What You'll Learn
Scan the lesson. List two headings you would use to make an outline of the lesson.

- **Factors** - numbers being multiplied
  - ex. $3 \times 2 = 6$
- Factor x Factor = Product
- **Multiples**: (2) 0, 2, 4, 6, 8, 10... (5) 0, 5, 10, 15, 20, 25...

Vocabulary Start-Up
A **common factor** is a number that is a factor of two or more numbers. The greatest of the common factors of two or more numbers is called the **greatest common factor** (GCF).

The least number that is a multiple of two or more whole numbers is the **least common multiple** (LCM) of the numbers.

Fill in the charts below.

### GCF
- **GCF**
  - stands for: **Greatest Common Factor**
  - Define:
    - **Greatest** The largest of a set of values
    - **Common** The same feature among several values
    - **Factor** A number that is multiplied by another number

### LCM
- **LCM**
  - stands for: **Least Common Multiple**
  - Define:
    - **Least** The smallest of a set of values
    - **Common** The same feature among several values
    - **Multiple** The product of a number and any whole number

Real-World Link
Bryan is making balloon arrangements. He has 8 blue and 12 green balloons. What is the greatest amount of arrangements he can make if he wants them to be identical?
Find the Greatest Common Factor

You can use common factors or prime factors to find the GCF.

Example

1. There are one-slice servings of three types of cake on a table. Each row has an equal number of servings and only one type of cake. What is the greatest number of servings in each row?

To solve this problem, use common factors.

- factors of 10: 1, 2, 5, 10
- factors of 15: 1, 3, 5, 15
- factors of 20: 1, 2, 4, 5, 10, 20

The common factors are 1 and 5.

The GCF of 10, 15, and 20 is 5. So, the greatest number of pieces of cake that can be placed in each row is 5.

Got It? Do this problem to find out.

a. Lana earned $49 on Friday, $42 on Saturday, and $21 on Sunday selling bracelets. She sold each bracelet for the same amount. What is the most she could have charged for each bracelet?

b. 6

c. 6

d. 16

Example

2. Find the GCF of 12 and 18.

2 and 3 are the common prime factors.

So, the GCF of 12 and 18 is $2 \times 3$, or 6.

Got It? Do these problems to find out.

Find the greatest common factor of each set of numbers.

b. 12, 66
c. 18, 30
d. 32, 48
Find the Least Common Multiple

You can find the least common multiple (LCM) by using a number line, making a list, or by using prime factors.

Examples

3. Find the LCM of 2 and 3.

**Method 1** Use a number line.
Put a red X above each multiple of 2 and a blue X above each multiple of 3.

```
 1 2 3 4 5 6 7 8 9 10 11 12
  X X X X X X X X X X
```

The least number with both a red and a blue X is 6.
So, 6 is the least common multiple of 2 and 3.

**Method 2** Use an organized list.
List the nonzero multiples of 2 and 3.
multiples of 2: 2, 4, 6, 8, 10, 12,...
multiples of 3: 3, 6, 9, 12, 15,...

Notice that 6 and 12 are common multiples.
So, the least common multiple of 2 and 3 is 6.

4. Find the LCM of 14 and 21 using prime factorization.

Write the prime factorization of each number.

```
14 = 2 × 7
21 = 3 × 7
```

```
  7
 / \  \
/    \ \
7 × 2 × 3 = 42.
```

7 is the only common prime factor.

Multiply using each common prime factor only once.

So, the LCM is 7 × 2 × 3 or 42.

Got It? Do these problems to find out.

Find the least common multiple of each set of numbers.

- e. 2, 6
- f. 4, 5, 10
- g. 3, 5, 7
Example

5. Ernesto has painting class every 2 weeks. Kamala has a pottery class every 5 weeks. Ernesto and Kamala met at the art building for class this week. How many weeks will it be until they see each other again?

- multiples of 2: 2, 4, 6, 8, 10, 12, 14, ...
- multiples of 5: 5, 10, 15, 20, 25, 30, ...

The least common multiple of 2 and 5 is 10. So, Ernesto and Kamala will see each other again in 10 weeks.

Guided Practice

Find the greatest common factor of each set of numbers. (Example 1 and 2)

1. 8, 32
   \[\begin{array}{c}
   8 & 32 \\
   1 & 4
   \end{array}\]

2. 24, 60

3. 3, 12, 18
   \[\begin{array}{c}
   3 & 12 & 18 \\
   1 & 4 & 6
   \end{array}\]

Find the least common multiple of each set of numbers. (Examples 3 and 4)

4. 7, 9

5. 6, 15
   \[\begin{array}{c}
   6 & 15 \\
   2 & 5
   \end{array}\]

6. 9, 12, 15

7. The Movie House gives away a $5 coupon for every 4 movies purchased. They give away a bag of popcorn for every 3 movies purchased. How many movies would you have to purchase in all before receiving both a $5 coupon and a bag of popcorn at the same purchase? (Example 5)

8. Building on the Essential Question How does finding the greatest common factor help you to solve real-world problems?
Independent Practice

Find the greatest common factor of each set of numbers. (Example 2)

1. 8, 14
2. 21, 24, 27

3. 21, 35, 49
4. 12, 18, 26

Find the least common multiple of each set of numbers. (Examples 3 and 4)

5. 5 and 6
6. 6 and 9

7. 6, 12, and 15
8. 3, 9, and 15

9. A gardener has 27 pansies and 36 daisies. He plants an equal number of each type of flower in each row. What is the greatest possible number of pansies in each row? (Example 1)

10. Fourteen boys and 21 girls will be equally divided into groups. Find the greatest number of groups that can be created if no one is left out. (Example 1)
11. Inez waters her plants every two days. She trims them every 15 days. She did both today. When will she do both again? (Example 5)

12. **Identify Repeated Reasoning** An airport offers two shuttles that run on different schedules. If both shuttles leave the airport at 4:00 p.m., at what time will they next leave the airport together?

<table>
<thead>
<tr>
<th>Shuttle</th>
<th>Departs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>every 6 minutes</td>
</tr>
<tr>
<td>B</td>
<td>every 9 minutes</td>
</tr>
</tbody>
</table>

**H.O.T. Problems** Higher Order Thinking

13. **Model with Mathematics** Write and solve a real-world problem that can be solved using the greatest common factor of two numbers.

14. **Identify Repeated Reasoning** How can you use number patterns to find the least common multiple of 120 and 360?

15. **Persevere with Problems** If the GCF of two numbers is 1, they are called relatively prime. Find three sets of relatively prime numbers.

**Standardized Test Practice**

16. There are 36 cans of green beans and 48 cans of corn. The display designer wants an equal number of each vegetable in each row. What is the greatest number of cans of corn that can be in each row?

- A 3 cans
- B 4 cans
- C 6 cans
- D 12 cans

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