In Lesson 1, you learned about the meaning of multiplication. This lesson will help you solve multiplication problems using what you already know. Take a look at this problem.

Ava’s mom bought 2 packs of 3 T-shirts. Her dad bought 3 packs of 2 T-shirts. How many T-shirts did each of Ava’s parents buy?

**Mom**

- a. How many packs of T-shirts did Ava’s mom buy? ______
- b. How many T-shirts were in each of her mom’s packs? ______
- c. What multiplication equation could you write to find out how many T-shirts Ava’s mom bought? ________________

**Dad**

- d. How many packs of T-shirts did Ava’s dad buy? ______
- e. How many T-shirts were in each of her dad’s packs? ______
- f. What multiplication equation could you write to find out how many T-shirts Ava’s dad bought? ________________

- g. Explain what is the same and what is different about the two multiplication equations you wrote. ____________________________________________

Ava’s mom bought 2 packs of 3 T-shirts. Her dad bought 3 packs of 2 T-shirts. How many T-shirts did each of Ava’s parents buy?
On the previous page you saw that the order of the factors in a multiplication problem does not matter. If you know that $2 \times 3$ is 6, then you also know that $3 \times 2$ is 6. Sometimes you need to multiply three numbers together. You can use parentheses ( ) to show which two numbers you want to multiply first. Look at the problem below.

Jayden bought 4 boxes of hot dogs. Each box has 2 packs. Each pack has 5 hot dogs. How many hot dogs did she buy?

• **One way** to think about this is to first find how many packs there are. Then multiply by the number of hot dogs in each pack, 5.

  4 packs is 8 packs.

  8 packs with 5 hot dogs each is 40 hot dogs.

  $(4 \times 2) \times 5 = 40$

• **Another way** to think about this is to first find how many hot dogs are in each box. Then multiply by the number of boxes, 4.

  2 packs is 10 hot dogs in a box.

  4 boxes with 10 hot dogs is 40 hot dogs.

  $4 \times (2 \times 5) = 40$

**Reflect**

1. What did you just learn that can help you with multiplication?
Read the problem below. Then explore ways to show you can multiply factors in a multiplication equation in any order.

Chad read books at the library each week for 6 weeks. He read 3 books each week. Mia read books at the library each week for 3 weeks. She read 6 books each week. Who read more books at the library, Chad or Mia?

**Picture It**  You can use equal groups to help you understand the problem.

**Model It**  You can also use arrays to help you understand the problem. Each row in the arrays shows the number of books Chad or Mia read each week.
Connect It  Now you will solve the problem from the previous page using equations.

2 What multiplication equation could you write to find the number of books Chad read? ________________

3 What multiplication equation could you write to find the number of books Mia read? ________________

4 Who read more books? ____________________________________________________________

5 Explain how you could know that Chad and Mia read the same number of books without finding the product in each multiplication equation.
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

6 Your teacher tells you that $8 \times 9 = 72$. Explain how you know what $9 \times 8$ equals.
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

Try It  Use what you just learned about the order of factors to solve these problems. Show your work on a separate sheet of paper.

7 Josie has 5 cups with 4 tokens in each cup. Ian has 4 cups with 5 tokens in each cup. Draw a model to show that Josie and Ian have the same number of tokens.

8 Ashish has 6 drawers in his dresser. He puts 8 shirts in each drawer. Gita has the same number of shirts in all as Ashish. She has 8 dresser drawers. She wants to put an equal number of shirts in each drawer. How many shirts should Gita put in each drawer? ________________
Using Grouping to Multiply

Read the problem below. Then explore different ways to group factors to help you multiply three numbers.

Nykole decorates her gloves with plastic jewels. She glues 3 jewels onto each finger and thumb. How many jewels does she use?

**Picture It** You can multiply 5 fingers $\times$ 3 jewels on each finger to find that she has 15 jewels on each glove. Then multiply the 15 jewels $\times$ 2 to find how many jewels on both gloves altogether.

You could also multiply 2 gloves $\times$ 5 fingers on each hand to show there are 10 fingers, including thumbs. Then multiply 10 fingers $\times$ 3 jewels to find how many jewels she uses.

**Model It** You can write the multiplication problem and use parentheses to show which two numbers you will multiply first.

$$(3 \times 5) \times 2 \rightarrow 15 \times 2 = 30$$

You could also choose to multiply different numbers first.

$$3 \times (5 \times 2) \rightarrow 3 \times 10 = 30$$
**Connect It**  Now you will solve the problem from the previous page using equations.

9 Use parentheses to show one way to group $3 \times 5 \times 2.$

10 Use parentheses to show a different way to group $3 \times 5 \times 2.$

11 Which way would you choose to find the product? Explain why.

12 Explain how you can use grouping to make multiplying three factors easier.

**Try It**  Use what you just learned about grouping factors to solve these problems. Show your work on a separate sheet of paper.

13 Use parentheses to show two different ways to group $7 \times 2 \times 4.$ Then choose one of the ways and show the steps to finding the product.

14 Use parentheses to show two different ways to group $2 \times 4 \times 3.$ Then choose one of the ways and show the steps to finding the product.
Read the problem below. Then explore different ways to order and group factors to make multiplication easier.

Joelle bought 2 bags of bananas. There are 9 bunches in each bag, and there are 5 bananas in each bunch. How many bananas did Joelle buy?

**Model It**  Think of the multiplication problem you can write: \(2 \times 9 \times 5\).

You can use what you have learned about multiplying in any order and grouping to help make the problem easier.

Start with \(2 \times 9 \times 5\).

First, change the order of the numbers. Switch the 2 and the 9.

Now you have \(9 \times 2 \times 5\).

Then, group it like this: \(9 \times (2 \times 5)\).

Multiply the numbers in parentheses: \(2 \times 5 = 10\).

Then do the last multiplication: \(9 \times 10 = 90\).

**Model It**  You can use diagrams to help you understand the problem.

The first two diagrams show two ways you can solve the problem using just grouping. The third diagram shows how you can solve the problem by changing the order of the numbers before using grouping.
**Connect It**  Now you will choose which way to solve the problem from the previous page.

15 You can order and group the factors in the multiplication expression $2 \times 9 \times 5$ in different ways. Look at the ways shown below. Fill in the missing numbers.

$$(9 \times 2) \times _____ = 90 \quad (5 \times 2) \times _____ = 90 \quad _____ \times (9 \times 5) = 90$$

16 Remember that you must multiply numbers inside parentheses first. Look back at the multiplication equations in problem 15. Multiply the numbers in the parentheses, then fill in the missing numbers below.

$$(____) \times _____ = 90 \quad (____) \times _____ = 90 \quad _____ \times (____) = 90$$

17 Which of the three multiplication equations in problem 15 do you think is the easiest to solve? Explain why you think so.

__________________________________________________________

__________________________________________________________

__________________________________________________________

18 Explain how you can use grouping and multiplying in any order to make multiplying three numbers easier.

__________________________________________________________

__________________________________________________________

__________________________________________________________

**Try It**  Use what you just learned about ordering and grouping factors to solve these problems. Show your work on a separate sheet of paper.

19 Change the order of the factors and use parentheses to show one way to solve $3 \times 7 \times 3$. Then show the steps to finding the product.

__________________________________________________________

20 Change the order of the factors and use parentheses to show one way to solve $4 \times 9 \times 2$. Then show the steps to finding the product.

__________________________________________________________
Study the example below. Then solve problems 21–23.

Example

There are 8 rows of tables in the cafeteria. Each row has 5 tables. Maria knows that $5 \times 8$ is 40. How can she use this to figure out how many tables there are?

Look at how you could show your work using arrays.

The first array shows $5 \times 8$. The second array looks the same, just turned on its side. It shows $8 \times 5$.

Solution

You can multiply numbers in any order.

$5 \times 8 = 40$, so $8 \times 5 = 40$. There are 40 tables.

21 There are 2 classes of third graders. In each class, there are 3 rows of desks, with 7 desks in each row. Write a multiplication expression to find the number of desks in both classes. Show how to group the factors to find the product. Then write the answer.

Show your work.

Solution

You can multiply numbers in any order.

$5 \times 8 = 40$, so $8 \times 5 = 40$. There are 40 tables.
22 AJ needs to solve $3 \times 8 \times 2$. Show one way to find the answer. Use parentheses to show how you grouped the numbers.

**Show your work.**

I think it would be easiest if you changed the order of the factors before you grouped them.

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23 Matt knows $4 \times 6 = 24$. What other math fact does this help Matt remember? Circle the letter of the correct answer.

- A $6 + 4 = 10$
- B $8 \times 3 = 24$
- C $24 - 6 = 18$
- D $6 \times 4 = 24$

Sadie chose A as the correct answer. How did she get that answer?

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Solution

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**Pair/Share**

How did you decide which two numbers to multiply first?

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**Pair/Share**

Does Sadie’s answer make sense?
Using Order and Grouping to Multiply

Solve the problems.

1. Jackson knows $9 \times 7 = 63$. He needs to solve $\text{____} \times 9 = 63$. What number goes in the blank?
   - A 5
   - B 6
   - C 7
   - D 8

2. Which of the following is NOT true?
   - A $3 \times 6 \times 3 = 6 \times 3 \times 3$
   - B $3 \times 6 \times 3 = 9 \times 3$
   - C $3 \times 6 \times 3 = 9 \times 6$
   - D $3 \times 6 \times 3 = 3 \times 18$

3. Gisell’s service group is making sandwiches for a community picnic. There are 7 children in the service group. Each child is making 5 sandwiches. It takes 2 slices of bread to make a sandwich. What is the total number of slices of bread the children need to make the sandwiches?

   Answer ____________________ slices of bread
4 Lyn’s mom has pictures arranged on her refrigerator in rows. There are 3 rows of pictures. There are 7 pictures in each row. Which of the following expressions or arrays could be used to find the total number of pictures? Circle the letter for all that apply.

A  $3 \times 7$
B  $7 \times 3$
C  $7 \times 7 \times 7$
D
E

5 Dan has 2 photo albums. Each photo album has 8 pages. Dan can fit 4 pictures on each page. How many pictures can Dan fit in the albums?

Show your work.

Answer  ________________ pictures