Nature Lovers Club

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?

**✦ Unit Story:
My Name Is Harper**

You can read the Unit Story with your student by visiting the Unit Story page on the Caregiver Hub.

🔍 Unit Investigation

Lesson 1 is the Unit Investigation. Students recognize and represent examples of equal groups in the school community to build curiosity and apply their own knowledge in a variety of ways. Use the **Caregiver Connection** to help students continue to explore the math they will see in the unit.

Caregiver Connection

Students may enjoy searching for examples of equal groups in books, at home, or around other communities they are a part of. You can ask:

- "Where do you see equal groups?"
- "How would you describe the equal groups?"
- "How could you represent the equal groups?"

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

Try This

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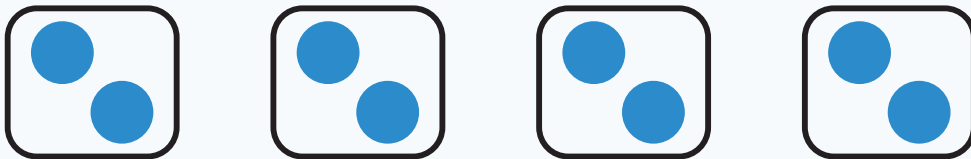
◡ Draw

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.
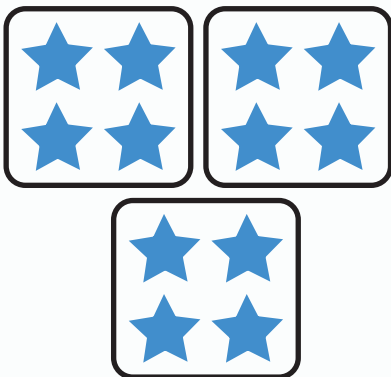
4 groups of 2
4 × 2

Try This

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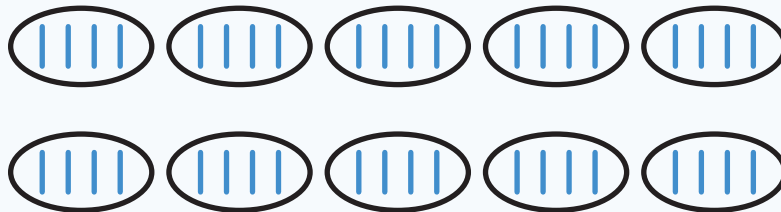
1   _____

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?

Try This

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.

$$6 \times 5 = ?$$
$$? \times 5 = 30$$
$$6 \times ? = 30$$

Try This

Solve the problem using any strategy.
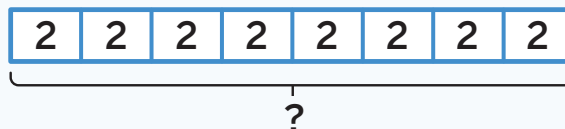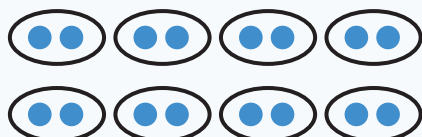
ⓘ **Show or explain your thinking.**

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

answer: _____

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

$$? = 8 \times 2$$

| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

?

Try This

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 | Lesson 7

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

$$3 \times 2 =$$
$$4 \times 2 =$$
$$5 \times 2 =$$
$$10 \times 2 =$$

Try This

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

i Show your thinking.

1 $7 \times 5 = 35$
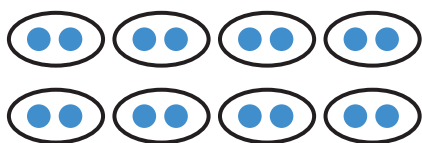
2 $6 \times 2 = 12$

In this sub-unit . . .

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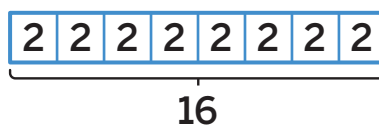
Situation

Diego has 8 piles of socks. Each pile has 2 socks.

Drawing	**Diagram**

| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

16

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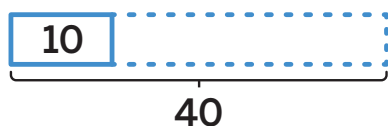
Expression

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.

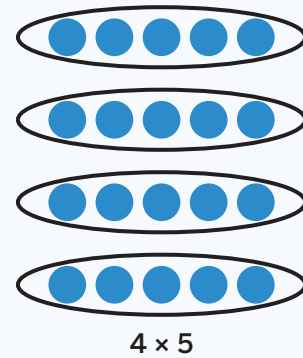There are some boxes of crayons. Each box has 10 crayons in it. There are 40 crayons.

10

40

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

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

4 × 5

Try This

1 Create 2 different arrays using 12 dots.

✓ Draw

2 Choose one 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

8
16
24
32
(40)

$$5 \times 8 = 40$$

8 rows of 5 scoops

5
10
15
20
25
30
35
(40)

$$8 \times 5 = 40$$

Try This

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.

$$? \times 4 = 20$$

Try This

Use the story problem 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.
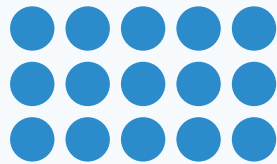
> **ℹ Show or explain your thinking.**
>
> answer: _____
>
> equation: _____

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

$$5 \times 3 = 15$$
$$\text{or}$$
$$3 \times 5 = 15$$

Try This

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**.
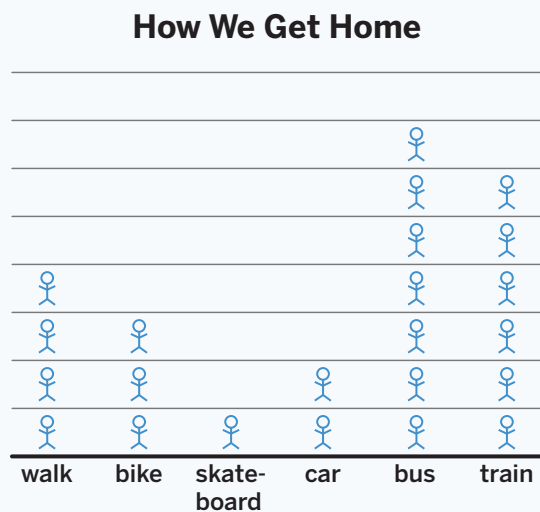
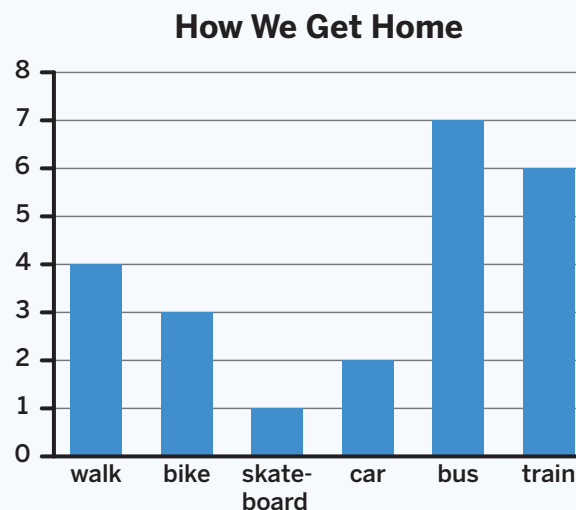$$3 \times 5 = 15 \qquad 5 \times 3 = 15 \qquad 3 \times 5 = 5 \times 3$$

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

How We Get Home

Each 👤 represents 1 student.
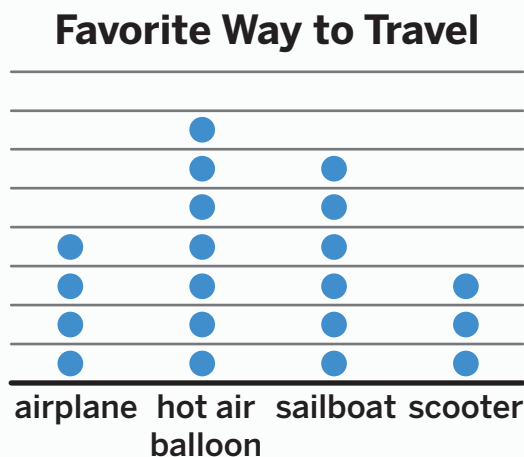
How We Get Home

Try This

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

airplane hot air balloon sailboat scooter

Each ● 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.
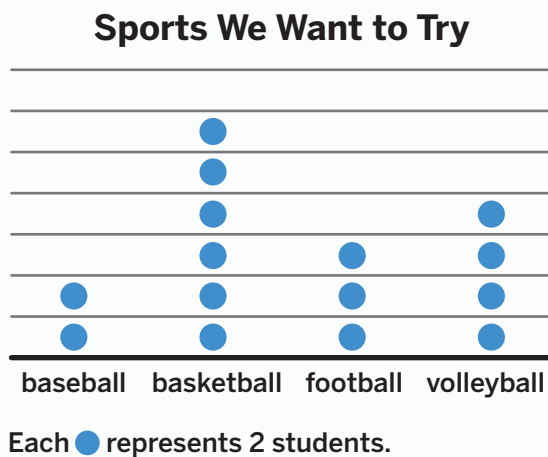
Library Visitors

| Monday | Tuesday | Wednesday | Thursday |

Each ● represents 10 visitors.
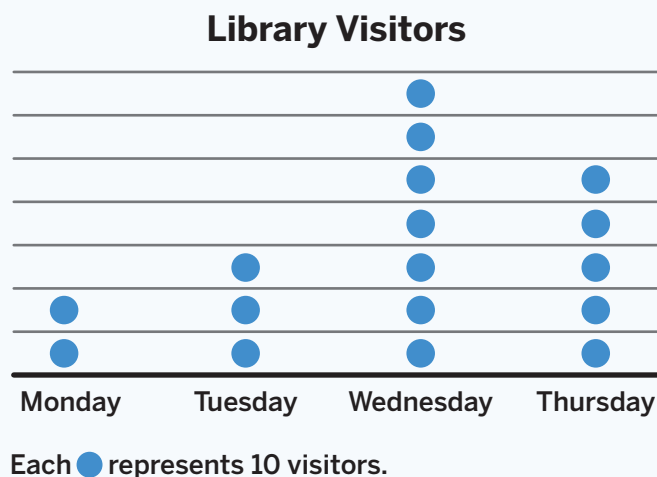
Try This

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

Sports We Want to Try

baseball   basketball   football   volleyball

Each ● represents 2 students.

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.

_____

Summary | Lesson 14

To create a scaled picture graph, use 1 picture to represent more than 1 person or thing. The scale is used to determine how many pictures represent the number of responses in each category.

Type of Character

☺			
☺	☺		
☺	☺		☺
☺	☺	☺	☺
☺	☺	☺	☺
hero	villain	sidekick	mentor

Each ☺ represents 10 students.

Try This

Use the table about favorite sports of some students.

1   Complete the scaled picture graph for the data in the table.

Favorite Sport

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

| tennis   swimming   gymnastics   soccer |

Each   represents 2 students.

Sport	Number of students
tennis	6
swimming	6
gymnastics	4
soccer	8

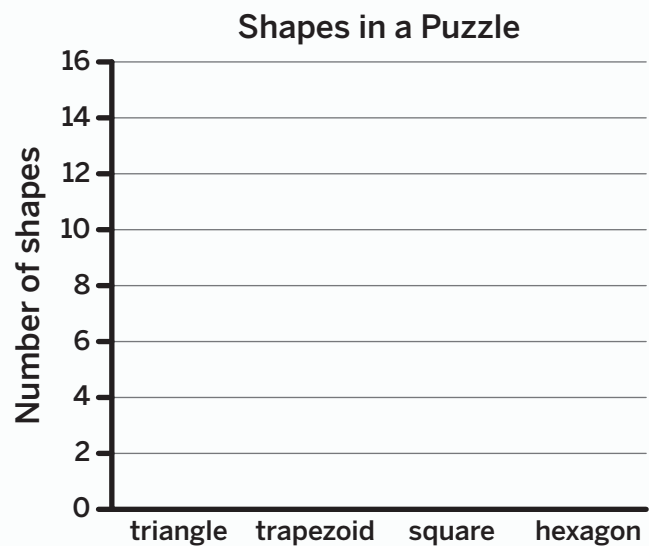**Scaled bar graphs** have a **scale** other than 1. The same data can look different on bar graphs with different scales.

Sticker Collection

Sticker Collection
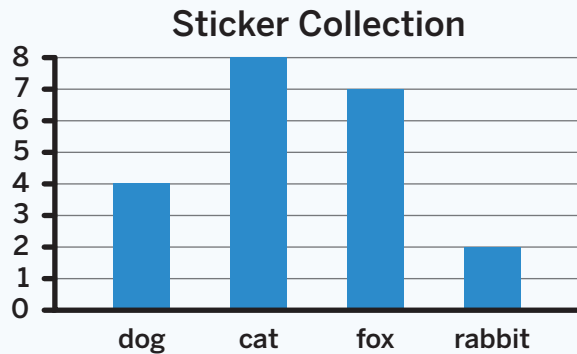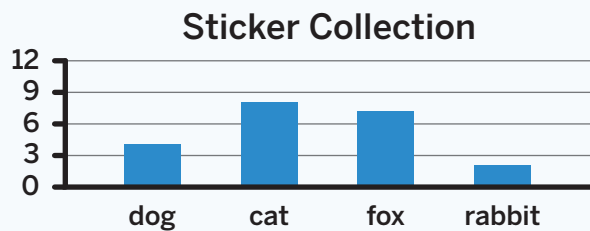
Try This

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

Shape	Number of shapes
triangle	13
trapezoid	10
square	9
hexagon	15

Shapes in a Puzzle

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

Try This

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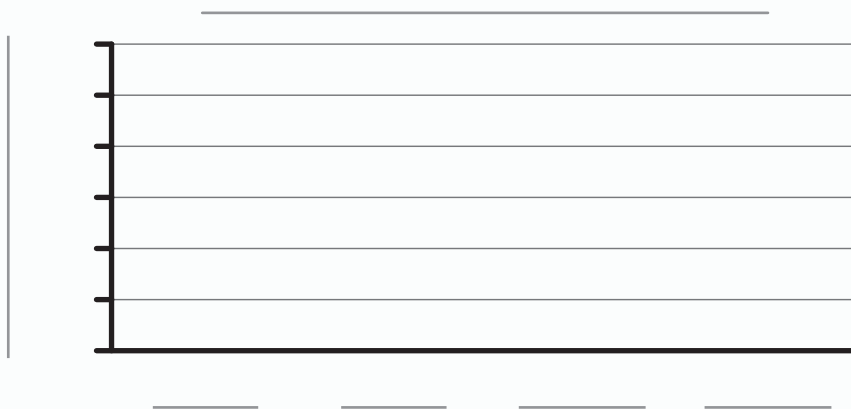
You can use a bar graph to help you answer questions about combining and comparing data.

Types of Bugs in the Garden
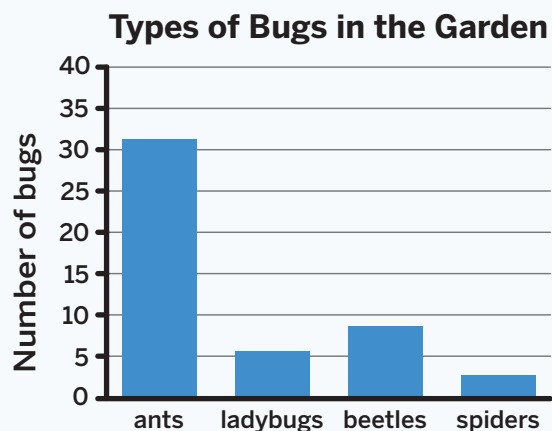
1. How many ladybugs, spiders, and beetles are in the garden?

2. How many fewer spiders are there than beetles?

Try This

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?
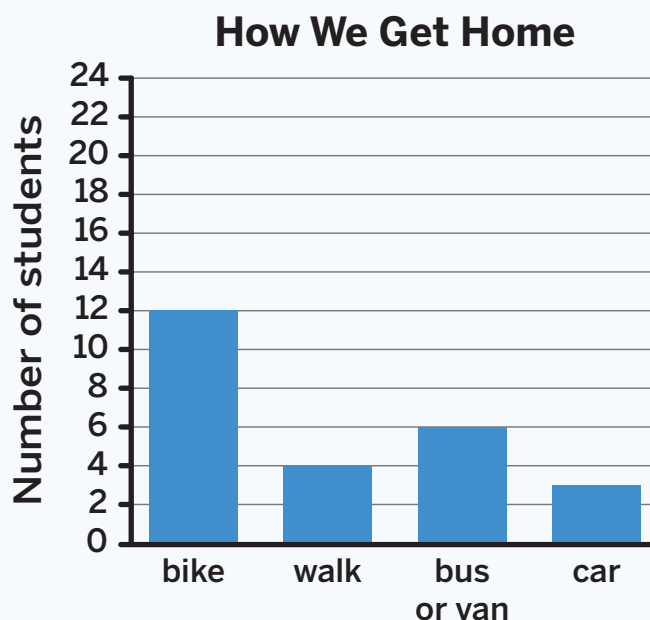
Students in Each Class
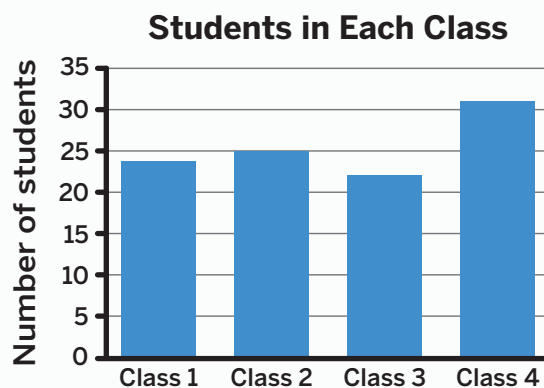
Show or explain your thinking.

answer: _____

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?

How We Get Home

Try This

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?
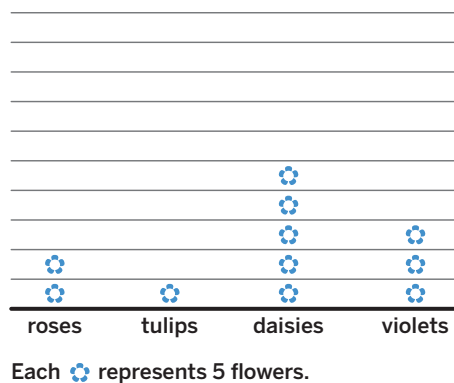
Students in Each Class
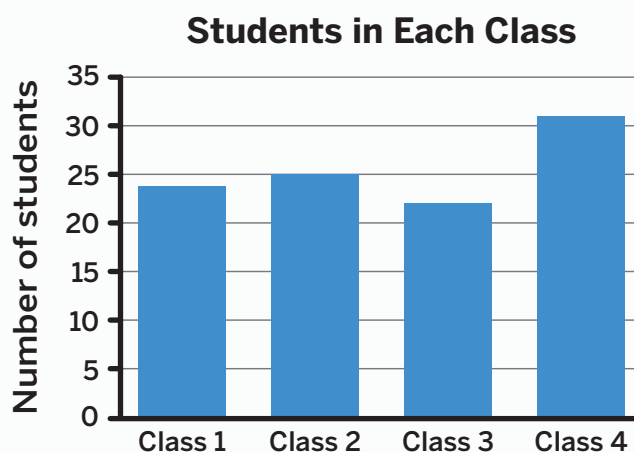
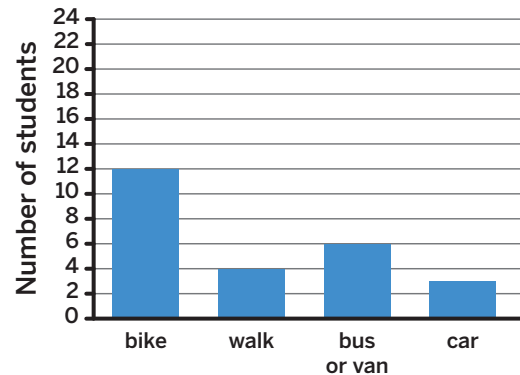✏ **Show your thinking.**

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

roses   tulips   daisies   violets

Each 🌸 represents 5 flowers.

How We Get Home

Number of students

24
22
20
18
16
14
12
10
8
6
4
2
0

bike   walk   bus or van   car

🔥 *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.

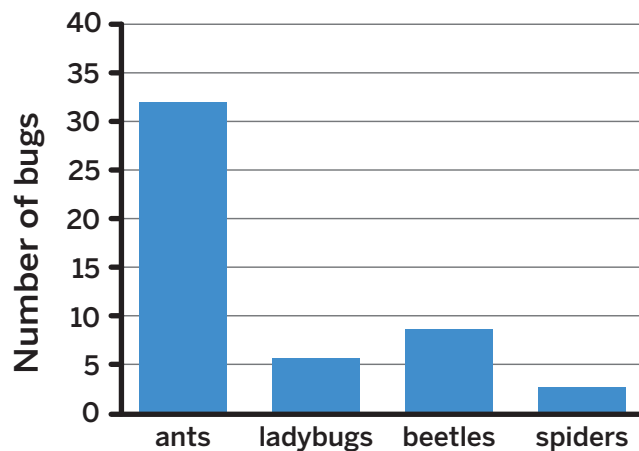How many *more* ants are there than ladybugs and spiders combined?
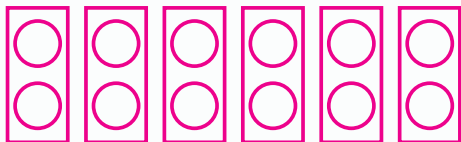
6 + 3 = 9

32 − 9

33 − 10 = 23

23 more ants

Types of Bugs in the Garden

Number of bugs

40
35
30
25
20
15
10
5
0

ants   ladybugs   beetles   spiders

Lesson 2

1   Sample response:

Lesson 3

1   3 × 4
2   4 × 10

Lesson 4

1   Sample work:
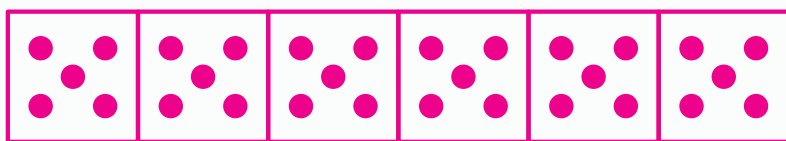
answer: **30 players**
expression: **6 × 5**

Lesson 5

1   Sample work:

Each circle represents a box of 5 granola bars. I counted by 5 to find the total.
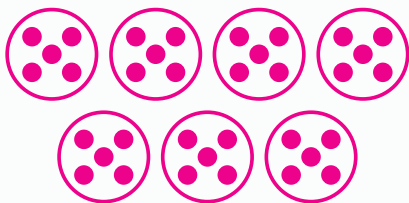
answer: **30 granola bars**

Lesson 6

1   8 × 10 = ? or ? = 8 × 10
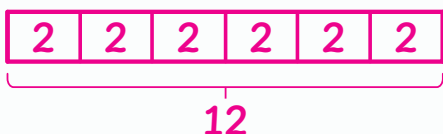**2**   Sample work: Each team has 10 players, so I counted by 10 eight times: 10, 20, 30, 40, 50, 60, 70, 80.

answer: **80 players**

Lesson 7

1   Sample response:

2   Sample response:

2	2	2	2	2	2

12

Lesson 8

1   Sample response:

2   Sample response: My second array has 4 columns with the same number of dots in each column. Those are the equal groups. Each column has 3 dots, so there are 4 equal groups of 3 dots.
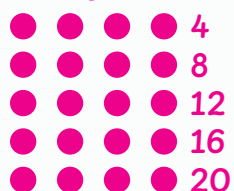
Lesson 9

1

Lesson 10

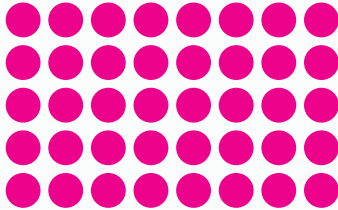**1**   20 = ? × 4 or ? × 4 = 20

2   Sample work:

4
8
12
16
20

answer: 5 rows

equation: 20 = 5 × 4 or 5 × 4 = 20

Lesson 11

1 Sample response:

2 Sample response:

Lesson 12

1 4 people

2 10 people

3 false

Lesson 13

1 12 students

2 4 students

3 Sample response: How many students want to try baseball?

Lesson 14

1

Favorite Sport

tennis   swimming   gymnastics   soccer
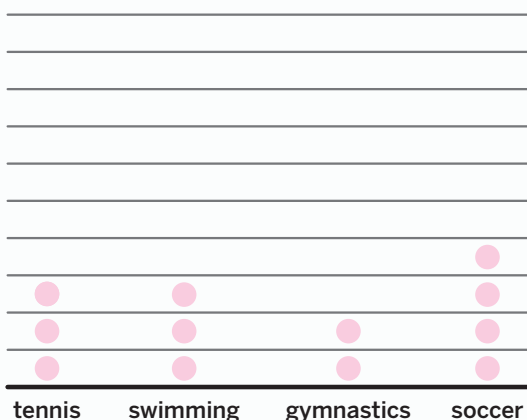
Each ⬤ represents 2 students.

Lesson 15

1

Shapes in a Puzzle
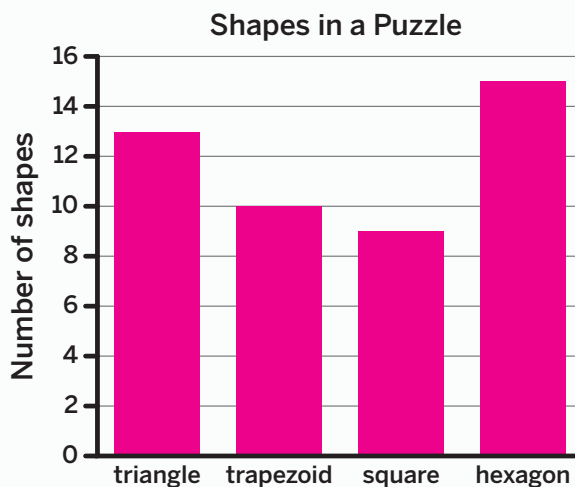
Lesson 16

1 Sample response:

Books at Home
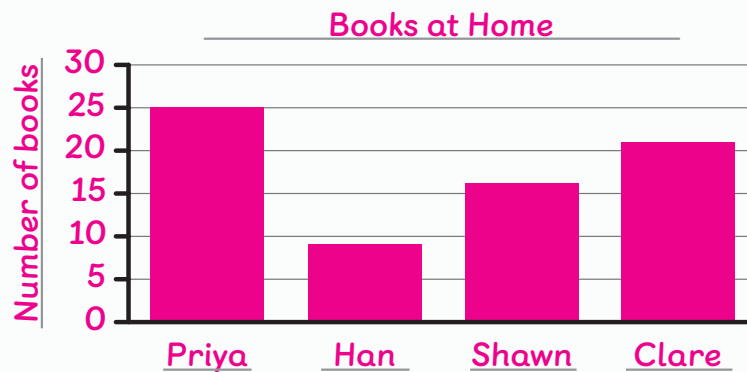
Lesson 17

1 Sample work: 31 – 22 = 9

answer: 9 students

Lesson 18

1 Sample work:

24 + 25 = 49

49 – 22 = 27

answer: 27 students