TCM Teacher Created Materials

Let's Talk Math

Engaging Students as Mathematical Thinkers

Lessons and Activities

Level 3

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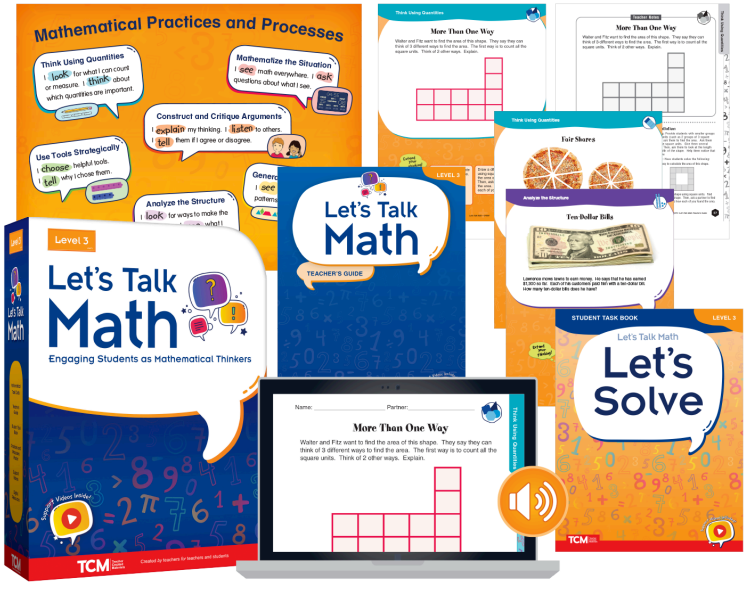

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LEVEL 3

Let's Talk Math

TEACHER'S GUIDE

Support Videos Included!

TCM Teacher Created Materials

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How to Use This Resource

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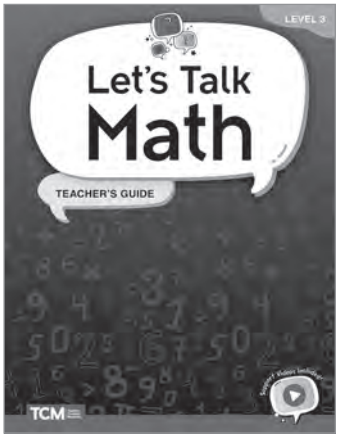
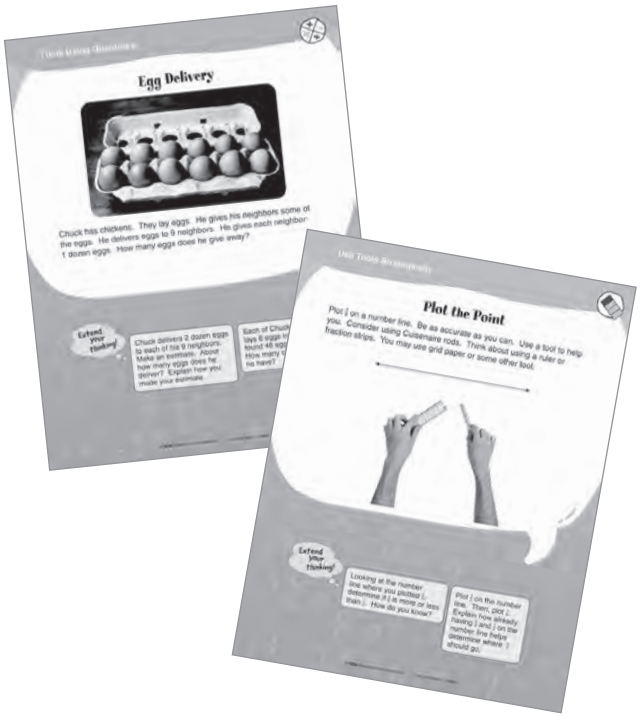
Teacher's Guide



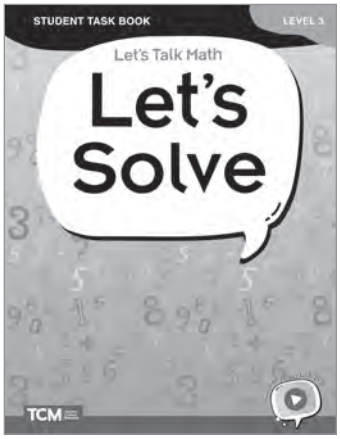
The *Let's Talk Math* Teacher's Guide is an informative, detailed guide that facilitates implementation of this supplemental resource. Every lesson includes a common student misconception for the particular task as well as differentiated support for both scaffolding and extension. Each lesson includes tiered vocabulary lists to provide language support and ensure access to the mathematics.

Task Cards

There are 60 full-color, double-sided cards for small-group lessons and workstations. Each card features one task on each side and two extension opportunities per task. The cards are color-coded based on the mathematical practices/processes and include icons to indicate the mathematical domains.



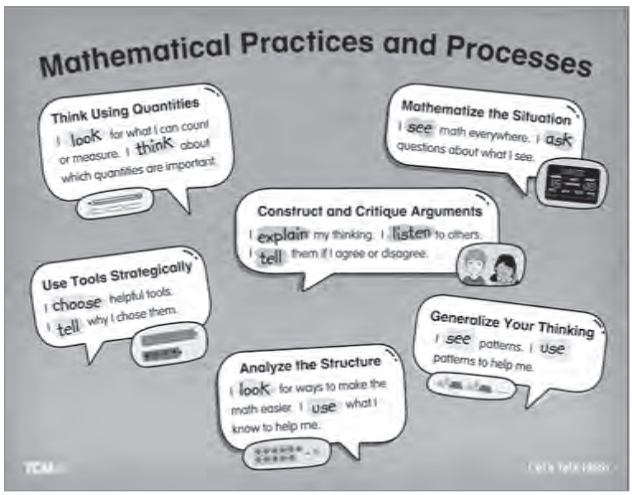
Let's Solve: Student Task Book

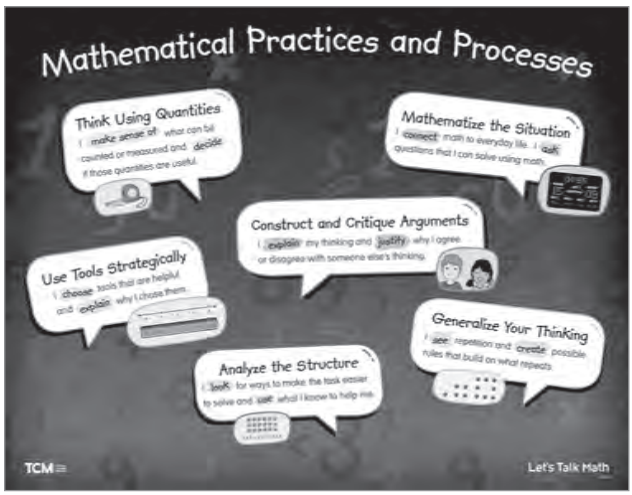


The 120 student tasks are provided in an easy-to-use book with perforated pages for easy distribution to students or for use as students' personal math journals. Each student page includes an opportunity for students to reflect and write.

Poster

A two-sided, full-color poster lists the Standards for Mathematical Practices/Processes in student-friendly language. One side is for grades K–1, and the other side is for grades 2–5.





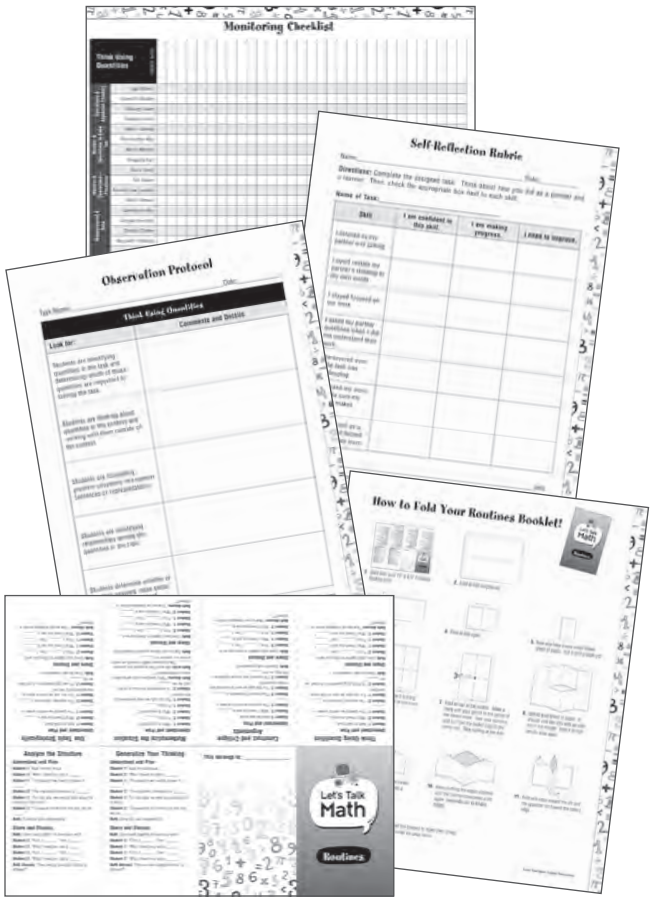
How to Use This Resource *(cont.)*

Components *(cont.)*

Digital Resources

Let's Talk Math features a wealth of digital resources. These digital resources offer greater flexibility and accessibility than the print resources alone.

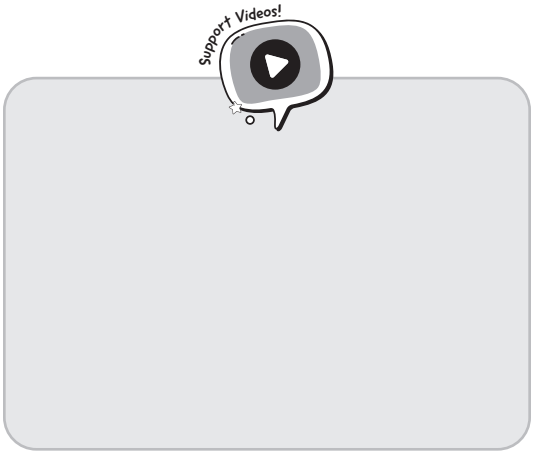
- Digital versions of **Task Cards, Student Task Book** pages, and the **poster** can be used on interactive whiteboards, for virtual sessions, in LMS platforms, and more!
- Assessment tools such as **Observation Protocols**, **Monitoring Checklists**, and **Student Reflection** and **Feedback** templates help teachers and students track progress.
- **Classroom exemplars** bring *Let's Talk Math* to life and inform instruction and assessment.
- **Anchor charts** can be displayed as reminders of the routines for the mathematical practices/processes.
- **Tier 3 vocabulary word cards** can be printed and used to prepare students for math tasks.



Support Videos

Don't miss the *Let's Talk Math* support videos for teachers and students.

- The **teacher videos** feature authors Kit Norris and Dr. Hilary Kreisberg discussing the routines, and include examples from classrooms and tips for implementation.
- Animated **student videos** explain the mathematical processes/practices and make concepts accessible with engaging examples.
  - Think Using Quantities
  - Construct and Critique Arguments
  - Mathematize the Situation
  - Use Tools Strategically
  - Analyze the Structure
  - Generalize Your Thinking

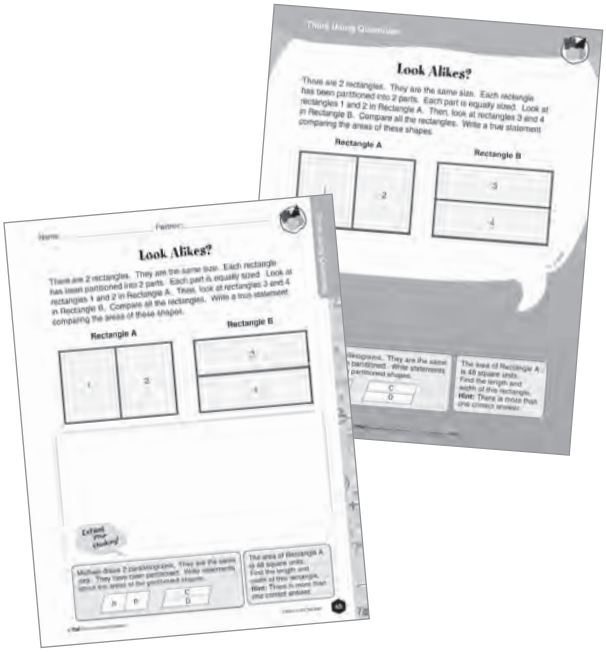


How to Use This Resource *(cont.)*

Tasks

This kit contains 120 tasks. There are 20 tasks for each of the six identified mathematical practices/processes (see Figure 5). The 20 tasks for each practice/process include four tasks per content domain (see Figure 6). The tasks are provided in three formats to give teachers flexibility in deciding how to use them with students.

- Full-color student reproducibles in the *Let's Solve: Student Task Book.* Each student activity sheet has the task and extension activities on one side and the Reflect and Write routine on the other. These student-facing pages can be used in small groups for students to record their thinking and reflections. Students can alternatively complete the pages during workstation work with partners and submit them for evaluation and review by the teacher. (The *Let's Solve: Student Task Book* can be purchased as student consumables. Contact Teacher Created Materials at 800-858-7339 for more information or to order.)
- Full-color cards (one set per kit) for use in small-group lessons or by students in math workstations. The tasks are organized by color to help with both management and student connections (see Figure 5).
- Full-color PDFs in the Digital Resources (see page 168 for more information) for whole-class projection to share with students for work in class or at home.



Practice/Process	Color
Think Using Quantities	blue
Construct and Critique Arguments	orange
Mathematize the Situation	red
Use Tools Strategically	green
Analyze the Structure	purple
Generalize Your Thinking	yellow

Figure 5—Task Card Colors

The student tasks (and teacher notes) also include visual icons to identify the mathematical domains of the tasks. These icons are included in all three versions of the cards as well as on the teacher notes pages for ease of teacher and student use and management. See Figure 6 for the icons used throughout the resource.

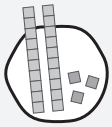
Mathematical Domain	Icon
Operations and Algebraic Thinking	
Number and Operations in Base Ten	
Number and Operations—Fractions	
Measurement and Data	
Geometry	

Figure 6—Domain Icons

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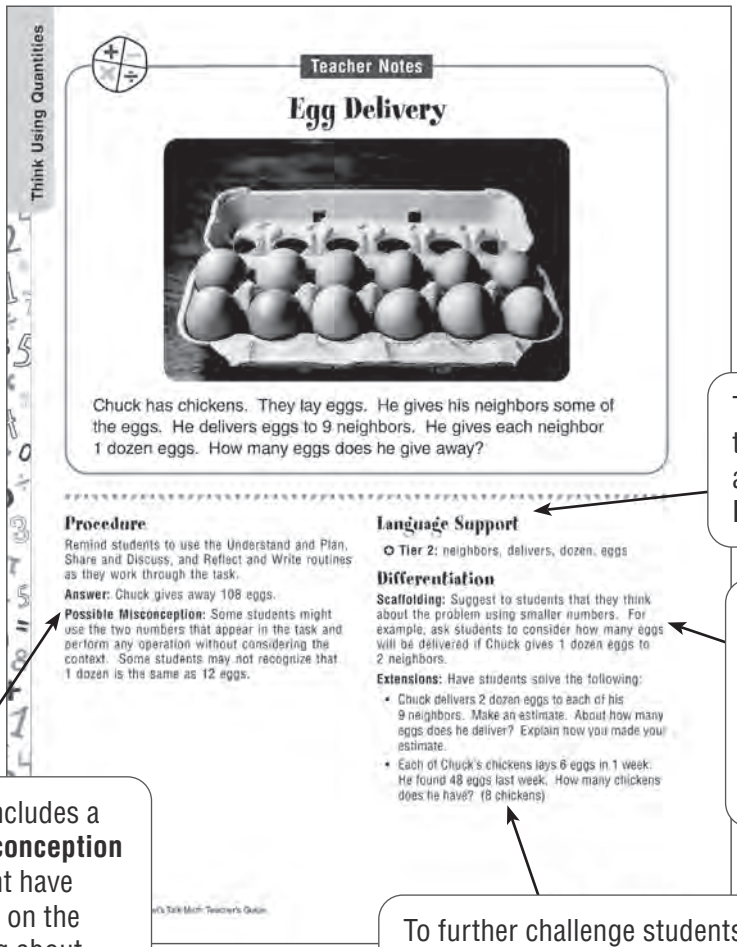


Think Using Quantities

Teacher Notes

Egg Delivery

Chuck has chickens. They lay eggs. He gives his neighbors some of the eggs. He delivers eggs to 9 neighbors. He gives each neighbor 1 dozen eggs. How many eggs does he give away?

Procedure

Remind students to use the Understand and Plan, Share and Discuss, and Reflect and Write routines as they work through the task.

Answer: Chuck gives away 108 eggs.

Possible Misconception: Some students might use the two numbers that appear in the task and perform any operation without considering the context. Some students may not recognize that 1 dozen is the same as 12 eggs.

Language Support

○ **Tier 2:** neighbors, delivers, dozen, eggs

Differentiation

Scaffolding: Suggest to students that they think about the problem using smaller numbers. For example, ask students to consider how many eggs will be delivered if Chuck gives 1 dozen eggs to 2 neighbors.

Extensions: Have students solve the following:

- Chuck delivers 2 dozen eggs to each of his 9 neighbors. Make an estimate. About how many eggs does he deliver? Explain how you made your estimate.
- Each of Chuck's chickens lays 6 eggs in 1 week. He found 48 eggs last week. How many chickens does he have? (8 chickens)

Tiered vocabulary from the task is highlighted along with other key **language supports**.

Scaffolding suggestions are provided to use with students who have demonstrated a need for additional support as they work on the task.

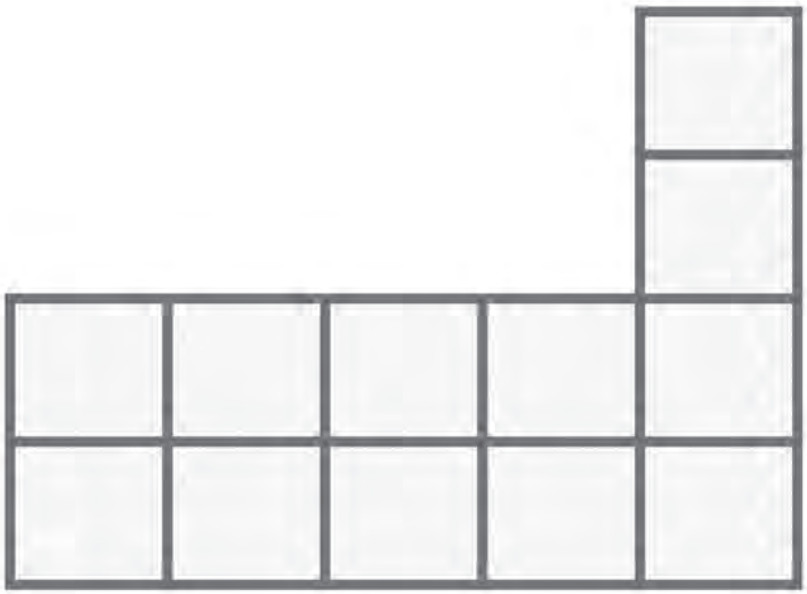
Each lesson includes a **possible misconception** students might have when working on the task. Knowing about these ahead of time will help you prepare to support students.

To further challenge students, two **extensions** are provided for each task. These provide opportunities for students to apply their critical thinking to related scenarios. When computable answers are possible, they are provided in parentheses.

Teacher Notes

More Than One Way

Walter and Fitz want to find the area of this shape. They say they can think of 3 different ways to find the area. The first way is to count all the square units. Think of 2 other ways. Explain.



Procedure

Remind students to use the Understand and Plan, Share and Discuss, and Reflect and Write routines as they work through the task.

Answer: 4 + 2 × 4 = 12 square units
Area of figure: 2 × 5 + 2 = 12 square units
Area of a 4 by 5 rectangle – the empty space:
4 × 5 – 2 × 4 = 12 square units

Possible Misconception: Students might confuse area with perimeter and look to find the total distance around the shape.

Language Support

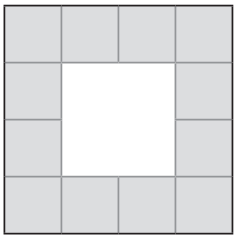
- **Tier 3:** square units
- **Tier 2:** area, different, find, count, explain

Differentiation

Scaffolding: Provide students with smaller groups of square units (such as 2 groups of 3 square units), and ask them to find the area. Ask them to count the square units. Give them several examples. Then, ask them to look at the length and the width of the shape. Help them notice that *l* × *w* = *area.*

Extensions: Have students solve the following:

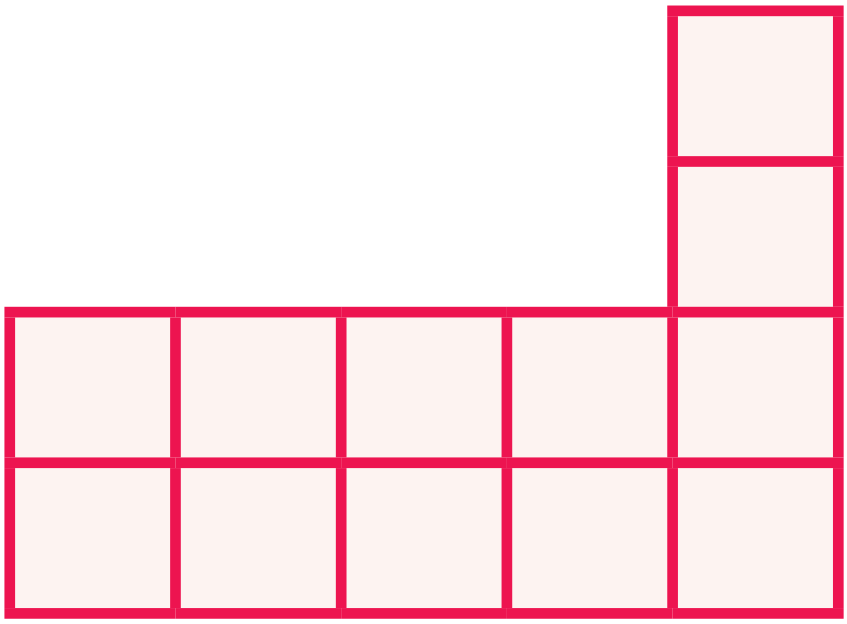
- Find a way to calculate the area of this shape.



- Draw a different shape using square units. Find the area of your shape. Then, ask a partner to find the area. Discuss how each of you found the area.

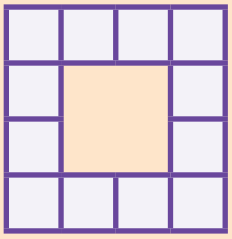
More Than One Way

Walter and Fitz want to find the area of this shape. They say they can think of 3 different ways to find the area. The first way is to count all the square units. Think of 2 other ways. Explain.



Extend your thinking!

Find a way to calculate the area of this shape.

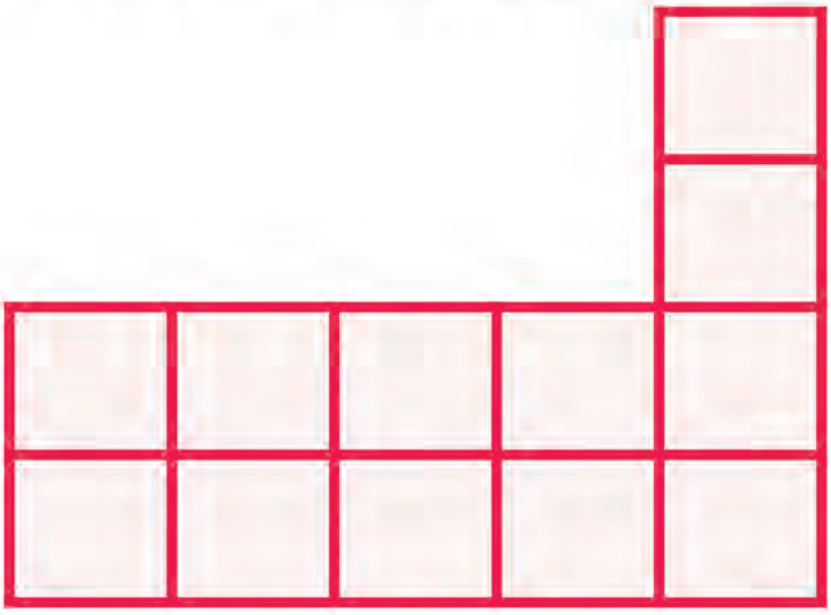


Draw a different shape using square units. Find the area of your shape. Then, ask a partner to find the area. Discuss how each of you found the area.

Name: _____ Partner: _____

More Than One Way

Walter and Fitz want to find the area of this shape. They say they can think of 3 different ways to find the area. The first way is to count all the square units. Think of 2 other ways. Explain.



Extend your thinking!

Find a way to calculate the area of this shape.

Draw a different shape using square units. Find the area of your shape. Then, ask a partner to find the area. Discuss how each of you found the area.

Name: _____ Date: _____

Think Using Quantities

Reflect and Write

Student 1: "Which quantities were important in this task?"

Student 2: Respond.

Student 2: "What did we notice about the important quantities?"

Student 1: Respond.

Both reflect: "How did we use quantities to help us solve the task?"

Both write: We used the quantities to help us solve by _____

Teacher Notes

Moana's Work

Moana is having a party. She buys 9 bags with 80 candies in each bag. She thinks she has 791 candies. This is her thinking:

9 groups of 80

I'll think about 10 groups of 80.

10 groups of 80 is 800 candies.

I only have 9 groups, so I need to take 1 group of 9 away.

800 – 9 = 791

There are 791 candies.

Is Moana's thinking correct? Why or why not?

Procedure

Remind students to use the Understand and Plan, Share and Discuss, and Reflect and Write routines as they work through the task.

Answer: Moana is not correct. She adjusted the number of groups to 10 and said that she had 800 candies. She knew that she used an extra group, so she subtracted 9. This was her mistake. She should have subtracted 80, which is the number of candies in each group.

Possible Misconception: Students may not understand why Moana should have subtracted 80.

Language Support

✪ **Tier 2:** having, buys, groups of, away

Differentiation

Scaffolding: Encourage students to draw pictures or create diagrams.

Extensions: Have students solve the following:

- Maggie is also having a party. She has 390 candies. She wants to put 30 candies in each bag. How many bags will she need? (13 bags)
- Maggie has 12 friends coming to a party. She wants to share 390 candies equally with everyone at the party. How many candies will each person get? (30 candies)

Moana's Work

Moana is having a party. She buys 9 bags with 80 candies in each bag. She thinks she has 791 candies. This is her thinking:

9 groups of 80

I'll think about 10 groups of 80.

10 groups of 80 is 800 candies.

I only have 9 groups, so I need to take 1 group of 9 away.

800 – 9 = 791

There are 791 candies.

Is Moana's thinking correct? Why or why not?

Extend your thinking!

Maggie is also having a party. She has 390 candies. She wants to put 30 candies in each bag. How many bags will she need?

Maggie has 12 friends coming to a party. She wants to share 390 candies equally with everyone at the party. How many candies will each person get?

Name: _____ Partner: _____

Moana's Work

Moana is having a party. She buys 9 bags with 80 candies in each bag. She thinks she has 791 candies. This is her thinking:

9 groups of 80

I'll think about 10 groups of 80.

10 groups of 80 is 800 candies.

I only have 9 groups, so I need to take 1 group of 9 away.

800 – 9 = 791

There are 791 candies.

Is Moana's thinking correct? Why or why not?

Extend your thinking!

Maggie is also having a party. She has 390 candies. She wants to put 30 candies in each bag. How many bags will she need?

Maggie has 12 friends coming to a party. She wants to share 390 candies equally with everyone at the party. How many candies will each person get?

Name: _____ Date: _____

Construct and Critique Arguments

Reflect and Write

Student 1: "How did we prove that our answers are correct?"

Student 2: Respond.

Student 2: "Do we agree or disagree with each other's problem-solving process?"

Student 1: Respond.

Both reflect: "How did we construct and critique arguments?"

Both write (select one):

We constructed arguments by _____

_____

_____

_____

_____

Or

We critiqued arguments by _____

_____

_____

_____

_____

Teacher Notes

Orange Juice

Procedure

1. Lead a discussion about the image with the class.
2. Place students into pairs. Tell students to use the Understand and Plan routine to generate mathematical questions about the image.
3. Ask students to share their questions with the class. Record questions on the board. At this point, decide whether to have everyone pursue the same question or have partners focus on their own questions. Consider giving partners choices of questions that they would like to pursue. You may also decide that developing questions and considering information needed to solve the problem is enough work for this day or this task.
4. If appropriate, have students answer questions independently. Tell them to use the Share and Discuss and Reflect and Write routines to complete the task.

Answer: Answers will vary depending on the questions chosen.

Possible Misconception: Students may want to explore questions that are not quantifiable, such as, "Do you like orange juice?" Encourage students to think of questions that can be answered using mathematics. For example, "If we filled another container with all the glasses of juice, how much would we have?"

Additional Information

After a mathematical question is determined, ask students what information they would need to know to answer it. Here are some ideas that could be used for this image. This list is not exhaustive.

- A half gallon of orange juice costs about $3.
- A half cup of orange juice is the same as 4 ounces of juice.
- 1 gallon is the same as 16 cups.
- 2 cups equal 1 pint.

Language Support

- **Tier 3:** fraction
- **Tier 2:** compare
- **Tier 1:** glass

Differentiation

Scaffolding: Consider making a list of questions that are not quantifiable (e.g., "Does orange juice only have oranges in it?") and a list of questions that are quantifiable (e.g., "How many $\frac{1}{4}$ units would make $\frac{3}{4}$ units?"). Creating this list can be done during a whole-class discussion or as partners share the questions they would like to explore.

Extension: Suggest that students extend their questions in some manner. For example, if they explored the number of $\frac{1}{4}$ units in $\frac{3}{4}$, ask them to consider how many fourths would fill 2 whole glasses.

Orange Juice

Name: _____ Partner: _____

Orange Juice

Questions we might be able to explore: _____

Name: _____ Date: _____

Mathematize the Situation

Reflect and Write

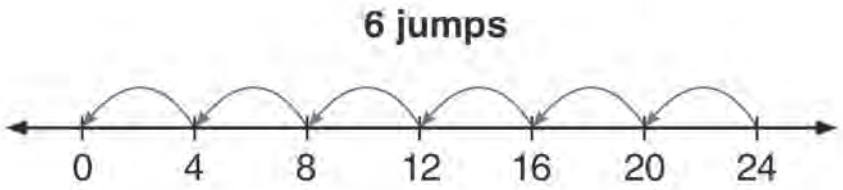
Both reflect: How did we use mathematics to answer our question about this picture?

Both write: We mathematized the situation by _____

Teacher Notes

Division with José

José says that he can show division on a number line. He shows $24 \div 4 = 6$:



Use a different tool to show the quotient of $24 \div 4$. You may choose Cuisenaire rods or tally marks. You may choose counters. You may use diagrams or pictures.

Procedure

Remind students to use the Understand and Plan, Share and Discuss, and Reflect and Write routines as they work through the task.

Answer: Tool selection will vary but should show quotients of 6.

Possible Misconception: Students may not understand how a number line can show division.

Language Support

- **Tier 3:** quotient, number line, tally marks, Cuisenaire rods
- **Tier 2:** counters, diagrams, tool
- **Tier 1:** different

Differentiation

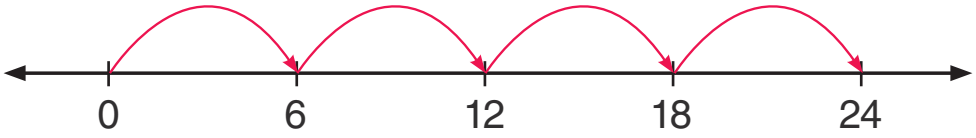
Scaffolding: Choose which type of division would be easiest for students to conceptualize: partitive or quotitive. If partitive, ask them to think about what tool would be helpful in showing 24 things shared between 4 groups. Ask, "How could we use tally marks as a tool to show 24 tally marks evenly shared among 4 groups?" If quotitive, ask them to choose a tool and start with 24 and make groups with 4 in each group. Ask, "How many groups will you make?"

Extensions: Have students solve the following:

- Create a story where you would need to find $24 \div 4$.
- Use a different tool to show $28 \div \_\_\_\_\_ = 7$. Write an explanation for your choice.

Raphael's Number Line

Raphael uses a number line to show the product of 4 × 6.



What other tool could you use to show the product of 4 × 6? Consider using diagrams or pictures. You might use counters. You may also use tally marks or pattern blocks.

Extend your thinking!

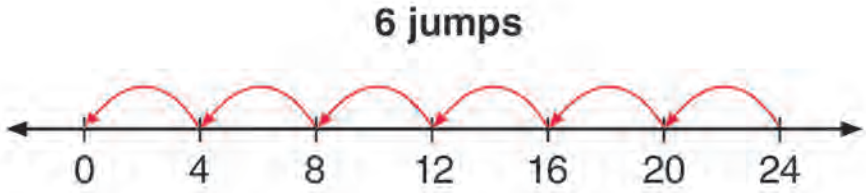
Select a tool to find the product of 8 × 6. Explain how you used that tool.

Create a story where you would need to find 4 × 6. Share your story with a partner.

Name: _____ Partner: _____

Division with José

José says that he can show division on a number line. He shows $24 \div 4 = 6$:



Use a different tool to show the quotient of $24 \div 4$. You may choose Cuisenaire rods or tally marks. You may choose counters. You may use diagrams or pictures.

Extend your thinking!

Create a story where you would need to find $24 \div 4$.

Use a different tool to show $28 \div$ _____ $= 7$. Write an explanation for your choice.

Name: _____ Date: _____

Use Tools Strategically

Reflect and Write

Student 1: "What tool(s) did we use to solve the task?"

Student 2: Respond.

Student 2: "Why did we select those tools?"

Student 1: Respond.

Both reflect: "How did we use tools strategically in this task?"

Both write: We used tools strategically by _____

_____

_____

_____

_____

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_____

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_____

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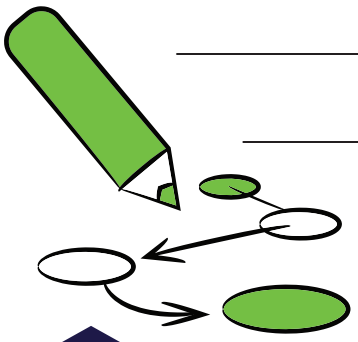
_____

_____.

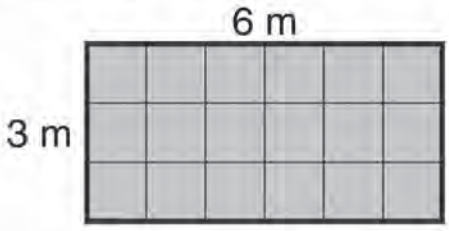


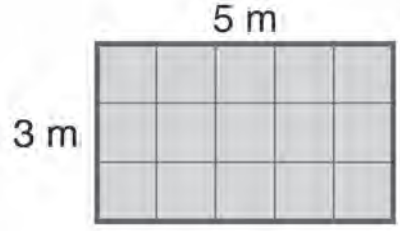
Teacher Notes

Area Two Ways

Imani has 2 rectangles. One rectangle is 3 meters by 6 meters. The other rectangle is 3 m by 5 m. She wants to find the total area. Her friends, Zoya and Brittany, solved this in different ways.

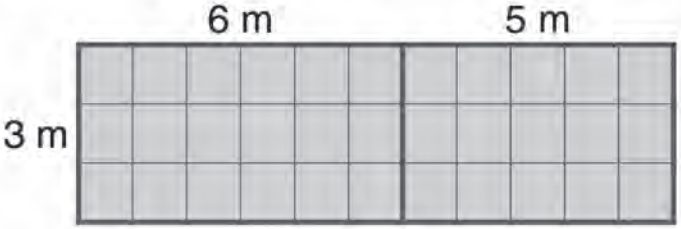
Zoya's method:





$3 \times 6 + 3 \times 5$
$18 + 15$
33 square meters

Brittany's method:



$3 \times (6 + 5)$
3×11
33 square meters

Analyze these methods. How are they similar? How are they different?

Procedure

Remind students to use the Understand and Plan, Share and Discuss, and Reflect and Write routines as they work through the task.

Answer: Zoya found the area of each rectangle. Then, she added them together. Brittany put the two rectangles together. Then, she found the area of the new rectangle. This method worked because the rectangles had the same width.

Possible Misconception: Students might need to review the meaning of area to make sense of this task.

Language Support

- **Tier 3:** rectangles
- **Tier 2:** area, method, analyze
- **Tier 1:** similar, different

Differentiation

Scaffolding: Assign alternating students only one method to analyze, either Zoya's or Brittany's. Then, pair them with students who analyzed the other method. Have them explain the method they analyzed to their partners.

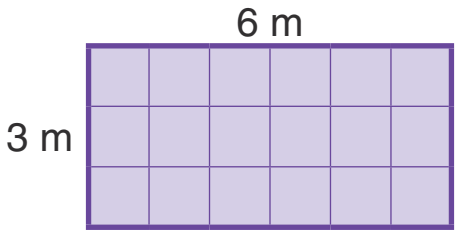
Extensions: Have students solve the following:

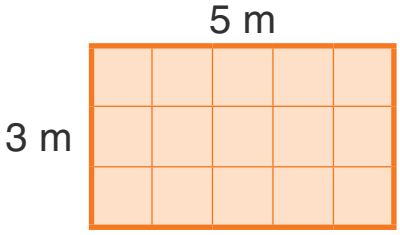
- Create 2 more rectangles with areas that can be solved using Brittany's method. Solve the areas. Then, share the rectangles with a partner. Have them solve the areas using Brittany's method.
- Find the perimeter of the rectangles you created.

Area Two Ways

Imani has 2 rectangles. One rectangle is 3 meters by 6 meters. The other rectangle is 3 m by 5 m. She wants to find the total area. Her friends, Zoya and Brittany, solved this in different ways.

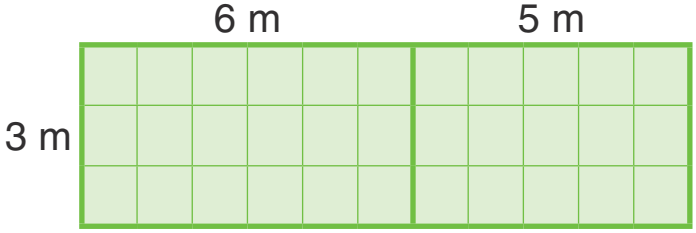
Zoya's method:





$3 \times 6 + 3 \times 5$
$18 + 15$
33 square meters

Brittany's method:



$3 \times (6 + 5)$
3×11
33 square meters

Analyze these methods. How are they similar? How are they different?

Extend your thinking!

Create 2 more rectangles with areas that can be solved using Brittany's method. Solve the areas. Then, share the rectangles with a partner. Have them solve the areas using Brittany's method.

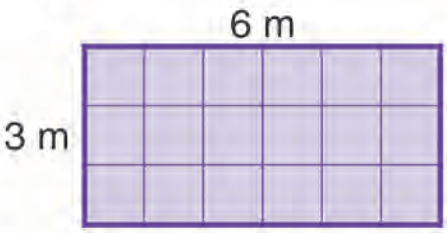
Find the perimeter of the rectangles you created.

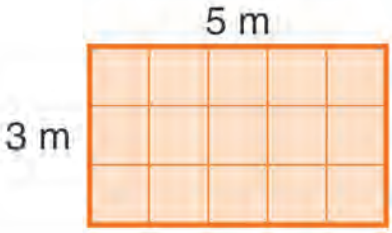
Name: _____ Partner: _____

Area Two Ways

Imani has 2 rectangles. One rectangle is 3 meters by 6 meters. The other rectangle is 3 m by 5 m. She wants to find the total area. Her friends, Zoya and Brittany, solved this in different ways.

Zoya's method:





$3 \times 6 + 3 \times 5$
$18 + 15$
33 square meters

Brittany's method:

$3 \times (6 + 5)$
3×11
33 square meters

Analyze these methods. How are they similar? How are they different?

Extend your thinking!

Create 2 more rectangles with areas that can be solved using Brittany's method. Solve the areas. Then, share the rectangles with a partner. Have them solve the areas using Brittany's method.

Find the perimeter of the rectangles you created.

Name: _____ Date: _____

Analyze the Structure

Reflect and Write

Student 1: “What did we look for to help make the task easier?”

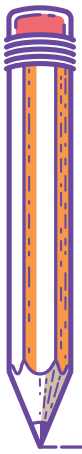
Student 2: Respond.

Student 2: “How did we apply what we know to help us?”

Student 1: Respond.

Both reflect: “How did we analyze the structure in this task?”

Both write: We analyzed the structure by _____



Teacher Notes

Many Marbles

Eddie arranges his marbles in groups. Look at the table to see how he arranges the marbles:

Group Number	Number of Marbles
1	3
2	6
3	9
4	
5	
6	
...	...
20	

How many marbles are in group 4? How many are in groups 5 and 6? Write a rule to describe the relationship between the group number and the number of marbles. Use your rule to find out how many marbles are in group 20.

Procedure

Remind students to use the Understand and Plan, Share and Discuss, and Reflect and Write routines as they work through the task.

Answer: There are 12 marbles in group 4, 15 marbles in group 5, and 18 marbles in group 6. The number of marbles in each group is 3 times the group number. There are 60 marbles in group 20.

Possible Misconception: Students may be thinking additively rather than multiplicatively.

Language Support

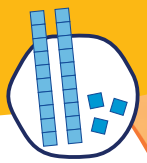
- ✪ **Tier 2:** arranges, relationship, rule, groups
- ✪ **Tier 1:** marbles

Differentiation

Scaffolding: Provide students with counters to represent the marbles. Ask them to create the groups of marbles in the table. Have them use what they build to discover the relationship between the number of groups and the number of marbles.

Extensions: Have students solve the following:

- Using the rule, how many marbles would be in group 50? (150 marbles) How many would be in group 100? (300 marbles)
- Create a table for a new rule. The rule is "multiply by 4 and add 1." How many marbles would be in groups 1 through 5 using the new rule? (5; 9; 13; 17; 21) How many would be in group 20? (81)



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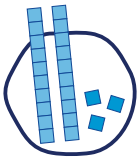
How many marbles are in group 4? How many are in groups 5 and 6? Write a rule to describe the relationship between the group number and the number of marbles. Use your rule to find out how many marbles are in group 20.

Extend your thinking!

Using the rule, how many marbles would be in group 50? How many would be in group 100?

Create a table for a new rule. The rule is "multiply by 4 and add 1." How many marbles would be in groups 1 through 5 using the new rule? How many would be in group 20?

Name: _____ Partner: _____



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Using the rule, how many marbles would be in group 50? How many would be in group 100?

Create a table for a new rule. The rule is "multiply by 4 and add 1." How many marbles would be in groups 1 through 5 using the new rule? How many would be in group 20?

Name: _____ Date: _____

Generalize Your Thinking

Reflect and Write

Student 1: "What stayed the same in the task?"

Student 2: Respond.

Student 2: "What changed in the task?"

Student 1: Respond.

Both reflect: "What rule or conjecture did we make to generalize our thinking?"

Both write: Our conjecture or rule is _____