Factors and Multiples

Essential Question: How are factors and multiples related?

Unlock the Problem

Toy animals are sold in sets of 3, 5, 10, and 12. Mason wants to make a display with 3 animals in each row. Which sets could he buy, if he wants to display all of the animals?

The product of two numbers is a multiple of each number. Factors and multiples are related.

\[ 3 \times 4 = 12 \]

\[ \uparrow \quad \uparrow \quad \uparrow \]

factor factor multiple of 3 multiple of 4

One Way Find factors.

Tell whether 3 is a factor of each number.

Think: If a number is divisible by 3, then 3 is a factor of the number.

- Is 3 a factor of 3? \_
- Is 3 a factor of 5? \_
- Is 3 a factor of 10? \_
- Is 3 a factor of 12? \_

3 is a factor of \_

Another Way Find multiples.

Multiply and make a list.

\[ 1 \times 3 \quad 2 \times 3 \quad 3 \times 3 \quad 4 \times 3 \quad 5 \times 3 \]

\_

\_

So, Mason could buy sets of \_

Math Talk

Explain how you can use what you know about factors to determine whether one number is a multiple of another number.
Common Multiples A **common multiple** is a multiple of two or more numbers.

**Example** Find common multiples.

Tony works every 3 days and Amanda works every 5 days. If Tony works June 3 and Amanda works June 5, on what days in June will they work together?

Circle multiples of 3. Draw a box around multiples of 5.

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Think: The common multiples have both a circle and a box.

The common multiples are ____ and ____.

So, Tony and Amanda will work together on June ____ and June ____.

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**Share and Show**

1. Multiply to list the next five multiples of 4.
   
   4, ____, ____, ____, ____, ____, ____

   $1 \times 4$

2. Is the number a factor of 6? Write yes or no.
   
   2. 3
   
   ____

   3. 6
   
   ____

   4. 16
   
   ____

   5. 18
   
   ____

Is the number a multiple of 6? Write yes or no.

6. 3
   
   ____

7. 6
   
   ____

8. 16
   
   ____

9. 18
   
   ____
Name ________________________________

**On Your Own**

Is the number a multiple of 3? Write yes or no.

10. 4  11. 8  12. 24  13. 38

14. List the next nine multiples of each number. Find the common multiples.

   Multiples of 2: 2, ________________________________

   Multiples of 8: 8, ________________________________

   Common multiples: ________________________________

**Mathematical Practice 8** Generalize Algebra Find the unknown number.

15. 12, 24, 36, ______  

16. 25, 50, 75, 100, ______

Tell whether 20 is a factor or multiple of the number. Write factor, multiple, or neither.

17. 10  18. 20  19. 30

20. Every whole number is a multiple of 1.

21. Every whole number is a factor of 1.

22. **Think Smarter** Julio wears a blue shirt every 3 days. Larry wears a blue shirt every 4 days. On April 12, both Julio and Larry wore a blue shirt. What is the next date that they will both wear a blue shirt?
Complete the Venn diagram. Then use it to solve 23–25.

23. What multiples of 4 are not factors of 48?

24. What factors of 48 are multiples of 4?

25. **Go Deeper** Pose a Problem Look back at Problem 24. Write a similar problem by changing the numbers. Then solve.

26. Kia paid $10 for two charms. The price of each charm was a multiple of $2. What are the possible prices of the charms?

27. **Look for Structure** The answer is 9, 18, 27, 36, 45. What is the question?

28. **Write Math** How do you know whether a number is a multiple of another number?

29. **Think Smarter** For numbers 29a–29e, select True or False for each statement.
   - 29a. The number 45 is a multiple of 9.  ○ True  ○ False
   - 29b. The number 4 is a multiple of 16.  ○ True  ○ False
   - 29c. The number 28 is a multiple of 4.  ○ True  ○ False
   - 29d. The number 4 is a factor of 28.  ○ True  ○ False
   - 29e. The number 32 is a factor of 8.  ○ True  ○ False
Is the number a multiple of 8? Write yes or no.

1. 4
Think: Since $4 \times 2 = 8$, 4 is a factor of 8, not a multiple of 8.
   no

List the next nine multiples of each number.
Find the common multiples.

5. Multiples of 4: 4, ___________
   Multiples of 7: 7, ___________
   Common multiples: ___________

6. Multiples of 3: 3, ___________
   Multiples of 9: 9, ___________
   Common multiples: ___________

Tell whether 24 is a factor or multiple of the number.
Write factor, multiple, or neither.

7. 6 ___________
8. 36 ___________
9. 48 ___________

10. Ken paid $12 for two magazines. The cost of each magazine was a multiple of $3. What are the possible prices of the magazines?

11. Jodie bought some shirts for $6 each. Marge bought some shirts for $8 each. The girls spent the same amount of money on shirts. What is the least amount they could have spent?

12. Write a word problem that can be solved by finding the numbers that have 4 as a factor.
Lesson Check (4.OA.B.4)

1. Of the numbers listed below, which are NOT multiples of 4?
   2, 4, 7, 8, 12, 15, 19, 24, 34

2. What number is a common multiple of 5 and 9?

Spiral Review (4.OA.A.3, 4.NBT.A.2, 4.NBT.B.4, 4.NBT.B.5)

3. Jenny has 50 square tiles. She arranges the tiles into a rectangular array of 4 rows. How many tiles will be left over?

4. Jerome added two numbers. The sum was 83. One of the numbers was 45. What was the other number?

5. There are 18 rows of seats in the auditorium. There are 24 seats in each row. How many seats are in the auditorium?

6. The population of Riverdale is 6,735. What is the value of the 7 in the number 6,735?