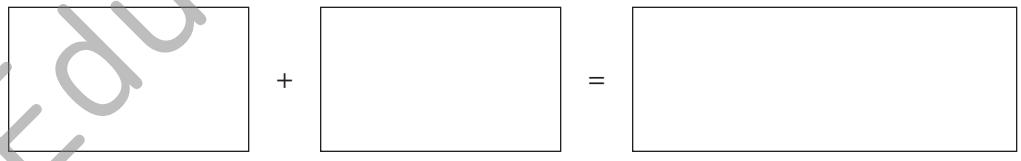


0-19.

Sum:

□ + □ = □

Dot arrangements:



Representative:

Investigator:

Coordinator:

Organizer:

Closure

Reflect on what you heard, saw, and learned during class today. Use the following prompts to help organize your thoughts, and then write your reflection in the blank or grid space of your Mathematician's Notebook.

- What were some examples of effective communication you heard or saw?
- Write at least one thing you learned from another team.
- Did your team make any mathematical conclusions? If so, what were they? If not, what steps will you take to continue your investigation?
- Write other notes to your future self so that you remember what you learned today.

Reflection & Practice

0-23.

Without counting the dots, decide which of the following arrangements shows an even number of dots.

A. 

B. 

C. 

D. 

0-24.

I can ask mathematical questions.

Consider the image shown.

a. What questions come to your mind when you look at this picture?

b. Without looking anything up, guess or make approximations to answer your questions.

0-25.

I can use examples and pictures to write a convincing argument.

In today's lesson, you and your classmates investigated whether the sum of two numbers will be even or odd.

a. Last year, a team wrote the following three statements about sums on their vertical non-permanent surface. Two are true, and one is false. Which statement is false?

> Statement 1: The sum of an even number and an odd number is even.
>
> Statement 2: The sum of two even numbers is even.
>
> Statement 3: The sum of two odd numbers is even.

b. What might you say to convince this team that the sum of two numbers is not always even? Include examples and pictures.

0-26. (from a previous course)

Evaluate each of the following without using a calculator. Then use a calculator to check your answers. **For additional support, refer to the Methods & Meanings box "Operations With Decimal Numbers" on page 300.**

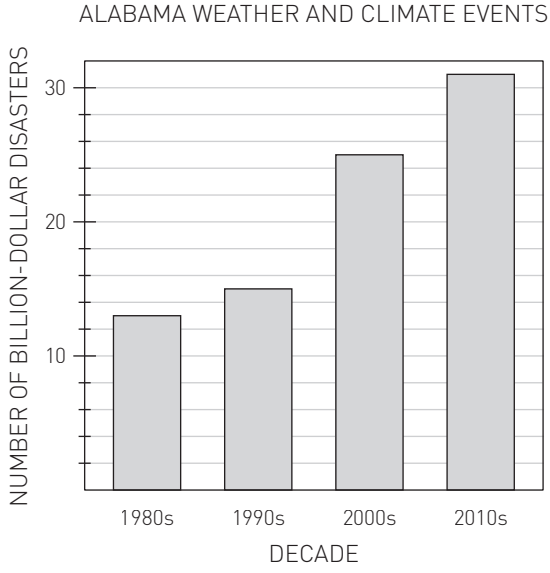
a. $1.3 + 9.5$

b. $5.2 - 4.1$

c. 1.1×2.3

Reflection & Practice continues on page 20.

0-27. (from Lesson 0.1.1)
Four students on a team were wondering about the following bar graph and each asked a different question. Answer their questions in any order.



source: ncei.noaa.gov

R: What is this bar graph about?

I: When were there the most billion-dollar weather and climate events in Alabama? How do you know?

C: Which decade had 25 billion-dollar weather and climate disasters?

O: How many billion-dollar weather and climate disasters did Alabama have in total between 1980 and 2019?

Fraction Sort

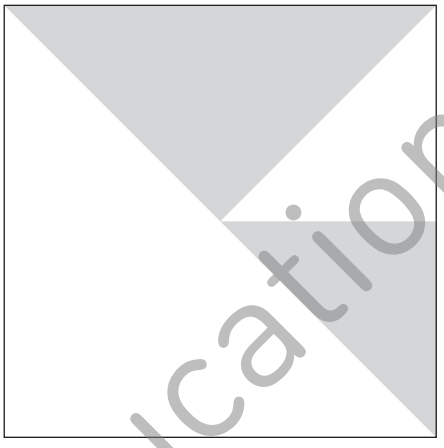
0.1.4 How can I categorize my words?

Launch

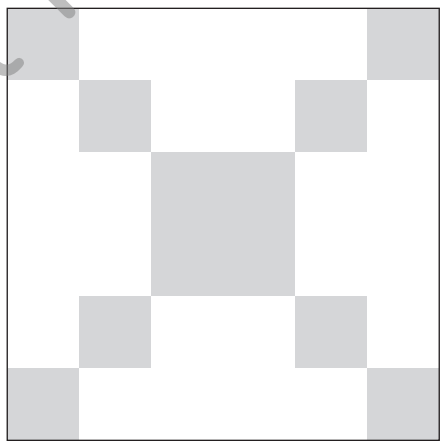
Examine the following shape. What do you notice? What do you wonder?

Explore

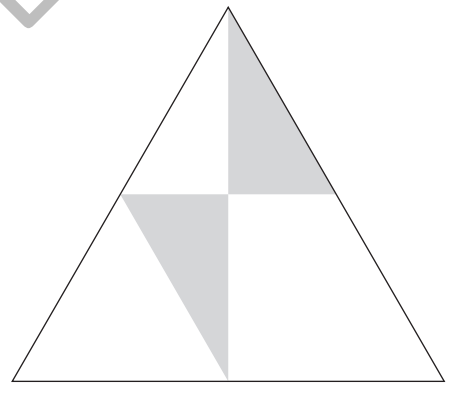
0-28.



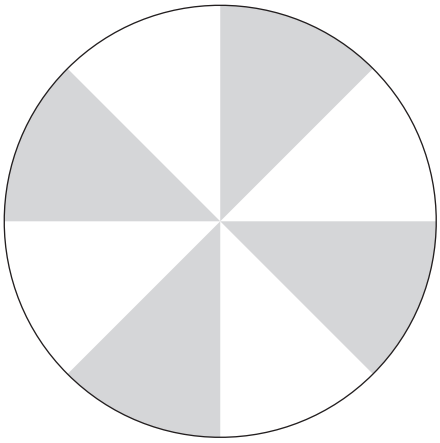
A



B



C



D

Representative:

Investigator:

Coordinator:

Organizer:

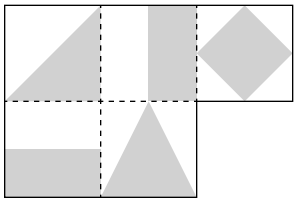
Closure

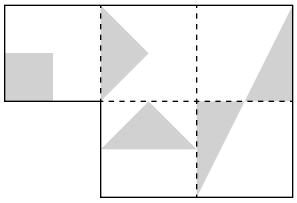
Write three ideas for how you will demonstrate a growth mindset in this class. Prepare to share these ideas with your classmates.

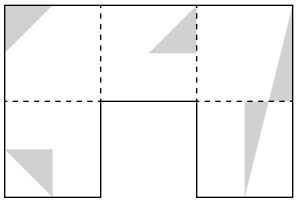
Reflection & Practice

0-29.

Which of the following represents $\frac{1}{4}$?

A. 

B. 

C. 

0-30.

I can explain the difference between a growth mindset and a fixed mindset.

Blossom says, "*I am naturally good at math.*"

Kerry responds, "*That statement represents a growth mindset because it is positive.*"

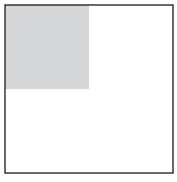
Do you agree or disagree with Kerry? Explain.

0-31.

I can order fractions.

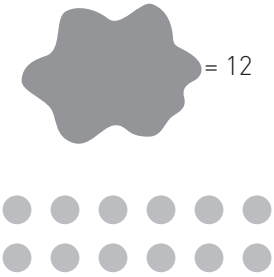
Study the following shapes. What fractions do you see represented? Order the fractions from least to greatest.





0-32. (from Lesson 0.1.3)

Marvin and Gaye added two numbers together and represented the sum with a dot arrangement. Unfortunately, Marvin spilled juice on their work! Use the following image to complete parts (a) through (c). **For additional support, refer to the Methods & Meanings box "Even and Odd Numbers" on page 301.**



a. If they were adding two even numbers, what might the numbers have been? How do you know?

b. If they were adding two odd numbers, what might the numbers have been? How do you know?

c. Could Marvin and Gaye have been adding an even number and an odd number? Why or why not?

0-33.

Think about what you have learned today regarding growth and fixed mindsets.

a. What is one thing you have learned about mindsets?

b. How will you work on having a growth mindset this year?

0.1.5 Respectful Communicating
How can I communicate my ideas?

Launch

Think about your experiences working in a team, both this year and in previous years. Recall the feedback you gave your teammates and the feedback you received. Go Chat with a partner and discuss some of the helpful and unhelpful feedback you remember receiving.

Explore

0-34.

Representative:

Investigator:

Coordinator:

Organizer:

Closure

During the Launch, you thought about different ways to provide feedback. Throughout this course, you will be giving feedback in a variety of contexts, such as within your team and during class discussions. You may also encounter situations in which you and another classmate have different points of view. In all of these cases, it is important that everyone remains respectful. To prepare for these discussions, your teacher will guide the class in creating a list of what respect looks like.

Reflection & Practice

0-37.

Katlyn says that 51 – 21 is the same as 50 – 20. Why is she correct?

0-38.

I can explain my class's definition of respect.

Think about your discussions about feedback and respect during today's class.

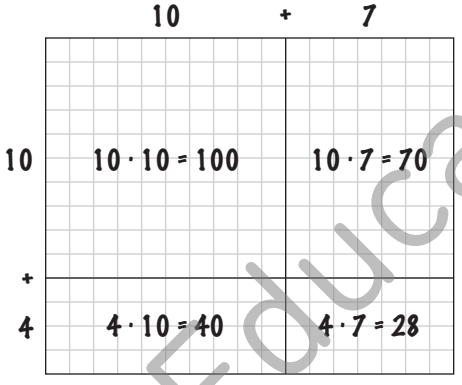
a. Give an example of helpful feedback you heard. What made it helpful?

b. Think back to the list of respectful behaviors generated by your class. Pick some items from that list that also represent your family's definition of respect.

0-39.

I can multiply using an area model.

Yasmin is using the area model shown to solve a problem.



a. What problem is she trying to solve?

b. What is her next step?

0-40. (from a previous course)

Complete parts (a) through (c). **For additional support, refer to the Methods & Meanings box "Fractions" on page 302.**

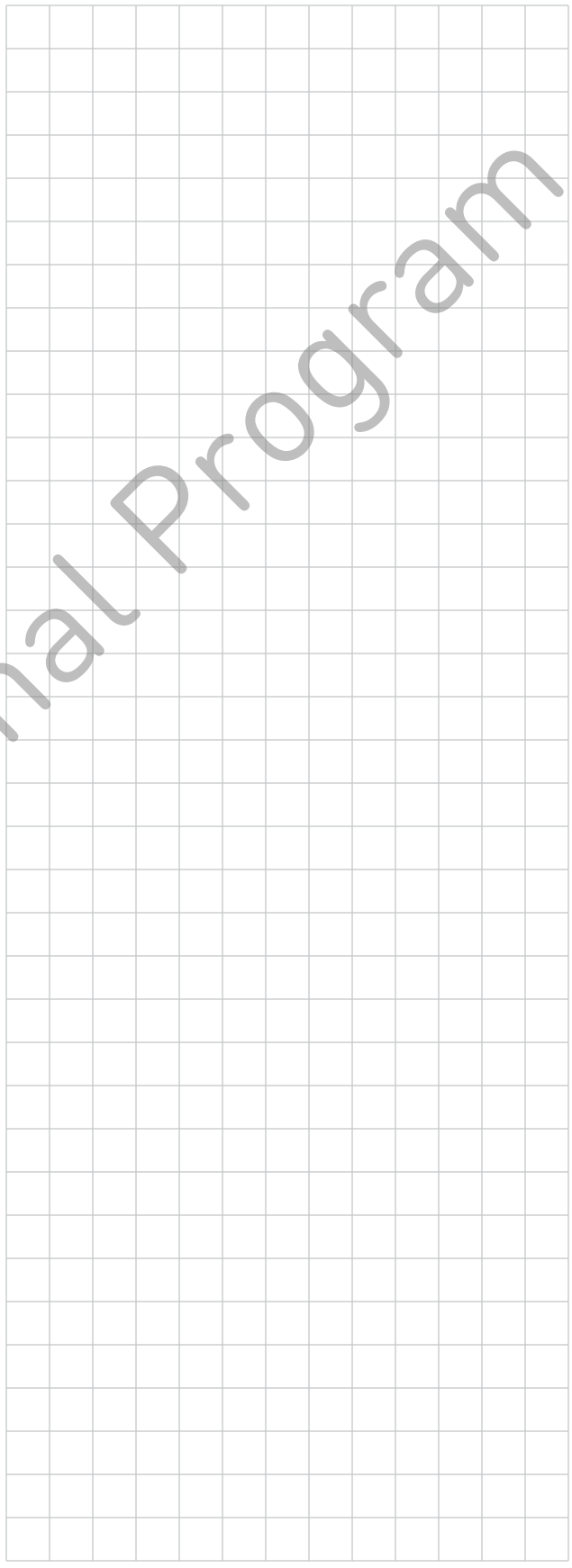
a. Draw a representation of $\frac{5}{8}$.

b. Draw a representation of $\frac{7}{16}$.

c. Draw a representation of $\frac{5}{8} + \frac{7}{16}$.

0-41.

Give an example of a time you did not give up when you were challenged by learning something new.



Build the Shape, Part 1

0.1.6 How can the team build this together?

Launch

Complete the following sentence frames. In the first sentence, state something you are good at. For example, you could write, "I am good at eating hot chili peppers." In the second sentence, state something that you are not good at. For example, you could write, "I am not good at running a mile without stopping." Use the following to structure your sentences.

I am good at _____ .

I am not good at _____ .

Explore

0-42.

Representative:
Investigator:
Coordinator:
Organizer:

Closure

The Goal Journal titled "Lesson 0.1.6: Taking Risks" is located on the following page. Read the prompt and write a response.

Goal Journal

Lesson 0.1.6: Taking Risks

In this first Goal Journal, you will set a goal relating to taking risks. Taking risks and making mistakes are part of the learning process.

Write a specific goal to reach by the end of Chapter 1 that focuses on risk-taking in math class. Use the following questions to help set your goal.

- What could you do in math class that might feel risky or outside of your comfort zone?
- How can making mistakes help you learn?

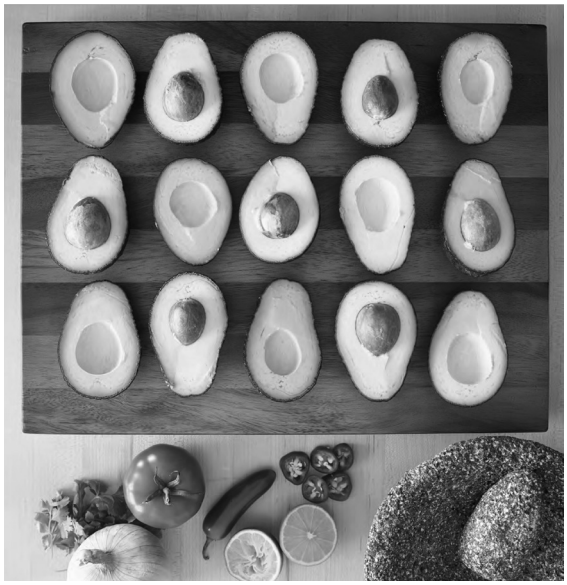
Write your goal using the following sentence frame.

By the end of Chapter 1, I will _____ by _____.

Reflection & Practice

0-43.

Study the picture. Then ask yourself, *"How many?"* Give at least three different true answers, indicating what you are counting and how many you see.



source: *How Many: A Counting Book* by Christopher Danielson

0-44.

I can work with my teammates to solve challenging problems.

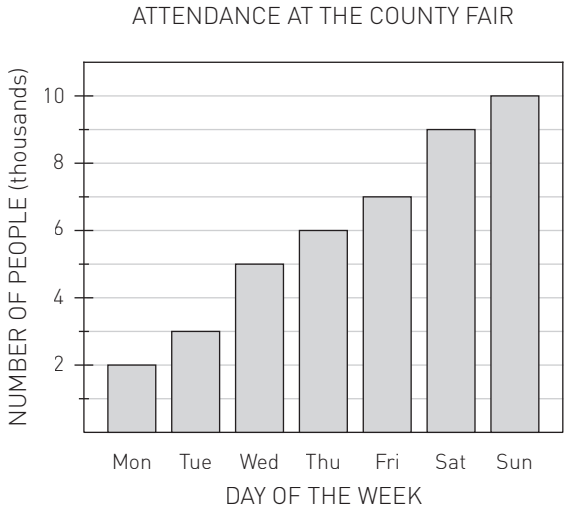
You will work in teams during each lesson of this course.

a. Think about your work with your team so far in this class. In what ways have you been a supportive team member? Explain your answer.

b. What will you do to make sure you support your teammates in the upcoming lessons? Explain.

Reflection & Practice continues on page 34.

0-45. (from Lesson 0.1.1)
Four students on a team were wondering about the following bar graph and each asked a different question. Answer their questions in any order.



R: How many people attended the fair on Tuesday?

I: Which day had the greatest attendance?

C: What was the total attendance for the week?

O: On what day did 7,000 people attend the county fair?

0-46. (from Lesson 0.1.5)
Darneisha sent her multiplication work to her teammate but did not include all the information.

40	12,000	2,000	240
+			
8	2,400	400	48

a. What problem was Darneisha solving? In other words, what two numbers was she trying to multiply together? **For additional support, refer to the Methods & Meanings box "Multiplication Using Area Models" on page 303.**

b. What is the answer to this problem?

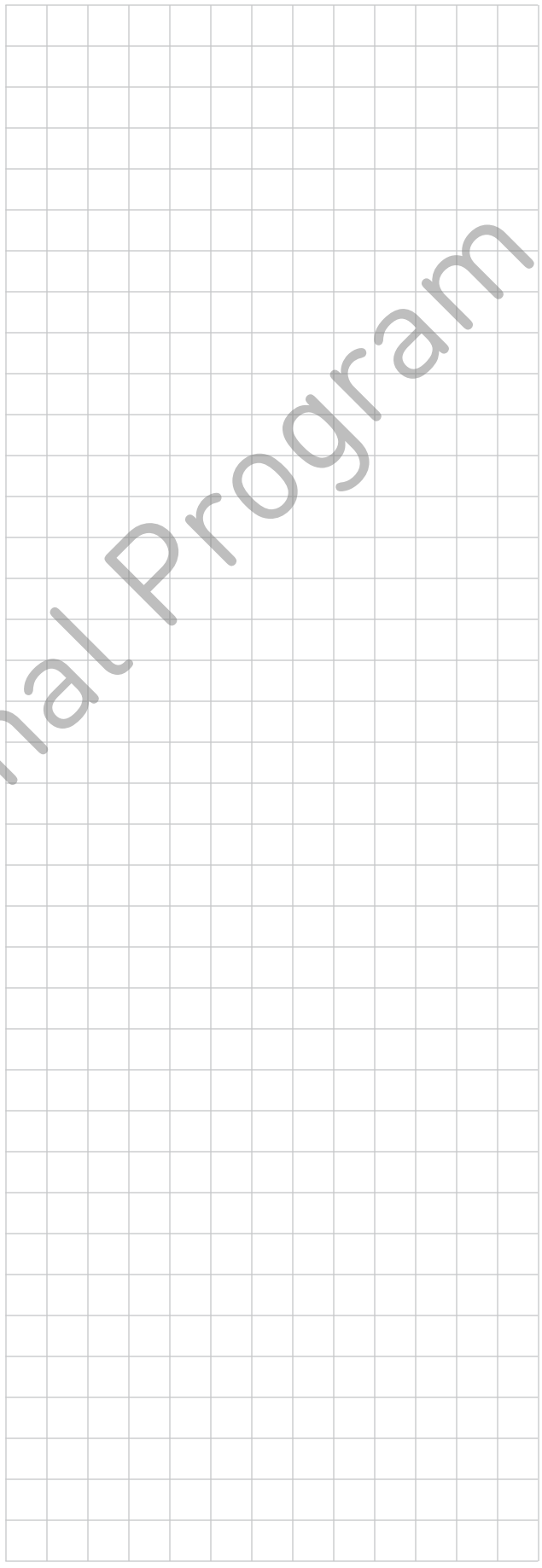
c. What numbers in the diagram would change if Darneisha was multiplying by 38 instead of 48? You do not need to calculate the new values.

0-47. (from a previous course)
Choose one of the numbers in each set. Write the number in the blank space, then perform the operation.

a. _____ [4.5, 5.2, 6.1] + _____ [1.9, 2.8, 3.3]

b. _____ [4.5, 5.2, 6.1] – _____ [1.9, 2.8, 3.3]

c. _____ [4.5, 5.2, 6.1] × _____ [1.9, 2.8, 3.3]



0.1.7 Collaborative Learning Agreements
What do we need to work together?

Launch

When you work with others, what do you need?

a. Use the following sentence frames to organize your thoughts about teamwork.

When my team is not working well together, I need _____.

When working on a team, I would appreciate _____.

When working on a team, I would like to be able to _____.

I wish my teammates would _____.

I would like my teammates to show they are listening to me by _____.

b. Work with your team to categorize your needs.

Explore

Representative:

Investigator:

Coordinator:

Organizer:

Closure

Throughout this course, you will be asked to reflect on what and how you learn. The Reflection Journal titled "Lesson 0.1.7: Attitudes about Math" is located on the following page. Read the prompt and write a response.

Reflection Journal

Lesson 0.1.7: Attitudes about Math

As you embark on a year of amazing mathematics, take time to do a self-assessment and reflect on your attitudes about math. As you progress through the course, you can refer back to this and see how you have changed.

Use the following sentence frames to reflect on your attitudes about mathematics.

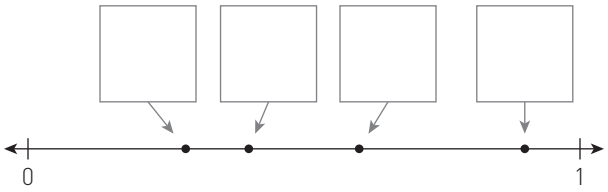
- When I think of math, I think about _____.
- When I walk into math class each day, I feel _____.
- I do not feel confident with the following math topics: _____.
- I feel confident with the following math topics: _____.

Reflection & Practice

0-50.

Place each of the following numbers in the correct location on the number line.

$0.4, 0.9, \frac{3}{5}, \frac{2}{7}$



0-51.

I can explain my class's agreed-upon expectations for behavior when working in teams.

Think about the collaborative learning agreements created by your class during today's lesson.

a. Which items from the list will help meet your personal needs?

b. When you notice that someone is not behaving in accordance with these agreements, what might you say?

Reflection & Practice continues on page 40.

0-52. (from Lesson 0.1.2)
Maddy, Jessica, and Carla are discussing the figures shown.

FIGURE 1 FIGURE 2 FIGURE 3

Maddy says, *"I see a pile of two dots being added on the right side of the previous figure each time."*

Jessica says, *"I see two rows, each growing by one dot with each new figure."*

Carla says, *"I see two rows, each with a number of dots equal to the figure number."*

a. Maddy, Jessica, and Carla have all given valid descriptions of how the pattern grows. How is it possible that they have described the same pattern so differently?

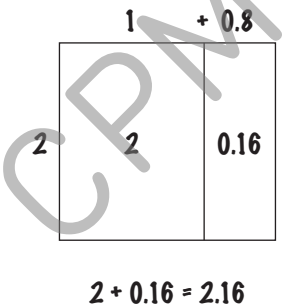
b. How many dots will be in Figure 25?

c. Will a figure in this pattern ever have an odd number of dots? Why or why not?

0-53. (from a previous course)
Lynn has ⅓ of a cup of flour, but she needs ¾ of a cup of flour for a recipe. How much more flour does she need?

0-54. (from a previous course)
Sven and Mirabel are trying to calculate 2 · 1.8. While Sven used an area model and Mirabel used the standard algorithm, they both got the same answer, 2.16. But when they checked their answer using a calculator, they saw that the answer was supposed to be 3.6! Analyze their work. What did they do wrong?

SVEN



$2 + 0.16 = 2.16$

MIRABEL

$$\begin{array}{r} 1.8 \\ \times\ \ 2 \\ \hline 0.16 \\ +\ 2.00 \\ \hline 2.16 \end{array}$$

Chapter 1

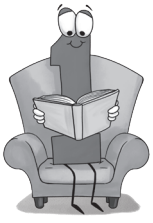
Welcome to an exciting journey into the world of mathematics! You have already learned a lot about numbers in your life. You are familiar with the number 0 and fractions — did you know it took thousands of years for these ideas to be developed? Look how far you have come in a much shorter time!

You will not be traveling alone. In this course, you will collaborate with your teammates, have discussions as a class, and receive guidance from your teacher. Before you start your journey, read through the following information to prepare for your travels.

Chapter 1 Table of Contents

1.1 Numbers and Data
1.1.1 How should data be placed on this line?
1.1.2 Where do these numbers belong on this line?
1.1.3 How can I use two lines to solve problems?
1.1.4 How can data be used to answer a question?
1.1.5 How are histograms helpful?
1.1.6 How else can data be displayed?

1.2 Shapes and Area
1.2.1 How can I write equivalent expressions in area and perimeter?
1.2.2 What shapes make up the polygon?
1.2.3 How can I make it a rectangle?



1.3 Expressions
1.3.1 How can I describe it using symbols?
1.3.2 What are the parts of an expression?
1.3.3 How do I work with decimals?
1.3.4 How do I multiply multi-digit decimals?
1.3.5 How can I represent the arrangement?

Chapter 1 Learning Targets

The following clusters will be highlighted in this chapter.

RP.A Understand ratio concepts and use ratio reasoning to solve problems.

EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.

NS.B Compute fluently with multi-digit numbers and find common factors and multiples.

NS.C Apply and extend previous understandings of numbers to the system of rational numbers.

SP.A Develop understanding of statistical variability.

SP.B Summarize and describe distributions.

G.A Solve real-world and mathematical problems involving area, surface area, and volume.

Lesson	Learning Target	N—Not yet, W—Working on it, Y—Yes, I can! Include comments or a plan for improvement.
1.1.1	I can position whole numbers and decimal numbers on a horizontal number line. (NS.C)	
1.1.2	I can position whole numbers, mixed numbers, fractions greater than one, and decimal numbers on a horizontal number line. (NS.C) I can compare whole numbers, mixed numbers, fractions greater than one, and decimals. (NS.C)	
1.1.3	I can position decimals on a double number line. (NS.C) I can use a double number line to solve problems. (RP.A)	
1.1.4	I can determine if a question has multiple answers or a single answer. (SP.A) I can interpret and analyze a histogram. (SP.B)	
1.1.5	I can use a histogram to display frequency. (SP.B)	
1.1.6	I can create a dot plot. (SP.B) I can report the number of observations in a data set. (SP.B)	
1.2.1	I can calculate the area of a figure made of square units. (G.A) I can calculate the perimeter of a figure. (G.A) I can write equivalent expressions. (EE.A)	
1.2.2	I can calculate the area of a polygon by summing the areas of its parts. (G.A)	
1.2.3	I can calculate the area of polygons by rearranging them into rectangles. (G.A)	
1.3.1	I can write a numerical expression. (EE.A) I can write an expression with letters that stand for numbers. (EE.A)	
1.3.2	I can identify parts of an expression. (EE.A)	

Chapter 1 Learning Targets continue on page 46.

Lesson	Learning Target	N—Not yet, W—Working on it, Y—Yes, I can! Include comments or a plan for improvement.
1.3.3	I can add multi-digit decimals using the standard algorithm. (NS.B) I can subtract multi-digit decimals using the standard algorithm. (NS.B)	
1.3.4	I can multiply multi-digit decimals using the standard algorithm. (NS.B)	
1.3.5	I can write an expression to represent an arrangement of objects. (EE.A)	

Learning with Clotheslines

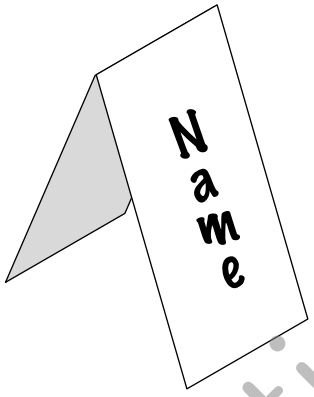
1.1.1 How should data be placed on this line?

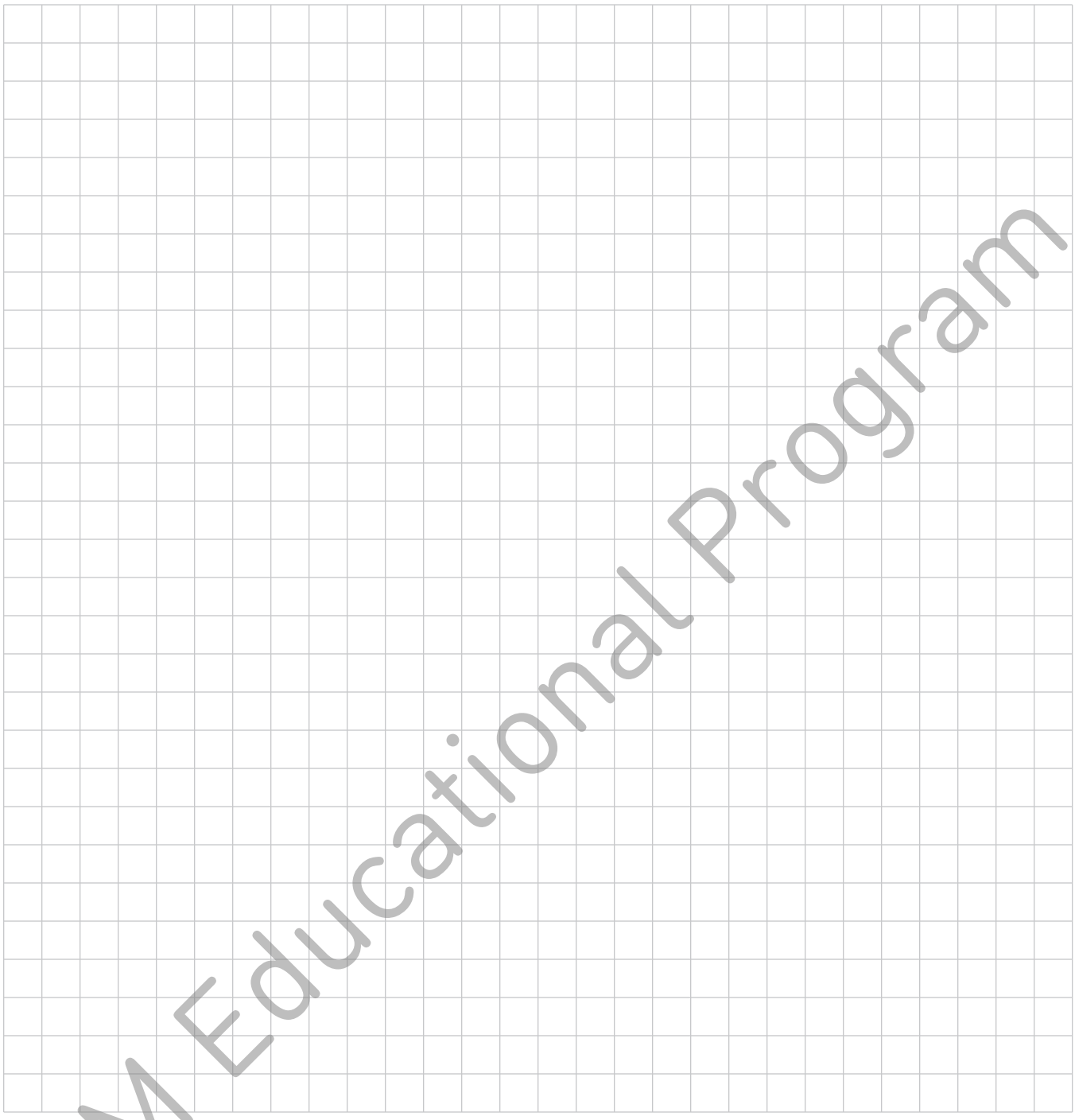
Launch

Mathematicians construct viable arguments and critique the reasoning of others. Be ready to construct an argument during a *Which One Is Unique*? activity. As with any Math Chat, think silently and extend one finger close to your chest when you have a response and justification.

Explore

1-1.





Closure

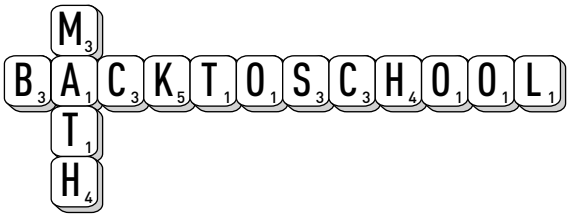
Today, you used clotheslines to represent data about your class. How can you represent the clothesline and data from problem 1-3 on paper? Sketch a representation in your Mathematician's Notebook, then annotate it by circling, drawing arrows, and writing notes to yourself. Use the following sentence frames to help you think about what you want to remember.

- When constructing this representation, it is important to pay attention to _____ because _____.
- In this representation, you can see _____ by paying attention to _____.

Reflection & Practice

1-5.

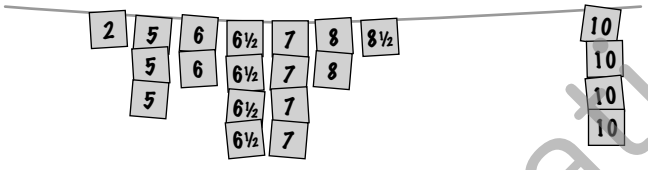
Kylo and Ren are playing a word game. After Ren placed the word *math*, Kylo placed *backtoschool*, which is not a word. If *backtoschool* had counted, how many points would Kylo have earned? (Hint: Each player calculates their score by adding the point values of all the letters in their word.)



1-6.

I can position whole numbers and decimal numbers on a horizontal number line.

Corban's class placed their shoe-size data on a clothesline. Use this clothesline to answer the following questions.



a. Corban insists that they move the sticky notes for size 8 slightly to the right. Why might this be?

b. Ashley says, *"We need to move the 2 to the left."* Kim asks, *"Why? The 2 is to the left of all the other numbers, so it is in the correct place."* Explain why Ashley wants to move the 2 to the left. How far to the left should it go?

c. Rosana, who wears a size 5½ shoe, joins the class. Which sticky notes would you need to move to place Rosana's shoe size on the clothesline? Where would you move them to?

d. Once Rosana's sticky note is added, Raj says that there are 22 shoe sizes represented on the graph. Santiago says that there are only 9 shoe sizes but 22 students. Explain why Santiago is correct.

1-7. (from Lesson 0.1.3)
Which of these figures has an odd number of dots? Explain how you can determine whether the number of dots is even or odd without having to count all of the dots.

FIGURE A

FIGURE B

FIGURE C

FIGURE D

Reflection & Practice continues on page 52.

1-8. (from Lesson 0.1.1)

Damon asks all his classmates about their favorite lunch food in order to answer the question "Which lunch food is most popular at my school?" Which of the following data representations makes answering the question easiest? Which representation makes answering the question hardest? Explain your thinking.

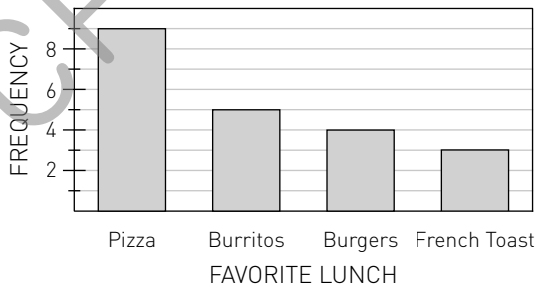
A.

B.

Name	Favorite Lunch
Adam	Burgers
Leah	Burgers
Karen	Burgers
Malachi	Burgers
Dan	Burritos
Kathy	Burritos
Lintilla	Burritos
Maddy	Burritos
Kaylee	Burritos
Jismary	French Toast
Keven	French Toast

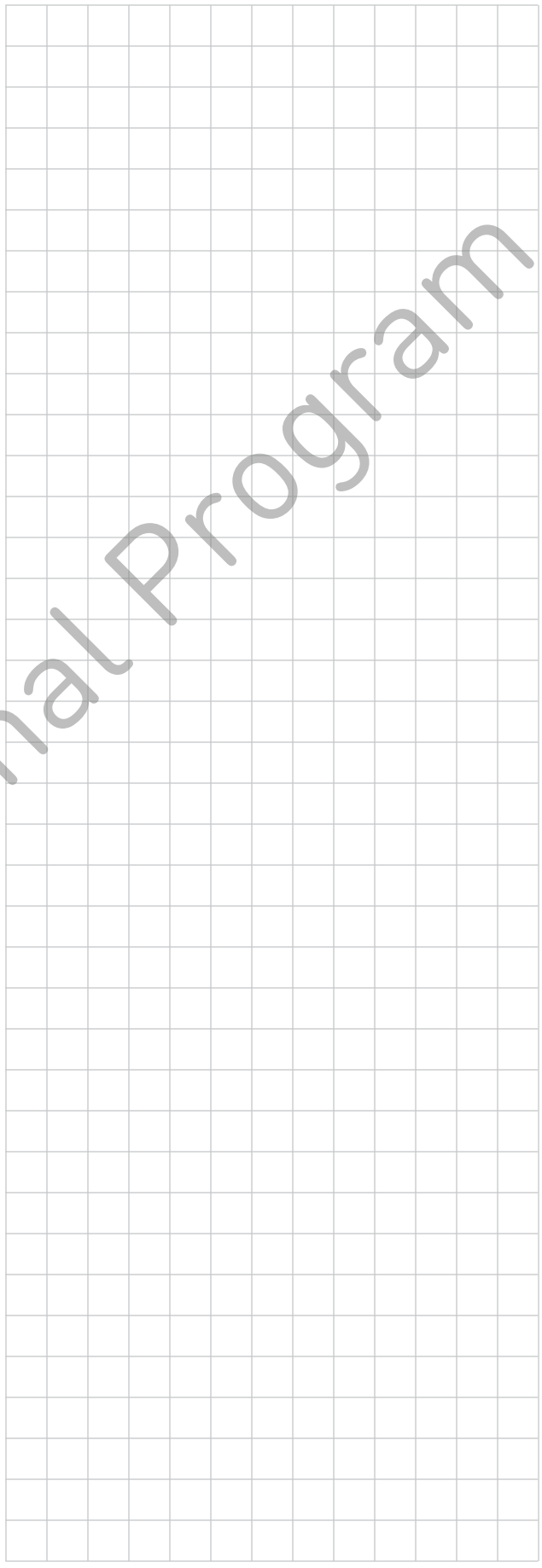
Name	Favorite Lunch
Erica	French Toast
Mark	Pizza
Svea	Pizza
Reid	Pizza
Marques	Pizza
Jarvis	Pizza
Jashawn	Pizza
Euddy	Pizza
Cykarria	Pizza
Gail	Pizza

C.



1-9.

Helping others understand a topic is an important aspect of being a good classmate. Think about the last week of math classes, including today's lesson. Write about one time you helped a classmate understand something better. What do you want your teacher to know about this experience?



Comparing Mixed Numbers, Fractions, and Decimal Numbers

1.1.2 Where do these numbers belong on this line?

Launch

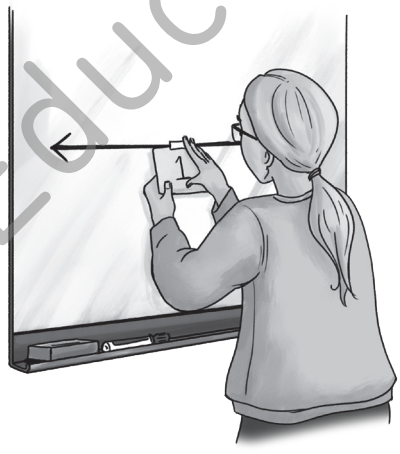
Mathematicians look for and make use of structure. Your teacher will display a dot arrangement for a *Dot Talk*. Think about how you might use the structure of the dot arrangement in your counting strategy. Silently determine the number of dots without counting each dot. Hold a hand close to your chest and extend one finger when you have an answer and a counting strategy.

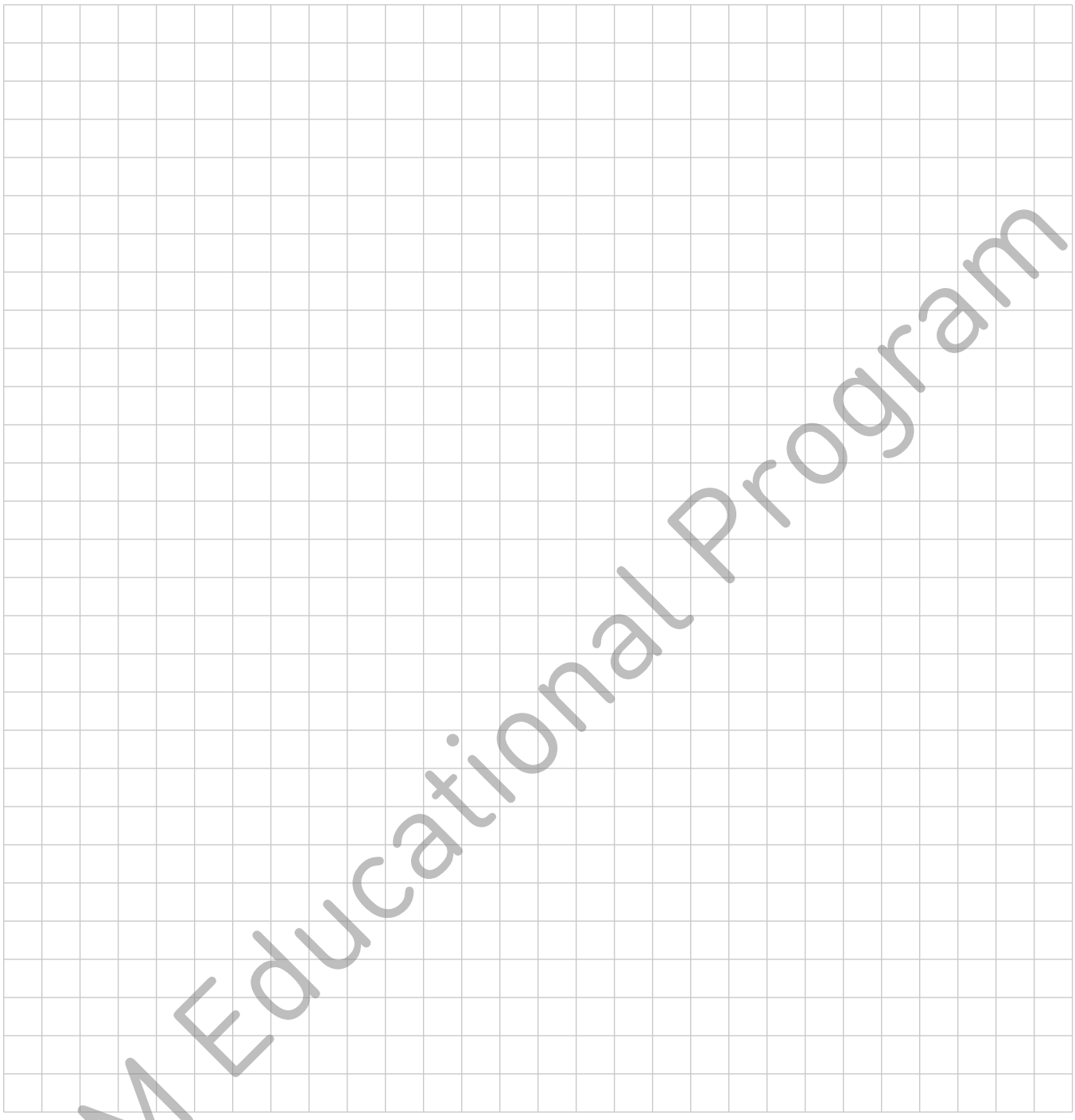
Explore

1-10.

$1.5,\ 1\frac{1}{5},\ \frac{11}{5}$

1-11.





Closure

Your teacher will lead your class through a clothesline activity.

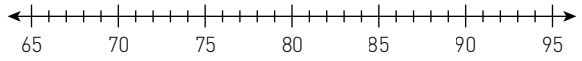
After the activity, write a note to your future self in your Mathematician's Notebook about what you did and what you learned. Use the following sentence frames as prompts to start your thinking, and then add anything that will help you remember what you learned today.

- When hanging _____ on the clothesline, I knew _____ so I _____.
- When placing numbers on the clothesline, it is important to pay attention to _____ because _____.
- When our class discussed hanging _____ on the clothesline, someone said _____ which made me think _____.

Reflection & Practice

1-13.

Mathematicians use appropriate tools strategically. A number line is a tool that may be helpful when evaluating expressions. How can you show the value of 90 – 78 on this number line?

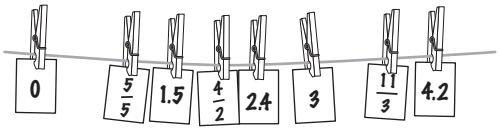


1-14.

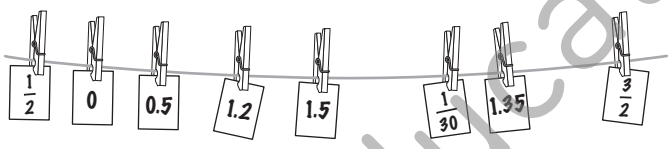
I can position whole numbers, mixed numbers, fractions greater than one, and decimal numbers on a horizontal number line.

Crosby's class successfully hung all the numbers on Clothesline A. Unfortunately, class ended before they could complete Clothesline B.

CLOTHESLINE A



CLOTHESLINE B



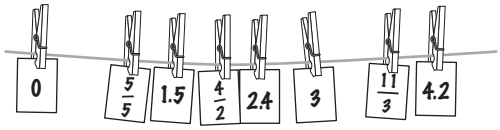
a. In Clothesline A, which number do you think was most difficult to place? Why?

b. What mistakes are shown on Clothesline B? Explain your answers.

1-15.

I can compare whole numbers, mixed numbers, fractions greater than one, and decimal numbers.

Add the benchmark numbers 0, 1, 2, 3, and 4. Would 5 fit on this clothesline?

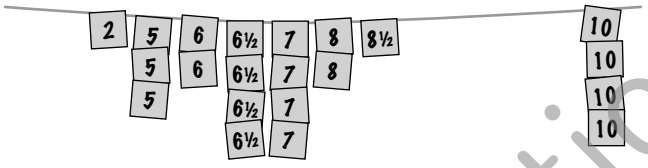


1-16. (from a previous course)
Lewis is having trouble writing decimal numbers in words. His work is shown.

0.4	**four oneths**
1.3	**one and three oneths**
0.56	**fifty-six tenths**
2.008	**two and eight hundredths**

What error has Lewis made? How would you fix it? **For additional support, refer to the Methods & Meanings box "Place Value" on page 304.**

1-17. (from Lesson 1.1.1)
Recall from problem 1-6 that Corban's class placed their shoe-size data on a clothesline as shown. Use this clothesline to answer parts (a) through (c).



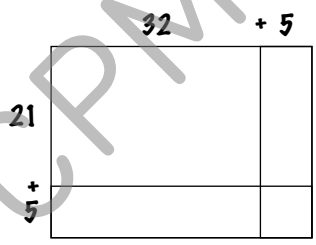
a. How many more people wear a size 7 than a size 8?

b. How many people wear a size bigger than 7½?

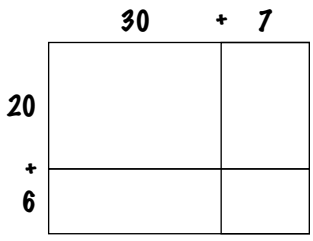
c. What is the smallest shoe size worn in Corban's class?

1-18. (from Lesson 0.1.5)
Katherine and Sekou are both trying to calculate the product 26 × 37. The beginning of their work is shown.

KATHERINE



SEKOU



a. Both of their strategies work, but which one will be easier? Explain your thinking.

b. Use whichever strategy is easier for you to calculate the product.

Paying by the Ounce

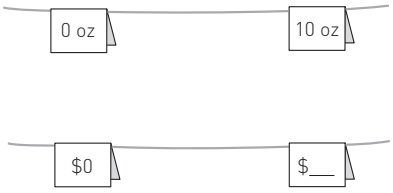
1.1.3 How can I use two lines to solve problems?

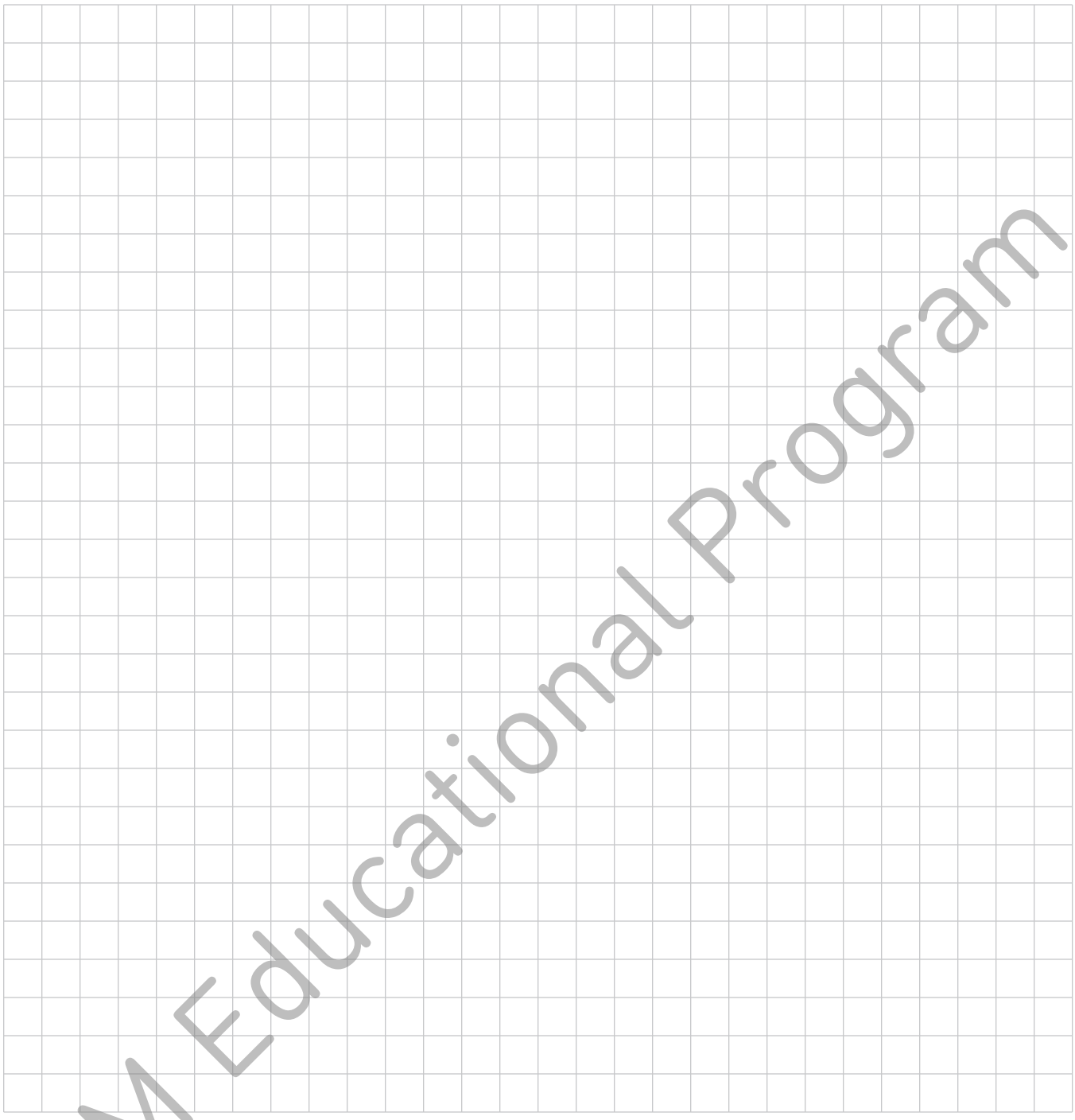
Launch

How much would you pay for 10 oz of candy? Think about this on your own, and then share your answer with your team.

Explore

1-19.





Closure

Your teacher will ask several teams to present their work. After the presentations, write a note to your future self in your Mathematician's Notebook about what you did in class today and what you learned about double number lines.

Reflection & Practice

1-23.

Mathematicians look for and make use of structure. Complete the equations in parts (a) and (b). Then answer part (c).

a. $3 + 7 =$ _____ $7 + 3 =$ _____

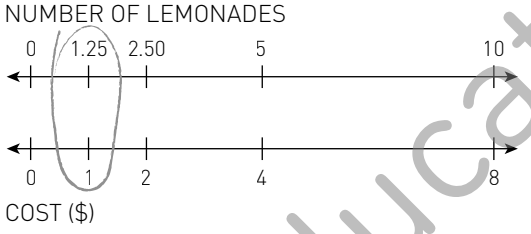
b. $7 \times 3 =$ _____ $3 \times 7 =$ _____

c. The equations in part (a) illustrate the Commutative Property of Addition. The equations in part (b) illustrate the Commutative Property of Multiplication. Think about the structure of the equations in each set. What do you think a "commutative property" is? Do you think subtraction and division also have commutative properties?

1-24.

I can position decimal numbers on a double number line.

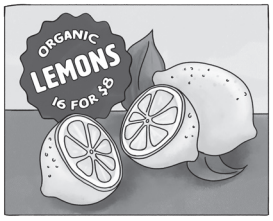
At a baseball game, Riley bought 10 lemonades for $8. Taylor drank one lemonade and wanted to pay Riley back, so they created a double number line to calculate their portion.



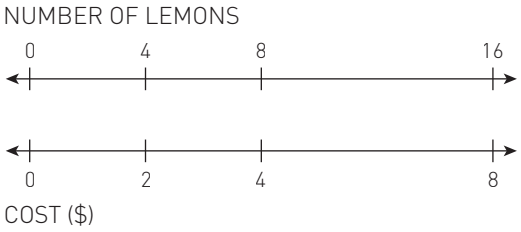
Taylor is stumped because the double number line indicates that 1.25 lemonades cost $1, but they want to know the cost of 1 lemonade. What should Riley add to the double number line to help Taylor?

1-25.

I can use a double number line to solve problems.



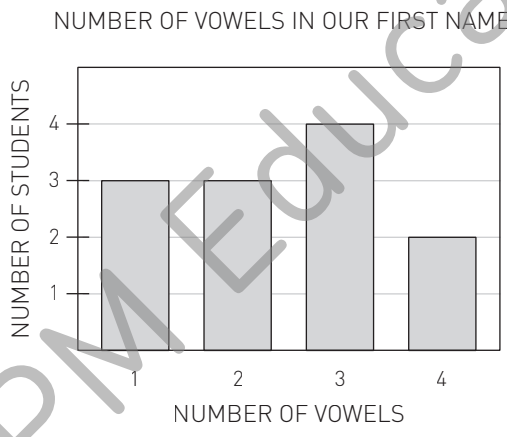
Speaking of lemons, Taylor was surprised to learn how expensive they are. Taylor's grandmother is making a lemon meringue pie and needs 4 lemons. The ad from the market says that 16 lemons cost $8. Taylor's grandmother correctly calculates how much 4 lemons will cost using a double number line.



Next week Taylor's grandmother is making lemon custard and needs 10 lemons. How much will 10 lemons cost?

1-26. (from Lesson 0.1.1)

Cynthia polled the students at her lunch table and collected the data shown in the following graph.



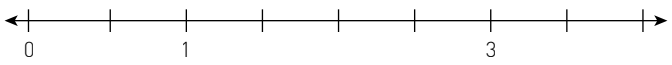
a. What question was Cynthia trying to answer?

b. Is there one answer or multiple answers to this question?

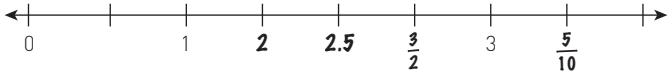
Reflection & Practice continues on page 62.

1-27. (from Lesson 1.1.2)
The students in Ms. Rodham's class were asked to place the following numbers on the number line.

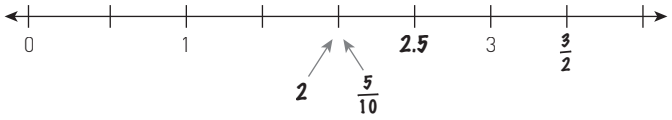
$$2,\ 2.5,\ \frac{3}{2},\ \frac{5}{10}$$



a. Chad and his team all placed the numbers on the number line as shown. Unfortunately, they did not place any of these numbers correctly. Which number are you most confident moving?



b. Clara correctly placed the decimal number but misplaced both fractions. Explain to Clara where the fractions should go.



1-28. (from Lesson 0.1.7)
Think back to the list of collaborative learning agreements your class created in Lesson 0.1.7.

a. What items on that list have you been keeping in mind when working with your teammates?

b. Suppose a teammate made a mistake and forgot to do something that was on that list. What steps would you recommend your team take to move forward and begin to work effectively again?

Falling Paper, Part 1

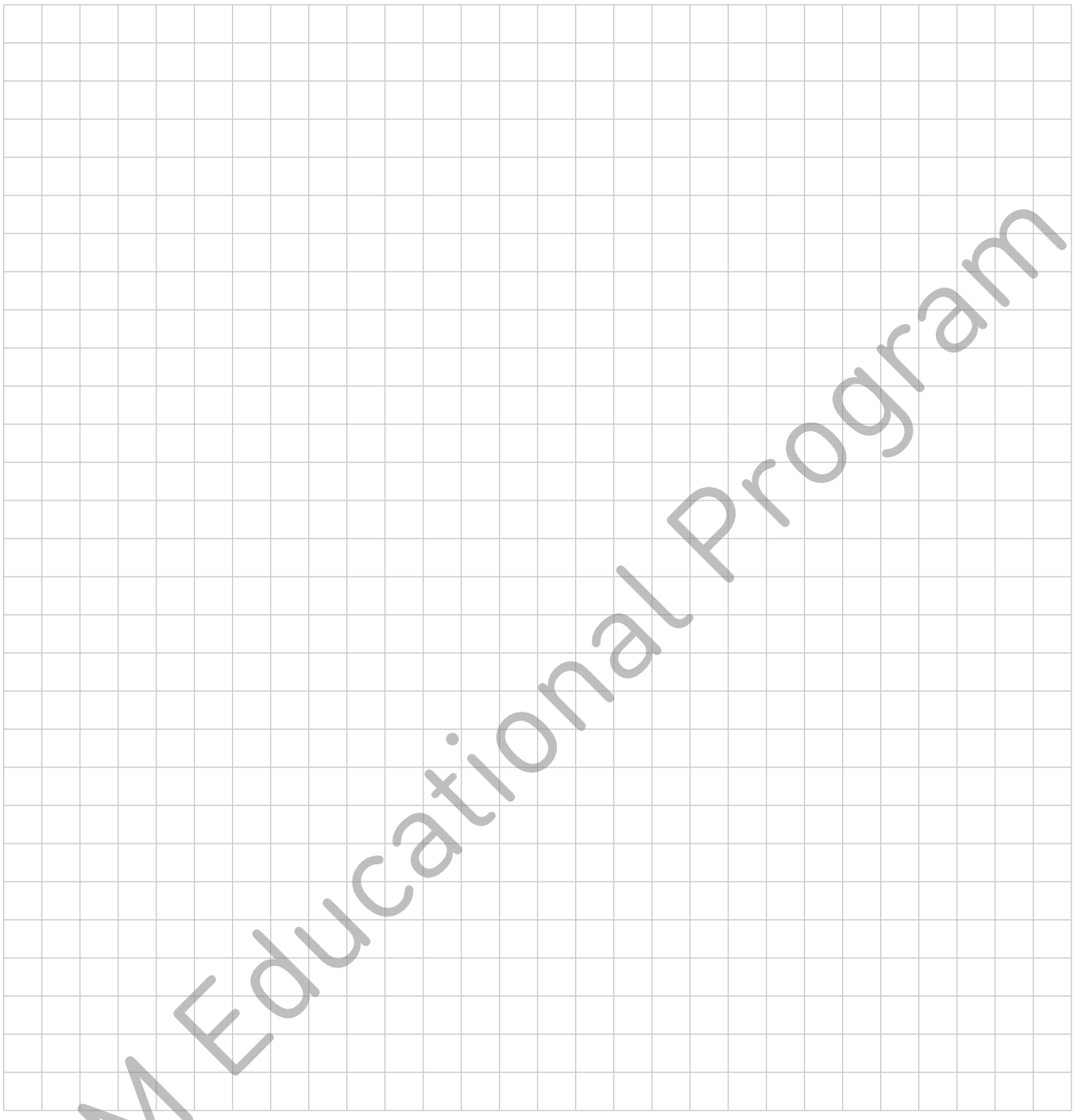
1.1.4 How can data be used to answer a question?

Launch

Your teacher has something they would like to demonstrate for you.

Explore

1-29.



Closure

How long does it take a piece of paper to fall to the floor? Be prepared to share your answer with the class.

Reflection & Practice

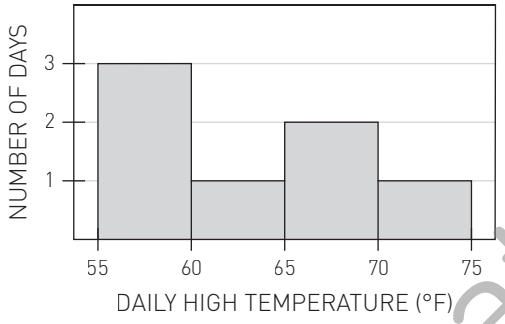
1-33.

Mathematicians look for and make use of structure. Use the structure of the dot arrangement shown to help you determine the number of dots without counting them individually. Sketch how you counted the dots on the dot arrangement.

1-34.

I can interpret and analyze a histogram.

The histogram shows the daily high temperature in San Francisco for several days.



a. Use the histogram to determine if each of the following statements is true or false.

   i. The high temperature was 55 °F or more on seven different days.

   ii. There were four days when the high temperature was 57 °F.

   iii. There was one day when the high temperature was between 60 and 65 °F.

b. Why might it be important to keep track of daily high temperatures?

1-35.

I can determine if a question has multiple answers or a single answer.

For each of the following, determine if the question has one answer or multiple answers.

a. How tall are you?

b. How tall are the players on the school basketball team?

c. How did you travel to school today?

d. How do 6th graders travel to school?

e. What are the different ways you travel to and from school?

1-36. (from a previous course)

Round each number to the specified place. **For a reminder on rounding, refer to the Methods & Meanings box "Rounding" on page 305.**

a. Round 5,294.6 to the hundreds place.

b. Round 45,469.23 to the thousands place.

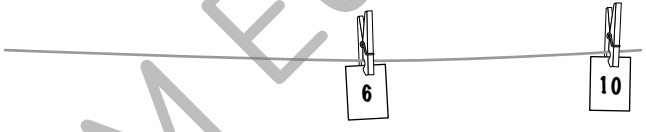
c. Round 7,526.442 to the hundredths place.

d. Round 492.3069 to the thousandths place.

1-37. (from Lesson 1.1.2)

Place the following numbers in their proper place on the clothesline.

$8\frac{1}{4}$, 8.14, $\frac{6}{10}$, 6.10



1-38.

Name two things your teammates have done that helped the team succeed. For example, did they make everyone in the team feel included? Did they help you understand something a little better? What questions have they asked that sparked a new idea for you? In what ways do they make you want to participate more in the team?

1.1.5 Creating Histograms
How are histograms helpful?

Launch

Some people eat their food with flatbread or tortillas. Some people eat their food with forks or chopsticks. What are the different tools you use to eat your food? Discuss this with your team.

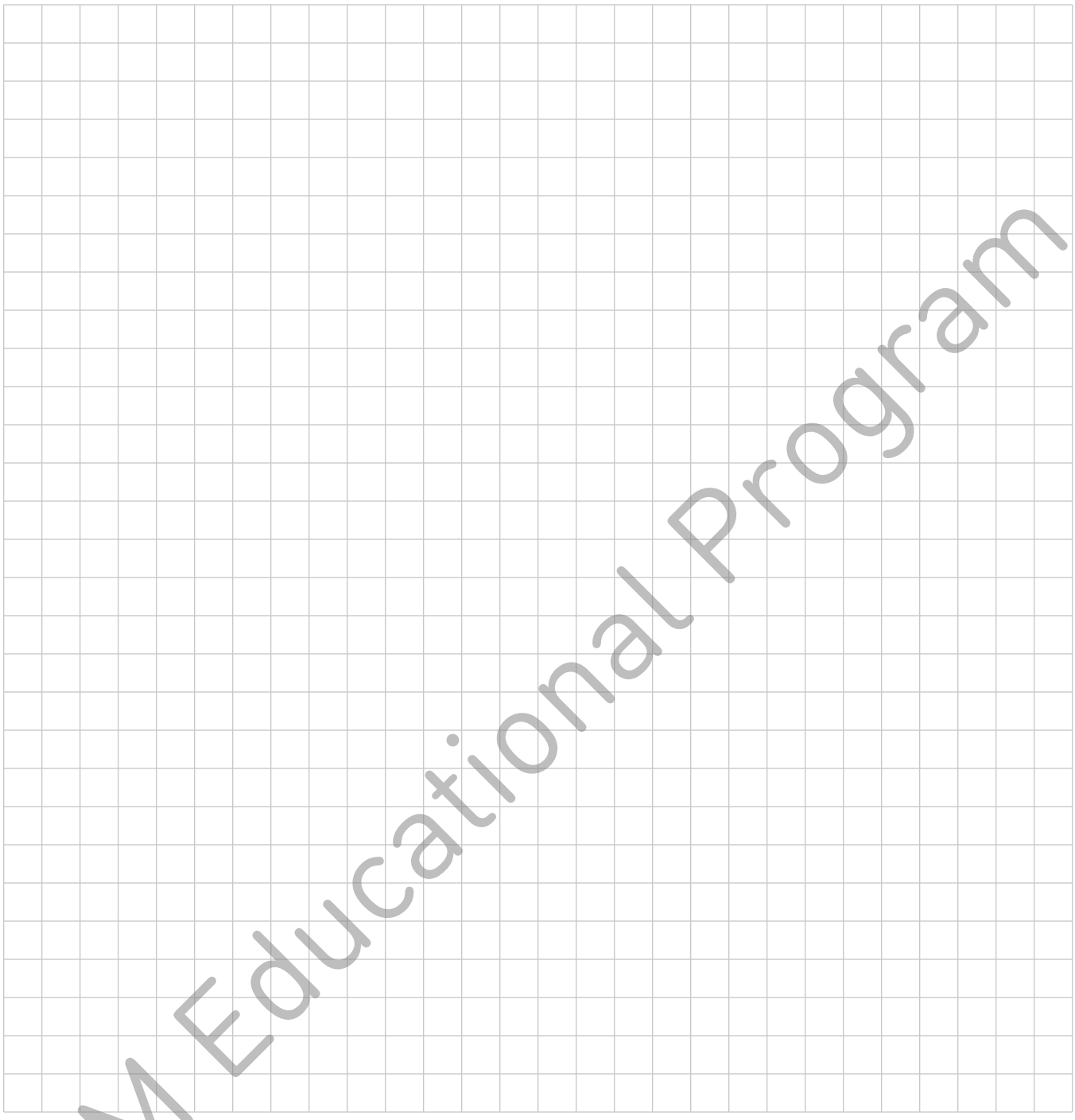
Explore

1-39.

Academy Award Nominees for Best Animated Film

Year	Title	Length (minutes)
2021	Encanto*	102
2021	Flee	90
2021	Luca	95
2021	The Mitchells vs. the Machines	114
2021	Raya and the Last Dragon	107
2020	Soul*	101
2020	Onward	102
2020	Over the Moon	100
2020	A Shaun the Sheep Movie: Farmageddon	87
2020	Wolfwalkers	103
2019	Toy Story 4*	100
2019	How to Train Your Dragon: The Hidden World	105
2019	I Lost My Body	81
2019	Klaus	97
2019	Missing Link	94
2018	Spider-Man: Into the Spider-Verse*	117
2018	Incredibles 2	118
2018	Isle of Dogs	101
2018	Mirai	98
2018	Ralph Breaks the Internet	112
2017	Coco*	105
2017	The Boss Baby	97
2017	The Breadwinner	94
2017	Ferdinand	108
2017	Loving Vincent	95

Note: Winning films are indicated by an asterisk (*).



Closure

For what questions is a histogram most helpful? For what questions is a table most helpful?

Reflection & Practice

1-40.

Mathematicians look for and make use of structure. Think about how the structure of each expression helps you evaluate it in your head. What do you notice?

a. 10 + 4

b. 9 + 5

c. 8 + 6

d. 7 + 7

1-41.

I can use a histogram to display frequency.

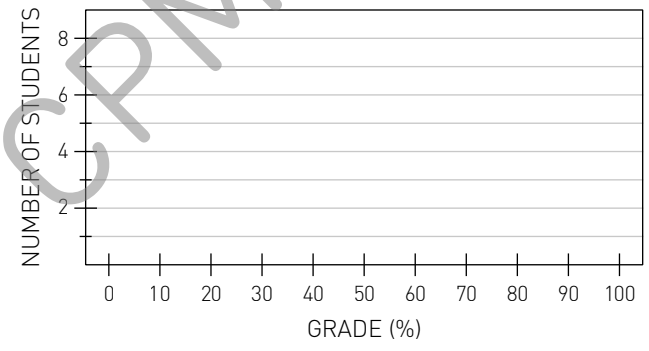
The following list of numbers represents the grades of students (in percent) in Mr. Nguyen's class.

50, 55, 57, 60, 62, 65, 78, 80, 82, 85, 88, 89, 90, 91, 93, 95, 96, 98, 99

a. Count the number of grades that fit in each interval to complete the frequency table.

Interval	Frequency
At least 40% and less than 50%	
At least 50% and less than 60%	
At least 60% and less than 70%	
At least 70% and less than 80%	
At least 80% and less than 90%	
At least 90% and less than 100%	

b. Use your table from part (a) to build a histogram on the following axes.



1-42.

Use the data and your histogram from problem 1-41 to answer the following.

a. How many percentage points separate the highest score from the lowest score?

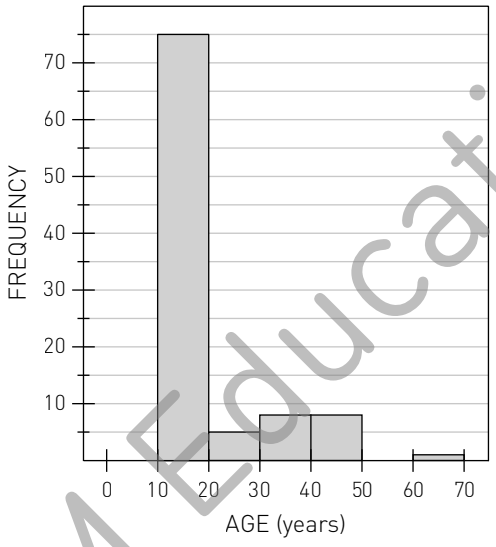
b. Students need a grade of 75% to pass in Mr. Nguyen's class. How many students did not pass?

1-43. (from a previous course)

Rachel says that when she ran 115 yards, she went farther than Beth, who ran 327 feet. Is Rachel correct? Explain how you know. Remember that 1 yard is equal to 3 feet.

1-44. (from Lesson 1.1.4)

Four students on a team created the following histogram to display the ages of all the students and adults at their school. Then they each asked a different question. Answer their questions in any order.



R: How many students are in the school?

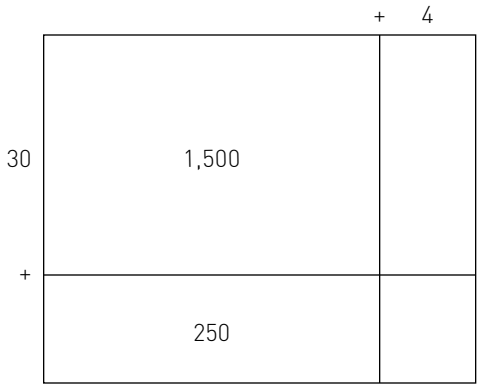
I: Can you tell which is the most common age of students at the school? Why or why not?

C: Approximately how many adults at the school are between the ages of 30 and 49?

O: How old might the oldest adult at the school be?

Reflection & Practice continues on page 72.

1-45. (from Lesson 0.1.5)
Use the following incomplete area model to complete parts (a) through (c).



a. Fill in the blank portions of the area model.

b. What multiplication problem is being solved?

c. What is the answer?

Dot Plots

1.1.6 How else can data be displayed?

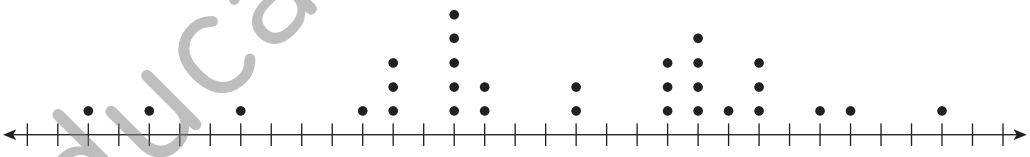
Launch

Several Launch activities in this course will focus on data literacy. For these Launch activities, a graph or an *infographic* (informational graphic) will be displayed and your teacher will lead you through a Talk-Write-Discuss. Use an electronic device to access the infographic.

Explore

1-46.

1-49.



1-50.

25, 27, 27, 29, 30, 30, 30, 31, 32, 53

Closure

Look at your work for problem 1-50. Read the following statements. Pick one and explain to your elbow partner why you agree or disagree with the statement. Take turns until you have discussed all of the statements.

I. Seven students participated in the investigation.

II. More people underestimated 30 seconds than overestimated 30 seconds.

III. Half of the participants' guesses were within 1 second of 30 seconds.

IV. The middle estimate is 40 seconds.

Reflection & Practice

1-51.

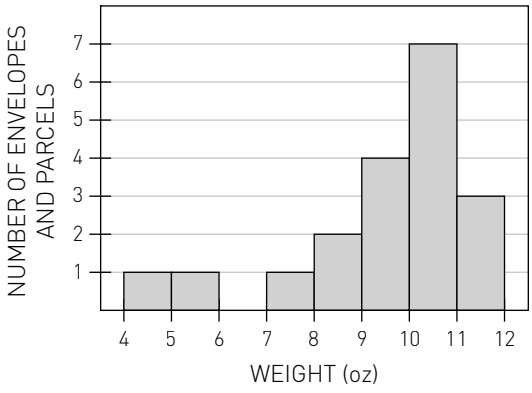
What would you change to make evaluating the following expression easier?

$$\frac{1}{3} + \frac{1}{6}$$

1-52.

I can report the number of observations in a data set.

The following histogram represents the weights, in ounces, of several envelopes and parcels. How many envelopes and parcels were included in this data set?



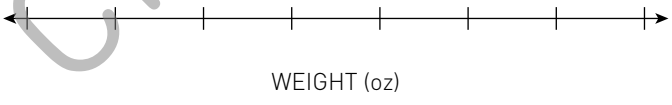
1-53.

I can create a dot plot.

The following data set represents the weights, in ounces, of several envelopes and parcels. Use the data set to complete parts (a) and (b).

11, 8, 10, 10, 10, 9, 4, 9, 7, 5, 11, 8, 9, 11, 10, 10, 10, 9, 10

a. Make a dot plot for the data set.



b. Compare this dot plot to the histogram in problem 1-52. How are the two representations the same? How are they different?

1-54. (from a previous course)
Aria and 19 of her friends plan to go to a baseball game and want to sit together. Aria wants to select a group of seats in the shape of a rectangle, but she cannot decide on the best arrangement. She starts by considering one row of 20 seats.

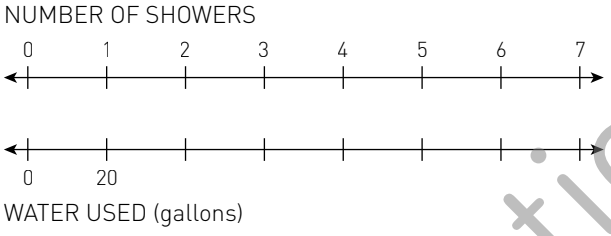
a. Draw a diagram showing Aria's arrangement.

b. Draw two other possible rectangular arrangements for 20 seats. Label each arrangement with the number of rows and the number of seats in each row.

c. Are all arrangements practical? Explain.

1-55. (from Lesson 1.1.3)
Mara uses 20 gallons of water each time she showers.

a. How much water does Mara use for 7 showers? Use the double number line to support your answer.



b. What suggestions might you give Mara to help them reduce the amount of water they are using?

1-56.
You have now spent several lessons learning about data representations.

a. List three things you knew about data representations when you started this chapter.

b. List two things you have learned about data representations in this chapter.

Build the Shape, Part 2

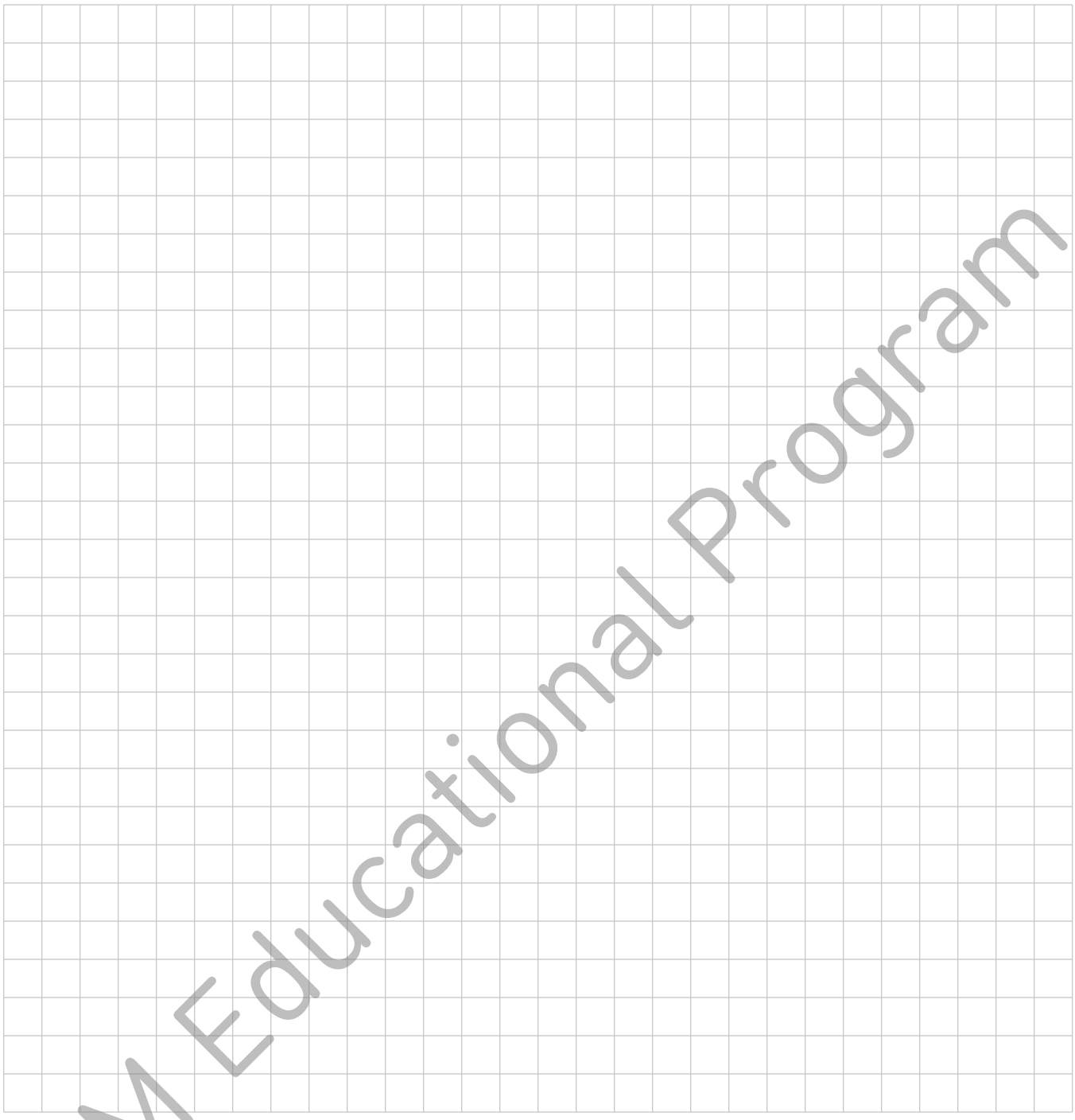
1.2.1 How can I write equivalent expressions in area and perimeter?

Launch

Think about the following questions and answer them in your Mathematician's Notebook.

- How has a teammate been kind to you?
- How have you been kind to a teammate?
- What act of kindness have you performed today?

Explore



Closure

The Reflection Journal titled "Lesson 1.2.1: Working With Teammates" is located on the following page. Read the prompt and write a response. Read the prompt and write a response.

Reflection Journal

Lesson 1.2.1: Working With Teammates

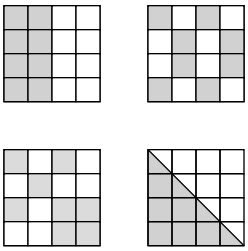
Choose at least two of the following prompts to respond to in your journal.

- What strategies did you find helpful today when describing your secret shape to your teammates?
- How did you work together to build the shape?
- What did you learn about yourself or your teammates today?
- If your team was not able to successfully build one of the shapes, what did you learn from this attempt that can inform the next time you try?

Reflection & Practice

1-60.

Which one is unique? Why?



1-61.

I can write equivalent expressions.

Chelsea and Jodi wrote different expressions to represent the number of dots in the following figure. Explain how both expressions can be correct.

CHELSEA

$2 + 3 + 2 + 1$

JODI

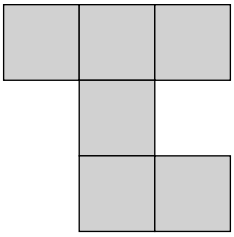
$4 + 3 + 1$

Reflection & Practice continues on page 82.

1-62.

I can calculate the area of a figure made of square units. I can calculate the perimeter of a figure.

The figure shown is made of squares. Each square is 1 centimeter on each side.



a. What is the area of this figure?

b. What is the perimeter of this figure? Write an expression showing how you calculated the perimeter.

c. Sketch a different figure that has the same perimeter as the figure above. Write an expression showing how you calculated the perimeter.

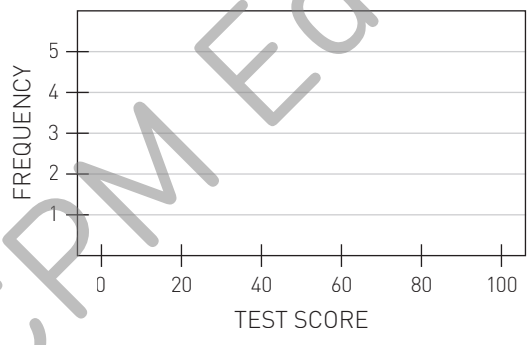
d. Are the expressions you wrote in parts (b) and (c) equivalent?

1-63. (from Lessons 1.1.5 and 1.1.6)

The following list shows the test scores for Ms. Blevin's class. Use this data set to complete parts (a) and (b).
For additional support, refer to the Methods & Meanings box "Data Displays" on page 306.

64, 87, 52, 12, 17, 23, 45, 88, 45, 92, 62, 76, 77, 34, 53

a. Use the data to create a histogram.



b. For analyzing this data set, why would it be better to use a histogram than a dot plot?

1-64. (from Lesson 0.1.5)
The following diagram shows that (12)(27) = 200 + 40 + 70 + 14 = 324.

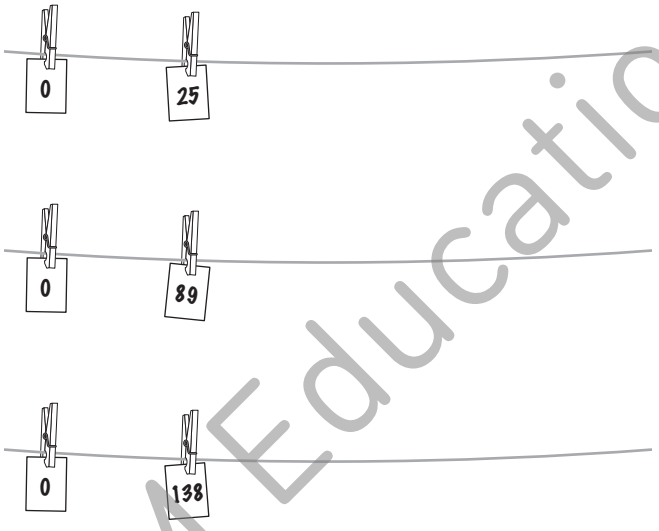
	20	+ 7
10	200	70
+ 2	40	14

Use an area model to help you calculate the products in parts (a) and (b). For each part, write: (total dimension) (total dimension) = sum of individual area parts = total area. Use the example shown to guide your work.

a. (42)(73)

b. 81 · 125

1-65. (from Lesson 1.1.1)
Your classmates placed these numbers on three different clotheslines



a. Where should you place 100 on each clothesline?

b. Araya says, *"Since 0 is in the same place on all the lines, 100 should also be in the same place on all of the lines."* How would you explain to Araya that you disagree with that idea?

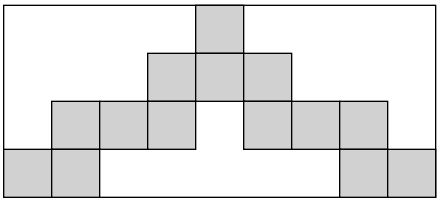
1.2.2 The Composition of Polygons
What shapes make up the polygon?

Launch

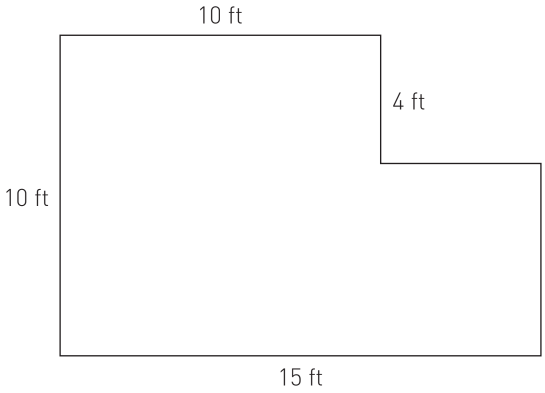
Mathematicians look for and make use of structure. Prepare your team for a *Dot Talk*. How does the structure of the dot arrangement help you count the dots?

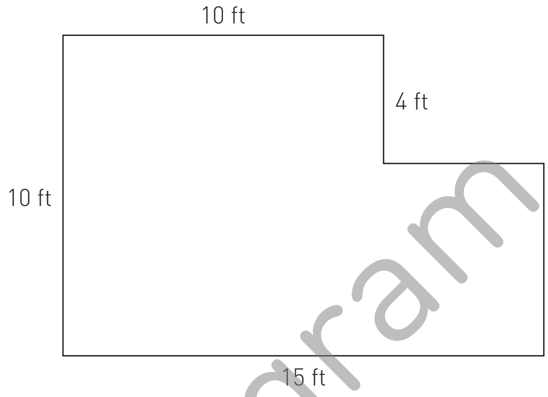
Explore

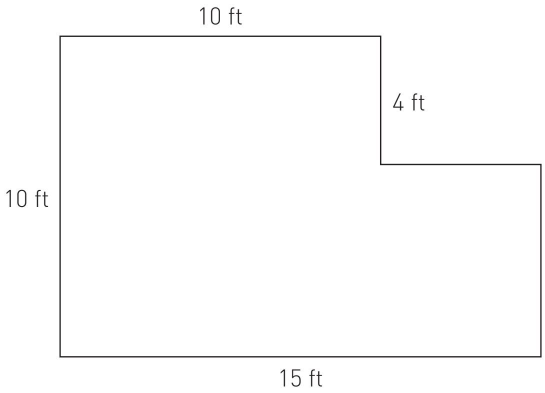
1-66.

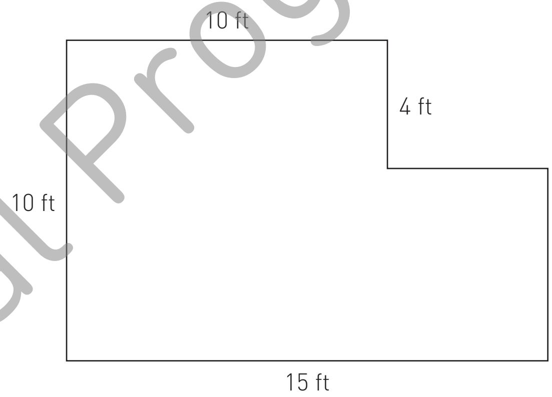


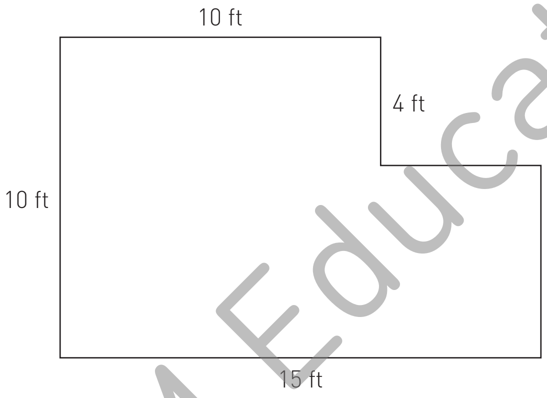
1-67.

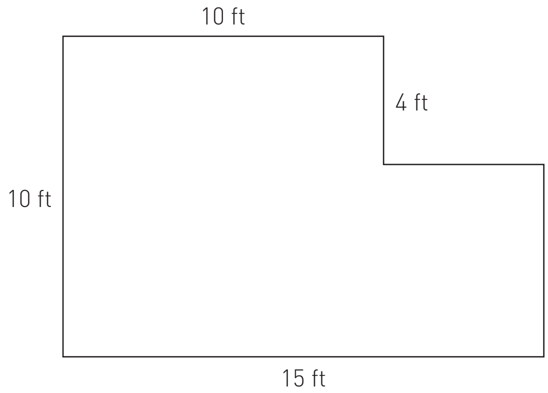












Closure The Reflection Journal titled "Lesson 1.2.2: Square Units and Area" is located on the following page. Read the prompt and write a response.

Reflection Journal

Lesson 1.2.2: Square Units and Area

Respond to one of the following prompts.

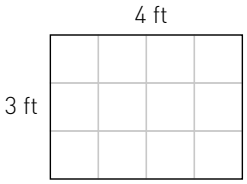
- Why do you think square units are used to calculate the area of flat surfaces?
- Sketch a square unit. Sketch a shape that has an area of $\frac{3}{4}$ of a square unit, and explain how you know the area is $\frac{3}{4}$ of a square unit.

Reflection & Practice

1-68.

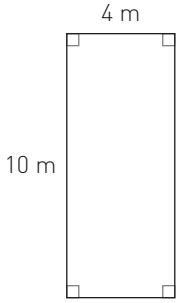
For each of the following multiple-choice questions, select the area of the shape shown.

a.



I. 7 ft^2 II. 12 ft^2 III. 14 ft^2 IV. 24 ft^2

b.



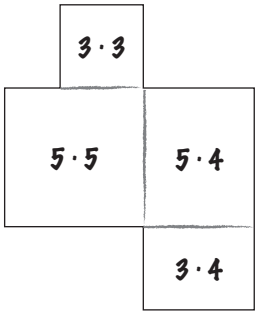
I. 14 m^2 II. 28 m^2 III. 40 m^2 IV. 44 m^2

Reflection & Practice continues on page 88.

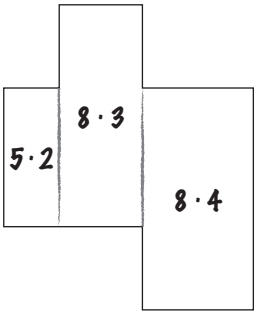
1-69.

I can calculate the area of a polygon by summing the areas of its parts.

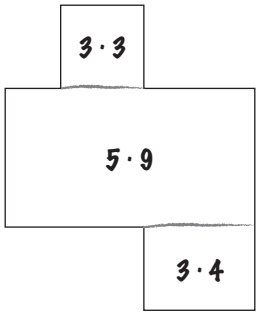
Three students are calculating the area of a shape. They each divide the shape into rectangles and then calculate the areas of the rectangles. Their work is shown.



STUDENT A



STUDENT B

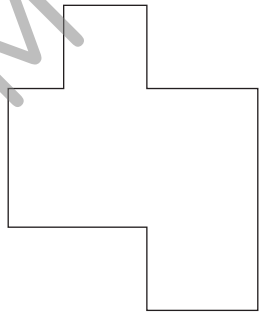


STUDENT C

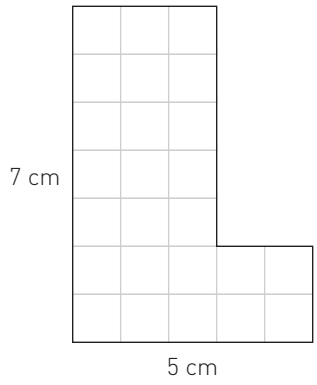
a. Choose one student's work and calculate the area of the overall shape.

b. If you chose a different student's work, would you get the same area? Why or why not?

c. Use the students' work to label all of the side lengths of the overall shape.



1-70. (from Lesson 1.2.1)
Calculate the area and perimeter of the following shape that was cut from graph paper. **For additional support, refer to the Methods & Meanings box "Perimeter and Area" on page 307.**



Reflection & Practice continues on page 90.

1-71. (from Lesson 1.1.5)
Match each list of data with its histogram.

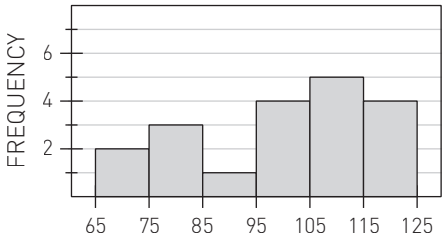
A. 70, 117, 108, 107, 99, 115, 72, 101, 111, 116, 101, 79, 81, 109, 84, 88, 110, 111, 114

B. 110, 111, 71, 75, 109, 107, 79, 105, 81, 118, 91, 88, 117, 85, 119, 86, 100, 102, 102

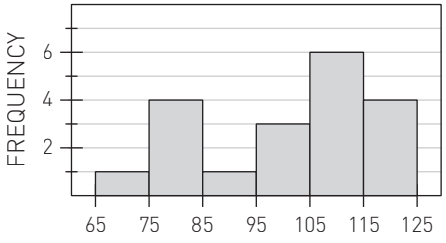
C. 66, 118, 122, 100, 99, 73, 113, 101, 103, 114, 124, 76, 81, 83, 90, 105, 111, 107, 116

D. 70, 96, 111, 76, 114, 81,103, 100, 83, 116, 106, 120, 107, 111, 112, 79, 123, 88, 122

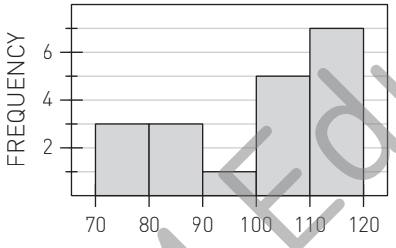
I.



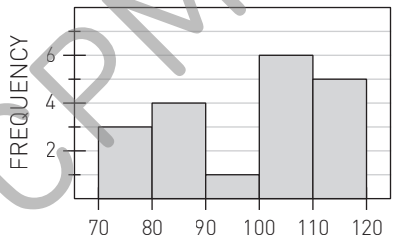
II.



III.



IV.



1-72. (from Lesson 1.1.3)
Place the following numbers on a vertical number line.

$$2,\ 3.2,\ 3\tfrac{3}{5},\ 0.20,\ \tfrac{11}{2}$$

1-73. (from Lesson 0.1.5)
Nikita is multiplying using an area model. Her incomplete area model is shown.

		+ 7
40	2,400	
1,600		56

a. Complete the area model.

b. What multiplication problem is Nikita solving?

c. What is the answer to this problem?

1.2.3 Untangle the Rectangle
How can I make it a rectangle?

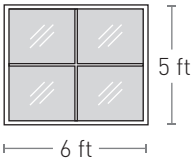
Launch

Your teacher will show you a video, and you will do a Think-Pair-Share.

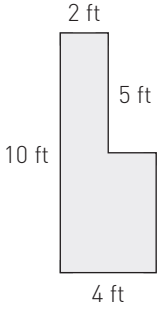
Explore

1-74.

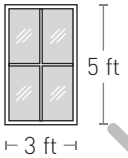
WINDOW



PLYWOOD

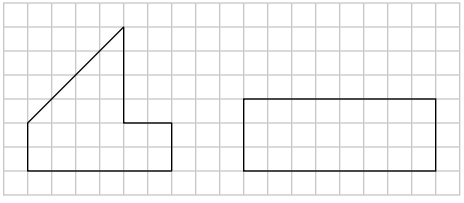


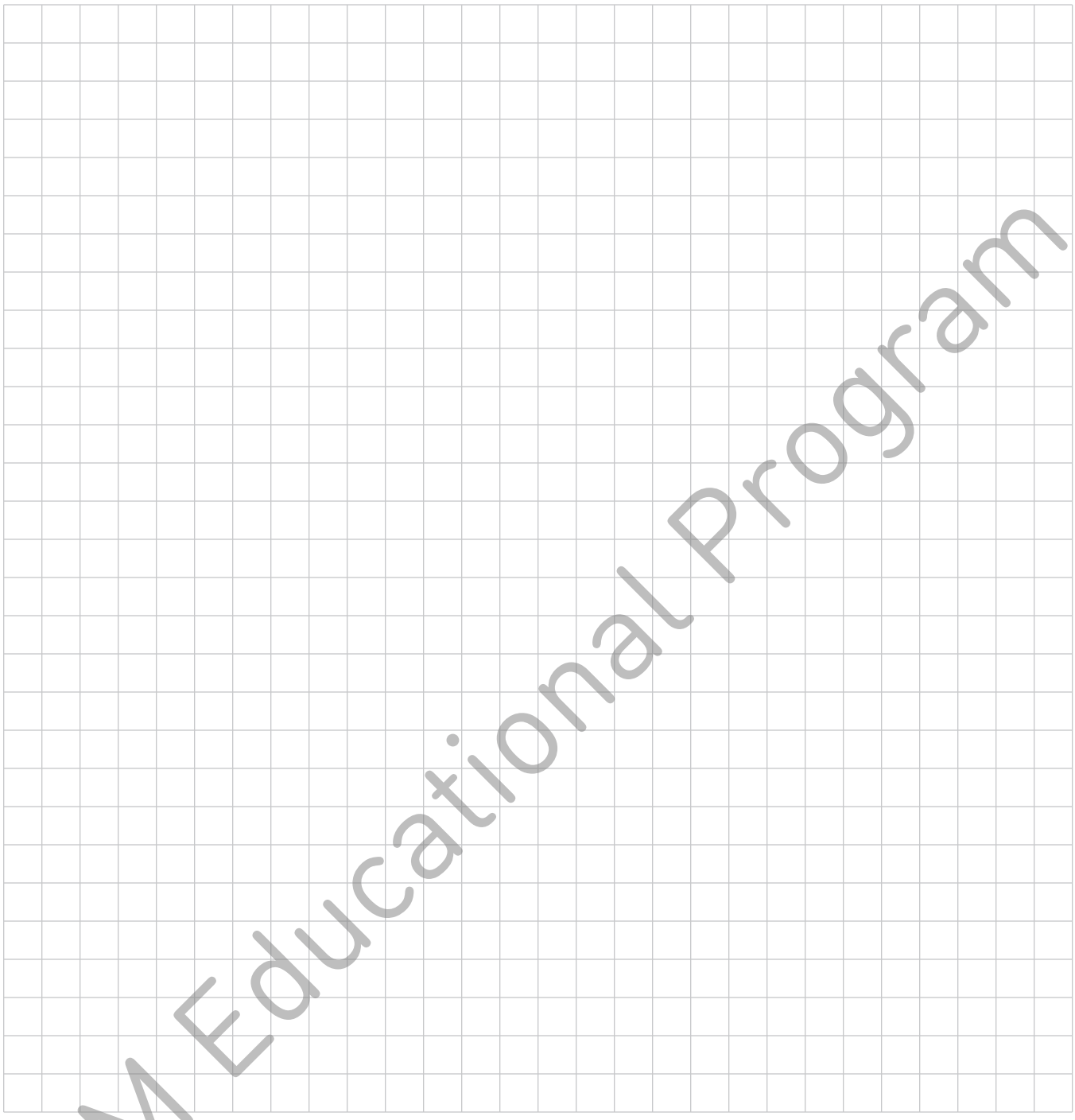
WINDOW



PLYWOOD

1-76.





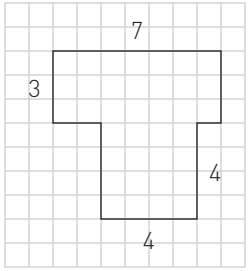
Closure

Your teacher will give you an exit ticket. Write your name at the top and respond to one of the prompts. Hand it to your teacher when you exit the classroom.

Reflection & Practice

1-77.

Mathematicians look for and make use of structure. The area of the shape shown is 37 square units. Consider the structure of the shape and determine which of the following statements are accurate methods for calculating its area. Select all that apply.



A. Count the number of the grid squares inside the shape.

B. Count the number of grid squares along the edge of the shape.

C. Multiply the 7-unit and 4-unit side lengths together.

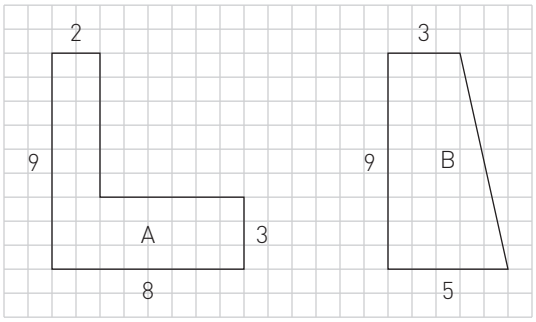
D. Calculate $3 \times 7 + 4 \times 4$.

E. Cover your entire workspace with copies of this shape, without overlap or gaps.

1-78.

I can calculate the area of a polygon by rearranging it into rectangles.

Aurora claims that both pieces of plywood shown can be cut and rearranged to cover a rectangular window that is 9 ft tall and 4 ft wide. All units shown are in feet.



a. Select either Figure A or Figure B. Show and explain how you would cut and rearrange the piece of plywood to cover the 9 ft by 4 ft window.

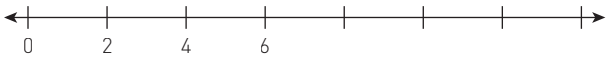
b. What is the area of the figure you chose in part (a)?
For additional support, refer to the Methods & Meanings box "Rectangles and Square Units" on page 308.

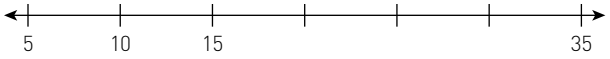
1-79. (from Lesson 1.2.1)

Jack has four tiles and makes the following shapes out of them. Determine the area and the perimeter for each shape. What do you notice?

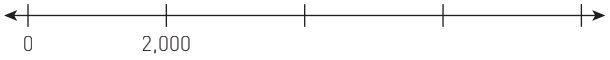
Reflection & Practice continues on page 96.

1-80. (from Lesson 1.1.1)
Fill in the missing numbers on each number line.

a. 

b. 

c. 

d. 

1-81. (from a previous course)
Evaluate each of the following without using a calculator. Then use a calculator to check your answers.

a. 0.3 + 1.8

b. 5.2 – 4.9

c. 1.5 · 2.2

1-82.

Over the past few lessons you have learned about polygons, perimeter, and area.

a. The following key shows the level of understanding represented by each emoji.

Below are some learning targets. Rate your current understanding of each topic by circling the appropriate emoji.

I can calculate the area of a figure made of square units.

I can calculate the perimeter of a figure.

I can calculate the area of a polygon by summing the areas of its parts.

I can calculate the area of a polygon by rearranging it into rectangles.

b. What questions do you have about these topics?

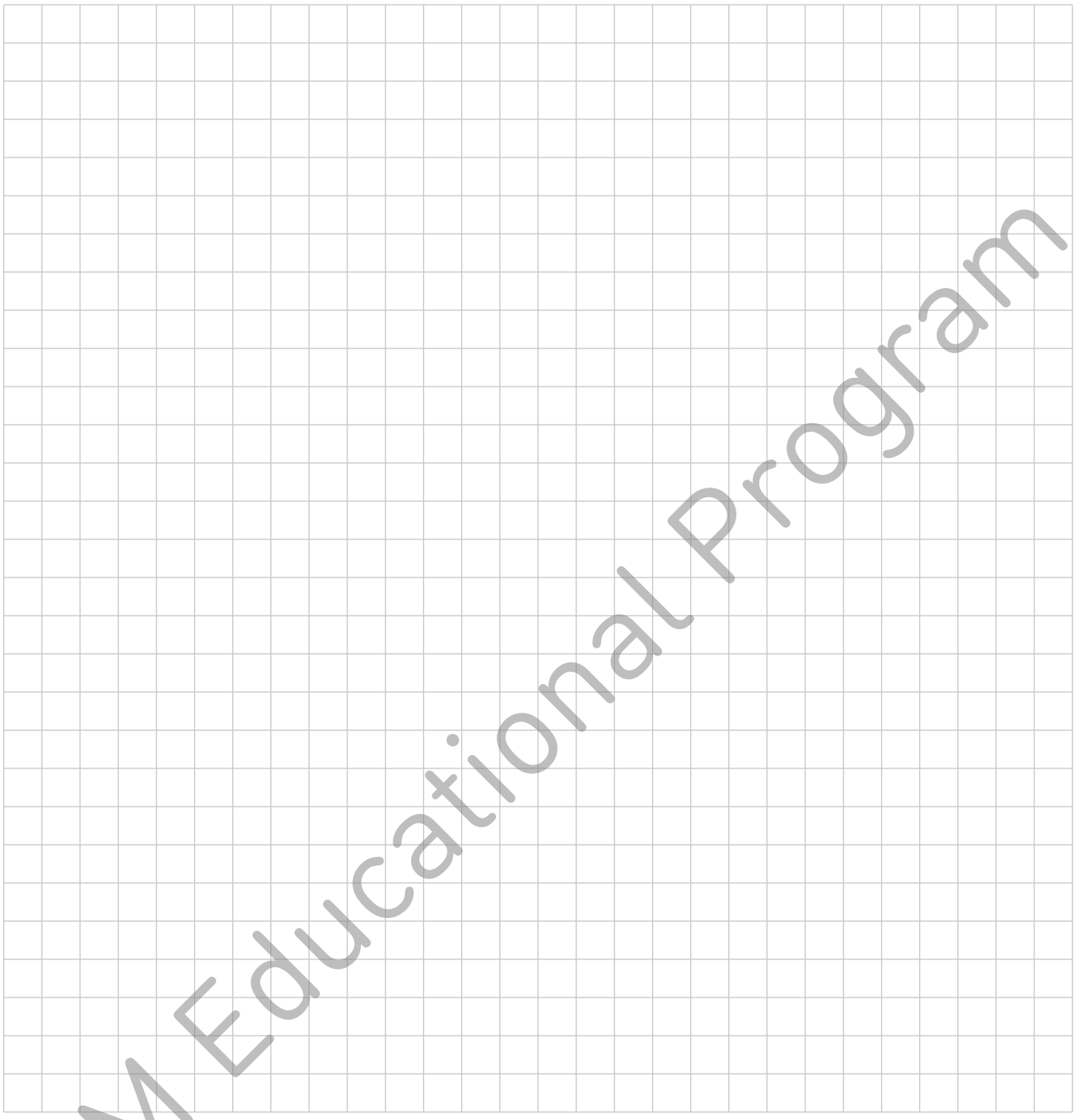
Silent Movie

1.3.1 How can I describe it using symbols?

Launch

Your teacher will show the class an image for a Math Chat.

Explore



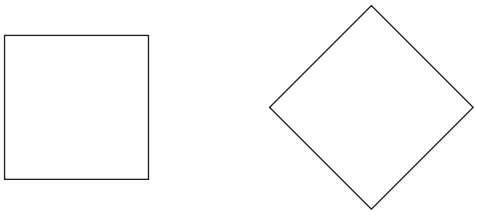
Closure

As a team, come up with a situation and decide how to represent it using numbers and math symbols. Your team will be presenting your work to the class.

Reflection & Practice

1-84.

Mathematicians construct viable arguments and critique the reasoning of others. Are these shapes the same or are they different? Justify your choice.



1-85.

I can write a numerical expression.

Alayna wanted to do 100 push-ups this week. She recorded the number of push-ups she did each day in the table shown.

Day	Sun	Mon	Tue	Wed	Thu	Fri
Number of Push-ups	15	15	15	15	20	20

To represent the total number of push-ups she did this week, she wrote the expression $4 \cdot 15 + 2 \cdot 20$.

a. Explain Alayna's expression using words.

b. Did Alayna meet her goal of completing 100 push-ups this week? How do you know?

1-86.

I can write an expression with letters that stand for numbers.

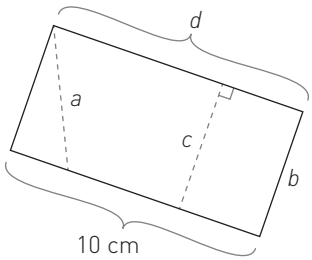
An animal shelter has an unknown number of dogs. Then they take in five puppies. Cole writes the expression $d + 5$ to represent this scenario. Explain what this expression means.

1-87. (from Lesson 1.2.1)
Use exactly six square tiles to create each of the figures described.

a. Draw a figure where the perimeter is greater than 12 units. Determine the area and perimeter of this figure.

b. Draw a figure where the perimeter is exactly 10 units. Determine the area and perimeter of this figure.

1-88. (from a previous course)
Demi is trying to calculate the area of this rectangle. She already determined that one side measures 10 cm. Which other length(s) could she measure to use to calculate the area? Explain your reasoning. **For additional support, refer to the Methods & Meanings box "Base and Height of a Rectangle" on page 309.**



1-89.
The last several lessons have been packed with math learning. You will come back to many of these topics in the coming chapters. What questions do you have about the math you have seen so far?

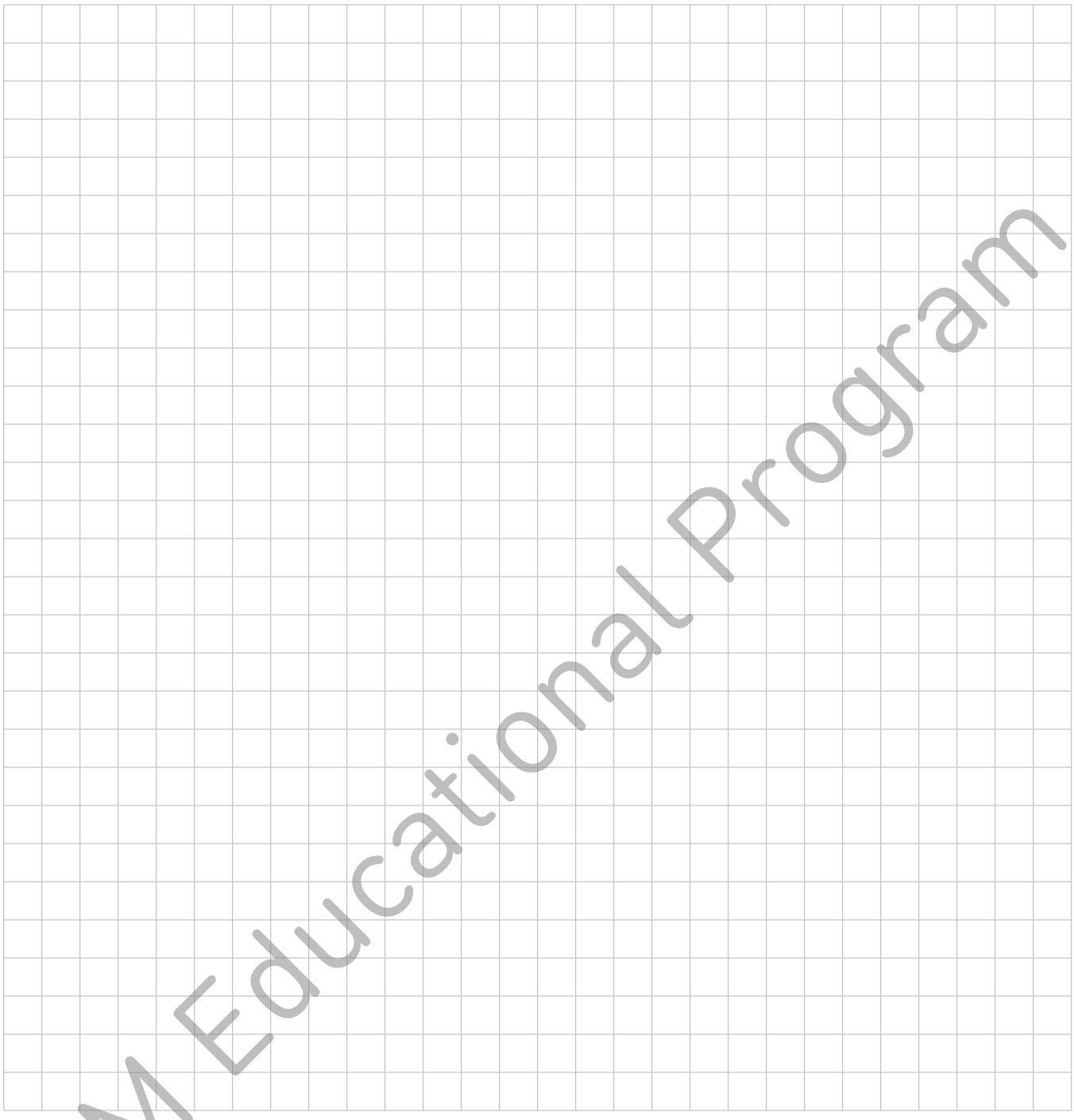
Counting Dots

1.3.2 What are the parts of an expression?

Launch

Mathematicians look for and make use of structure. Your teacher will display a dot arrangement for a *Dot Talk*. Think about how you might use the structure of the dot arrangement in your counting strategies. Silently determine the number of dots without counting each dot. Hold a hand close to your chest and extend one finger when you have an answer and a strategy.

Explore



Closure

The Goal Journal titled "Lesson 1.3.2: Goal Journal 1" is located on the following page. Read the prompt and write a response.

Goal Journal

Lesson 1.3.2: Goal Journal 1

When learning something challenging, sometimes a small change in your mindset can make a big difference. For example, instead of saying, *"I can't do this"* you could say, *"I don't know exactly how to do that. But, I do know how to do this, so I will start there and see what I can do."*

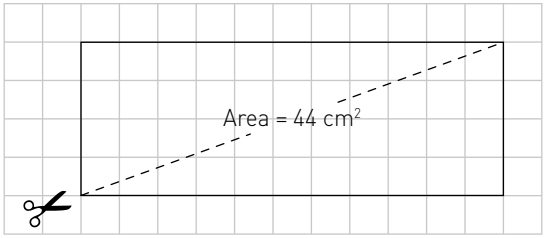
Write a specific goal for what you will do when you encounter a challenge in class. Be specific about what you plan to do and how you might make a shift in your mindset.

Lesson 1.3.2: Goal Journal 1 (vol 1, p 104)
Lesson 2.2.4: Goal Journal 2 (vol 1, p 172)
Lesson 3.1.3: Goal Journal 3 (vol 1, p 228)

Reflection & Practice

1-91.

Consider the following image.



a. What do you notice about the image?

b. If you cut along the dashed line, how are the two pieces of the rectangle related?

1-92.

I can identify parts of an expression.

Moira is counting the dots in the arrangement shown. She groups the dots as shown and writes 4 + 3 = 7.

How does Moira's sketch match what she wrote? Use the words "sum" and "term" in your explanation.

Reflection & Practice continues on page 106.

1-93.

Twyla and Alexis are discussing how to count the number of dots in an arrangement.

a. Twyla counts the arrangement as 2 + 3 + 2. Draw how she might be counting the dots on the following image.

b. Alexis counts the arrangement as 3 + 1 + 3. Draw how she might be counting the dots on the following image.

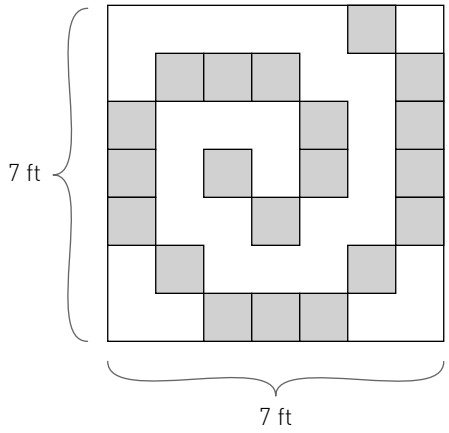
1-94. (from Lesson 1.3.1)

Complete the table.

Mathematical Expression	Explanation
$n + 21$	21 is added to an unknown number represented by n
$n + 6$	
$2n$	
	5 is being multiplied by an unknown number represented by n

1-95. (from Lesson 1.2.1)
Ms. Jancsi bought a package of bulletin-board border for the bulletin board in her classroom. The package contains 300 inches of border. The dimensions of the rectangular bulletin board are 8 feet by 3 feet. If she places the border around all four sides of the bulletin board, how much leftover border will she have? A labeled sketch may help you. (Hint: 12 inches is equal to 1 foot.)

1-96. (from Lesson 1.2.2)
Assume that the small shaded squares inside the large square each have an area of 1 square foot. Use this information to answer the following questions.



a. What is the total area of all of the shaded squares?

b. What is the total unshaded area?

c. Compute the area of the large square in two different ways.

1.3.3 Adding and Subtracting Decimals
How do I work with decimals?

Launch

Mathematicians look for and make use of structure. Your teacher will display a numerical expression for a *Number Talk*. Think about how you might use the structure of the numerical expression to determine the expression's value. Think silently and then extend one finger close to your chest when you have an answer with a justification, like you would for a *Dot Talk*.

Number Talks help build number sense and encourage working flexibly with numbers. Keep an open mind during *Number Talks* and try different strategies. Taking risks and making mistakes are parts of developing a growth mindset and important parts of your mathematical journey.

Explore

1-98.

$$\begin{array}{r} {\scriptstyle 5\ 11} \\ 5.721 \\ -\ 2.589 \\ \hline 3.042 \end{array}$$

1-99.

$$\begin{array}{r} {\scriptstyle 1} \\ 1296 \\ +\ 2012 \\ \hline 3308 \end{array}$$

1-100.

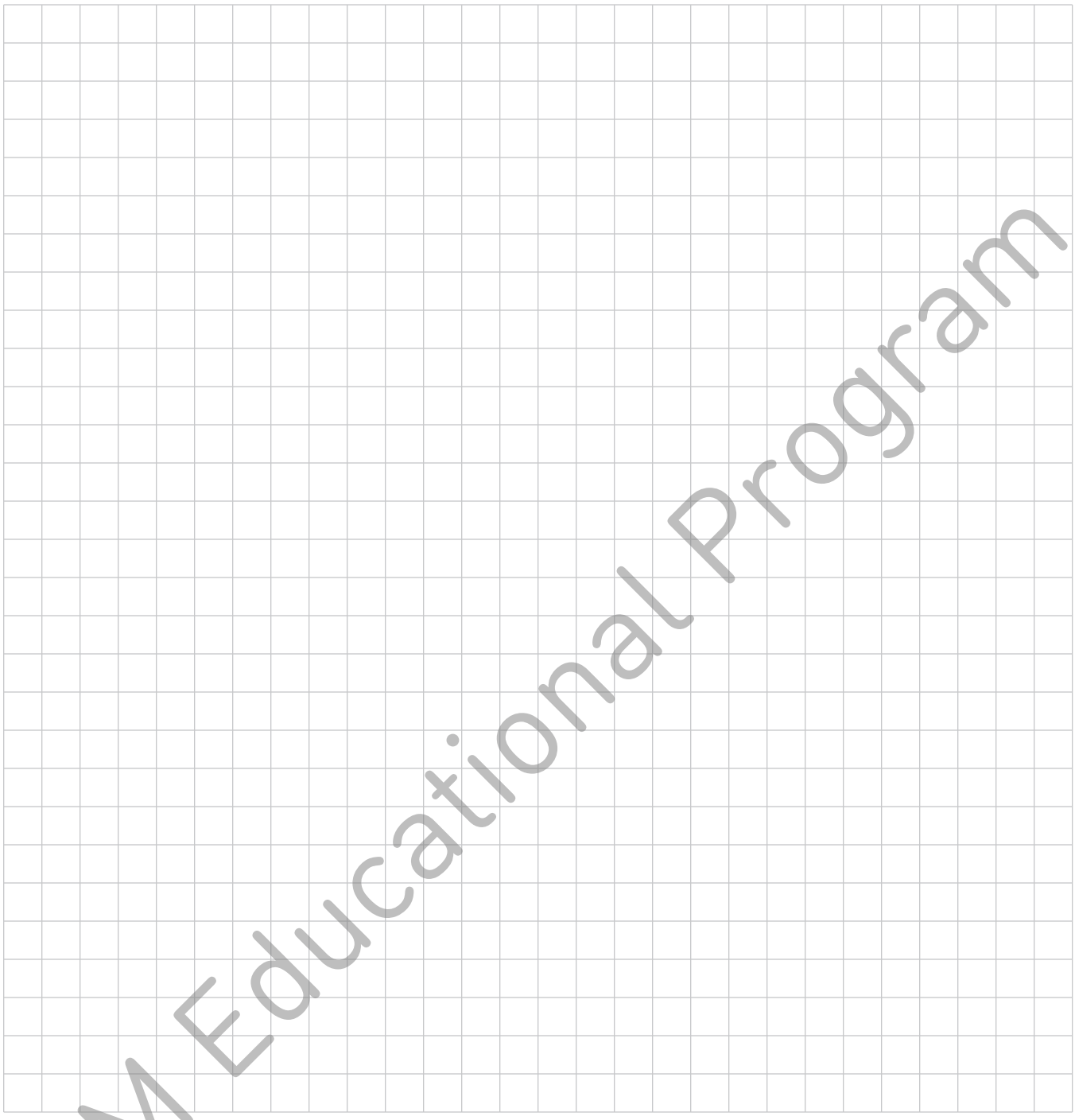
$$\begin{array}{r} 0.2105 \\ +\ 0.394 \\ \hline 0.2499 \end{array}$$

1-101.

a. 0.029 + 0.041

b. 8.675 – 3.09

c. 1.527 + 1.527 + 1.527 + 1.527 + 1.527



Closure

Work with your elbow partner to complete the following sentence frames.

a. When adding multi-digit decimals, I will _____ .

b. When subtracting multi-digit decimals, I will _____ .

Reflection & Practice

1-103.

Mathematicians look for and make use of structure. Use one of the strategies from today's *Number Talk* to calculate the sum 47 + 28 in your head. Write down your answer and describe your strategy.

1-104.

I can add multi-digit decimals using the standard algorithm.

Najia tried to evaluate 5.719 + 0.821, but did not get the correct answer. Examine her work below.

$$\begin{array}{r} 5.719 \\ +\ 0.821 \\ \hline 5.530 \end{array}$$

a. What mistake did Najia make?

b. Fix her mistake by evaluating the expression correctly. Show all of your work.

1-105.

I can subtract multi-digit decimals using the standard algorithm.

Refer to the example in part (a) and complete the missing work for parts (b) and (c).

a. $\begin{array}{r} {}^{2}\cancel{3}.{}^{1}\cancel{1}{}^{1}75 \\ -\ 2.484 \\ \hline 0.691 \end{array}$

b. $\begin{array}{r} {}^{1}7.{}^{1}3{}^{1}27 \\ -\ 4.189 \\ \hline 8 \end{array}$

c. $\begin{array}{r} 5.875 \\ -\ 1.092 \\ \hline \end{array}$

1-106. (from Lesson 1.3.1)

Janelle loves apples. She buys six apples on Sunday. She eats one on Monday, two on Tuesday, and one on Thursday. Then she buys three more apples on Friday. Write an expression to represent this scenario.

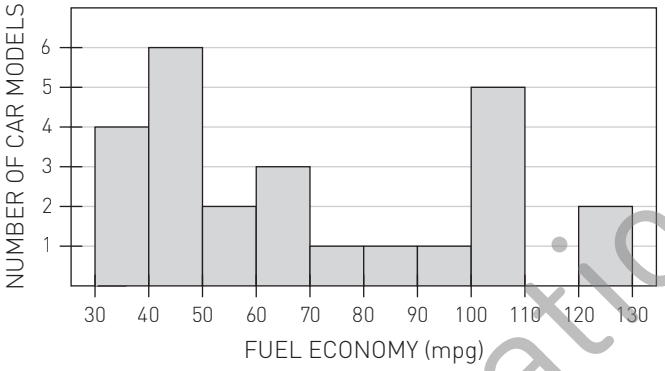
1-107. (from Lesson 1.1.4)
Determine if each of the following questions has one answer or multiple answers.

a. How many pets do you have?

b. Do you play any instruments?

c. What sports do the students in your class play?

1-108. (from Lesson 1.1.4)
Fuel economy refers to the relationship between the distance a vehicle can travel and the amount of fuel it consumes. In the United States, fuel economy is usually measured in miles per gallon (mpg). The following histogram shows the fuel economy in mpg for several different car models.



a. According to the histogram, how many car models have a fuel economy between 110 and 120 mpg?

b. According to the histogram, how many car models have a fuel economy less than 60 mpg?

c. Why is it important to consider a car's fuel economy?

Multiplying Decimals

1.3.4 How do I multiply multi-digit decimals?

Launch

Write the following number statements on your VNPS. Fill in the blank with <, >, or = without doing any calculations. Be prepared to justify your choice.

0.1 × 0.5 _____ 1

0.1 × 1.5 _____ 1

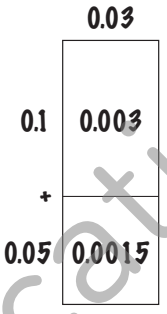
1.5 × 1.5 _____ 1

1 × 1.5 _____ 1.5

Explore

1-109.

Team A used an area model.



Team B used the standard algorithm.

$$\begin{array}{r} 0.15 \\ \times\ 0.03 \\ \hline 0.0015 \\ +\ 0.0030 \\ \hline 0.0045 \end{array}$$

Team C converted the decimals to fractions before multiplying.

$$0.15 \times 0.03$$

$$\frac{15}{100} \times \frac{3}{100} = \frac{45}{10{,}000} = 0.0045$$

Team D used problem strings and place values.

$$15 \times 3 = 45$$
$$1.5 \times 3 = 4.5$$
$$0.15 \times 3 = 0.45$$
$$0.15 \times 0.3 = 0.045$$
$$0.15 \times 0.03 = 0.0045$$

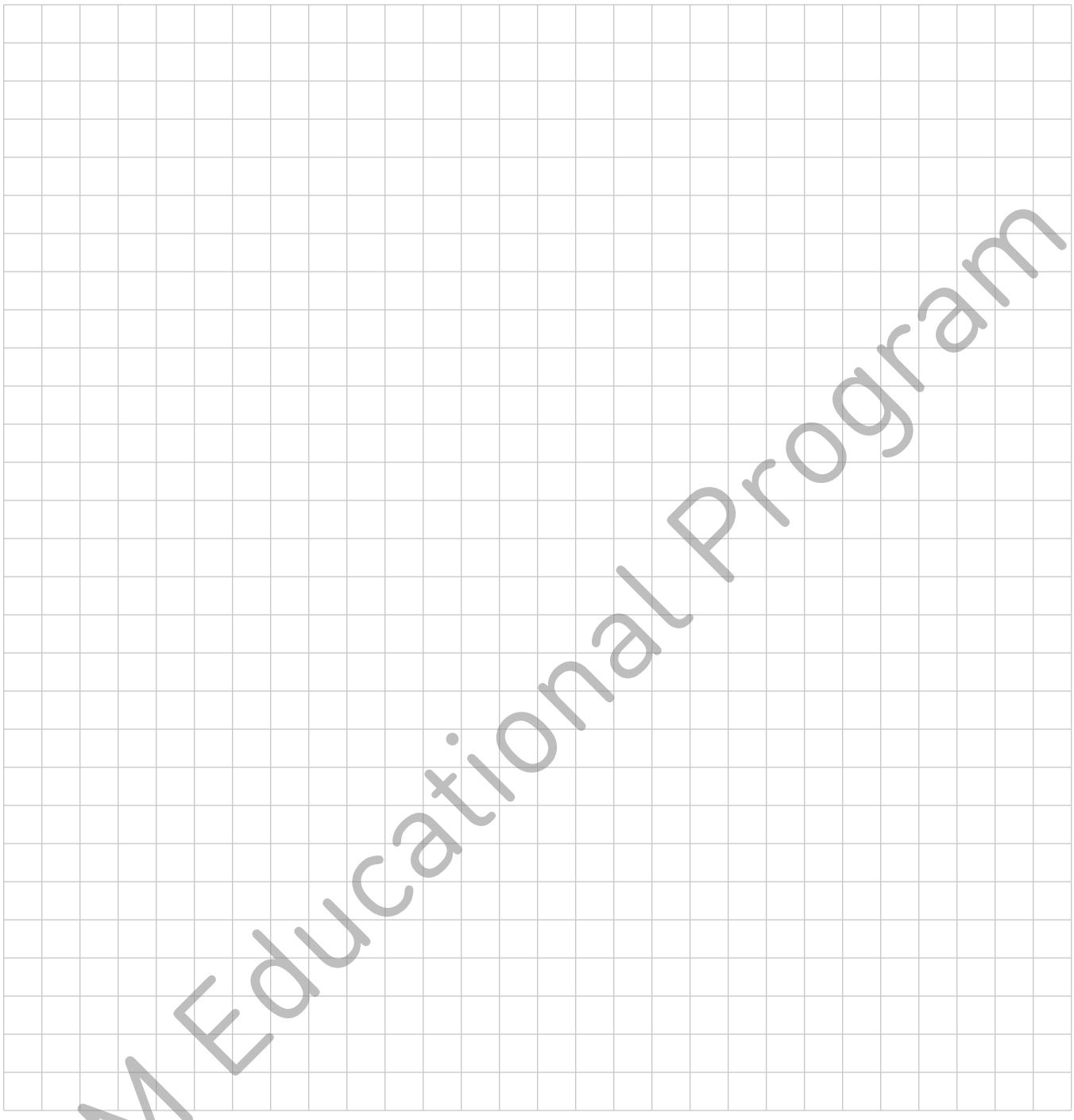
1-110.

a. 12.56 × 9.1 = 114296

b. 0.318 × 105.34 = 3349812

c. 45.3 × 17 = 7701

d. 14.7 × 3243.6 = 4768092



Closure Work with your team to calculate 3.54 × 0.03 using the standard algorithm.

Reflection & Practice

1-111.

Fill in each blank with <, >, or =.

a. 0.01 × 1 _____ 1

b. 0.1 × 1 _____ 1

c. 1 × 1 _____ 1

d. 10 × 1 _____ 1

1-112.

I can multiply multi-digit decimals using the standard algorithm.

Emilio calculated 7.77 × 7.77 incorrectly. His work is shown.

$$\begin{array}{r} 7.77 \\ \times\ 7.77 \\ \hline 0.4999 \\ 4.9990 \\ +\ 49.9900 \\ \hline 55.4889 \end{array}$$

a. What did Emilio do incorrectly? Explain.

b. What did Emilio do correctly? Explain.

c. What should the product be instead?

1-113.

Evaluate 314 × 25 and 3.14 × 0.25 using the standard algorithm for multiplication. What do you notice?

1-114. (from Lesson 1.3.3)

Evaluate the following expressions without using a calculator.

a. 3.541 + 0.09

b. 3.541 – 0.09

c. 0.5413 + 0.1231

d. 0.5413 – 0.1231

1-115. (from Lesson 1.3.1)

Write a story to match the expression $6 + x - 3$.

1-116.

Everyone makes mistakes. What do you think is a common mistake made when adding, subtracting, or multiplying decimals?

Pennies and Dice

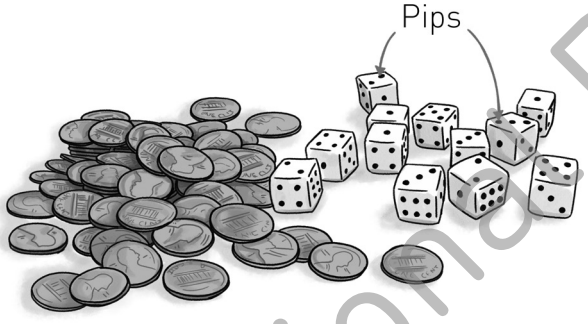
1.3.5 How can I represent the arrangement?

Launch

Mathematicians construct viable arguments and critique the reasoning of others. Be ready to construct an argument during this *Which One Is Unique?* activity. As with any Math Chat, think silently and then extend one finger close to your chest when you have a response and justification.

Explore

1-117.



Closure Your teacher will ask several teams to present their work.

Reflection & Practice

1-121.

Hiram's exam asked him to subtract 0.1 from 14. Which answer should he give?

A. 13.09 B. 13.9 C. 13 D. 12.9

1-122.

I can write an expression to represent an arrangement of objects.

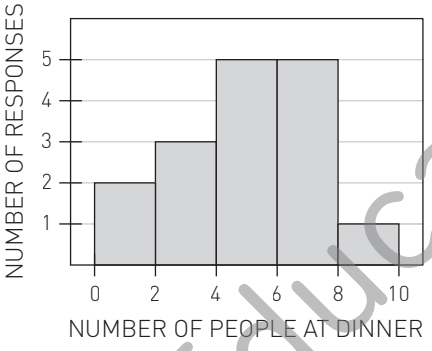
Jane has a pile of pennies. She arranges the pennies into 11 piles of 10 pennies, then has 7 pennies left over.

a. Write an expression to match this description.

b. Identify the product, sum, and terms in your expression from part (a).

1-123. (from Lesson 1.1.4)

Lyn asked some of her classmates how many people in their households are normally at home for dinner. She recorded the results in the following histogram.



a. How many classmates did Lyn survey?

b. How many of Lyn's classmates have eight or nine people at home for dinner?

c. Can you tell which is the most common number of people home for dinner? Why or why not?

1-124. (from Lesson 1.3.3)

Evaluate each of the following expressions without using a calculator. Then use a calculator to check your answers. **For additional support, refer to the Methods & Meanings box "Adding and Subtracting Multi-Digit Decimals" on page 310.**

a. 56.7 – 0.23

b. 1.23 + 3.045

c. 4.1 – 0.856

d. 0.045 + 1.2 + 62.003

1-125. (from Lesson 1.3.4)

The following multiplication problems have the correct digits in the answers, but each is missing the decimal point. Without using a calculator, determine where the decimal point should be placed for each answer.

a. 24.6 × 8.11 = 199506

b. 5.36 × 9.14 = 489904

c. 1.57 × 0.25 = 3925

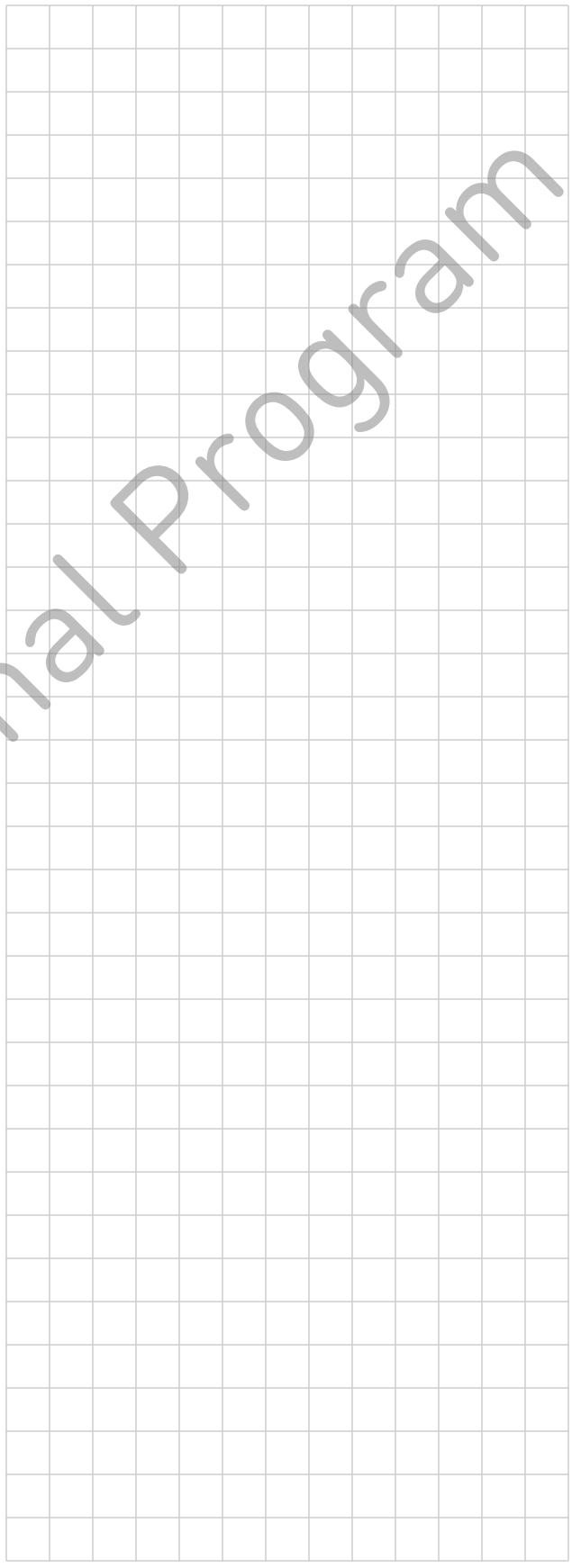
1-126.

As you near the end of Chapter 1, reflect on your learning.

a. List three things from this chapter that you already knew about before you started.

b. List two things from this chapter that refreshed your learning.

c. List one thing from this chapter that you want to learn more about.



Chapter 1 Vocabulary

Area

Data

Dimensions

Difference

Dot plot

Equation

Expression

Factor

Histogram

Perimeter

Polygon

Product

Quotient

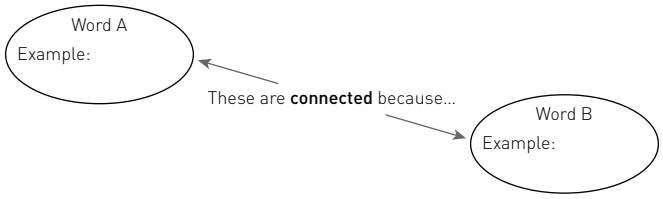
Sum

Term

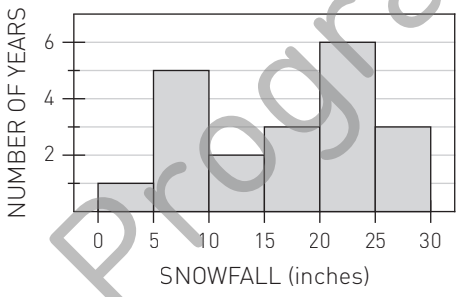
Chapter 1 Closure

The last section of each chapter is a Chapter Closure. This section gives you the chance to reflect on the chapter, summarize your learning, and make mathematical and real-world connections. There are four options in each Chapter Closure. Your teacher will let you know which option(s) you are using to close the chapter.

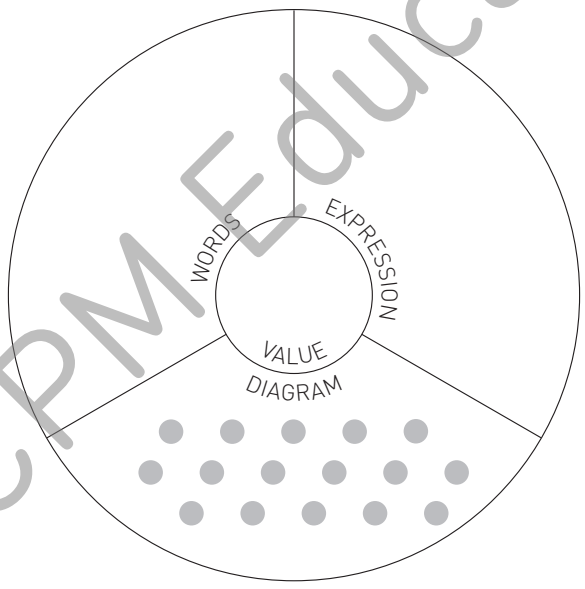
Making Connections



Checking Understanding



Summarizing Learning



Considering Perspectives

Checking Understanding

What Have I Learned?

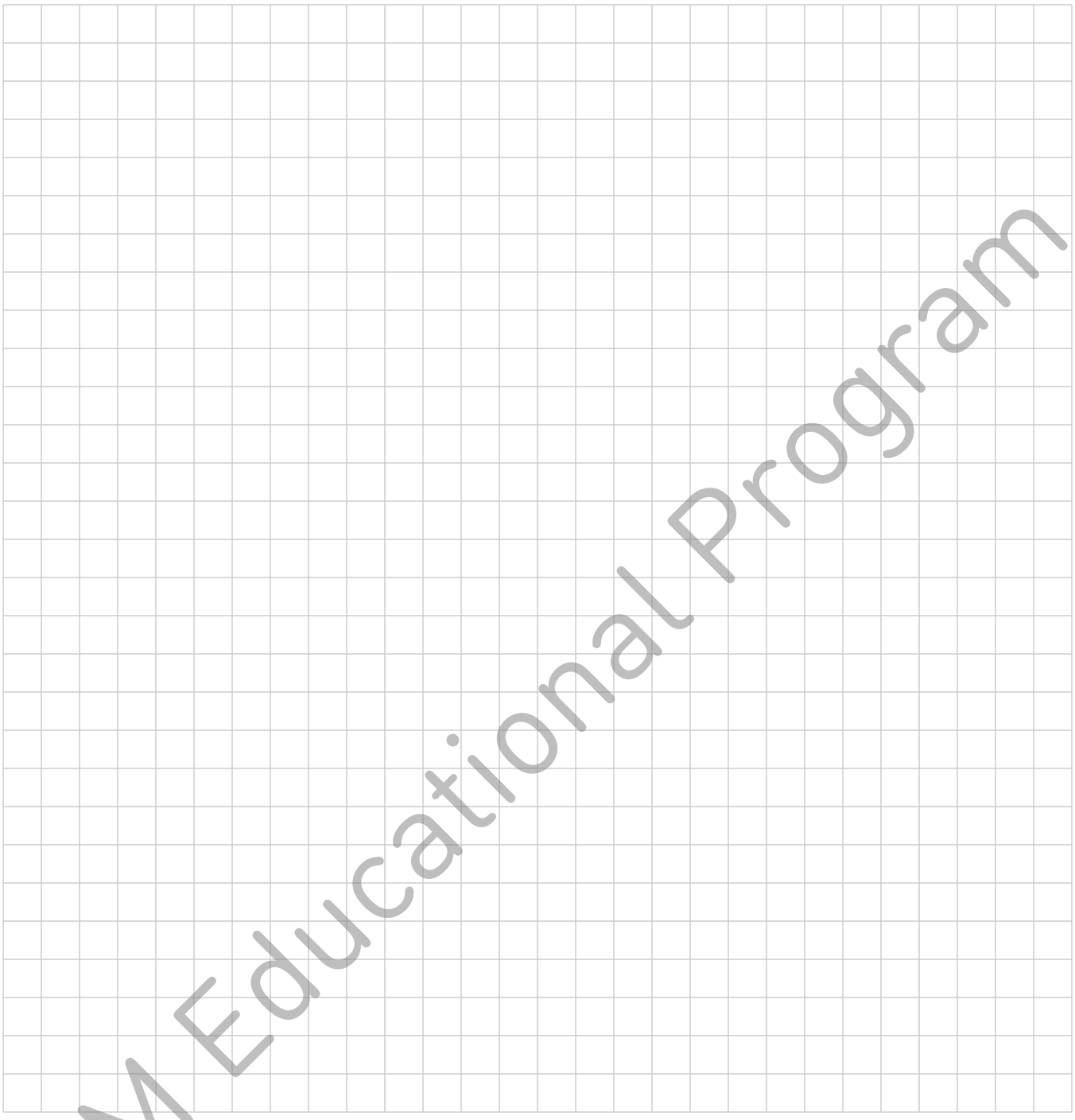
Launch

Look at the following student work and think silently. What does this student know? What mistake is this student making?

14.9 – 0.03

$$\begin{array}{r} 14.9 \\ -\ 0.03 \\ \hline 14.6 \end{array}$$

Explore



Closure

The Reflection Journal titled "Chapter 1 Closure: Teamwork" is located on the following page. Read the prompt and write a response.

Reflection Journal

Chapter 1 Closure: Teamwork

Working as a team can be beneficial and fulfilling.

Think about your experiences with collaboration and teamwork in math class. Answer the following questions about your experiences in math class this year.

- How has working with your team helped you understand the mathematics better?
- What are the challenges of working with your team?
- How can you be a more supportive team member and participate more in your team?

Reflection & Practice

The end of a chapter is a good time to reflect on what you have accomplished so far. Take some time now to review your progress on the Chapter 1 Learning Targets listed at the beginning of the chapter. Then use the following table to support your learning.

Closure Problem (Cluster)	Learning Targets	Need Help?	More Practice
CU 1-127 (previous course)	I can round decimals to a given place value.	• Lessons 1.1.1, 1.1.2, 1.3.3 • Place Value Methods & Meanings (1.1.2) • Rounding Methods & Meanings (1.1.4)	• Problems 1-16, 1-36
CU 1-128 (EE.A)	I can multiply using the area model.	• Lesson 0.1.5 • Multiplication Using Area Models Methods & Meanings (0.1.6)	• Problems 0-39, 0-46, 1-18, 1-45, 1-64, 1-73
CU 1-129 (EE.A)	I can write a numerical expression. I can write an expression to represent an arrangement of objects.	• Lessons 0.1.2, 0.1.3, 1.3.1, 1.3.2, 1.3.4	• Problems 0-23, 0-25, 0-32, 0-52, 1-7, 1-32, 1-61, 1-85, 1-92, 1-93, 1-106, 1-122
CU 1-130 CU 1-131 (NS.C)	I can position whole numbers, mixed numbers, fractions greater than one, and decimals on a horizontal number line.	• Lessons 1.1.1, 1.1.2	• Problems 1-6, 1-14, 1-15, 1-17, 1-27, 1-37, 1-65, 1-72, 1-80
CU 1-132 CU 1-133 CU 1-134 (SP.A and SP.B)	I can read and create a bar graph. I can determine if a question has multiple answers. I can read and analyze parts of a histogram. I can use a histogram to display frequency. I can create a dot plot. I can report the number of observations in a data set.	• Lessons 0.1.1, 1.1.4, 1.1.5, 1.1.6 • Data Displays Methods & Meanings (1.2.1)	• Problems 0-6, 0-7, 0-27, 0-45, 1-8, 1-26, 1-34, 1-35, 1-41, 1-42, 1-44, 1-52, 1-53, 1-63, 1-71, 1-107, 1-108, 1-123
CU 1-135 (G.A)	I can calculate the area of a figure made of square units. I can calculate the perimeter of a figure. I can calculate the area of a polygon by summing the areas of its parts.	• Lessons 1.2.1, 1.2.2, 1.2.3 • Perimeter and Area Methods & Meanings (1.2.2) • Rectangles and Square Units Methods & Meanings (1.2.3) • Lesson 1.2.2 Reflection Journal: Square Units and Areas	• Problems 1-62, 1-68, 1-69, 1-70, 1-77, 1-78, 1-79, 1-87, 1-95, 1-96

EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.

NS.C Apply and extend previous understandings of numbers to the system of rational numbers.

SP.A Develop understanding of statistical variability.

SP.B Summarize and describe distributions.

G.A Solve real-world and mathematical problems involving area, surface area, and volume.

Checking Understanding

CU 1-127. (from a previous course)

Round each decimal number to the specified place.

a. Round 17.1936 to the hundredths place.

b. Round 0.2302 to the thousandths place.

c. Round 8.256 to the tenths place.

CU 1-128. (from Lesson 0.1.5)

Examine the area model and answer parts (a) and (b).

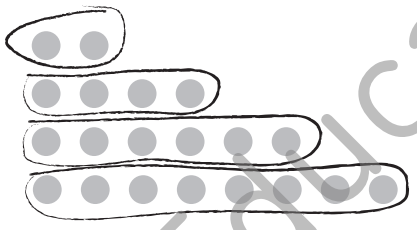
500	20
150	6

a. What two numbers are being multiplied using this area model?

b. Write the product of these numbers as a sum of the areas and evaluate it.

CU 1-129. (from Lessons 0.1.3 and 1.3.1)

Cece draws the following diagram on her paper.



a. Write an expression to represent how Cece is adding the numbers.

b. How might you rearrange the dots to visualize this sum differently?

CU 1-130. (from Lessons 1.1.1 and 1.1.2)

Fill in the missing numbers for each number line.

a.

b.

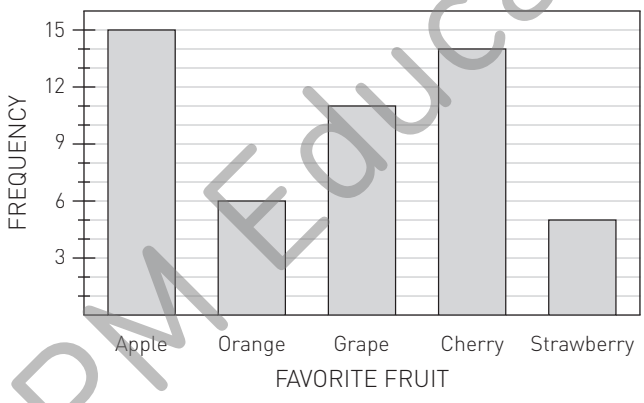
c.

CU 1-131. (from Lesson 1.1.2)

The portion of the number line between $\frac{1}{8}$ and $\frac{1}{2}$ is divided into three equal portions as shown. What number should be placed at the position marked by the arrow?

CU 1-132. (from Lesson 0.1.1)

Lina asked some students at her school what their favorite fruit was. Then she made the following bar graph.



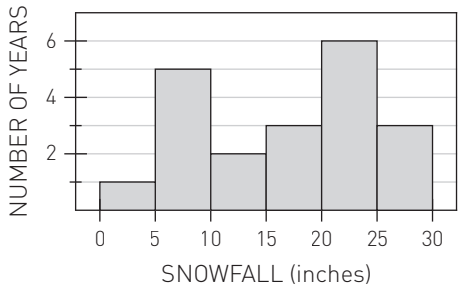
a. How many people's favorite fruit is strawberries?

b. What was the most common response?

c. How many people did Lina survey?

Checking Understanding continues on page 128.

CU 1-133. (from Lessons 1.1.4, 1.1.5, and 1.1.6)
Use the histogram shown to answer the following questions. The histogram shows the amount of snowfall in Fancyville each year for 20 years.



a. What is the unit of measurement for snowfall?

b. How many years of data are displayed on this histogram?

c. Which range of measurements occurred most often?

d. Were there any years with unusually high or low snowfall?

e. How many years had less than 20 inches of snow?

f. The data in this histogram was collected because someone asked a question. Which of the following questions was most likely asked? Why?

   I. How much does it snow in Fancyville?

   II. How many years between 1990 and 2009 did Fancyville have between 5 and 10 inches of snow?

CU 1-134. (from Lesson 1.1.6)
Use the following data to create a dot plot.

Year	Number of Major Atlantic Hurricanes
2010	5
2011	4
2012	2
2013	0
2014	2
2015	2
2016	4
2017	6
2018	2
2019	3
2020	6

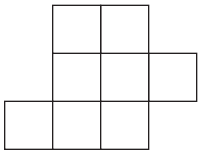
source: noaa.gov

NUMBER OF MAJOR ATLANTIC HURRICANES
2010–2020

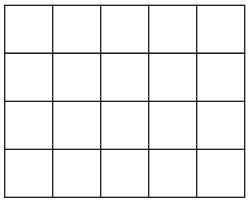
Checking Understanding continues on page 130.

CU 1-135. (from Lessons 1.2.1 and 1.2.2)
Calculate the perimeter and area of each figure in parts (a) through (c). Then answer parts (d) and (e).

a.



b.



c.

d. Sketch one way to rearrange the tiles in part (a) so that the shape has a larger perimeter.

e. Sketch one way to rearrange the tiles in part (a) so that the shape has a smaller perimeter.

Checking Understanding Answers

CU 1-127.

a. 17.19

b. 0.230

c. 8.3

CU 1-128.

a. Responses may vary. Possible responses include: 52 and 13, but 26 and 26 is also an option.

b. $52 \cdot 13 = 500 + 20 + 150 + 6 = 676$ or
$26 \cdot 26 = 500 + 20 + 150 + 6 = 676$

CU 1-129.

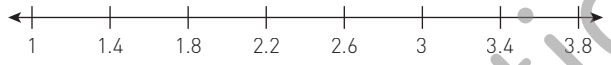
a. $2 + 4 + 6 + 8$

b. Responses may vary. Possible responses include: rearranging the dots into a rectangular array and multiplying the length by the width.

CU 1-130.

a.

b.



c.

CU 1-131.

$\frac{3}{8}$

CU 1-132.

a. 5

b. apples

c. 51

CU 1-133.

a. inches

b. 20 years

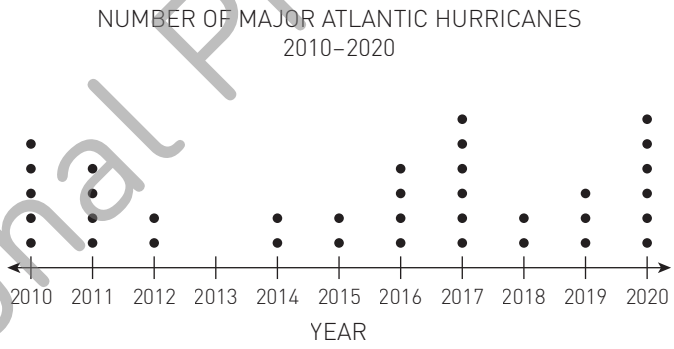
c. 20 to 25 inches

d. Responses may vary. Possible responses include: the year with less than 5 inches of snowfall was unusually low, but without the specific data points, this is unclear.

e. 11 years

f. I; This is a statistical question (the answer has variability).

CU 1-134.



CU 1-135.

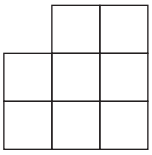
a. perimeter = 14 units, area = 8 square units

b. perimeter = 18 units, area = 20 square units

c. perimeter = 40.6 meters, area = 84.1 square meters

d. Responses may vary. A possible arrangement is shown.

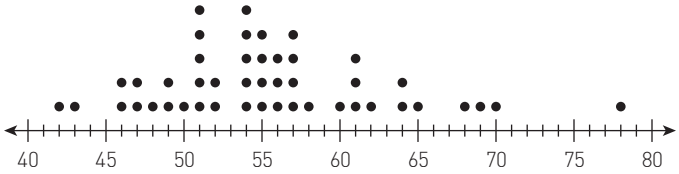
e. Responses may vary. A possible arrangement is shown.



Checking Understanding

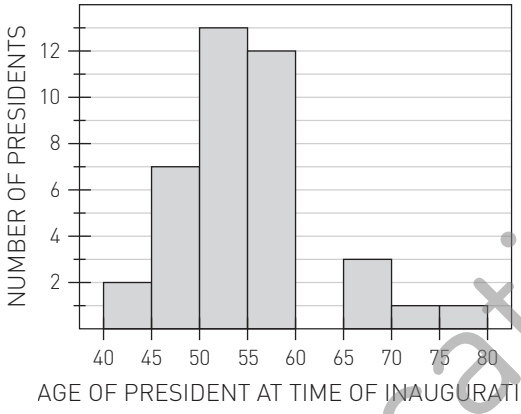
CU 3-135. (from Lessons 1.1.5 and 1.1.6)

The following dot plot contains the age of each of the U.S. presidents (as of 2021) at the time of their inauguration.



a. How old was the oldest president at the time of their inauguration? How old was the youngest?

b. The following histogram represents some of the data about U.S. presidents. Fill in the missing bar. How did you decide how tall the bar should be?



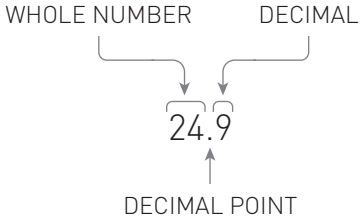
c. How many U.S. presidents were younger than 50 years old at the time of their inauguration?

d. How many U.S. presidents are represented by this data set?

Checking Understanding continues on page 294.

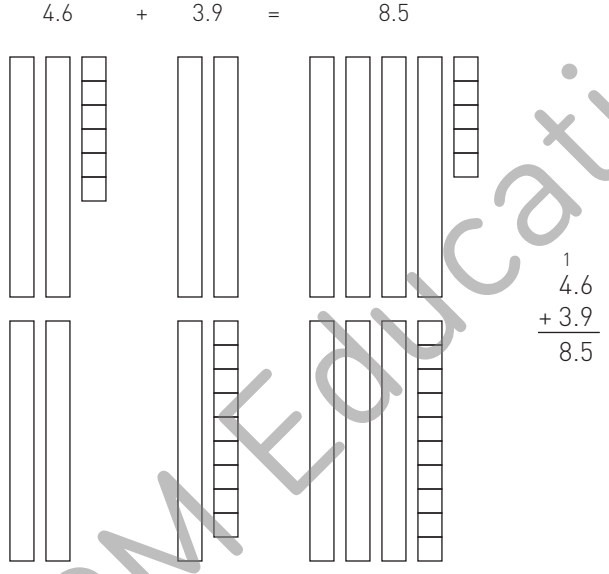
Operations With Decimal Numbers (from Lesson 0.1.3)

Decimal numbers are numbers that contain a **decimal point** that separates a whole number from the decimal, or part of a whole. For example, the number 24.9 (twenty-four and nine-tenths) is a decimal number composed of 2 tens, 4 ones, and 9 tenths.



Addition

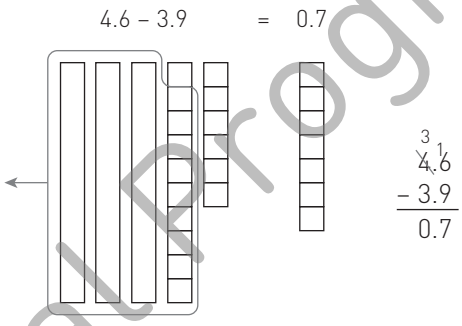
Adding decimal numbers requires combining the whole numbers and the decimals. For example, to add 4.6 and 3.9, combine the 4 ones, the 6 tenths, the 3 ones, and the 9 tenths. The sum (8.5 or 8 ones and 5 tenths) can be calculated using unit blocks or the standard algorithm with regrouping, as shown.



$$\begin{array}{r} {\scriptstyle 1} \\ 4.6 \\ +\ 3.9 \\ \hline 8.5 \end{array}$$

Subtraction

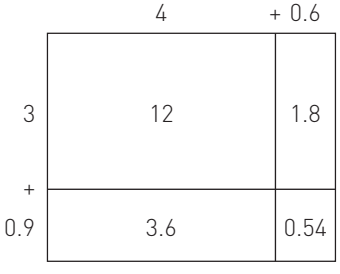
Subtracting decimal numbers requires subtraction of both the whole number and the decimal of the subtrahend from the whole number and the decimal of the minuend. For example, to subtract 3.9 (the subtrahend) from 4.6, (the minuend) start with 4 ones and 6 tenths and then remove 3 ones and 9 tenths. The difference (0.7 or 7 tenths) can be calculated using unit blocks or the standard algorithm with regrouping, as shown.



$$\begin{array}{r} {\scriptstyle 3\ \ 1} \\ 4.6 \\ -\ 3.9 \\ \hline 0.7 \end{array}$$

Multiplication

Multiplying decimal numbers requires careful attention to place value. The whole numbers and decimals of each factor are multiplied and the partial products are added together. For example, to multiply 4.6 by 3.9, an area model or the standard algorithm can be used to calculate the product (17.94 or 1 tens, 7 ones, 9 tenths, and 4 hundredths), as shown.



$$\begin{array}{r} {\scriptstyle 1} \\ 4.6 \\ \times\ 3.9 \\ \hline 0.54 \\ 3.60 \\ 1.80 \\ +12.00 \\ \hline 17.94 \end{array}$$

$4.6 \times 3.9 = 17.94$

Even and Odd Numbers (from Lesson 0.1.4)

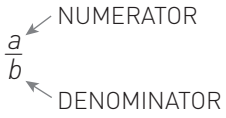
The numbers {1, 2, 3, 4, 5, 6, ...} are called **natural numbers** or **counting numbers**. Note that the **whole numbers** include the natural numbers and 0.

A natural number is **even** if it is divisible by 2 with no remainder. Otherwise, the natural number is **odd**. Because even numbers are divisible by 2, they can be represented by pairs of dots. For example, the number 10, which is even, can be represented by five pairs of dots, as shown.

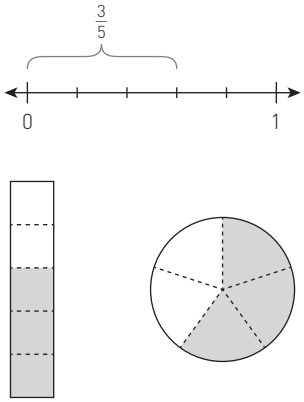
Odd numbers are not divisible by 2. When an odd number is divided by 2, there is always a remainder of 1. Therefore, an odd number can be represented with pairs of dots followed by an unpaired dot. For example, the odd numbers 7 and 11 can be represented by the dot arrangements shown.

Fractions (from Lesson 0.1.5)

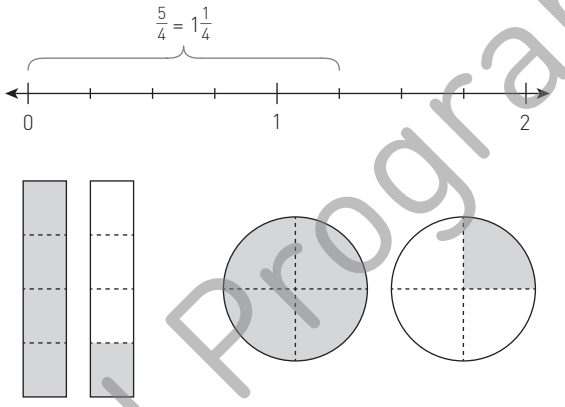
A **fraction** is a type of number expressed in the form $\frac{a}{b}$, where b is not equal to 0. The **numerator** (the number above the bar) is the number of equal parts, while the **denominator** (the number below the bar) is the number of equal parts in the whole.



For example, the fraction $\frac{3}{5}$ refers to three parts of a whole divided into five parts. Different representations of $\frac{3}{5}$ are shown.



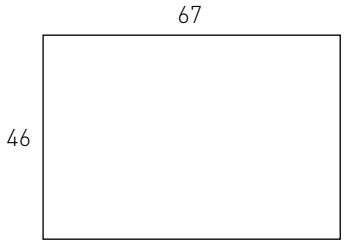
When the numerator is greater than the denominator, the fraction can be written as a **fraction greater than one** or as a **mixed number**. For example, the fraction $\frac{5}{4}$ and the mixed number $1\frac{1}{4}$ both refer to five parts of a whole divided into four parts. Different representations of $\frac{5}{4}$ are shown.



Multiplication Using Area Models (from Lesson 0.1.6)

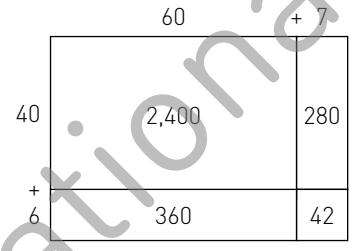
Area models are a useful tool to represent multiplication. The area of a rectangle can be calculated by multiplying the length by the width. Therefore, a rectangle can be used to represent the product of two numbers, where one number represents the length and the other represents the width.

For example, the product 46 · 67 can represent the area of a rectangle with dimensions 46 and 67 units.



To calculate the product 46 · 67, think of 46 as 40 + 6 and 67 as 60 + 7. Divide the rectangle accordingly. Determine the area of each of the smaller rectangular regions and then calculate the sum of these areas. This sum is the area of the large rectangle and the answer to the original problem. This process can be summarized mathematically as follows.

46 · 67 = (40 + 6)(60 + 7) = 2,400 + 280 + 360 + 42 = 3,082

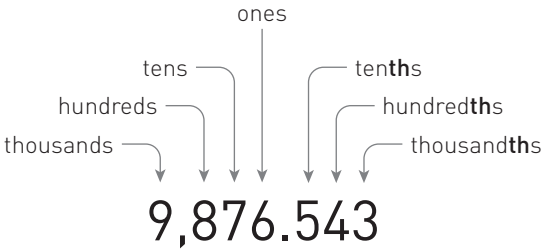


Place Value (from Lesson 1.1.2)

The value assigned to the place that a digit occupies is called the **place value**. In the base 10 number system, the place values are all powers of 10.

Starting from the decimal point and moving to the left, the place values are ones, tens, hundreds, thousands, ten thousands, and so on. Starting from the decimal point and moving to the right, the place values are ten**ths**, hundred**ths**, thousand**ths** and so on.

In the example shown, the place occupied by 8 has a place value of 100, so the value of the digit 8 is 800.



In words, the number 9,876.543 is nine thousand, eight hundred seventy-six and five hundred forty-three thousandths.

In words, the number 64.3 is sixty-four and three tenths.

In words, the number 7.17 is seven and seventeen hundredths.

The word "and" is used to indicate the location of the decimal point.

Rounding (from Lesson 1.1.4)

Sometimes you want an approximation of a number. One way to do this is to **round** the number. For example, 4,738 is 5,000 when rounded to the nearest thousand.

Use the following steps to round a number:

1. Find the place to which the number will be rounded.
2. Examine the digit one place to the right of this place.
3. If the digit is 5 or greater, round up (add 1 to the place you are rounding). If the digit is less than 5, round down (keep the digit in the place you are rounding the same).

In the example 4,738 above, the number 4 is in the thousands place. The digit to the right of the thousands place (in the hundreds place) is 7, which is greater than 5. This means the 4 needs to be increased by 1.

Consider the following examples.

To round 431.6271 to the nearest tenth, the steps are as follows:

1. Focus on the 6 in the tenths place.
2. The number to the right (in the hundredths place) is 2, which is less than 5.
3. The tenths place value remains the same and the following digits are removed to give the answer of 431.6.

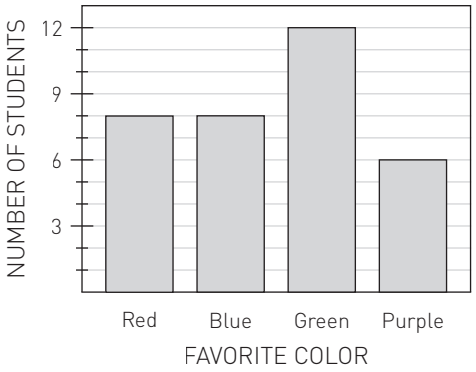
To round 17,389 to the nearest hundred, the steps are as follows:

1. Focus on the 3 in the hundreds place.
2. The number to the right (in the tens place) is 8, which is more than 5.
3. One is added to the hundreds place and the following digits are replaced with zeros to give the answer of 17,400.

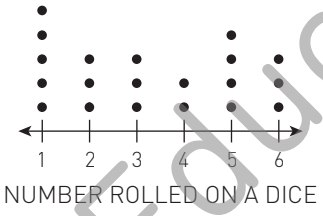
Data Displays (from Lesson 1.2.1)

Data can be displayed visually in different formats depending on the kind of information collected.

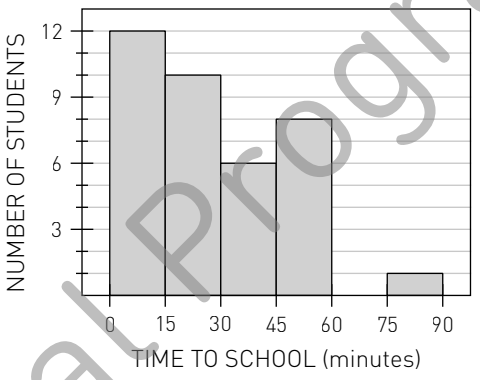
A **bar graph** is used when data falls in categories that typically have no numerical order. The frequency (number of pieces of data in each interval) is represented by the height of the bar. For example, the following bar graph shows that green is the favorite color of 12 students.



A **dot plot** is a way of displaying data that has an order and can be placed on a number line. Dot plots are generally used when the data is discrete (separate and distinct) and numerous pieces of data fall on most values. For example, the following dot plot shows that a 1 was rolled on a dice five times out of 20 rolls.



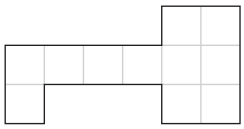
A **histogram** is similar to a dot plot except that each bar represents a range of data. The span of each interval (or **bin**) is represented by the width of the bars. The values on the horizontal axis represent the lower end of each interval. For example, the following histogram shows that 10 students take at least 15 minutes but less than 30 minutes to get to school.



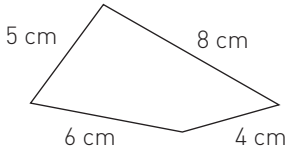
Histograms and dot plots are for displaying numeric data with an order. Bar graphs are for categorical data, where order generally does not matter.

Perimeter and Area (from Lesson 1.2.2)

The **perimeter** of a shape is the total length of the boundary around the shape. See the following examples.

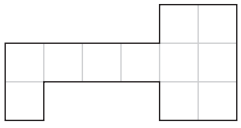


Perimeter = 2 + 4 + 1 + 2 + 3 + 2 + 1 + 3 + 1 + 1 = 20 units

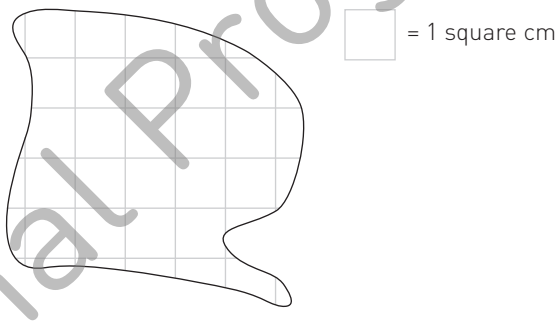


Perimeter = 5 + 8 + 4 + 6 = 23 cm

The **area** of a shape is the number of square units that fit inside of the shape. In this course, you will be asked to consider the area of flat regions such as the top of a table, the floor of your classroom, various geometric shapes, and the surface of a pond. See the following examples.



Area = 11 square units



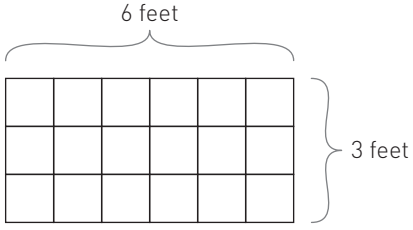
Area = between 23 and 24 square cm

Rectangles and Square Units (from Lesson 1.2.3)

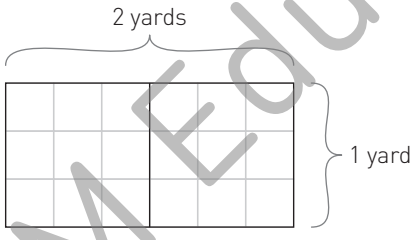
A **rectangle** is a quadrilateral (a polygon with four sides) with four right angles. The opposite sides are equal in length. Two sides that meet at a right angle are referred to as the length and width, or base and height. The area of any rectangle is calculated using the relationship area = length · width. Often, other shapes can be rearranged into rectangles. Therefore, the ability to calculate the area of a rectangle is a useful and important tool in this course and for the future.

To determine the area of a rectangle, choose a square unit of a convenient size to cover the rectangle completely with no overlaps. Sometimes this will require fractional parts of the square units.

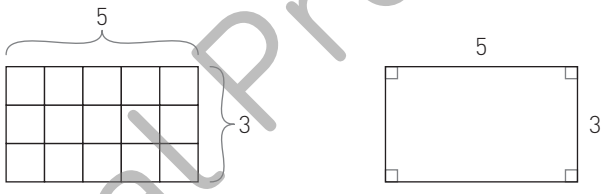
It takes 18 squares (each with a side length of 1 foot) to cover the following rectangle. Therefore, the area of the rectangle is 18 square feet.



Shapes can be measured in different units. While the area remains the same, the number of unit squares inside the shape changes. For example, the above rectangle can be measured in yards. Note that while the units of measurement changed, the area of the rectangle did not. Therefore, this rectangle's area can be described as either 18 square feet or 2 square yards.



The number of unit squares in a rectangle can be calculated by multiplying the lengths of the base and height (since multiplication is defined as repeated addition). For example, the area of the following rectangle can be interpreted as five columns of 3 unit squares or three rows of 5 unit squares. In either case, the area of a rectangle can be computed using the formula area = (base)(height).



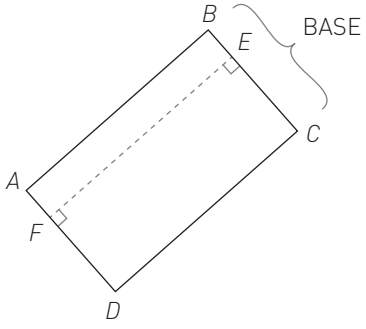
Base = 5 units, Height = 3 units
Area = 5 · 3 = 15 square units

Units for area are often abbreviated. An area of 18 square feet can also be written as 18 ft^2 or (2 yd^2).

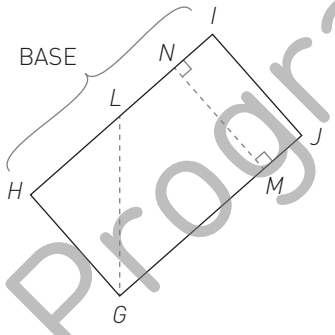
Base and Height of a Rectangle (from Lesson 1.3.1)

Any side of a rectangle can be chosen as its **base**. Then the **height** is either of the two sides that intersect (meet) the base at one of its endpoints. Note that the height may also be any segment across the rectangle that is **perpendicular** to (each end forms a 90° angle with) the base.

In the following rectangle, $\overline{BC}$ is chosen as the base. As a result, $\overline{AB}$ and $\overline{DC}$ are heights, as is $\overline{FE}$.



In the following rectangle, $\overline{HI}$ is chosen as the base; so $\overline{HG}$, $\overline{IJ}$, and $\overline{MN}$ are heights. Note that $\overline{GL}$ is not a height because it is not perpendicular to $\overline{HI}$.



Adding and Subtracting Multi-Digit Decimals (from Lesson 1.3.5)

Adding Multi-Digit Decimals

When adding multi-digit decimals using the standard algorithm, you must align the digits according to their place value. The first step is to add the right-most digits together. In the following example, this is 3 and 9. Their sum, 12, represents 12 ten-thousandths, so the 2 remains in the ten-thousandths place, while the 1 is added to the thousandths place. When the digits in the thousandths place are added, this 1 is added as well. This regrouping is informally known as "carrying." This process is then continued for the remaining digits.

A demonstration of the addition of multi-digit decimals follows.

$$\begin{array}{r} 39.0143 \\ +\ 6.7959 \end{array}$$ Align the digits according to their place values.

$$\begin{array}{r} {\scriptstyle 1} \\ 39.0143 \\ +\ 6.7959 \\ \hline 2 \end{array}$$ Add from right to left.

$$\begin{array}{r} {\scriptstyle 1\ 111} \\ 39.0143 \\ +\ 6.7959 \\ \hline 45.8102 \end{array}$$ Regroup as needed.

Subtracting Multi-Digit Decimals

Just like with addition, you must align the digits by their place values for multi-digit subtraction. For each place value, subtract the bottom digit from the top digit. When the top digit is less than the bottom digit, the next greatest place value represented is used to make the subtraction possible. In the following example, when computing the difference between the ten-thousands, 1 one-thousandth is taken from 0.004 and added to 0.0003 to make 13 ten-thousandths. This regrouping is informally known as "borrowing."

A demonstration of the subtraction of multi-digit decimals follows.

$$\begin{array}{r} 39.0143 \\ -\ 6.7959 \end{array}$$ Align the digits according to their place values.

$$\begin{array}{r} {\scriptstyle 3} \\ 39.0143 \\ -\ 6.7959 \\ \hline 4 \end{array}$$ Subtract from right to left.

$$\begin{array}{r} {\scriptstyle 11} \\ 39.0143 \\ -\ 6.7959 \\ \hline 32.2184 \end{array}$$ Regroup as needed.

Representative

Reports the team's thinking to the class

Answers questions asked of the team

"I am going to share _____ with the class. What else should I include?"

"I think our conclusion is that _____. Do we all agree?"

"I heard you say _____. Is that the same as _____?"

"How should we share our answer with the class?"

"When we report out to the class, I plan to say _____."

Coordinator

Tracks tasks and time

Helps the team agree on a strategy

"Okay, let's get back to work!"

"We have _____ minutes left!"

"What strategy should we start with?"

"Did we answer all parts of the question?"

"They said _____. Who agrees? Why or why not?"

Investigator

Asks teacher questions

Makes sure the team justifies their work

"We all seem to be stuck on _____. Should I call the teacher over?"

"What should I ask the teacher?"

"How can we justify this?"

"Can you please explain how you know that?"

"How do we know that is the answer?"

Organizer

Collects and returns materials

Ensures team members record their work

"What supplies do we need?"

"What do we need to solve this problem?"

"I will go get _____ if you will get _____."

"What _____ said seems to make sense to all of us. How should we record that?"

"How should we organize our work so that it will be clear to someone else?"

General Sentence Frames

Use these sentence frames to start, continue, or improve discussions throughout this course.

Collaborate

When you said _____, that made me think _____.

I think what you are saying is _____.

This part of _____ reminds me of _____.

That is an interesting idea that relates to _____.

That's a great idea. Which part of _____ does that represent?

_____ did not work, but what I learned is _____.

We have _____. Is _____ the next step?

Does anyone have a prediction or estimate to share?

Check-in

I see you are _____. Does that mean _____?

Let's take 1 minute to think independently.

I need a break. Does anybody else need a break?

[Name], you have been quiet. Do you feel excluded from the conversation?

When I [said/did] _____, how did that make you feel?

I am getting frustrated. Will you help me _____?

If you [see/hear] me _____, I need you to _____.

The team [is/is not] _____. Does that mean _____?

Broaden

_____ connects to _____ because _____.

Would it be easier to draw something?

We all agree that _____. Let's look around the room to see what other teams are thinking.

What do you think [Name] would say?

[Name]'s approach looks different from mine. How are our approaches similar?

I heard someone from another team say _____. How can we incorporate this?

What's another way to think about this?

Change

What if _____?

If we change _____, what else changes?

I checked this by _____. Can someone confirm this by checking another way?

Changing _____ to _____ might make this easier.

What would happen if we tried _____?

I heard someone say _____. Does that change how we approach this?

This reminds me of a problem we did before where we _____.

Challenge

I can see how _____ can be interpreted as _____ and _____.

Let's be sure to include multiple perspectives. What haven't we considered?

I don't think we included [Name]'s idea. How can we incorporate it?

I heard you say _____. Did you make some assumptions to come to that conclusion?

Can you explain _____ further?

What if we approached this by _____?

Refine

I heard you say _____. What does that mean?

_____ to me means _____. What does it mean to you?

What words come to mind when you [look at/think about] _____?

We are stuck on _____. Let's pause and look around the room for ideas.

Does anyone know how to _____?

If the task is to _____, are we finished?

We know _____. We're missing _____. What else?