Factors and Multiples

Unit 4 Lesson 3
Factors and Multiples

Students will be able to...

- Find all factor pairs for a whole number in the range 1-100.
- Recognize that a whole number is a multiple of each of its factors.
- Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number.
- Determine whether a given whole number in the range 1-100 is prime or composite.
Factors and Multiples

Key Vocabulary

Factor
Factor pairs
Prime
Composite
Divide
Multiple
Product
Let's look at factors and multiples in an equation.

\[ 4 \times 5 = 20 \]

Factors: 4 and 5
Multiples: 20
What is a **factor**?
- The numbers that are multiplied to get a given number.

For example...

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Factors of 16 are 1, 2, 4, 8, 16

- The first factor of every number greater than 0 is **1**.
- Factors never go beyond the number you are finding factors for.
Let's try...

Find all the factors of 18

Ask yourself...

What factors can I multiply together to get 18?

Factors of 18 are 1, 2, 3, 9, 18
Let's try...

Find all the factors of 32

Ask yourself...

What factors can I multiply together to get 32?

Factors of 32 are 1, 2, 4, 8, 16, 32
You can draw a Factor Rainbow to find all the factors!

Find all the factors of 30

Always start with 1

Always end with the number you are finding the factors for.
Factors and Multiples

Factors of 30 are 1, 2, 3, 5, 6, 10, 15, 30

Move on to the next number (from the least to the greatest)
Let's try...

Find all the factors of 48

Factors of 48 are 1, 2, 3, 6, 8, 16, 24, 48
Let's try...
Find all the factors of 98
Let's draw a factor rainbow.

Factors of 98 are 1, 2, 6, 13, 49, 90

There are no factors between 6 and 13 that would be 98 when multiplied together.
What is a **multiple**?

- The product of a given number and another factor multiplied together.

For example...

4x1=4
4x2=8
4x3=12
4x4=16
4x5=20

There is **no limit** to the number of multiples a number can have.

The first multiple of every number greater than zero is the number you are finding multiples for.
Let's try...
Find all the first 6 multiples of 6

<table>
<thead>
<tr>
<th>6 x 1 = 6</th>
<th>6 x 2 = 12</th>
<th>6 x 3 = 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 x 4 = 24</td>
<td>6 x 5 = 30</td>
<td>6 x 6 = 36</td>
</tr>
</tbody>
</table>

The first 6 multiples of 6 are 6, 12, 18, 24, 30, 36
What are the first 6 multiples of 10?

Let’s try...

10 \times 1 = 10
10 \times 2 = 20
10 \times 3 = 30
10 \times 4 = 40
10 \times 5 = 50
10 \times 6 = 60

The first 6 multiples of 10 are 10, 20, 30, 40, 50, 60
What is a factor pair?

- Factor pair of a number is two numbers that you can multiply together to get the target number.

For example...

What are the factor pairs for 32?

1   2   4
8   16  32
Factors and Multiples

1 x 32 = 32
2 x 16 = 32
4 x 8 = 32

Would 2 & 32 be a factor pair?
- No, because they don’t make 32 when multiplied together.

Answer:
1&32, 2&16, 4&8 are the factor pairs for 32.
Let's try...

What are the factor pairs for 56?

1&56, 2&28, 4&14, 7&8  are the factor pairs for 56.
Let's try...

What are the factor pairs for 95?

1 & 95, 5 & 19 are the factor pairs for 95.
What is a **prime number**?

A prime number has only two factors: 1 and itself.

**2 is a prime number**

Why? It’s because 2 has only two factors, 1 and 2.

**17 is a prime number**

Why? It’s because 17 has only two factors, 1 and 17.
True or False?

“29 is a prime number.”

Let’s find the factors of 29 and find out if 29 is a prime number or not.

Is there any other numbers that make 29 when multiplied together?

- No.

The statement is true because 29 only has two factors, 1 and 29.
“99 is a prime number.”

Let’s find the factors of 99 and find out if 99 is a prime number or not.

The factors of 99 are 1, 3, 33, 99.

The statement is false because 99 has more than 2 factors.
What is a **composite number**?

A composite number has more than two factors.

9 is a **composite number**

Why?

It’s because 9 has more than two factors.

32 is a **composite number**

Why?

It’s because 32 has more than two factors.

1 is neither prime nor composite number.
“69 is a composite number.”

Let’s find the factors of 69 and find out if 69 is a composite number or not.

The factors of 69 are 1, 3, 23, 69.

The statement is true because 69 has more than 2 factors.
“87 is a composite number.”

Let’s find the factors of 87 and find out if 87 is a composite number or not.

Is there any other numbers that make 87 when multiplied together?

- No.

The statement is false because 87 has only two factors.
Let's try...

Is 85 a prime or composite number?

Answer: 85 is a composite number.
Let's try...

Is 67 a prime or composite number?

Is there any other numbers that make 67 when multiplied together?

-No.

Answer: 67 is a prime number.