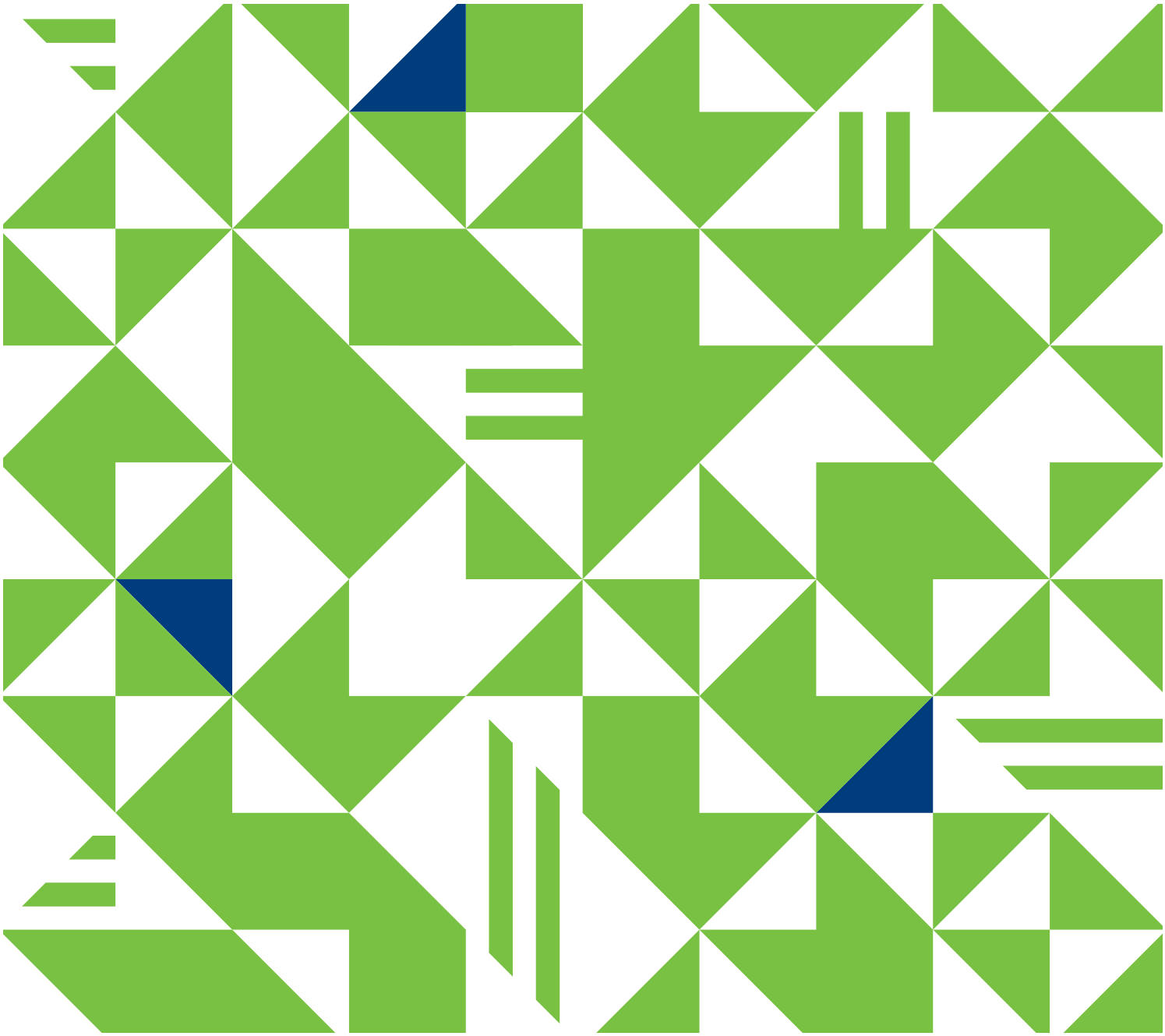


Grade 3 – Unit 2 – Module 1
Teachers Guide Sample

bridges® in mathematics

bridges®
in mathematics

Module 1
Multiplication in Context

Print Originals

Pages renumber with each module.

Student Book Pages

Page numbers correspond to those in the Bridges Student Books.

Home Connections Pages

Page numbers correspond to those in the Home Connections books.

Module 1

Multiplication in Context

Overview

In this module, students investigate situations designed to elicit key ideas and strategies that build a foundation for a deep understanding of multiplication. They examine various groups of items in a pet store that facilitate the use of repeated addition and skip-counting and nudge them toward multiplicative strategies such as doubling. Students take part in a number string and a math forum, both of which elicit a variety of strategies for multiplying. Students also take a unit screener and learn a new Work Place.

Sessions	P&I	NS	MF	WP	A	HC
Session 1 Introducing The Pet Store Session 1 sets the stage for this unit by developing a shared understanding of equal groups multiplication. Students have the opportunity to notice and wonder about displays in a pet store that encourage multiplicative reasoning with equal groups and arrays. They pose problems and then work in pairs to answer a specific problem and share their strategies with the class.	●					
Session 2 More Dog Bones The session begins with a number string that uses more equal groups of dog bones as a jumping-off point for exploring multiplication strategies. Students look at bags of dog bones and find the total number of bones in each image before sharing and discussing their strategies. Then they take the Unit 2 Screener. Finally, the teacher introduces and assigns The Pet Store Home Connection.		●		●	●	●
Session 3 Hamster Multiplication Students solve and discuss a series of problems that involve equal groups. Then they work in pairs on a problem that will be discussed during a forum in the following session. Lastly, students spend the remainder of the session at Work Places.	●			●		
Session 4 Hamster Multiplication Forum Students convene for a math forum to share their multiplication strategies from the previous session. They practice listening to ideas that may be different from their own and critiquing the reasoning of others to build a deeper understanding of multiplication. Then students are introduced to a new Work Place, Loops & Groups, and visit Work Places. Finally, the teacher assigns The Pet Store Challenges Home Connection.	●		●	●		●
Session 5 The Pet Store, Part 1 In this session, students compare and contrast two images from The Pet Store print original and discuss arrays as rectangular arrangements of objects. Then student pairs pose and solve problems involving multiplication before visiting Work Places.	●			●		
Session 6 The Pet Store, Part 2 In this session, students make posters and discuss strategies for a problem they posed and solved in the previous session. Then they visit Work Places. Finally, the teacher introduces and assigns the Leaves & Flower Petals Home Connection.	●			●		●

P&I – Problems & Investigations, **NS** – Number String, **MF** – Math Forum, **WP** – Work Places, **A** – Assessment, **HC** – Home Connection

Materials Preparation

Each session includes a complete list of the materials you'll need and notes about any preparation you'll need to do. If you would like to prepare materials for the entire module ahead of time, you can use this to-do list.

Copies & Display

- [ ] Visit the Bridges Educator Site to review the Interactive Display Materials for this module. Decide whether you will use digital materials for display or copies of print originals and student pages. Make copies as needed.

Work Places

- [ ] Prepare the materials for Work Place 2A using the materials listed on the Work Place Guide.
- [ ] Session 4: Staple a Unit 2 Work Place Log at all four corners to the back of each students' Work Place folder. Leave the Unit 1 Work Place Log attached to the front of the folders.

Concepts, Skills & Practices	Sessions						Work Places					
	1	2	3	4	5	6	1A	1B	1C	1D	1E	2A
2.OA.1 Solve one-step addition and subtraction word problems with sums and minuends to 100 involving situations of putting together, taking from, and comparing, with unknowns in all positions	**DP**											
2.OA.2 Fluently add and subtract within 20 using mental strategies		**HC DP**					●	●	●			
2.NBT.5 Fluently add and subtract with sums and minuends to 100										●		
Supports 3.OA Use and explain additive strategies (e.g., repeated addition and skip-counting) and multiplicative strategies (e.g., doubling, doubling and halving, and using partial products) to demonstrate an understanding of multiplication	**P&I**		**P&I DP**	**MF DP**	**P&I DP**							●
Supports 3.OA Model word problems involving multiplication within 100 by writing equations						**HC DP**						
3.OA.1 Interpret products of whole numbers	**P&I**	**NS**	**P&I DP**	**MF HC**	**P&I DP**	**DP**						●
3.OA.3 Solve multiplication and division word problems with products and dividends to 100 involving situations of equal groups, arrays, and measurement quantities	**P&I**	**NS HC**	**P&I DP**	**MF HC DP**	**P&I DP**	**HC DP**						●
3.OA.8 Solve multistep word problems involving only whole numbers, using addition, subtraction, multiplication, and division		**HC**										
3.OA.9 Identify and apply patterns among basic addition and subtraction using properties of operations							●					
3.NBT.2 Use strategies based on place value to add and subtract fluently with sums and minuends to 1,000										●	●	
3.MP.1 Make sense of problems and persevere in solving them	**P&I**	**NS**			**P&I**							
3.MP.2 Reason abstractly and quantitatively		**NS**			**P&I**							
3.MP.3 Construct viable arguments and critique the reasoning of others	**P&I**			**MF**								
3.MP.6 Attend to precision			**P&I**									
3.MP.7 Look for and make use of structure			**P&I**									

P&I – Problems & Investigations, **NS** – Number String, **MF** – Math Forum, **A** – Assessment, **HC** – Home Connection, **DP** – Daily Practice

Session 1

Introducing The Pet Store

Summary

Session 1 sets the stage for this unit by developing a shared understanding of equal groups multiplication. Students have the opportunity to notice and wonder about displays in a pet store that encourage multiplicative reasoning with equal groups and arrays. They pose problems and then work in pairs to answer a specific problem and share their strategies with the class.

Module 1 Learning Goals

Students learn about multiplication concepts by working with equal groups and arrays.

- ■ **Students compare and connect strategies for solving multiplication problem situations.**
- □ Students develop an understanding of multiplication as an operation that involves equal groups.
- □ Students apply strategies to solve a problem situation involving equal groups.
- □ Students explore the connection between arrays and multiplication.

Materials

Problems & Investigations Introducing The Pet Store	
Copies & Display	**PO P1** The Pet Store **PO P2** Dog Bone Display
Kit Materials	• colored tiles • game markers • Word Resource Cards for *multiply* and *product*
Classroom Materials	• student math journals • Unifix cubes • chart paper • Student Books (for ABCs of Math Talk)
Daily Practice	
Copies & Display	**SB 31** Addition & Subtraction: Mixed Review

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

**Word Resource Card available*

columns
groups of
multiply*
product*
rows

Preparation

Look over The Pet Store and the Dog Bone Display print originals. Think about how students might see equal groups or arrays when they look at the pictures. Consider how to illustrate their observations to support a foundation for early multiplication concepts and skills. Anticipate possible strategies that students might use to find the total number of dog bones.

Problems & Investigations

Introducing The Pet Store

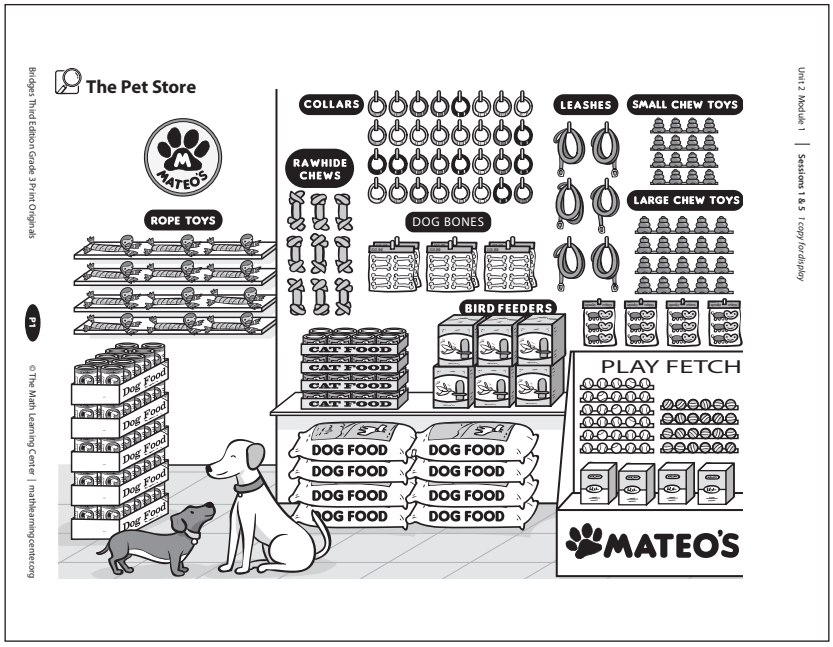
Observing the Whole Display

Students have developed some understanding of multiplication in second grade and during September Number Corner. Most recently, they have explored pictures, loops and groups, arrays, ratio tables, and scaled bar graphs. Though it is important to build on that work, allow space for students to think additively as they work toward developing multiplicative reasoning throughout this unit.

1 Open the session by inviting students to join you in the discussion area as you introduce the work for Module 1.

- Explain that students will have opportunities to work independently and with partners throughout this module.
- Remind students of the importance of exploring and sharing different strategies for solving problems.

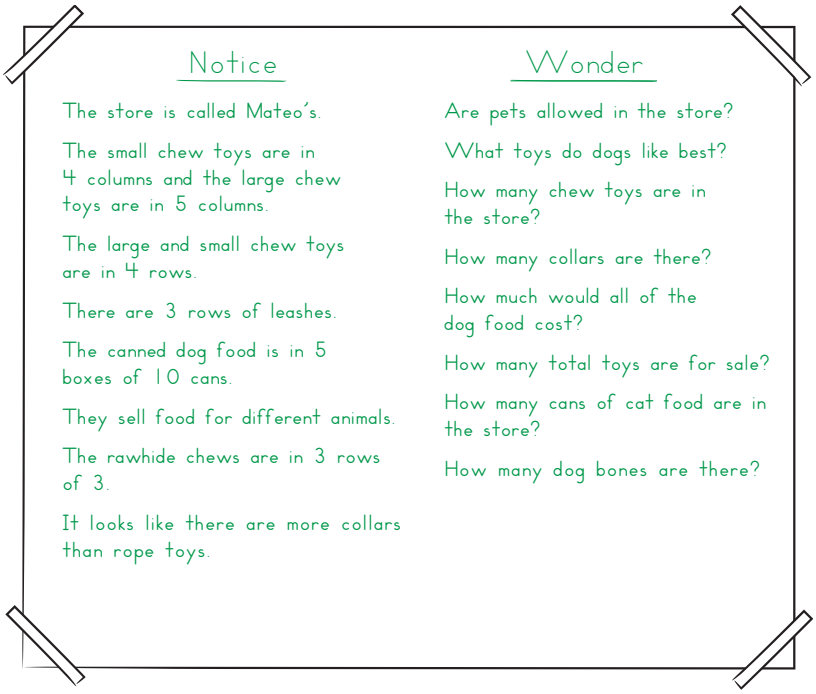
2 Introduce The Pet Store print original and display it where all the students can see. Give them a minute or so to study the picture quietly.



MLL Using a picture to launch an investigation can help students to understand the context of the investigation. Be ready to help with any vocabulary, mathematical or otherwise, as the class proceeds.

3 Ask students to think-pair-share what they notice and wonder about the display.

4 Invite pairs to share. Record their observations and questions on chart paper.



Notice	Wonder
The store is called Mateo's.	Are pets allowed in the store?
The small chew toys are in 4 columns and the large chew toys are in 5 columns.	What toys do dogs like best?
The large and small chew toys are in 4 rows.	How many chew toys are in the store?
There are 3 rows of leashes.	How many collars are there?
The canned dog food is in 5 boxes of 10 cans.	How much would all of the dog food cost?
They sell food for different animals.	How many total toys are for sale?
The rawhide chews are in 3 rows of 3.	How many cans of cat food are in the store?
It looks like there are more collars than rope toys.	How many dog bones are there?

5 Invite students to look first at the observations and then at the questions and identify which ones are mathematical.

- Which observations involve a mathematical description?
- Which questions could be answered using mathematics?

Vincent *The observation about the dog food is mathematical because it tells how many boxes of food there are and how many cans are in each box.*

Keiko *Yeah, I agree. I also think the observation about the chew toys is mathematical because it tells us how many columns and rows there are.*

Teacher *Does anyone see a question we could answer using math?*

Tiffany *We could answer the question about the collars using math.*

Wyatt *"How many dog bones are there?" is also a math question.*

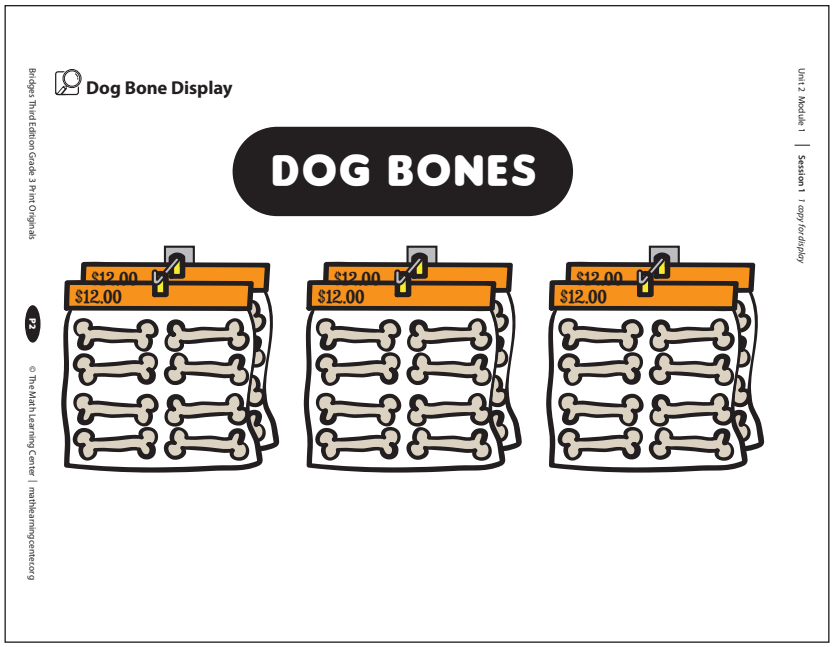
Teacher *I agree. Both of those would be interesting questions to answer!*

Note

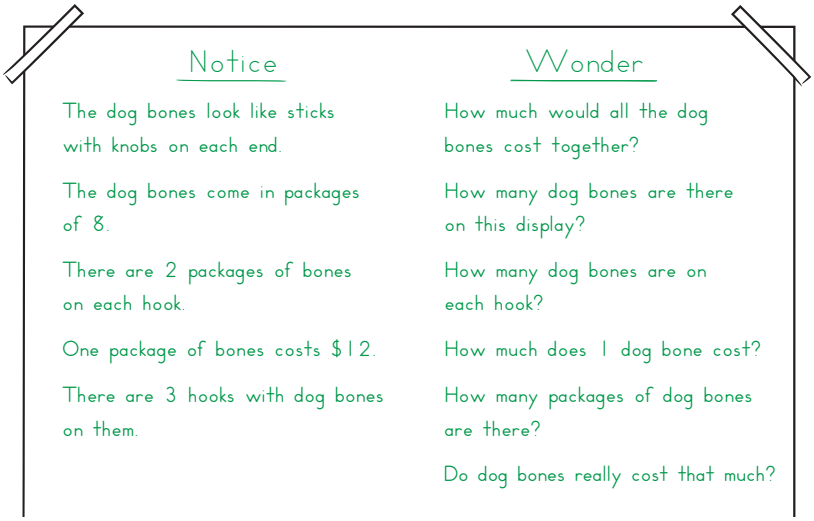
Save the chart for use in Session 5.

Students Solve in Pairs

6 Show students the Dog Bone Display print original, and give them a minute to examine it quietly.



7 Repeat steps 3–5 with this display, using a new piece of chart paper to record students' observations and questions.



8 Explain that students will work with a partner to solve a question about the display, then they will share their strategies with the class.

9 Ask students to determine the total number of bones on display or a related question raised by students.

- Have students record their work in their math journals.
- Remind students that there are several strategies that could be used to solve this problem. Encourage them to solve the problem in two different ways.
- Encourage students to record their thinking in a way that helps them to share easily with their classmates.
- Challenge students to solve a second problem from the Dog Bones Notice & Wonder list if time allows.
- Make colored tiles, game markers, Unifix cubes, and other classroom manipulatives available for students to use to help solve the problem if they'd like.

Math Teaching Practice

Implement tasks that promote reasoning and problem solving

Determining the total number of dog bones is a task with a high cognitive demand that elicits strategies related to the meaning of equal groups multiplication and the connection between repeated addition and multiplication. This task has been intentionally positioned at the beginning of the unit to engage students in productive struggle and sensemaking.

10 As students work, circulate to make note of different representations and strategies. Select a few pairs who solved the problem in different ways to share with the class. Students' strategies might include:

- Using manipulatives to model 6 groups of 8 and counting by 1s, 2s, or another number
- Skip-counting by 8
- Adding six 8s together
- Using colored tiles to create one or more arrays
- Finding three 8s and doubling or finding two 8s and tripling

Open Strategy Sharing

11 When students have finished solving, discuss expectations for the mathematical discussion that will follow.

- Listen respectfully.
- Restate your classmates' ideas in your own words.
- Ask questions to help you understand.
- Explain why you agree or disagree with an idea.

12 Review the ABCs of Math Talk on the inside cover of the Bridges Student Book, and encourage students to use these sentence starters and questions.

13 Ask selected pairs to share their strategies while you record their thinking on the whiteboard or chart paper.

- Solicit and record solutions first.
- Ask students to share: _____, *would you be willing to share your strategy?*
- Invite discussion about each strategy. For each one, highlight the equal groups structure of the problem and connect it back to the pet store image. For example, 6 bags of bones with 8 bones in each bag translates to 6 equal groups of 8 items.
- Confirm your recording: *Does this represent your thinking,* _____*?*

Teacher *How many total bones are on display? Tell me together.*

Students *Forty-eight!*

Teacher *Did anyone get a different answer?*

Ramona *We got 24.*

Kiara *We got 46.*

Teacher *I love it when we have different answers to talk about! Jules, would you be willing to share your strategy?*

Jules *I knew there were 8 dog bones in each pack and there were 6 packs, so I added 8 six times and got 48.*

Terrell *Can you explain how you added 8 six times? Did you get a new total each time and then add 8 more?*

Jules *I started with 8 and added 8 to get 16. Then I added 8 to that to get 24. I kept going until I had added six 8s.*

Teacher *Jules, can you talk me through each step so that I can record your thinking?*

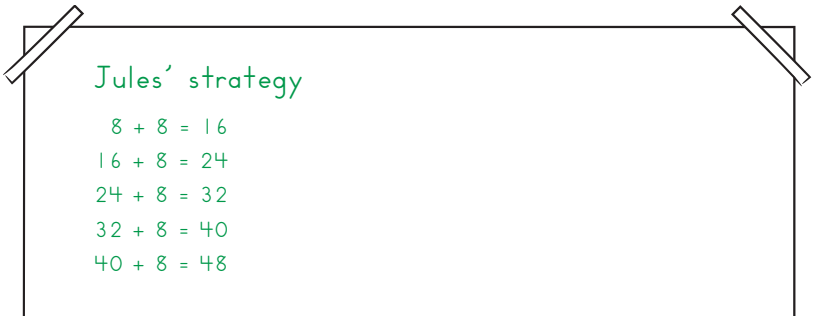
Jules *OK, so after 24, I added 8 more to get to 32. Then I added 8 more to get to 40. Then 40 + 8 = 48. That's how I got the answer. I added six 8s in all.*

Teacher *Jules, does this represent your thinking?*

Instructional Routine

Discussion structure

The purpose of this open strategy sharing is to bring out a range of strategies so that students begin to develop a repertoire of strategies for solving multiplication problems. Although connections between strategies may be possible, focus this discussion on the meaning of multiplication in this equal groups context.



Jules *Yeah, it does.*

Jada *How did you get six 8s? I only see you adding five 8s.*

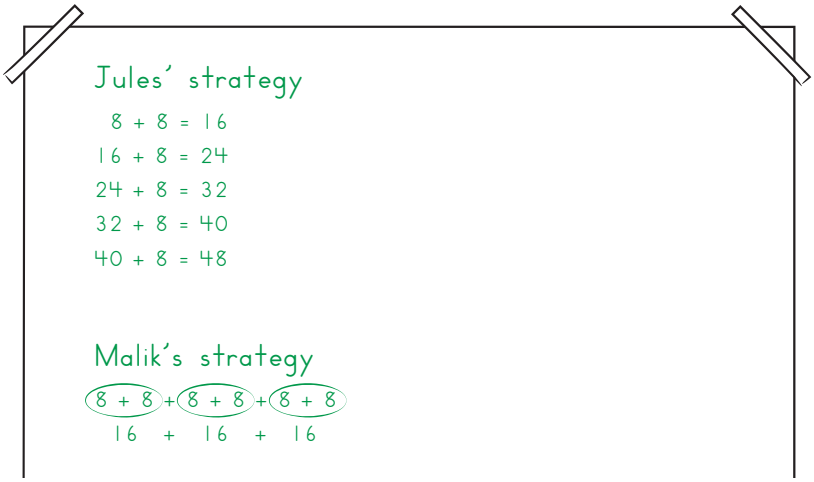
Jules *There are six 8s in all. Two of them are in the first problem.*

Jada *Oh, that makes sense.*

Teacher *Malik, would you explain the strategy you used?*

Malik *I thought about 2 groups of 8 as 16 because there are 2 packages of dog bones on each hook. Since there are 3 hooks, I added three 16s together.*

Teacher *Malik, I've recorded 16 + 16 + 16. What did you do next?*

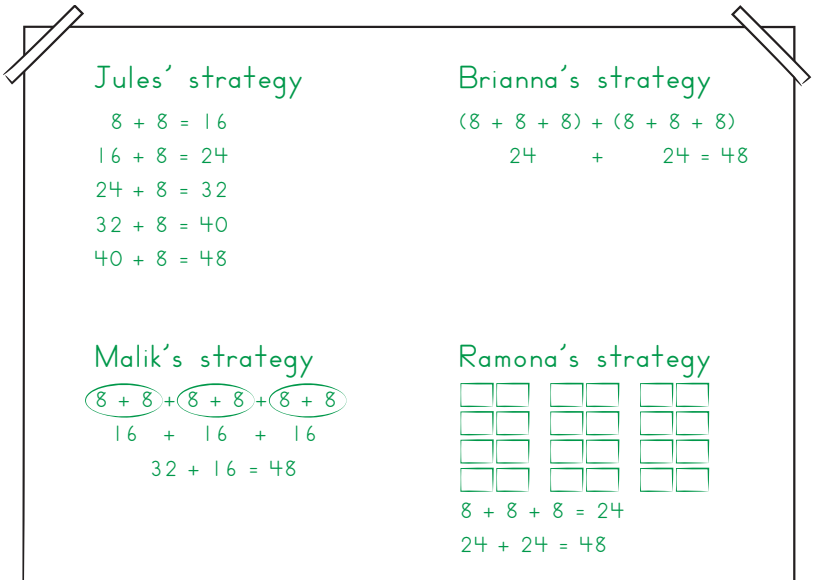


Malik *I thought about it kind of like Jules did, in parts. I added 16 + 16 to get 32. Then I added 16 more to get 48.*

Teacher *I notice that both Jules and Malik talked about having six 8s to add together. Why does that make sense for this problem? Where do you see six 8s in the picture of dog bones?*

14 Be sure to invite students who had incorrect answers to share their thinking. Often, students will revise their thinking while they are listening to others' reasoning or explaining their own strategy.

- Students may realize that they added too few or too many groups of 8 (for example, 3 visible groups of 8, 8 + 8 + 8 = 24; shown with correction as Ramona's strategy).
- Students may recognize a calculation error they made (for example, 8 + 8 = 16, 16 + 8 = 22 … with a final answer of 46).



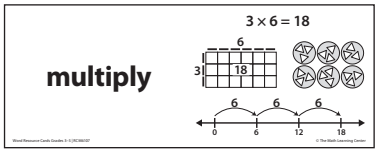
15 Once various strategies have been recorded, invite students to describe, in their own words, a strategy shared by another student.

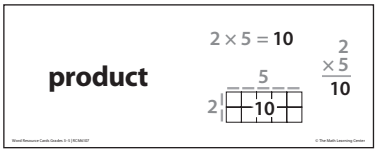
Multiplication Discussion

16 Together, reflect on the problem situation students investigated today. Ask questions like:

- *Where do you see equal groups in the dog bone problem?*
- *How many packages are there? How many dog bones are in each package?*
- *Where do you see the number of packages and the number in each package in the different strategies that were shared?*

17 Have students think-pair-share how they would describe multiplication. Then introduce the Word Resource Cards for *multiply* and *product*.





18 Invite students to describe the dog bones problem situation using equal groups language (that is, "6 groups of 8"). Then have them think-pair-share a related multiplication equation ($6 \times 8 = 48$) and identify the product in the equation.

19 If time allows, invite students to share other problems from the Wonder list that they solved and their strategies.

- How many dog bones are on each hook?
- How much would all the dog bones cost?
- How much does 1 dog bone cost?

Daily Practice

The optional Addition & Subtraction: Mixed Review student book page provides additional opportunities to apply the following skill:

- Solve one-step addition and subtraction word problems with sums and minuends to 100 involving situations of putting together, taking from, and comparing, with unknowns in all positions

Session 2

More Dog Bones

Summary

The session begins with a number string that uses more equal groups of dog bones as a jumping-off point for exploring multiplication strategies. Students look at bags of dog bones and find the total number of bones in each image before sharing and discussing their strategies. Then they take the Unit 2 Screener. Finally, the teacher introduces and assigns The Pet Store Home Connection.

Module 1 Learning Goals

Students learn about multiplication concepts by working with equal groups and arrays.

- ☐ Students compare and connect strategies for solving multiplication problem situations.
- ■ **Students develop an understanding of multiplication as an operation that involves equal groups.**
- ☐ Students apply strategies to solve a problem situation involving equal groups.
- ☐ Students explore the connection between arrays and multiplication.

Materials

Number String More Dog Bones	
Copies & Display	**PO P3** More Dog Bones
Classroom Materials	• copy paper (2 sheets, for covers) • whiteboard or chart paper • colored tiles (optional, for support) • game markers (optional, for support) • student math journals
Assessment Unit 2 Screener	
Copies & Display	**PO P4–P5** Unit 2 Screener
Work Places in Use	
1A Make the Sum (introduced in Unit 1, Module 1, Session 5) **1B** Target 20 (introduced in Unit 1, Module 2, Session 1) **1C** Blast Off to Space (introduced in Unit 1, Module 2, Session 4) **1D** Target 100 (introduced in Unit 1, Module 4, Session 2) **1E** Anything But 5 (introduced in Unit 1, Module 4, Session 4)	
Home Connection	
Copies & Display	**HC 17–18** The Pet Store
Daily Practice	
Copies & Display	**SB 32** Missing Numbers Fill In

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

**Word Resource Card available*

commutative property of multiplication*

Number String

More Dog Bones

The purpose of this number string is to introduce the doubling and adding a group strategies for multiplication.

1 Introduce today's number string by using the More Dog Bones print original to display the first problem from the following table.

- Cover three bags of dog bones in the first set of images so that only two bags of dog bones with three bones in each bag are showing.
- Ask students to find the total number of bones and to show thumbs-up when they have an answer.

2 When most students are ready, ask two or three volunteers to explain how they figured it out.

- Record students' thinking on the whiteboard or chart paper for everyone to see. Look for opportunities to use open number lines and equations to represent their thinking.
- Ask students to share their strategies, then reflect on the shared thinking when a strategy aligns with the goals of the number string. For example:
  - » *Why does it make sense to add 3s (5s) together?*
  - » *How is this problem similar to and different from the others?*
  - » *Where do you see the number of groups? How many are in each group?*
  - » *Where do you see the answer to this problem?*

3 Deliver the rest of the problems shown in the table.

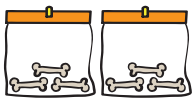
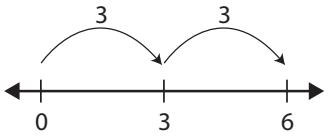
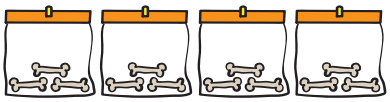
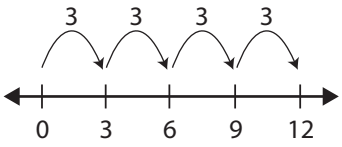
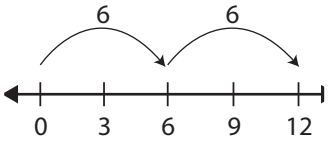
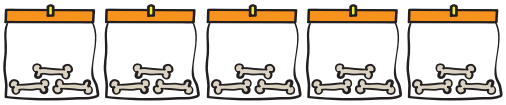
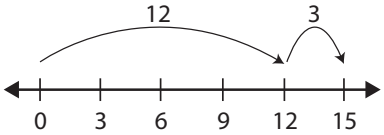
- Display each new problem by revealing additional bags of bones.
- For problems 4–6, use the second set of images with five dog bones in each bag.

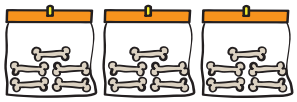
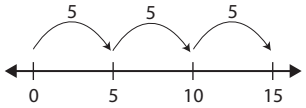
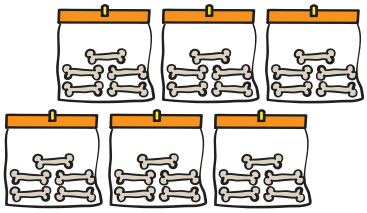
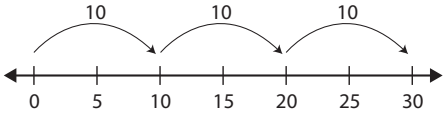
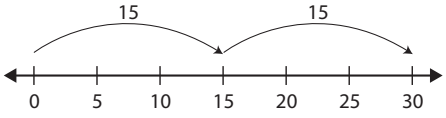
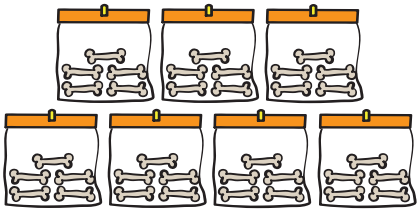
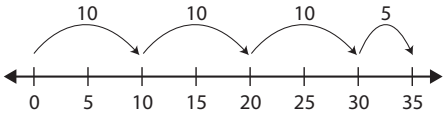
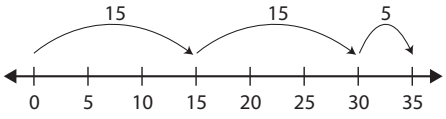
SUPPORT Make colored tiles or game markers available for students to recreate the equal groups in each problem. Encourage students to maintain the groups and count by 3s and 5s.

Instructional Routine

Number string

This is the first of several number strings in this unit. The context has been curated to support students in unitizing the quantity in each of the equal groups. Students begin to develop multiplicative reasoning as they attend to two quantities: the number of bags and the number of dog bones in each bag.

Problems	Sample Strategies & Recording	Connections
 (2 bags of 3 dog bones)	 3 + 3 = 6 2 × 3 = 6	**Big Idea** Although these problems can be solved by skip-counting by 3s or 5s, students may begin to use multiplicative strategies too. They may use previous problems to double the number of groups or to add a group, supporting the development of multiplicative reasoning by simultaneously tracking the number of groups and the number in each group. Whenever possible, elicit multiplication equations to represent students' thinking. For example, ask: • *How many jumps of 3 do we see on the number line?* • *How could we represent 4 jumps of 3 with a multiplication equation?* • *How do the 4 and the 3 connect to the image of the dog bones? What about the 12?*
 (4 bags of 3 dog bones)	"I counted by 3s: 3, 6, 9, 12."  4 × 3 = 12 "I doubled 6 to get 12."  6 + 6 = 12 (2 × 3) + (2 × 3) = 12	
 (5 bags of 3 dog bones)	"I added another 3 onto 12 to get 5 groups of 3, or 5 × 3."  4 × 3 = 12 12 + 3 = 15 5 × 3 = 15	

Problems	Sample Strategies & Recording	Connections
 (3 bags of 5 dog bones)	"I skip-counted by 5s."  5 + 5 + 5 = 15 3 × 5 = 15	Students may be surprised that 5 groups of 3 is the same amount as 3 groups of 5. Invite students to think about the two equations 5 × 3 = 15 and 3 × 5 = 15. Ask: • *What do you notice about these two equations?* • *Do you think this might be true with other pairs of numbers?* It is not necessary to introduce the commutative property of multiplication at this time. Instead, leave this observation and any conjectures open for further inquiry.
 (6 bags of 5 dog bones)	"There are 10 bones in 2 bags. I made 3 groups of 10 to get 30." 10 + 10 + 10 = 30  3 × 5 = 15 (3 × 5) + (3 × 5) = 15 + 15 15 + 15 = 30 6 × 5 = 30  	
 (7 bags of 5 dog bones)	"I added another 5 onto 30 to get 7 groups of 5." (6 × 5) + 5 = 30 + 5 = 35 7 × 5 = 35   	

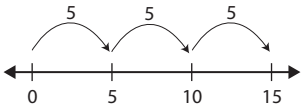
4 Ask students to explain in their own words some of the strategies used today. Generate a class summary from their thinking, and have students record the summary and example problems in their journals.

- Touch specifically on the strategy of doubling the number of groups between problems 1 and 2, and problems 4 and 5.
- Highlight the strategy of adding a group between problems 2 and 3 and problems 5 and 6.

Sample Summary: Finding Products

You can count by the number in each equal group to find a product. You can also use a product you know to find other products. If the number in each group stays the same, you can double the number of groups or add on a group.

number of groups × number in each group = product



5 + 5 + 5 = 15
3 × 5 = 15

Math Practices in Action

Look for and make use of structure

Expect variation in the ideas from this number string that students choose to summarize. When possible, highlight how the ideas connect to the structure of equal groups multiplication. Emphasize the number of groups, the number in each group, and how problems build on each other by changing those quantities.

Assessment

Unit 2 Screener

5 Introduce the Unit 2 Screener.

- Display the screener, give each student a copy, and preview it together.
- Remind them that when you conduct an assessment like this, you need to see what each student can do on their own.
- Remind students to wait to begin working until they are asked to.
- Give students a minute to look over the screener.

6 When students understand what to do, let them begin.

Remind them to raise their hands if they need help reading a problem; this is not meant to be a reading test.

7 As students finish, have them give you their screener and then go to Work Places or work on something independently.

Work Places

8 As students complete the screener, have them pick up their Work Place folders and a pencil, and remind them to fill out their Work Place Logs as they finish each activity.

9 Close the session and have students clean up the Work Place materials.

Home Connection

10 Introduce and assign The Pet Store Home Connection, which provides more practice with the following skills:

- Fluently add and subtract within 20 using mental strategies
- Solve multiplication and division word problems with products and dividends to 100 involving situations of equal groups, arrays, and measurement quantities
- Solve multistep word problems involving only whole numbers, using addition, subtraction, multiplication, and division

Daily Practice

The optional Missing Numbers Fill In student book page provides additional opportunities to apply the following skill:

- Fluently add and subtract within 20 using mental strategies

Session 3

Hamster Multiplication

Summary

Students solve and discuss a series of problems that involve equal groups. Then they work in pairs on a problem that will be discussed during a forum in the following session. Lastly, students spend the remainder of the session at Work Places.

Module 1 Learning Goals

Students learn about multiplication concepts by working with equal groups and arrays.

- ☐ Students compare and connect strategies for solving multiplication problem situations.
- ☐ Students develop an understanding of multiplication as an operation that involves equal groups.
- ■ **Students apply strategies to solve a problem situation involving equal groups.**
- ☐ Students explore the connection between arrays and multiplication.

Materials

Problems & Investigations Hamster Multiplication	
Copies & Display	**PO P6** Hamster Bedding **PO P7–P10** Hamster Multiplication forum discourse planner **SB 33–34** Hamster Multiplication
Kit Materials	• colored tiles (class set) • game markers (class set)
Classroom Materials	Unifix cubes (class set)
Work Places in Use	
1A Make the Sum (introduced in Unit 1, Module 1, Session 5) **1B** Target 20 (introduced in Unit 1, Module 2, Session 1) **1C** Blast Off to Space (introduced in Unit 1, Module 2, Session 4) **1D** Target 100 (introduced in Unit 1, Module 4, Session 2) **1E** Anything But 5 (introduced in Unit 1, Module 4, Session 4)	
Daily Practice	
Copies & Display	**SB 35** Alexandra's Garden

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

**Word Resource Card available*

columns
repeated addition
rows
skip-count

Preparation

Read Session 4 to see how students might share their work from today's session. Before next session's math forum, use the forum discourse planner to help you select which students will share their work.

Problems & Investigations

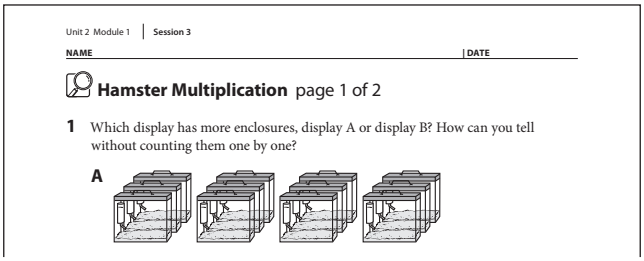
Hamster Multiplication

Introducing Hamster Multiplication

1 Open the session by inviting students to think about their previous experiences with different strategies for multiplying. You can remind them of the strategies they explored in the open strategy share in Session 1 and last session's Number String.

2 Explain that students will spend this session and the next continuing to develop and discuss strategies for solving multiplication problems.

3 Have students open their student books to Hamster Multiplication. Read the first problem aloud.


Unit 2 Module 1 | Session 3

NAME | DATE

Hamster Multiplication page 1 of 2

1 Which display has more enclosures, display A or display B? How can you tell without counting them one by one?

A

Students Solve in Pairs

4 Invite students to work in pairs to make sense of the first problem.

- First, ask students to reread the problem and discuss what they are being asked to do.
- Ask students to think about what they need to do to solve this problem.
- Remind them to consider strategies used in the last two sessions.

5 Ask student pairs to solve the first problem using tools that make sense for them.

- Pass out colored tiles, game markers, and Unifix cubes to all student pairs, or indicate where these have been made available.
- Encourage students to write or draw on their book page to show their thinking.
- Invite them to think about representing their thinking using multiplication.
- Challenge them to solve the problem in two different ways.

6 When pairs are done with the first problem, ask them to make sense of and solve problems 2 and 3, and the challenge problem if they have time.

- If time allows, check in with pairs about their solution and strategy for the first problem before they move on.
- Remind them to find strategies that don't involve counting the objects one by one.
- Encourage them to show their thinking clearly on their student book page and to use multiplication expressions and equations to express their thinking.

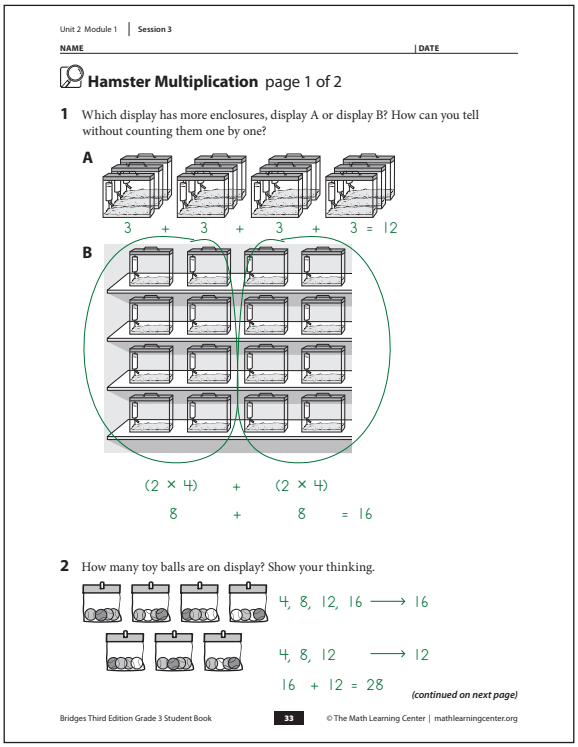
7 As students work, circulate to observe their strategies, and select a few pairs to share in a few minutes. Select students who used a variety of representations, including, but not limited to, the following:

- Skip-counting
- Repeated addition
- Finding partial products
- Using doubling or tripling

Sharing Strategies

8 When students have finished, ask the students you selected to share their strategies for solving each problem.

- As students share, have them display their work from their student pages. (Sample student work is pictured.)


Unit 2 Module 1 | Session 3

NAME | DATE

Hamster Multiplication page 1 of 2

1 Which display has more enclosures, display A or display B? How can you tell without counting them one by one?

A

3 + 3 + 3 + 3 = 12

B

(2 × 4) + (2 × 4)

8 + 8 = 16

2 How many toy balls are on display? Show your thinking.

4, 8, 12, 16 ⟶ 16

4, 8, 12 ⟶ 12

16 + 12 = 28

(continued on next page)

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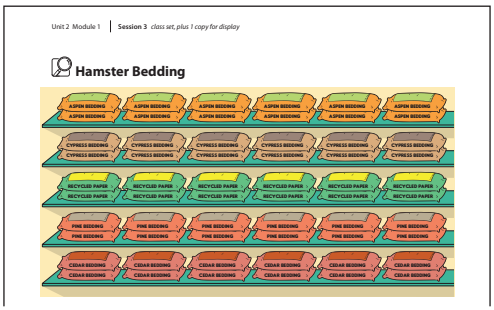
- As each student shares, ask them whether they think their answer is reasonable, and press them to support their conclusion.
- Allow plenty of time for students to share their strategies and clarify their thinking for others, but leave at least 20 minutes for the remainder of the session.

Hamster Bedding Problem Solving

9 Display the Hamster Bedding print original and read the problem aloud.


Unit 2 Module 1 | Session 3 *class set, plus 1 copy for display*

Hamster Bedding

10 Pass out a copy of the print original to each student and invite them to continue their work in pairs to solve the problems.

You may want to mention to students that recycled paper is a type of hamster bedding.

11 As students work, offer support as needed. Circulate and use the Hamster Multiplication forum discourse planner to make notes about students' strategies and who you'll ask to share in next session's math forum.

SUPPORT Encourage students who are counting one by one to group the items to make them easier to count, including making larger groups from smaller groups. Temporarily cover the final column in the image or isolate a single column to support them in seeing groups of 10.

CHALLENGE Encourage students to solve the problem in more than one way by grouping the items differently. Alternatively, ask students how they could change the display so that it shows 100 bags of hamster bedding.

12 Collect students' work. Before the next session, prepare the Hamster Multiplication forum discourse planner.

- Look over students' work to gather a variety of solutions that demonstrate an understanding and application of equal groups.
- Record and sequence select students' work in the planner.
- Ask those students whether they would be willing to share their work with the class next session.

Work Places

13 As students finish, have them turn in their work and go to Work Places. Remind them to fill out their Work Place Logs with each activity they complete.

14 Close the session and have students clean up the Work Place materials.

Daily Practice

The optional Alexandra's Garden student book page provides additional opportunities to apply the following skills:

- Interpret products of whole numbers
- Solve multiplication and division word problems with products and dividends to 100 involving situations of equal groups, arrays, and measurement quantities
- Use and explain additive strategies (e.g., repeated addition and skip-counting) and multiplicative strategies (e.g., doubling, doubling and halving, and using partial products) to demonstrate an understanding of multiplication

Equity-Based Practice

Leveraging multiple mathematical competencies

This task is structured to have various entry points, thereby encouraging engagement and input from all students. The forum discourse planner provides suggestions for assessing and advancing questions that develop, connect, and build on the diverse competencies of all students.

Session 4

Hamster Multiplication Forum

Summary

Students convene for a math forum to share their multiplication strategies from the previous session. They practice listening to ideas that may be different from their own and critiquing the reasoning of others to build a deeper understanding of multiplication. Then students are introduced to a new Work Place, Loops & Groups, and visit Work Places. Finally, the teacher assigns The Pet Store Challenges Home Connection.

Module 1 Learning Goals

Students learn about multiplication concepts by working with equal groups and arrays.

- ☐ Students compare and connect strategies for solving multiplication problem situations.
- ☐ Students develop an understanding of multiplication as an operation that involves equal groups.
- ■ **Students apply strategies to solve a problem situation involving equal groups.**
- ☐ Students explore the connection between arrays and multiplication.

Materials

Math Forum Hamster Multiplication	
Classroom Materials	• Hamster Bedding (PO P6) with work from Session 3 • Hamster Multiplication forum discourse planner (PO P7–P10) with notes from Session 3
Problems & Investigations Introducing Work Place 2A Loops & Groups	
Copies & Display	**PO P11** Work Place Guide 2A Loops & Groups **PO P12** 2A Loops & Groups record sheet **PO P13** Unit 2 Work Place Log **SB 36** Work Place Instructions 2A Loops & Groups
Kit Materials	dice numbered 1–6 (half-class set)
Work Places in Use	
1A Make the Sum (introduced in Unit 1, Module 1, Session 5) **1B** Target 20 (introduced in Unit 1, Module 2, Session 1) **1C** Blast Off to Space (introduced in Unit 1, Module 2, Session 4) **1D** Target 100 (introduced in Unit 1, Module 4, Session 2) **1E** Anything But 5 (introduced in Unit 1, Module 4, Session 4) **2A** Loops & Groups (introduced in this session)	
Home Connection	
Copies & Display	**HC 19–20** Pet Store Challenges
Daily Practice	
Copies & Display	**SB 37** Fruit Boxes

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

**Word Resource Card available*

array*
columns
row

Preparation

- Look over students' work and use the forum discourse planner to help decide which students will present today.
- In today's session, you'll introduce Work Place 2A Loops & Groups. Read the Work Place Guide and Instructions, including suggestions for differentiating the activity to meet students' needs. Assemble the materials listed on the Guide, and place them in the bin.

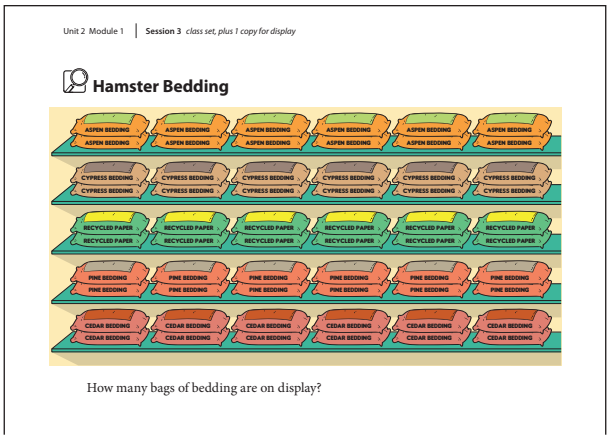
- Students will visit Work Places today. Staple a Unit 2 Work Place Log at all four corners to the back of each students' Work Place folder. Leave the Unit 1 Work Place Log attached to the front of the folders. Double-check the bins for the available Work Places to make sure there are enough record sheets.
- If you are ready to explore or implement options for differentiation during Work Places or other flexible session time, see Opportunities for Differentiation in the Teaching Tips section of the Unit 2 Introduction.

Math Forum

Hamster Multiplication Forum

Preparing for the Math Forum

1 Open the lesson by distributing the Hamster Bedding page back to students. Have students read over the problem to remind them of the work they did in the previous session. Tell students that a few members of the class will share their work in a forum.



2 Review the ABCs of Math Talk on the inside cover of the student books.

- Emphasize that the act of listening is just as important as the role of speaking. The class is responsible for listening respectfully, asking questions, and learning from others.
- Review the sentence starters, provide examples of how they might be used, and invite students to share their own examples.

Conducting the Math Forum

3 Use the Hamster Multiplication forum discourse planner to help structure discussion.

- Ask the first student to explain their strategy.
- Invite the rest of the class to make observations and ask questions. Encourage students to use the sentence starters from the ABCs of Math Talk.
- Throughout the discussion, ask assessing and advancing questions from the planner to clarify and generalize strategies.
- As students share, display their work in a way that allows everyone to see.

Teacher *Tierra, can you share your work with us and explain how you solved the problem?*

Equity-Based Practice

Going deep with mathematics

Math forums provide an opportunity to reinforce norms about what mathematics learning looks like. The multiple solution strategies elicited by the visual arrangement of hamster bedding engage students in analyzing, critiquing, and even debating others' thinking.

Math Teaching Practice

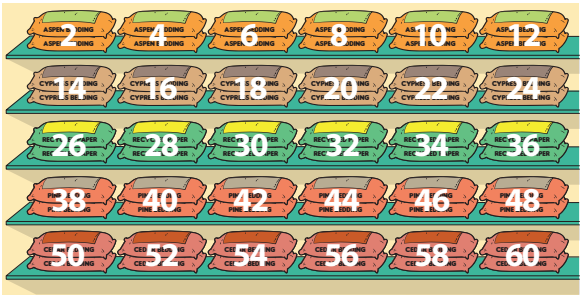
Facilitate meaningful mathematical discourse

The forum discourse planner is an effective tool for assessing and recording students' thinking and guiding a meaningful and productive discussion. Additionally, the ABCs of Math Talk is a supportive student-facing tool for developing norms of effective classroom discourse.

Tierra *I counted the bags by 2s.*

Teacher *Can you tell us a little more about why and how you did that?*

Tierra *Yeah, I saw that the bags were stacked in 2s. So instead of counting each bag, I counted each set of two bags. I wrote the next number I got by skip-counting on each pair of bags. In the end, there were 60 bags.*



4 Repeat step 3 with three or four other strategies.

- Use the notes provided on the forum discourse planner for sharing, comparing, and connecting, as well as your own notes about students' work to support the class in making connections among strategies.
- Be sure to have students identify how each presenter saw equal groups within the image.

Teacher *Esteban, can you share your work with us?*

Esteban *I saw that each row had 12. There were 6 groups of 2, so I knew that was 12. I added the first two shelves and got 24. Then I added the next two shelves and got 24.*

Teacher *How did you know that you could keep adding 12s together instead of figuring out how many were on each shelf?*

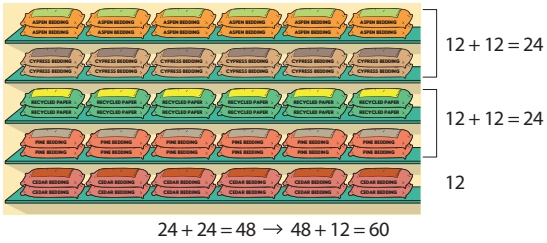
Esteban *All the shelves had the same number of things, so I knew I could add the same numbers together.*

Teacher *Does anyone have any questions or comments for Esteban?*

Asia *Yeah, I see how you got 24 for the first two shelves and the next two shelves, but how did you get your answer?*

Esteban *Oh! I added 24 and 24 and got 48. That was the top four shelves. Then I added another 12 for the bottom shelf and got 60.*

Asia *OK, that makes sense now.*

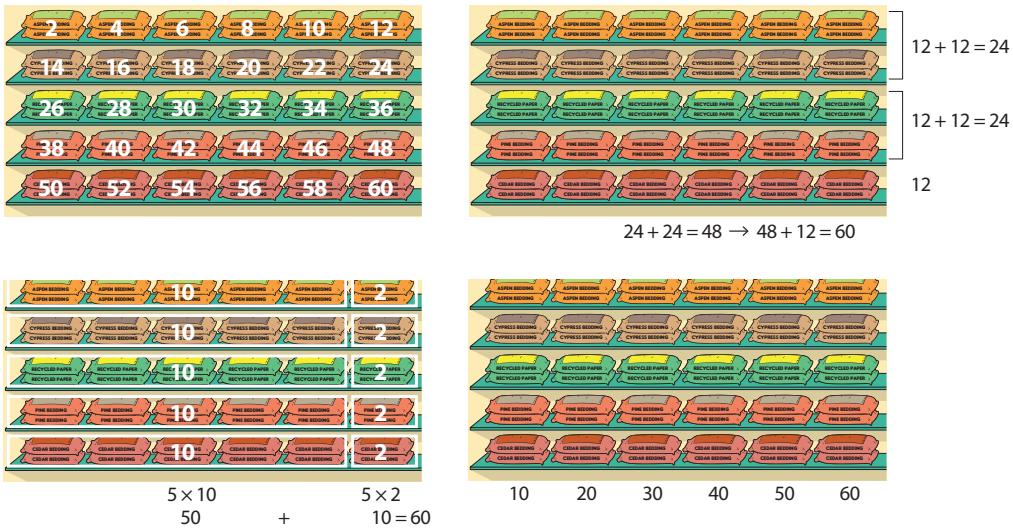


5 Display two or more students' work side by side so the class can compare strategies and make connections.

Teacher *Can anyone make connections between Tierra's strategy and Esteban's strategy?*

Aaron *If you look at the end number on each shelf on Tierra's it matches the 12 that Esteban added for each shelf.*

6 Once students have shared their strategies, invite all students to reflect on the strategies again and make additional connections.



Marquis *I see equal groups in each one.*

Connor *Yeah, it's like you know there's the same number on each shelf or going up or down so you can add that number over and over.*

Tierra *I didn't think about looking for groups of 10. That seems like a good way to count.*

7 If the presenters' work does not include multiplication expressions or equations, invite the class to represent the work that they see using multiplication (5×12, 12×5, 6×10, or 10×6).

Closing the Math Forum

8 Ask guiding questions to help students reflect on this math forum experience.

- *What do you notice about how equations were used to represent the different ways we saw this picture?*
- *How did you and your classmates use multiplication?*
- *How are addition and multiplication related?*
- *How was seeing other students' thinking helpful to your own understanding?*
- *How will this help you solve similar problems in the future?*

Problems & Investigations

Introducing Work Place 2A Loops & Groups

Students play Loops & Groups in September Number Corner. If you have already introduced the game in Number Corner, you can abbreviate or skip this introduction.

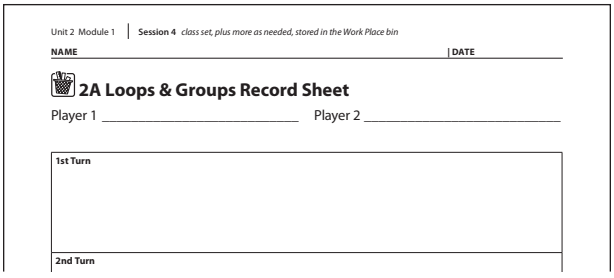
9 Take a moment to recognize students for their work with multiplication in the first four sessions of this unit. Let them know that they will learn a Work Place game that will help them practice and further develop multiplication concepts.

10 Introduce the game Loops & Groups, using the Work Place Guide. You might also invite students to review the Work Place Instructions in their student books at this time.

Players take turns rolling a die numbered 1–6 two times. The first roll tells how many loops to draw; the second roll tells how many shapes to draw in each loop. For example, if a player rolled a 4 first and then a 3, they would draw 4 loops and 3 small shapes inside each loop, for a total of 12. Players write a multiplication equation (4 × 3 = 12) or a sentence (4 groups of 3 equals 12) to show the results. Each player takes five turns and then adds their products to find the sum. The player with the greater sum wins.

11 Use the 2A Loops & Groups record sheet to play two rounds of Loops & Groups against the class.

You may choose to divide your display copy of the record sheet into two columns for this demonstration to show the teacher's turn and the class's turn at the same time.



Unit 2 Module 1 | **Session 4** *class set, plus more as needed, stored in the Work Place bin*

NAME | DATE

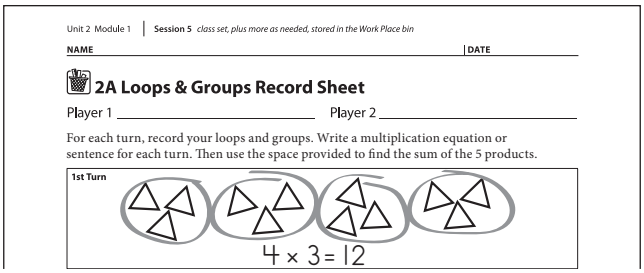
2A Loops & Groups Record Sheet

Player 1 _____ Player 2 _____

1st Turn

2nd Turn

- Pose questions like the following to promote discussion of multiplication concepts and notation while you play:
  - » *What do you see? What do you notice?*
  - » *How many triangles do I have in all? How do you know?*
  - » *Where do you see the 4 in the picture? Where do you see the 3? Where is the 12?*
- While playing the game:
  - » Encourage students to use the language they have been using in recent sessions, such as "groups of" and "times."
  - » Ask students to help write equations showing what you and they rolled.
  - » Write the equations using numbers (4 × 3 = 12) and words (4 groups of 3 equals 12), as in the following example. Tell students that they don't need to record both ways of describing the results, but they do need to write at least one equation or sentence for each set of loops and groups.



Unit 2 Module 1 | **Session 5** *class set, plus more as needed, stored in the Work Place bin*

NAME DATE

2A Loops & Groups Record Sheet

Player 1 _____ Player 2 _____

For each turn, record your loops and groups. Write a multiplication equation or sentence for each turn. Then use the space provided to find the sum of the 5 products.

1st Turn

4 × 3 = 12

12 Stop after you have completed two rounds of the game, and remind students that the game continues until each player has had five turns. Explain that each player adds all of their products together, and the player with the greater sum wins the game.

Remind students that a *product* is the answer to a multiplication problem.

13 Have students turn to a partner and summarize the directions for Loops & Groups.

Work Places

14 Let students know that they will go to Work Places for the remainder of the session.

15 Show students an example of the Unit 2 Work Place Log that has been stapled to their Work Place folders. Remind them that they will still visit Work Places from Unit 1 and, for now, will be using both the Unit 1 and Unit 2 Work Place Logs.

16 Encourage students to play Loops & Groups today, as well as other Work Places they have not visited recently.

Have students get their Work Place folders and a pencil, and remind them to fill out their Work Place Logs as they finish each activity.

SUPPORT Suggest specific Work Places for students to work on critical skills.

CHALLENGE Encourage students to think about the strategies they are using and to share their thinking with other students. Encourage them to generalize what happens in certain Work Places.

17 Close the session and have students clean up the Work Place materials.

Home Connection

18 Assign The Pet Store Challenges Home Connection, which provides more practice with the following skills:

- Interpret products of whole numbers
- Solve multiplication and division word problems with products and dividends to 100 involving situations of equal groups, arrays, and measurement quantities
- Use and explain additive strategies (e.g., repeated addition and skip-counting) and multiplicative strategies (e.g., doubling, doubling and halving, and using partial products) to demonstrate an understanding of multiplication

Daily Practice

The optional Fruit Boxes student book page provides additional opportunities to apply the following skills:

- Solve multiplication and division word problems with products and dividends to 100 involving situations of equal groups, arrays, and measurement quantities
- Use and explain additive strategies (e.g., repeated addition and skip-counting) and multiplicative strategies (e.g., doubling, doubling and halving, and using partial products) to demonstrate an understanding of multiplication

Session 5

The Pet Store, Part 1

Summary

In this session, students compare and contrast two images from The Pet Store print original and discuss arrays as rectangular arrangements of objects. Then student pairs pose and solve problems involving multiplication before visiting Work Places.

Module 1 Learning Goals

Students learn about multiplication concepts by working with equal groups and arrays.

- ☐ Students compare and connect strategies for solving multiplication problem situations.
- ☐ Students develop an understanding of multiplication as an operation that involves equal groups.
- ☐ Students apply strategies to solve a problem situation involving equal groups.
- ■ **Students explore the connection between arrays and multiplication.**

Materials

Problems & Investigations The Pet Store, Part 1	
Copies & Display	**PO P14** Same & Different **PO P1** The Pet Store **SB 38** Problem Posing in the Pet Store
Kit Materials	• colored tiles (class set) • game markers (class set)
Classroom Materials	• The Pet Store Notice & Wonder chart from Session 1 • Word Resource Cards for *array* and *factor* • Unifix cubes (class set)
Work Places in Use	
1A Make the Sum (introduced in Unit 1, Module 1, Session 5) **1B** Target 20 (introduced in Unit 1, Module 2, Session 1) **1C** Blast Off to Space (introduced in Unit 1, Module 2, Session 4) **1D** Target 100 (introduced in Unit 1, Module 4, Session 2) **1E** Anything But 5 (introduced in Unit 1, Module 4, Session 4) **2A** Loops & Groups (introduced in Unit 2, Module 1, Session 4)	
Daily Practice	
Copies & Display	**SB 39** Pet Problems

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

**Word Resource Card available*

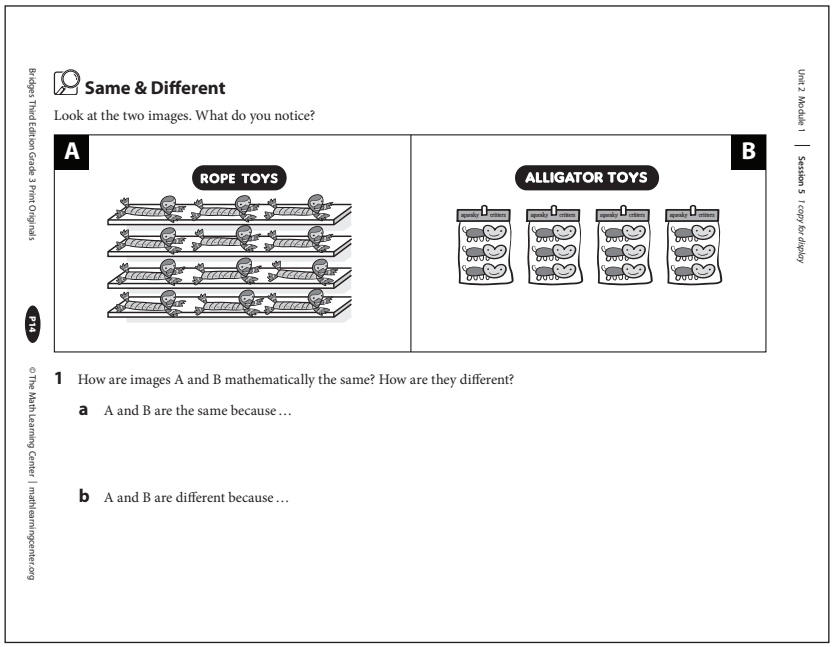
array*
columns
factor*
rows

Problems & Investigations

The Pet Store, Part 1

Same & Different

1 Introduce the Same & Different print original and have students take a moment to look closely at both images.



2 Invite students to think-pair-share what is the same and different between the two images.

- Invite pairs to share their observations with the class.
- Record students' thoughts on the whiteboard.
- Ask students to identify the observations and comparisons that are mathematical.

Students may notice the following:

Same

- Both images show 12 toys.
- Toys are grouped by 3s on shelves or in bags.
- You can see all the items in both pictures.

Different

- The rope toys are arranged in a rectangle (array) on shelves, and the alligator toys are in bags. (Students may recognize that the alligator toys are also arranged in an array, ignoring the bags.)
- The rope toys are arranged 3 across and 4 down and the alligators are arranged 4 across and 3 down.
- The rope toys are sold on their own, but the alligator toys are sold only in groups.

3 Ask students to consider how the number of items in each image can be determined without counting one by one. Invite several students to share their ideas.

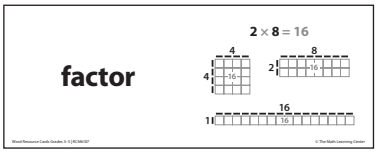
4 Focus the discussion on any differences from step 2 that are about the arrangement of the items.

- Invite students to share ideas for the type of arrangement in image A. Because students have learned the term *array* in earlier grades and in Number Corner, this term may arise naturally.
- Review the terms *rows* and *columns* as needed.
- Ask the class to think about how they could determine the total number of items in an arrangement like this without counting each one. (They could count by the number in each row or each column.)

5 For each image, have students describe the multiplication situation and identify a multiplication equation. Record descriptions and equations alongside image A (4 rows of 3 toys; $4 \times 3 = 12$) and image B (4 groups of 3 toys; $4 \times 3 = 12$).

6 Introduce the Word Resource Cards for *array* and *factor*.

- Read each definition aloud. Have students share what they notice about the associated images.
- Ask students how the words connect to the images they have explored and the multiplication equations you have recorded.
- Review the definition of *product*. Identify the product in each equation.



Math Practices in Action

Reason abstractly and quantitatively

Inviting students to record equations for both images helps them to see connections between the two contexts. Although the appearance of the displays is different, both situations can be represented with the same equation.

Problem Posing

7 Reintroduce The Pet Store print original and display the chart of observations and questions from Session 1. Ask students to silently reread the observations and questions.

Notice	Wonder
The store is called Mateo's.	Are pets allowed in the store?
The small chew toys are in 4 columns and the large chew toys are in 5 columns.	What toys do dogs like best?
The large and small chew toys are in 4 rows.	How many chew toys are in the store?
There are 3 rows of leashes.	How many collars are there?
The canned dog food is in 5 boxes of 10 cans.	How much would all of the dog food cost?
They sell food for different animals.	How many total toys are for sale?
The rawhide chews are in 3 rows of 3.	How many cans of cat food are in the store?
It looks like there are more collars than rope toys.	How many dog bones are there?

8 Introduce problem posing to students. Have them identify the mathematical questions that have already been posed on the chart paper.

> ***Teacher*** *Sometimes you will have data or information, like this picture, that you have collected, and you will need to answer mathematical questions using that information. The first step to answering mathematical questions is asking them. We call this* problem posing. *The other day, you came up with observations and questions about Mateo's Pet Store. Which of these questions could be answered with math?*

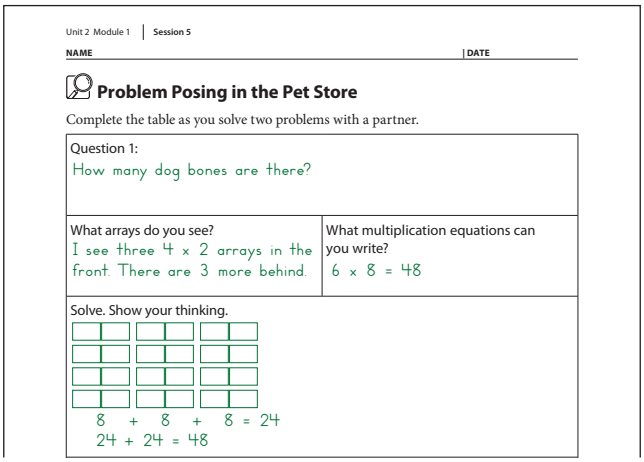
9 Invite students to think about additional mathematical questions that might be posed about Mateo's Pet Store. Record these new questions on the chart.

- Students can turn observations from the Notice list into questions.
- Students can reword questions from the Wonder list.
- Students can generate new questions to answer.
- Remind students that they are posing mathematical problems.
- Consider introducing students to more complex comparison problems, such as: *Are there more cans of dog food or cans of cat food? How many more?*

10 Explain to students that while previously the teacher chose the question to answer, today they will work with a partner to select and answer two questions.

Partner Problem Solving

11 Display the Problem Posing in the Pet Store student book page and work together as a class to complete it using the problem you solved together as a class during session 1.



Unit 2 Module 1 | Session 5

NAME | DATE

Problem Posing in the Pet Store

Complete the table as you solve two problems with a partner.

Question 1:
How many dog bones are there?

What arrays do you see?
I see three 4 x 2 arrays in the front. There are 3 more behind.

What multiplication equations can you write?
6 x 8 = 48

Solve. Show your thinking.

8 + 8 + 8 = 24
24 + 24 = 48

12 Pass out colored tiles, game markers, and Unifix cubes to all student pairs, or indicate where these have been made available.

13 Ask students to work with a partner to complete the Problem Posing in the Pet Store page using two problems of their choice. As students work, encourage them to do the following:

- Represent equal groups, situations, and arrays with multiplication equations
- Find connections between sets of items with the same factors

Instructional Routine

Discussion structure

Problem posing is an opportunity for students to generate their own mathematical problems and questions of interest. Students will often pose and choose problems that are within a comfortable range. Observe the problems that students generate and select, paying careful attention to how their multiplicative reasoning has developed since first engaging with Mateo's Pet Store.

- Identify and describe the displays that are arrays
- Think about how they could calculate the total number of items to help them answer their chosen questions
- Write or draw on their student book page to show their thinking

14 Observe students' conversations and question them to assess and advance their thinking. Ask questions like the following:

- *What strategy or model are you using to answer your question?*
- *Why did you choose that particular model (or strategy)?*
- *Could you solve your problem in a different way?*

15 Explain that students will have the opportunity to share their questions and solutions during the next session.

Work Places

16 Let students know that they will go to Work Places for the remainder of the session. Ask a student to summarize the directions for Work Place 2A Loops & Groups, which they learned in the previous session.

17 Encourage students to play Loops & Groups today, as well as other Work Places they have not visited recently.

Have students get their Work Place folders and a pencil, and remind them to fill out their Work Place Logs as they finish each activity.

SUPPORT Suggest specific Work Places for students to work on critical skills.

CHALLENGE Encourage students to think about the strategies they are using and to share their thinking with other students. Encourage them to generalize what happens in certain Work Places.

18 Close the session and have students clean up the Work Place materials.

Daily Practice

The optional Pet Problems student book page provides additional opportunities to apply the following skills:

- Interpret products of whole numbers
- Solve multiplication and division word problems with products and dividends to 100 involving situations of equal groups, arrays, and measurement quantities
- Use and explain additive strategies (e.g., repeated addition and skip-counting) and multiplicative strategies (e.g., doubling, doubling and halving, and using partial products) to demonstrate an understanding of multiplication

Session 6

The Pet Store, Part 2

Summary

In this session, students make posters and discuss strategies for a problem they posed and solved in the previous session. Then they visit Work Places. Finally, the teacher introduces and assigns the Leaves & Flower Petals Home Connection.

Module 1 Learning Goals

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- ☐ Students apply strategies to solve a problem situation involving equal groups.
- ■ **Students explore the connection between arrays and multiplication.**

Materials

Problems & Investigations The Pet Store, Part 2	
Classroom Materials	• Problem Posing in the Pet Store (SB 38) with work from Session 5 • copy paper (half-class set)
Work Places in Use	
1A Make the Sum (introduced in Unit 1, Module 1, Session 5) **1B** Target 20 (introduced in Unit 1, Module 2, Session 1) **1C** Blast Off to Space (introduced in Unit 1, Module 2, Session 4) **1D** Target 100 (introduced in Unit 1, Module 4, Session 2) **1E** Anything But 5 (introduced in Unit 1, Module 4, Session 4) **2A** Loops & Groups (introduced in Unit 2, Module 1, Session 4)	
Home Connection	
Copies & Display	**HC 21–22** Leaves & Flower Petals
Daily Practice	
Copies & Display	**SB 40** Making Dog Biscuits

PO – Print Original, **SB** – Student Book, **HC** – Home Connection

Vocabulary

**Word Resource Card available*

array*
columns
rows

Preparation

Write a list on the whiteboard of the Work Places available to students today.

Problems & Investigations

The Pet Store, Part 2

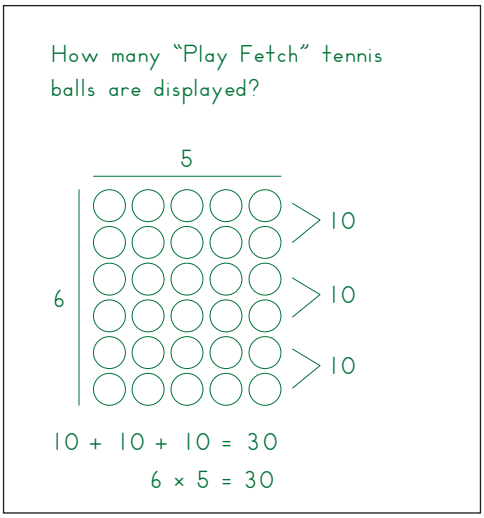
Making Posters

1 Begin today's session by inviting students to think about their multiplication work in this unit so far. You can ask the following questions to facilitate the discussion:

- *What is something new that you have learned about multiplication?*
- *How does our ongoing work remind you of what you did in Number Corner at the beginning of the year?*

2 Have students open their student books to the Posing Problems in the Pet Store page. Give pairs 15–20 minutes to create a poster (on copy paper) that shows their work solving one of the problems they posed in the previous session. Posters should include:

- The question they were answering
- A drawing showing their work
- A multiplication equation



Math Teaching Practice

Elicit and use evidence of student thinking

Observing and engaging with students' work on their posters is an opportunity to assess their thinking before the Module 2 checkpoint. These two types of assessments provide a balanced perspective on the development of students' multiplicative reasoning.

Sharing Strategies

3 Invite student pairs to share their problems and solution strategies with the class.

- As students share, have them display their posters.
- Encourage students to refer to the ABCs of Math Talk for sentence starters and question frames.
- Encourage the use of new multiplication vocabulary as they share.
- Ask students to think about the connections between different strategies and representations shared.
- Invite them to connect their equations to the work on the poster.

Math Practices in Action

Construct viable arguments and critique the reasoning of others

The ABCs of Math Talk is a scaffold for students developing their skills in mathematical discourse. Encourage students to use this tool to practice building upon and adding to the conversation by clarifying and challenging ideas shared by their classmates.

4 Be sure to compare and contrast solution strategies for items with the same or related factors or products. Here's a list of items that have products and factors that would make for interesting strategy comparisons:

- There are 48 dog bones and 24 striped balls.
- Both the cat food and the collars have a factor of 8.
- The canned dog food, the tennis balls, and the large chew toys all have a factor of 5.
- Both the tennis balls and the striped balls have a factor of 6.
- The rawhide chews and small chew toys each have two of the same factors (3×3 and 4×4).
- Both the small chew toys and the large chew toys have a factor of 4 since they are arranged in 4 rows.

5 If students did not present a problem that compared two groups of items, take a few moments to compare items represented on different posters. For example:

- How many more tennis balls are in the display than striped balls?
- How many more large chew toys are there than small chew toys?

6 Once students have shared their strategies, address the following points that may not have been discussed:

- The connection between addition and multiplication
- How students may use the product of one multiplication problem to find the product of another (that is, use 4×4, or 4 groups of 4, to find the product of 5×4, or 5 groups of 4)

7 Find a place to display the posters and encourage students to observe one another's work more closely during Work Places or at other times over the next couple of days.

Work Places

8 Encourage students to play Loops & Groups today, as well as other Work Places they have not visited recently.

Have students get their Work Place folders and a pencil, and remind them to fill out their Work Place Logs as they finish each activity.

SUPPORT Suggest specific Work Places for students to work on critical skills.

CHALLENGE Encourage students to think about the strategies they are using and to share their thinking with other students. Encourage them to generalize what happens in certain Work Places.

9 At the end of class, close the session.

- Have students clean up and put away their materials.
- Invite students to share something they have learned about multiplication this year. This might be a new strategy, or it might be a new way of thinking about multiplication.

Home Connection

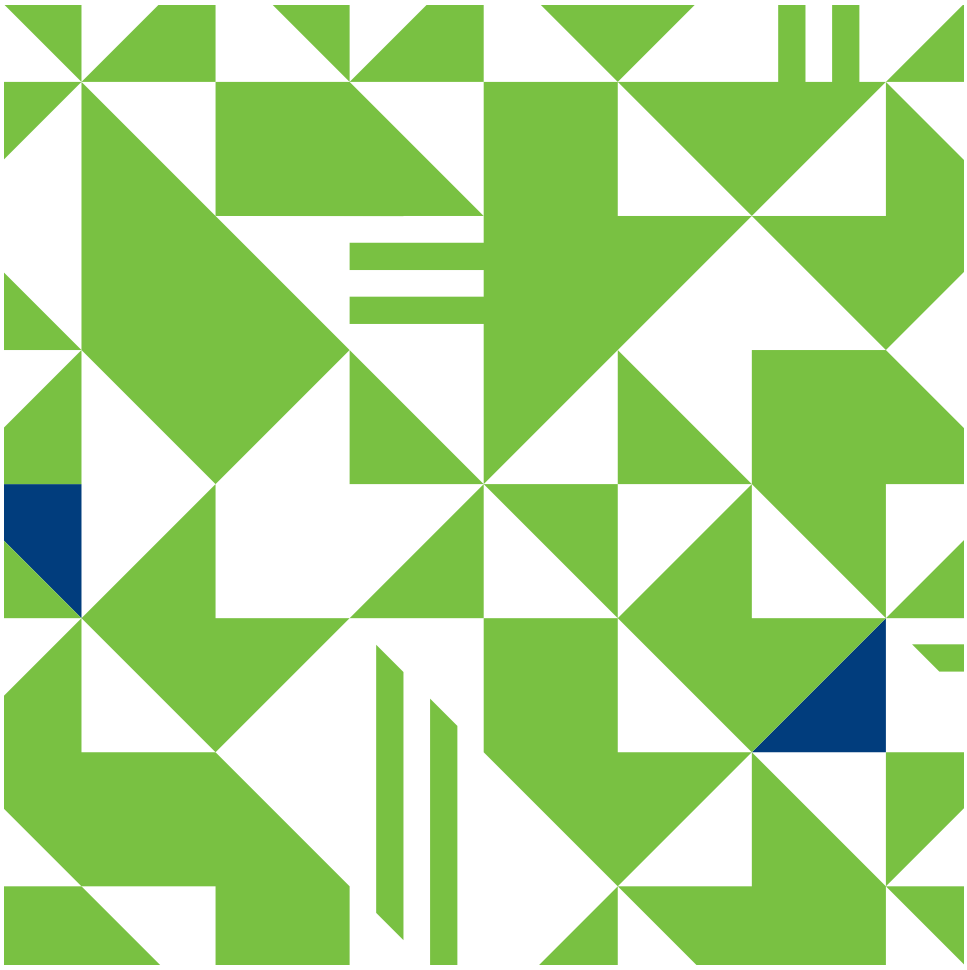
10 Introduce and assign the Leaves & Flower Petals Home Connection, which provides more practice with the following skills:

- Solve multiplication and division word problems with products and dividends to 100 involving situations of equal groups, arrays, and measurement quantities
- Model word problems involving multiplication within 100 by writing equations

Daily Practice

The optional Making Dog Biscuits student book page provides additional opportunities to apply the following skills:

- Interpret products of whole numbers
- Model word problems involving multiplication within 100 by writing equations
- Solve multiplication and division word problems with products and dividends to 100 involving situations of equal groups, arrays, and measurement quantities



Print Originals & Student Pages

bridges® in mathematics

The Pet Store

Dog Bone Display

DOG BONES

More Dog Bones

Problems 1–3

Problems 4–6

NAME | **DATE**

Unit 2 Screener page 1 of 2

I can skip-count by 10s, 5s, and 2s.

1 Fill in the missing numbers.

a 10, _____, _____, 40, _____, 60, 70, _____, _____, 100

b 5, 10, _____, _____, 25, _____, _____, _____, 45, _____

c 2, 4, 6, _____, 10, _____, _____, _____, _____, 20

I can solve addition problems with single-digit numbers.

2 Solve the addition problems.

a 6 + 6 = _____

b _____ = 7 + 7

c 9 + 9 = _____

d 4 + 4 + 4 = _____

e _____ = 5 + 5 + 5 + 5

f What do these problems have in common?

(continued on next page)

NAME | **DATE**

Unit 2 Screener page 2 of 2

I can use rows and columns in arrays to count objects and write an equation to match.

3 Examine the arrays. Find the number of objects and write an equation to show your thinking.

a

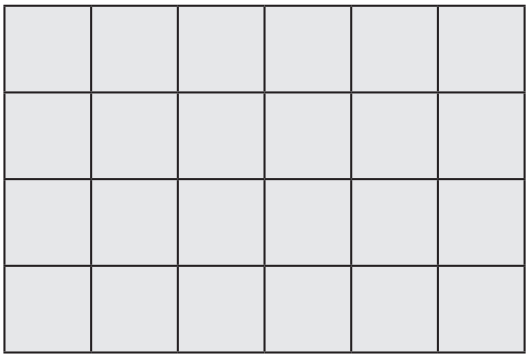
How many pennies are in each row? _____

How many pennies are in each column? _____

My equation:

_____

b



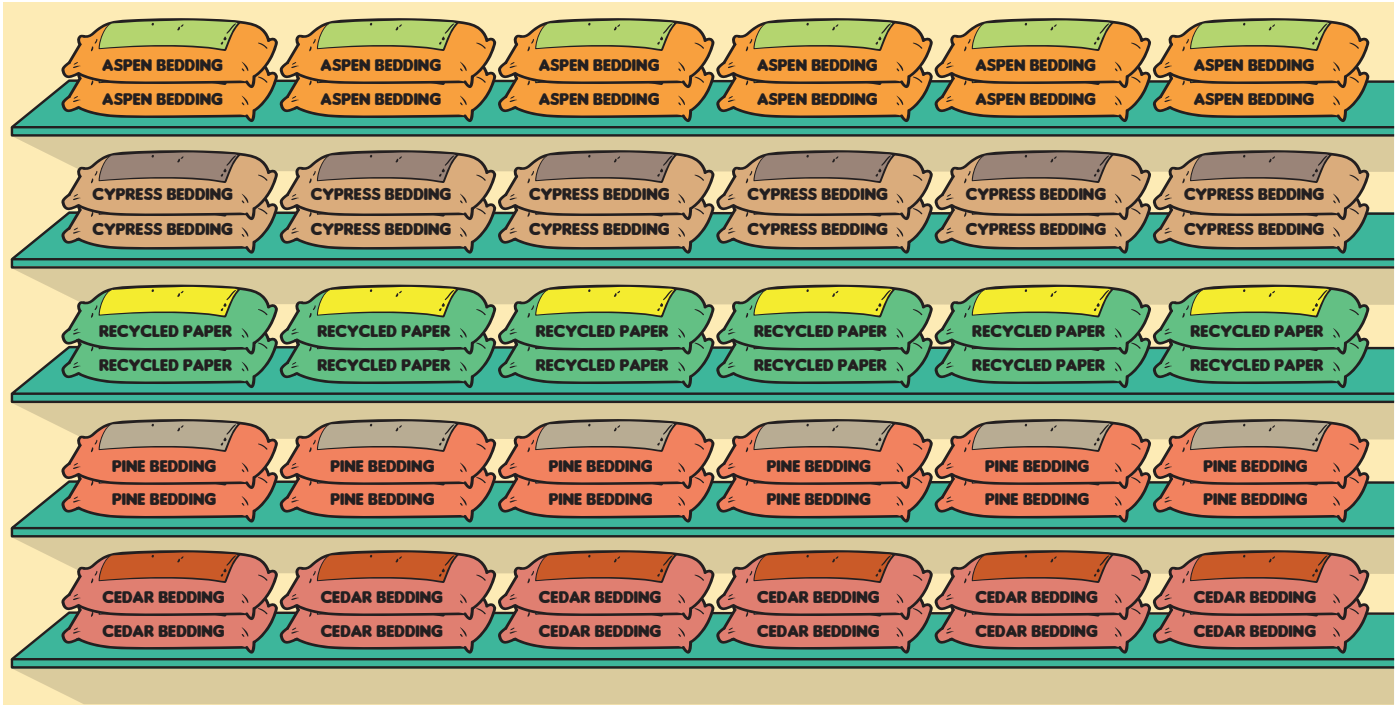
How many squares are in each row? _____

How many squares are in each column? _____

My equation:

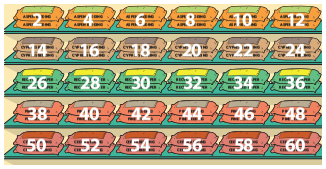
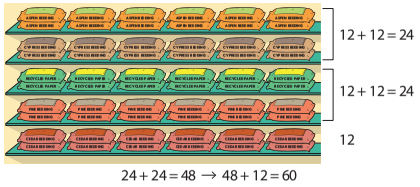
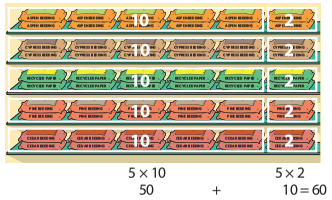
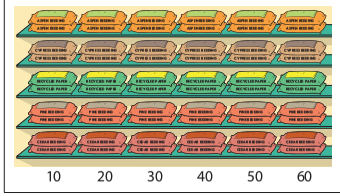
_____

Hamster Bedding



How many bags of bedding are on display?

Hamster Multiplication Forum Discourse Planner page 1 of 4

What are the various ways that students might approach the task or activity, including correct, incorrect, and incomplete thinking? Name the type of thinking or reasoning connected to each approach.	Monitoring Tool			
	Instructional Support		**Who and What** Who is using the strategy or a variation? Make note of any differences between students' strategies.	**Order** In what order will students present?
	Assessing Questions What will you ask to support exploration?	**Advancing Questions** What will you ask to connect what students did with what you want them to learn?		
Anticipated Solution Paths				
Skip-count by 2s 	• Why did you count by 2s? • Did you count by 2s the whole way?	How could you use your groups of 2 to create larger equal groups?		
Add groups of 12 (rows) 	• Where do you see groups of 12? How many groups of 12 do you see? • What multiplication equation could you write to represent your work?	• How did seeing groups of 12 help you figure out the total? • If there were more shelves of hamster bedding, would you use the same strategy or try something different? Why?		
Add 10s and then 2s 	• Can you explain how you grouped the 10s? • How could you write multiplication equations or expressions to represent your work?	• How did seeing groups of 10 help you figure out the total? • If there were more bags of bedding on each shelf, would you use the same strategy or try something different? Why? What if there were fewer bags of bedding on each shelf?		
Add columns of 10 	• How did you know you could add 10 over and over? • How could you write multiplication expressions or equations to represent your work?	• How did seeing groups of 10 help you figure out the total? • Could you have grouped the bags differently? • If there were more shelves of hamster bedding, would you use the same strategy or try something different? Why?		

(continued on next page)

Hamster Multiplication Forum Discourse Planner page 2 of 4

Monitoring Tool				
Anticipated Solution Paths What are the various ways that students might approach the task or activity, including correct, incorrect, and incomplete thinking? Name the type of thinking or reasoning connected to each approach.	**Instructional Support**		**Who and What** Who is using the strategy or a variation? Make note of any differences between students' strategies.	**Order** In what order will students present?
	Assessing Questions What will you ask to support exploration?	**Advancing Questions** What will you ask to connect what students did with what you want them to learn?		

(continued on next page)

Hamster Multiplication Forum Discourse Planner page 3 of 4

Class Discussion: Sharing, Comparing & Connecting

Selecting and Sequencing Which anticipated approaches and solutions do you want students to share and compare? In what order? Why?	**Connecting Responses** What specific questions will you ask so that students make connections among the presented approaches and solutions and make sense of what you want them to learn?
Skip-count by 2s Skip-counting by a number like 2, 5, or 10 is common for students. Share this strategy first to establish the pairs of bags of bedding before showing work where a student grouped the bags into greater quantities.	• Why did you decide to count by 2s? • Did it take a long time to count the whole display by 2s? • Could the pairs of bags be combined to create larger groups?
Add groups of 12 (rows) The shelves of common bedding types help to create accessible visual groupings of 12. Students may add five 12s in a variety of ways. Students may calculate the number of items in one row and add that number for as many rows as there are.	• How did you know there were 12 bags in each row? • Do you see any of the same numbers in your calculations as when we counted the bags by 2s? • How is this strategy different than counting the bags by 2s?
Add 10s and then 2s It may be natural for students to look for groups of 10 in an image, especially since adding 12s is more challenging. In this strategy, each row is seen as one group of 10 bags plus 2 more. This strategy begins to build the foundation for the distributive property and partial products.	• How does your strategy connect with counting by 2s? • How do the 10s and 2s connect to the shelves of 12 bags of bedding? • Is there a different way you could have grouped by 10s?
Add columns of 10 This vertical visualization of 10 bags of bedding is useful and efficient, but it may be less intuitive due to the physical structure of the image. Save this strategy for last, and consider presenting it as a strategy observed by a fictional student if it doesn't arise in the class. Students may benefit from seeing how they might look beyond the physical structure presented in an image to find equal groups of convenient numbers.	• How did you identify these groups of 10? • How is your strategy similar to and different from the previous strategies?

Evaluation Criteria What will you listen for as students share? What will you look for in their written work?

- Watch for students' identification of equal groups in the image, and use of these equal groups to find the product.
- Observe cases where students are moving from additive reasoning to multiplicative reasoning, in which they track both quantities — the number of groups and the number in each group — in their calculations.
- Although students will likely identify equal groups in this image, the objects are also arranged in small and large arrays. Listen for students making connections to rows and columns, which will get more attention in later sessions.

(continued on next page)

Hamster Multiplication Forum Discourse Planner page 4 of 4

Class Discussion: Sharing, Comparing & Connecting	
Selecting and Sequencing Which approaches and solutions do you want students to share and compare? In what order? Why?	**Connecting Responses** What specific questions will you ask so that students make connections among the presented approaches and solutions and make sense of what you want them to learn?
Evaluation Criteria What will you listen for as students share? What will you look for in their written work?	

Tool adapted from *Taking Action: Implementing Effective Mathematics Teaching Practices in K–Grade 5*, NCTM, 2017

Work Place Guide 2A Loops & Groups

Summary

Players take turns rolling a die numbered 1–6 two times. The first roll tells how many loops to draw; the second roll tells how many shapes to draw in each loop. For example, if a player rolled a 4 first and then a 3, they would draw 4 loops and 3 small shapes inside each loop, for a total of 12. Players write a multiplication equation ($4 \times 3 = 12$) or a sentence (4 groups of 3 equals 12) to show the results. Each player takes five turns and then adds their products to find the sum. The player with the greater sum wins.

Skills & Concepts

- Interpret products of whole numbers
- Solve multiplication and division word problems with products and dividends to 100 involving situations of equal groups, arrays, and measurement quantities
- Use and explain additive strategies (e.g., repeated addition and skip-counting) and multiplicative strategies (e.g., doubling, doubling and halving, and using partial products) to demonstrate an understanding of multiplication

Materials

Copies	Kit Materials	Classroom Materials
PO P11 Work Place Guide 2A Loops & Groups **PO P12** 2A Loops & Groups record sheet **SB 36** Work Place Instructions 2A Loops & Groups	• 3 dice numbered 1–6 • 3 dice numbered 4–9 (optional, for challenge)	

Assessment & Differentiation

If you see that …	Differentiate	Example
Students are counting the shapes by ones	SUPPORT Help students to use skip-counting or repeated addition. Provide a number line to make skip-counting easier.	"I notice you are counting by 1s. I bet that takes a long time. Do you know any other way that won't take so long? How about a number line? Can you skip-count on a number line?"
Students would benefit from seeing an example of how to write an equation to represent the picture	SUPPORT Work with students to describe what they see (for example, "4 groups of 3" or "2 sets of 5"). Support them in writing equations to match what they describe.	"Do you remember what the multiplication sign means? It means 'groups of.' So, if you have 4 groups of 6, you can write '$4 \times 6 =$ ____.'"
Students would benefit from the support of addition strategies when determining their final score	SUPPORT Review addition strategies with these students. Encourage them to use combinations of 10 or friendly numbers.	When adding 8 + 13 + 15 + 16 + 24, students could add 16 to 24 to get 40. Then, they could split 8 into 7 and 1, and add 7 to 13 to get 20. Finally, they could add the leftover 1 to 15 to get a combination of 40 + 20 + 16, which may be easier to calculate mentally.
Students can efficiently multiply single-digit numbers	CHALLENGE Encourage students to use a die numbered 4–9 for greater numbers. For even greater numbers, suggest that students roll a die numbered 4–9 and a die numbered 1–6 and add the numbers shown. They can use this number for the number of loops or the number of shapes in each loop. Then they roll a die numbered 4–9 for the other number and follow the directions accordingly.	"It seems like you really know these multiplication problems. Can you play the game with greater numbers? What if you had 9 loops? What if you had 12 loops? What if you had 8 loops with 13 objects in each one? How would you solve those problems?"
Multilingual learners		
• Play the game with students, modeling how to play and what to do. Focus on showing students how the equations and phrases (such as, "2 groups of 5" or "3 sets of 4") match the pictures created on the record sheet. • Encourage students to play with peers in the language they are most comfortable speaking.		

NAME | **DATE**

2A Loops & Groups Record Sheet

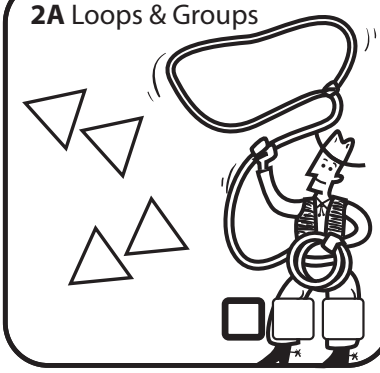
Player 1 _____ Player 2 _____

1st Turn
2nd Turn
3rd Turn
4th Turn
5th Turn
Find the Sum

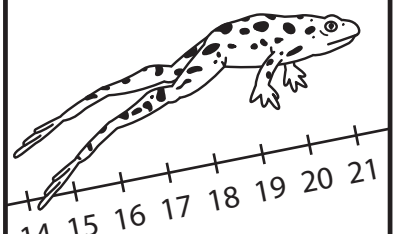
NAME | **DATE**

Unit 2 Work Place Log

2A Loops & Groups

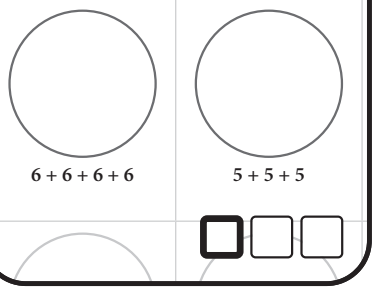


2B Frog Jump Multiplication

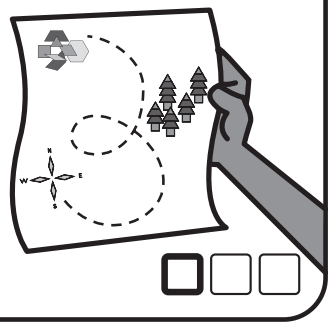


2C Cover Up

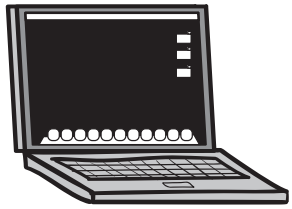
2D Multiplication Four in a Row



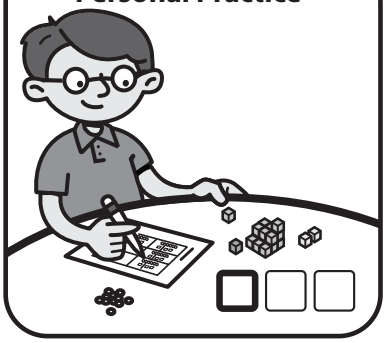
Concept Quests



Digital Activity



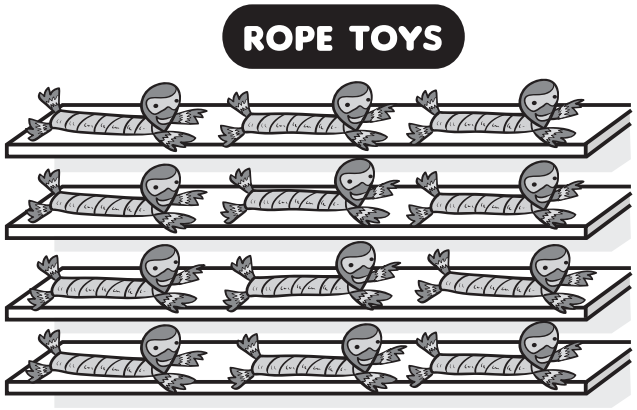
Personal Practice



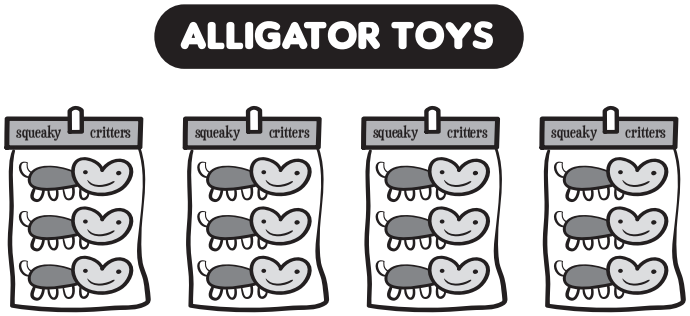
Same & Different

Look at the two images. What do you notice?

A



B



1 How are images A and B mathematically the same? How are they different?

a A and B are the same because …

b A and B are different because …

NAME | DATE

Addition & Subtraction: Mixed Review

Solve each problem. Write an equation, show your thinking, and label your answer with the correct units.

1 Alejandro is making designs with pattern blocks. His first design has 44 pattern blocks. His second design has 18 pattern blocks. How many more blocks are in his first design than in his second design?

2 Elizabeth is also making designs with pattern blocks. Her first design has 17 pattern blocks, and her second design has 15 pattern blocks. How many pattern blocks did she use in all?

3 Solve the following problems. Show your thinking.

5 + 5 + 5 + 5 + 5 = _____ 9 + 9 + 9 = _____ 6 + 6 + 6 + 6 = _____

NAME | DATE

Missing Numbers Fill In

1 Fill in the missing numbers.

5 + _____ = 10 _____ + 3 = 10 6 + _____ = 10 10 = _____ + 8

0 + _____ = 10 9 + _____ = 10 10 = _____ + 7 10 = 4 + _____

2 Fill in the missing numbers.

2 + _____ = 4 16 = _____ + 8 6 = 3 + _____ _____ = 9 + 9

5 + _____= 10 _____ + 6 = 12 8 = _____ + 4 7 + 7 = _____

3 Fill in the missing numbers.

15 − ☐ = 8	13 − 3 = ☐	18 − ☐ = 9	11 − ☐ = 4	16 − 9 = ☐	☐ − 3 = 8
17 − ☐ = 9	12 − 3 = ☐	11 − 2 = ☐	12 − ☐ = 9	☐ − 2 = 12	13 − ☐ = 8

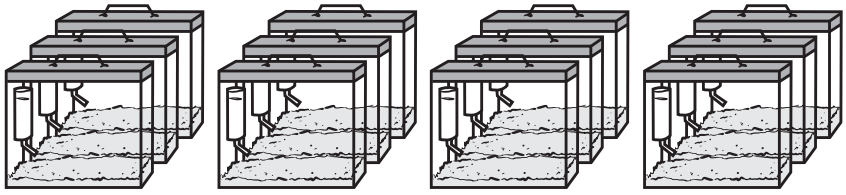
4 **CHALLENGE** What is one way the equations in problem 2 are alike?

NAME | DATE

Hamster Multiplication page 1 of 2

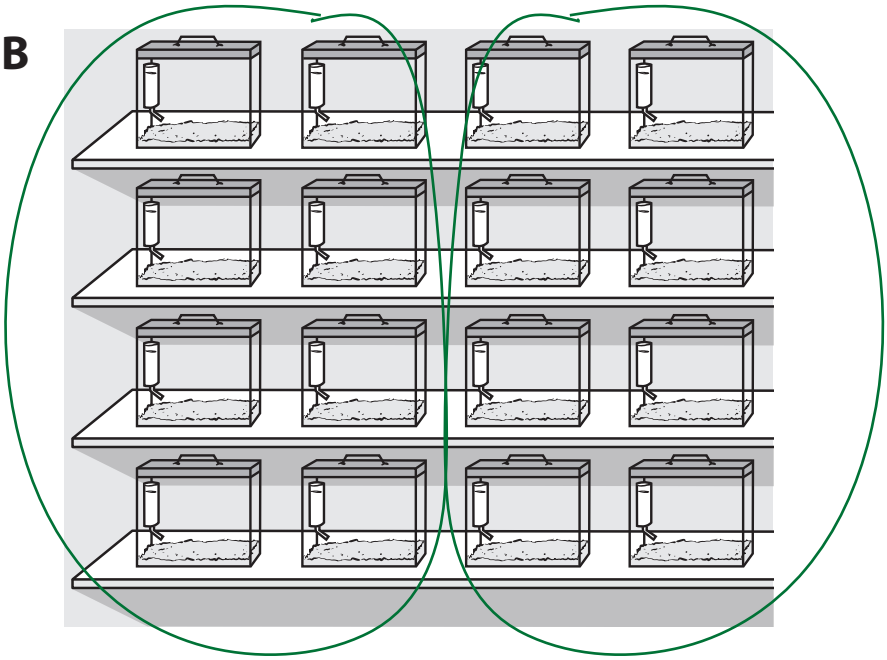
1 Which display has more enclosures, display A or display B? How can you tell without counting them one by one?

A



3 + 3 + 3 + 3 = 12

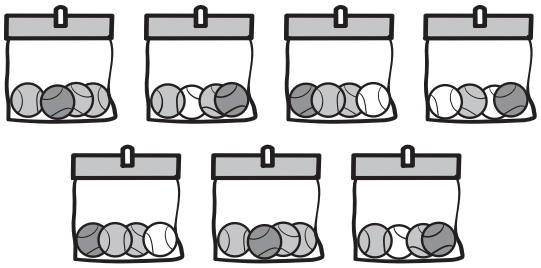
B



(2 × 4) + (2 × 4)

8 + 8 = 16

2 How many toy balls are on display? Show your thinking.



4, 8, 12, 16 ⟶ 16

4, 8, 12 ⟶ 12

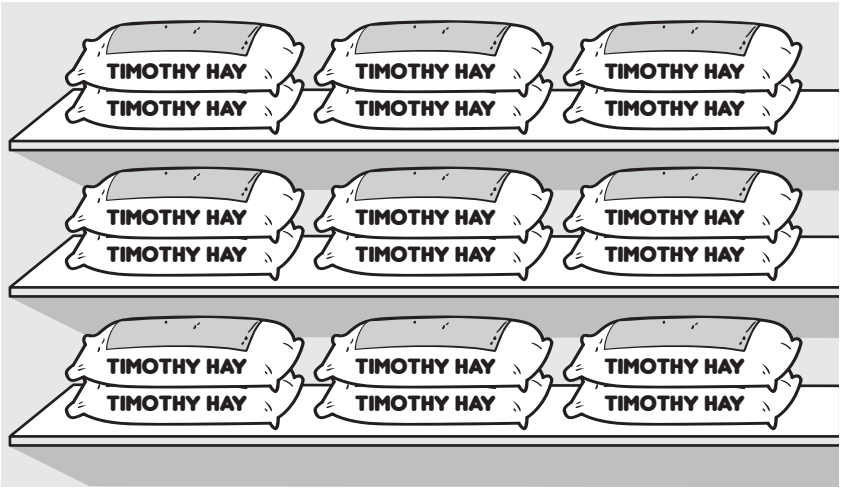
16 + 12 = 28

(continued on next page)

NAME | DATE

Hamster Multiplication page 2 of 2

3 How many bags of hay are on display? Show your thinking.



3 × 2 + 3 × 2 + 3 × 2 = 18

6 6 6

4 Write or draw your own problem involving items at a pet store and solve it using multiplication.

NAME | DATE

Alexandra's Garden

Solve each problem. Show your thinking. Label the answers with the correct units.

1 Alexandra has a garden. In her garden, she has 6 daisy plants. Each plant has 3 flowers. How many daisy flowers does Alexandra have?

2 Alexandra catches ladybugs for her garden because they eat the aphids that eat her plants. Alexandra has a pepper plant with 4 peppers on it. Each pepper has 4 ladybugs on it. How many ladybugs are on the pepper plant?

3 Solve the following problems.

7 + 7 + 7 + 7 = _____ 6 + 6 + 6 = _____ 9 + 9 + 9 + 9 + 9 = _____

4 **CHALLENGE** Write a multiplication equation to represent one of the addition equations in problem 3.

Work Place Instructions 2A Loops & Groups

Object of the Game

Take turns rolling a die and making loops and groups to solve multiplication problems. After 5 rounds, add up your products. The player with the greater score wins!

Get Ready to Play

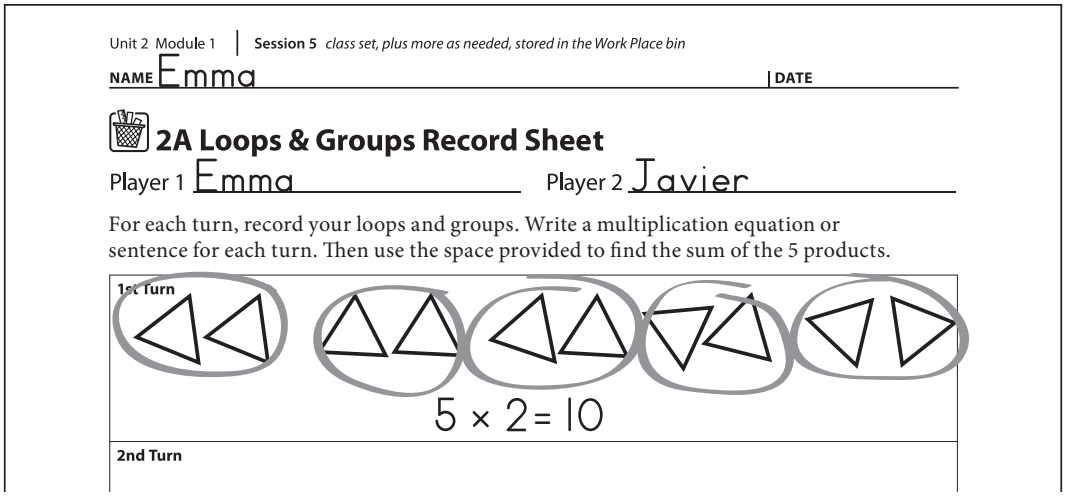
- Each player needs their own **2A Loops & Groups record sheet**.
- Players need a **die numbered 1–6** to share.
- Each player rolls the die. The player with the lesser number goes first.

On Your Turn

1 Roll the die and draw that number of loops.

2 Roll a second time to see how many shapes to draw in each loop.

3 Record a multiplication equation or a sentence to represent the picture.


Unit 2 Module 1 | Session 5 *class set, plus more as needed, stored in the Work Place bin*

NAME Emma | DATE

2A Loops & Groups Record Sheet

Player 1 Emma Player 2 Javier

For each turn, record your loops and groups. Write a multiplication equation or sentence for each turn. Then use the space provided to find the sum of the 5 products.

1st Turn

5 × 2 = 10

2nd Turn

Emma rolled a 5 so she drew 5 loops on the record sheet. Then she rolled a 2, so she drew 2 shapes in each loop. Lastly, she wrote 5 × 2 = 10 to represent her sketch.

Ending the Game

After 5 rounds, find the sum of your products. Share your sum and addition strategy with your partner. The player with the greater total wins.

Variations

A As you play Loops & Groups throughout the unit, keep a list in your journal of the products that you get in each game. Make observations about which products occur most and least often.

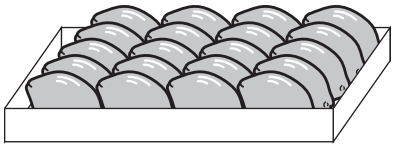
B Use a die numbered 4–9. How does the game change with a different die?

NAME | DATE

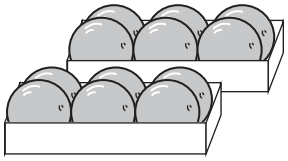
Fruit Boxes

Solve each problem. Show your thinking. Label the answers with the correct units.

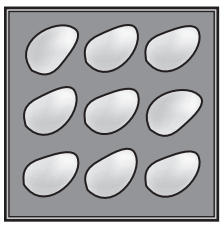
1 How many lemons are in the box?



2 How many oranges are in the boxes?



3 Each mango in the box costs the same amount. Decide how much a mango should cost. Then figure out how much the whole box of mangoes would cost.



NAME | DATE

Problem Posing in the Pet Store

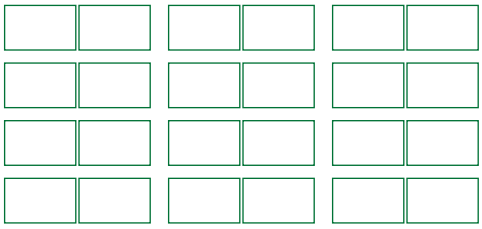
Complete the table as you solve two problems with a partner.

Question 1:

How many dog bones are there?

What arrays do you see?	What multiplication equations can you write?
I see three 4 x 2 arrays in the front. There are 3 more behind.	6 x 8 = 48

Solve. Show your thinking.



8 + 8 + 8 = 24

24 + 24 = 48

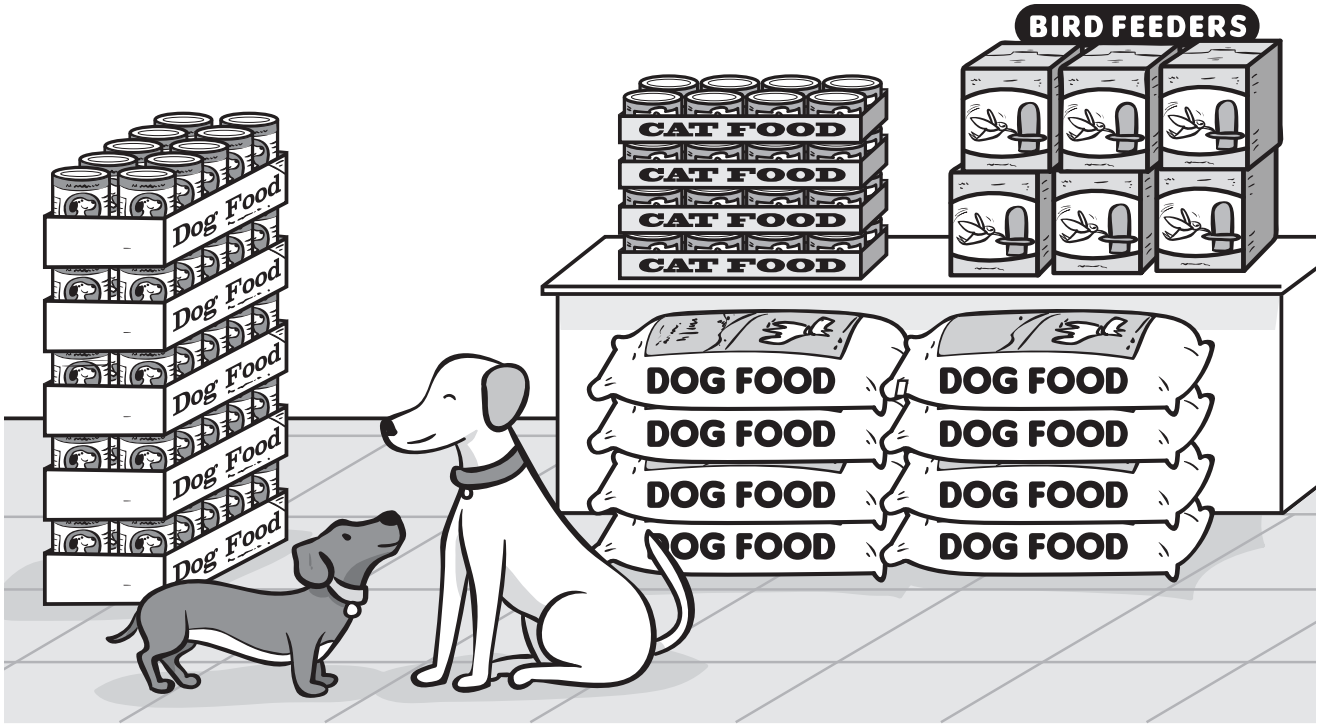
Question 2:

What arrays do you see?	What multiplication equations can you write?

Solve. Show your thinking.

NAME | DATE

Pet Problems



1 What do you notice about this picture? What do you wonder?

2 How many cans of dog food are on display? Show your thinking.

3 Ask and answer another question about this image.

NAME | DATE

Making Dog Biscuits

Solve each problem. Show your thinking. Label the answers with the correct units.

1 Jorge decided to make homemade dog biscuits. He started by making 2 biscuits for each of his 3 dogs. How many biscuits did he make?

2 Jorge's dogs ate the biscuits he made, so he made 12 more. How could Jorge have arranged the dog biscuits in an array on the baking sheet?

3 Jorge decided to share his dog biscuits with the other dogs at the local dog parks. He made 20 dog biscuits to pass out at each of the 3 dog parks he goes to. How many biscuits did he make?

NAME | DATE

The Pet Store page 1 of 2

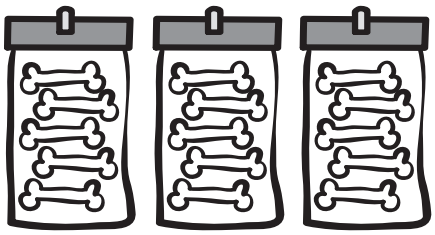
Note to Family

At school, we have started looking for efficient ways to find the total number of items in a group. We studied a picture of a pet store that was full of packages and containers. We posed several problems and solved some of them. Additionally, we participated in a number string that highlighted strategies for multiplying.

Use the pictures to find the total for each problem. Show your thinking. Label your answers with the correct units.

1 How many cans of cat food are there? How do you know?

2 How many chew toys are there? How do you know?



3 Fill in the blanks.

17 – 8 = _____ 6 + 7 = _____ 13 – 9 = _____

3 + _____ = 10 16 – _____ = 8 5 + _____ = 15

(continued on next page)

NAME | **DATE**

The Pet Store page 2 of 2

4 Find the sums.

4 + 4 + 4 + 4 = _____ 8 + 8 + 8 = _____ 7 + 7 + 7 = _____

6 **CHALLENGE** Molly bought a box of toys for her kitten. Inside the box were 4 packages with 3 toys inside each package.

a How many new toys does Molly's cat have? Show your thinking.

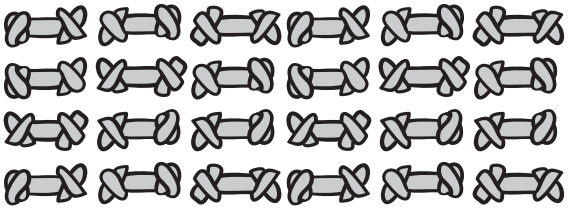
b Her sister bought the same box of toys for Molly's kitten. How many new toys does Molly's cat have now? Show your thinking.

NAME | **DATE**

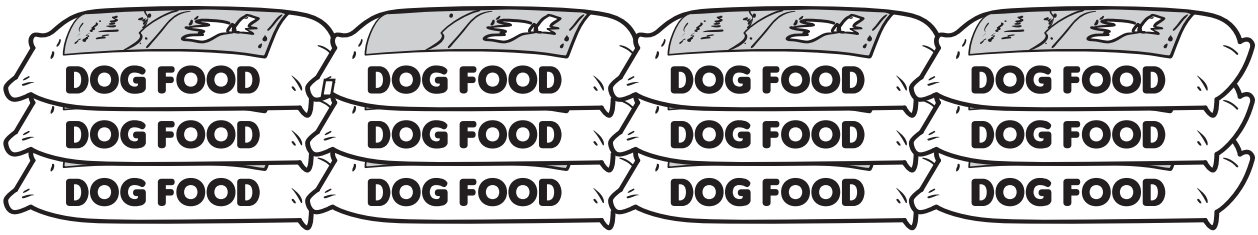
Pet Store Challenges page 1 of 2

For each image, find the total number of items displayed. Show your thinking. Can you write a multiplication equation to represent each situation?

1



2



(continued on next page)

NAME | DATE

Pet Store Challenges page 2 of 2

3

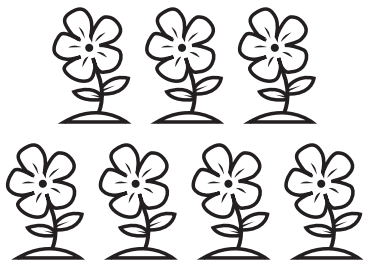
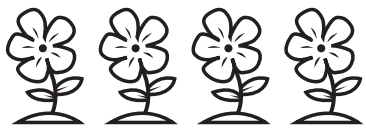
4 How are problems 2 and 3 related?

5 **CHALLENGE** Cans of cat food come in packages of 2. José made a display of cat food arranged in 6 rows, with 4 packages in each row. How many cans of cat food were there in the whole display? Show your thinking.

NAME | DATE

Leaves & Flower Petals page 1 of 2

Answer each question. Write an addition or multiplication equation for each problem.

Answer the question.	Write an equation.
ex  There are 3 flowers. How many *leaves?* 6	2 + 2 + 2 = 6 or 3 × 2 = 6
1  There are 3 flowers. How many *petals?*	
2  There are 7 flowers. How many *leaves?*	
3  There are 4 flowers. How many *petals?*	

(continued on next page)

NAME | DATE

Leaves & Flower Petals page 2 of 2

Complete the following problems. Show your thinking.

4 Mrs. Foley planted 24 plants in her garden. How could Mrs. Foley have arranged the plants in an array?

5 Write an equation to represent the array that you drew for problem 4.

6 **CHALLENGE** Terrance had 2 boxes of tulips. Each box had 14 flowers in it. How many tulips did Terrance have?

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