

Unit 1

Introducing Multiplication

Essential Questions

- How does multiplication represent equal groups?
- How are arrays related to multiplication?
- How do different scales affect picture graphs and bar graphs?

Nature Lovers Club



Unit Story: My Name Is Harper

In this story, young Harper found her interests and friends at the library. Now she's a grown-up, running that same library.

Summary | 3.02

Multiplication situations describe a certain number of groups with an equal number of objects in each group. You can represent equal groups with drawings.



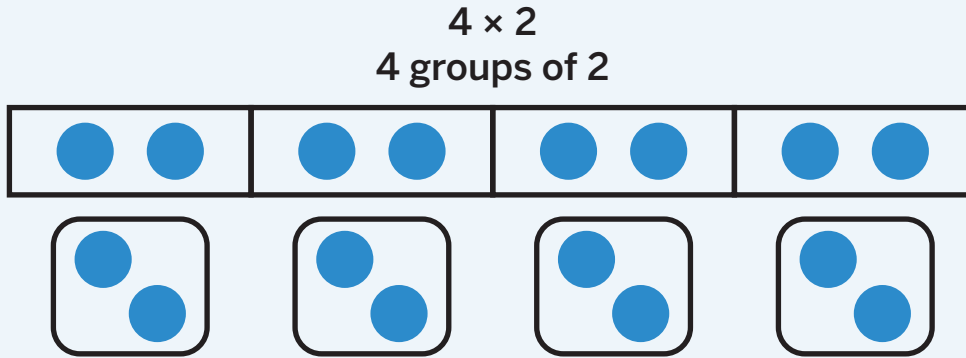
Practice

- 1 There are 6 tennis courts. There are 2 players on each tennis court. Represent the situation with an equal-groups drawing.

 Draw

Summary | 3.03

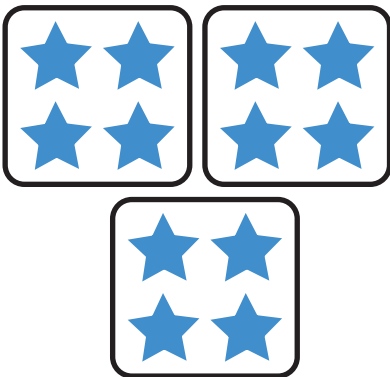
You can write a mathematical expression to represent multiplication. Words, expressions, and drawings can all represent the number of equal groups and the number in each group.



Practice

For Problems 1 and 2, write a multiplication expression to represent the drawing.

1

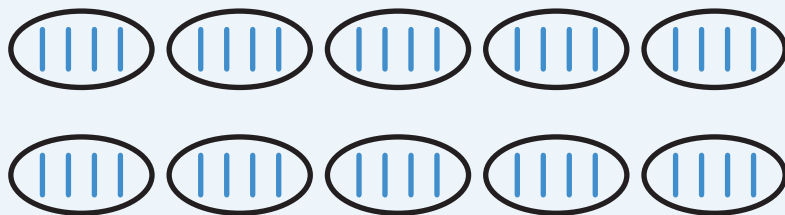


2



When you **multiply**, you are determining the total number of objects, which is called the **product**. There are many strategies to determine the product.

There are 10 students in the Creepy Crawly Creatures book club. Each student chose 4 creatures to talk about.



How many creatures will the book club talk about?

Practice

For Problems 1–3, solve the problem and write an expression that represents the situation.

i Show or explain your thinking.

- 1** There are 6 basketball teams in the gym. There are 5 players on each team. How many basketball players are in the gym?

answer: _____ expression: _____

You can write a multiplication equation to represent a situation with an unknown amount. The unknown amount could be the total, the number of groups, or the amount in each group.

$$6 \times 5 = ?$$

$$? \times 5 = 30$$

$$6 \times ? = 30$$

Practice

For Problems 1–4, solve the problem using any strategy.

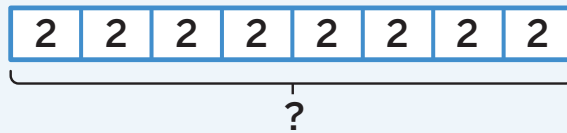
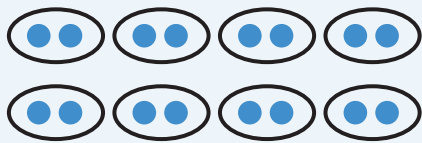
i Show or explain your thinking.

- 1 There are 6 boxes of granola bars. Each box has 5 bars. How many granola bars are there?

answer: _____

Summary | 3.06

You can use different representations to help you understand and solve multiplication problems.



$$? = 8 \times 2$$

Practice

Use the situation for Problems 1 and 2.

There are 8 soccer teams. Each team has 10 players. How many players are there altogether?

- 1 Write a multiplication equation to represent the problem. Use a ? to represent the unknown value.

- 2 Solve for the number of players.

 Show or explain your thinking.

answer: _____

Summary | 3.07

You can use patterns and known facts to help you solve multiplication problems.

$$\begin{aligned}3 \times 2 &= \\4 \times 2 &= \\5 \times 2 &= \\10 \times 2 &= \end{aligned}$$

Practice

For Problems 1 and 2, create a drawing, tape diagram, or situation that represents the multiplication equation.

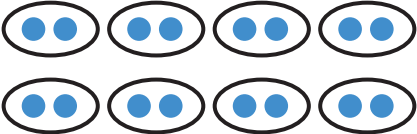
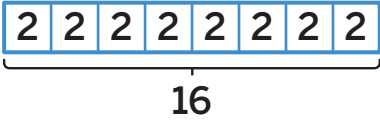
 Show your thinking.

1 $7 \times 5 = 35$

2 $6 \times 2 = 12$

In this sub-unit . . .

- We worked with equal-groups situations. We created drawings and diagrams to represent those situations.

Situation	Drawing	Diagram
Diego has 8 piles of socks. Each pile has 2 socks.		

- We wrote multiplication expressions and equations to represent equal groups.

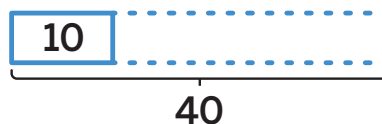
Expression
 8×2

Equation
 $8 \times 2 = 16$

- Math tip:** The **factors** represent the number of groups and the number in each group. The **product** represents the total.

- We represented multiplication situations with equations, using symbols for the unknown values. Then we solved for the unknown values.

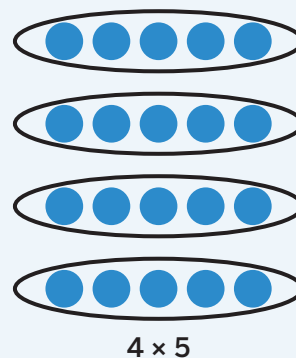
There are some boxes of crayons. Each box has 10 crayons in it. There are 40 crayons.



$? \times 10 = 40$
I counted 10 four times, so I know $4 \times 10 = 40$. There are 4 boxes.

Summary | 3.08

You can use arrays to represent multiplication because arrays show equal groups. There is an equal number of objects in each row, and there an equal number of objects in each column.



Practice

- 1 Create 2 different arrays using 12 dots.

 Draw

- 2 Choose 1 of your arrays in Problem 1. How is the array related to equal groups? Explain your thinking.

You can multiply numbers in any order and get the same product. This is called the **Commutative Property of Multiplication**.

$$5 \times 8 = 8 \times 5$$

5 rows of 8 scoops



$$5 \times 8 = 40$$

8 rows of 5 scoops



$$8 \times 5 = 40$$

Practice

Use the situation for Problems 1 and 2.

There are 4 rows of water bottles in a box. There are 5 bottles in each row.

- 1 Create an array to represent the situation.

 Draw

You can represent problems involving arrays with multiplication equations, using a symbol for the unknown. Then you can choose a strategy to determine the value of the unknown number.



$$? \times 4 = 20$$

Practice

Use the situation for Problems 1 and 2.

There are 20 chairs set up in an array in a classroom. There are 4 chairs in each row. How many rows of chairs are there?

- 1 Write a multiplication equation to represent the problem. Use a ? for the unknown value.

- 2 Determine the number of rows of chairs. Then rewrite the equation with the number that makes it true.

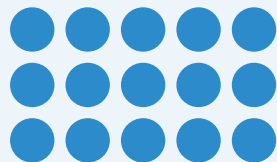
 Show or explain your thinking.

rows: _____

equation: _____

Summary | 3.11

You can use multiplication and the different representations of multiplication to solve problems involving equal groups.


$$5 \times 3 = 15$$

or

$$3 \times 5 = 15$$

Practice

- 1 A band will be marching in a parade. There are 40 people in the band. Show how they could be lined up in an array.



 Draw

- 2 An elevator has buttons for 24 floors. Show how the elevator buttons could be organized in an array.

 Draw

In this sub-unit . . .

- We discovered that arrays are related to equal groups and to multiplication. We represented arrays with expressions and equations.

Equal groups	Array
	
Expression	Equation
3×5	$3 \times 5 = 15$

🔥 **Math tip:** The rows and columns of arrays show equal groups. When representing arrays with expressions, you can think about the factors as the number of rows (or columns) and the number of objects in each row (or column).

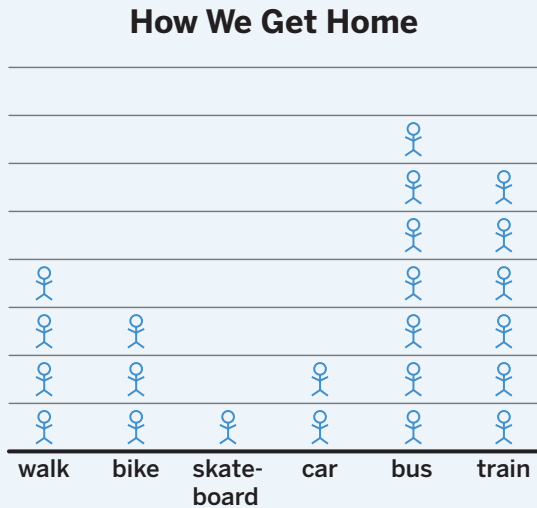
- Using our understanding of arrays, we saw that we can multiply numbers in any order and still get the same product. This is called the **Commutative Property of Multiplication**.

$$3 \times 5 = 15$$

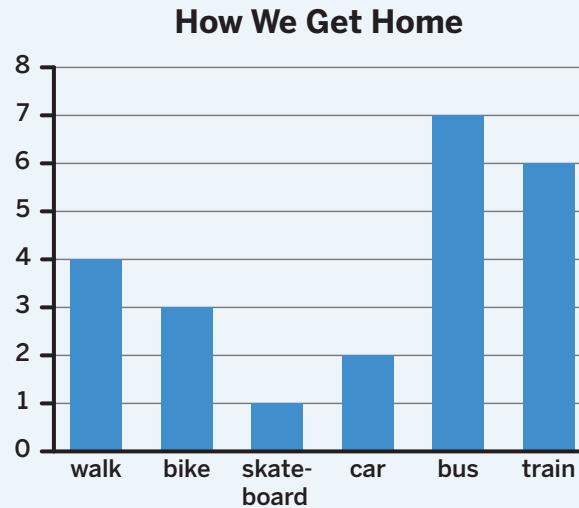
$$5 \times 3 = 15$$

$$3 \times 5 = 5 \times 3$$

Use the features of a picture graph or bar graph to help interpret the data represented by the graph.



Each stick figure represents 1 student.



Practice

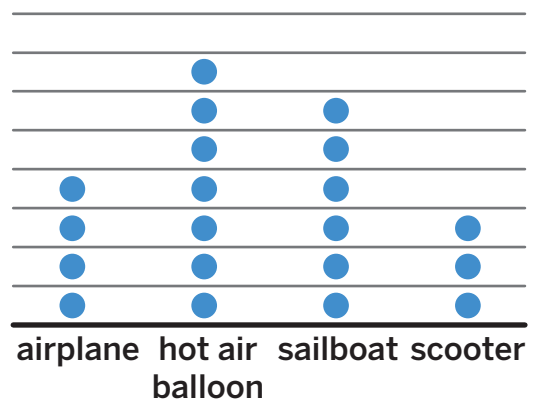
For Problems 1–3, use the picture graph.

- 1** How many *fewer* people chose scooter than hot air balloon?

- 2** How many people chose airplane or sailboat?

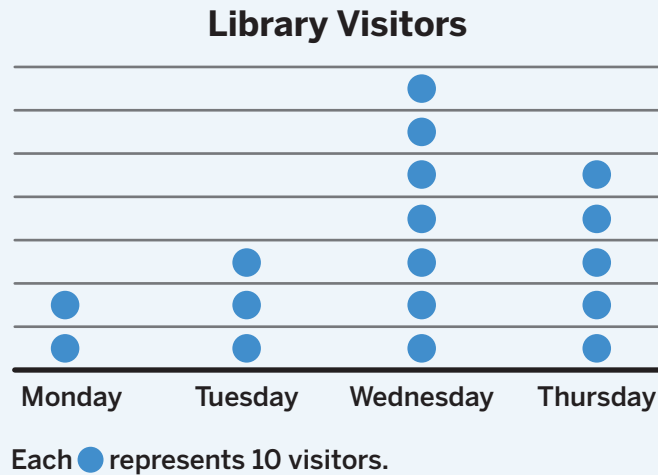
- 3** State whether this statement is *true* or *false*. 7 more people chose airplane or hot air balloon combined than scooter.

Favorite Way to Travel



Each blue dot represents 1 person.

When each picture on a picture graph represents a number other than 1, the graph is called a **scaled picture graph**. The key tells you the number of objects or responses that each picture represents.



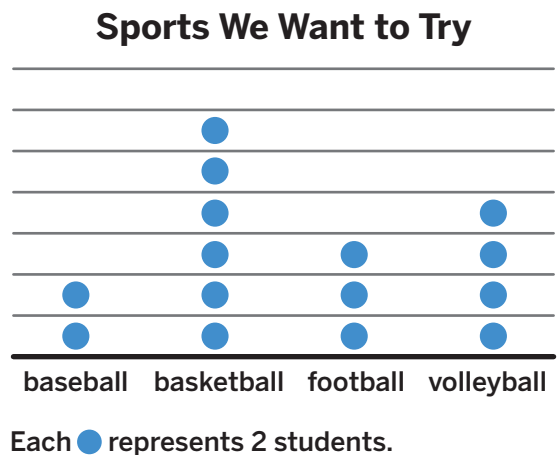
Practice

For Problems 1–3, use the picture graph about sports that some students want to try.

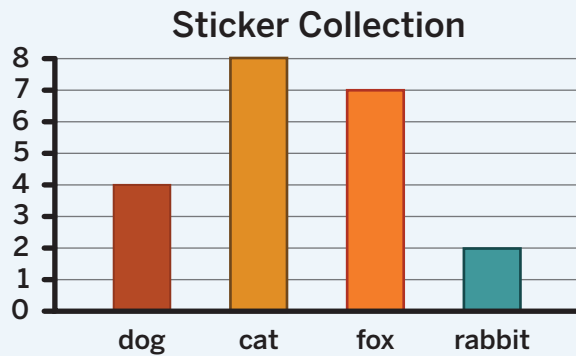
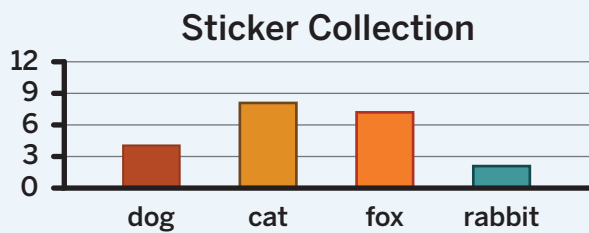
- 1** How many students want to try basketball?

- 2** How many *fewer* students want to try baseball than volleyball?

- 3** Write another question that could be answered using the graph.



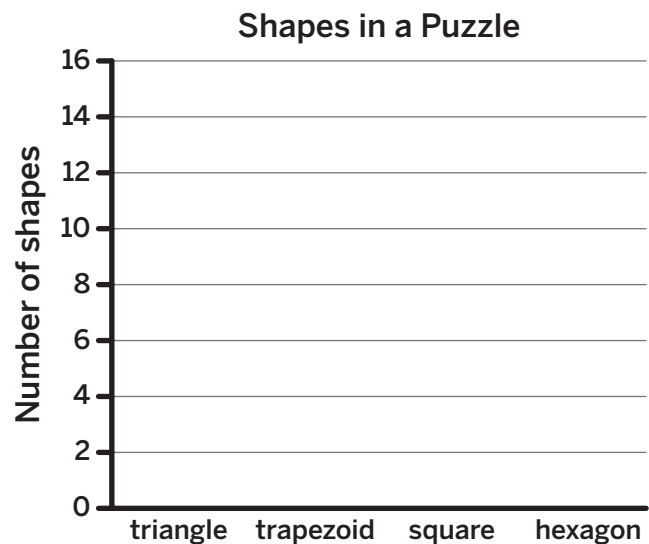
Scaled bar graphs have a **scale** other than 1. The same data can look different on bar graphs with different scales.



Practice

- 1 Use the data in the table to complete the scaled bar graph.

Shape	Number
triangle	13
trapezoid	10
square	9
hexagon	15



Different scales can be used to represent the same data. When choosing a scale, consider the data you need to represent and what scale will make it clearer to interpret that data.

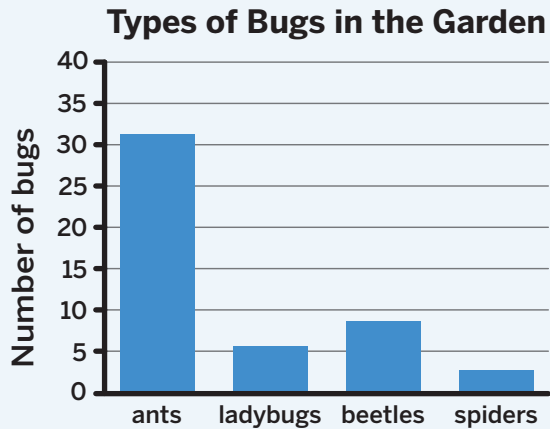
Activity	Number of visitors
sports	80
reading	62
arts and crafts	44
exploring	119

Practice

- 1 The table shows the number of books some students have at home. Use the information from the table to create a scaled bar graph.

Student	Number of books
Priya	25
Han	9
Shawn	16
Clare	21

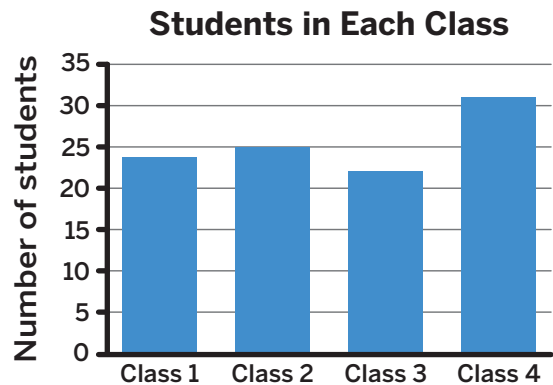
You can use a bar graph to help you answer questions about combining and comparing data.



1. How many ladybugs, spiders, and beetles are in the garden?
2. How many *fewer* spiders are there than beetles?

Practice

- 1 The scaled bar graph shows how many students are in each Grade 3 class at a school. How many *more* students are there in Class 4 than Class 3?



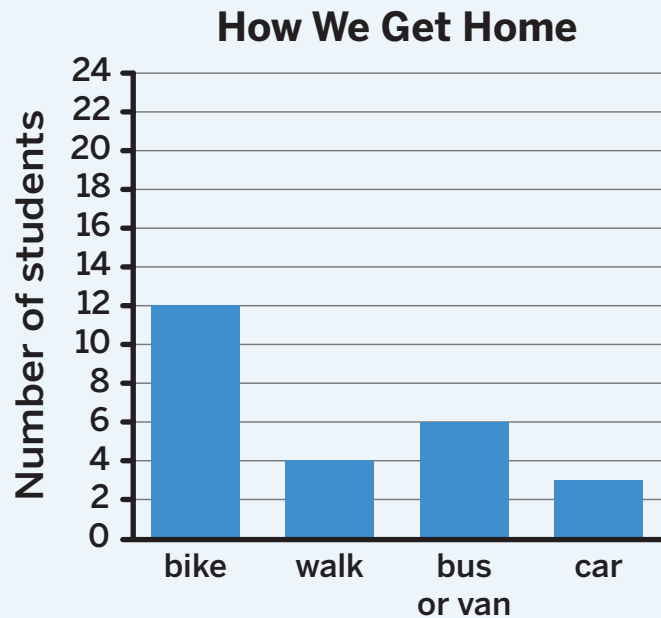
 Show or explain your thinking.

answer: _____

Summary | 3.18

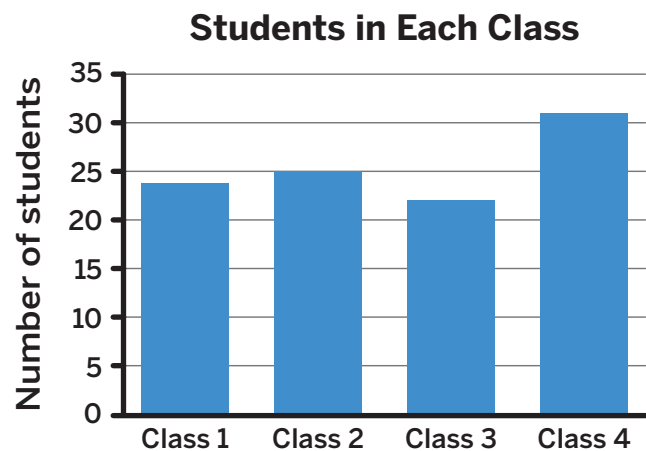
You can answer questions about data represented on a bar graph. Sometimes, the questions require 2 steps.

How many *more* students bike home than walk home or ride in a car combined?



Practice

- 1 The scaled bar graph shows how many students are in each Grade 3 class at a school. How many *fewer* students are there in Class 3 than there are in Classes 1 and 2 combined?



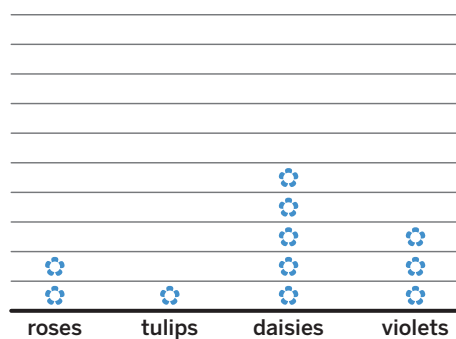
 Show your thinking.

answer: _____

In this sub-unit . . .

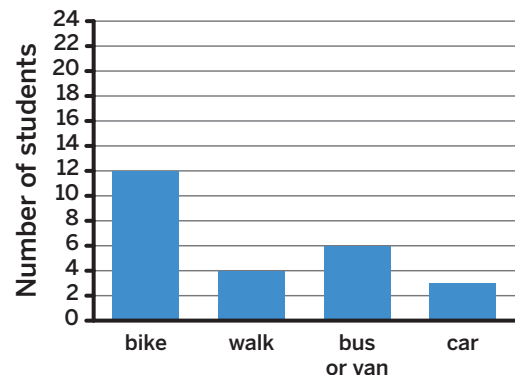
- We created scaled picture graphs and scaled bar graphs and chose which scale to use based on the data.

Flowers I Saw on the Way Home



Each 🌸 represents 5 flowers.

How We Get Home



- 🔥 **Math tip:** When working with scaled picture graphs, the key shows the scale. When working with scaled bar graphs, number labels show the scale.

- We solved one- and two-step problems about data represented on scaled bar graphs.

How many *more* ants are there than ladybugs and spiders combined?

$$6 + 3 = 9$$

$$32 - 9$$

$$33 - 10 = 23$$

23 more ants

Types of Bugs in the Garden

