

Chapter 4

FACTORS and GREATEST COMMON FACTOR

FACTORS are integers you multiply together to get another integer.

EXAMPLE: What are the factors of 6?

2 and 3 are factors of 6, because $2 \times 3 = 6$

1 and 6 are also factors of 6, because $1 \times 6 = 6$

So, the factors of 6 are: 1, 2, 3, and 6.

When finding the factors of a number, ask yourself, "What numbers can be multiplied together to give me this number?"

Every number greater than 1 has at least two factors, because every number can be divided by 1 and itself!



EXAMPLE: What are the factors of 10?

(Think: "What can be multiplied together to give me 10?")

$$1 \cdot 10$$

$$2 \cdot 5$$

The factors of 10 are 1, 2, 5, and 10.

Even though 5×2 also equals 10, these numbers have already been listed, so we don't need to list them again.

EXAMPLE: Emilio needs to arrange chairs for a drama club meeting at his school. There are 30 students coming. What are the different ways he can arrange the chairs so that each row has the same number of chairs?

1 row of 30 chairs

2 rows of 15 chairs

3 rows of 10 chairs

5 rows of 6 chairs

30 rows of 1 chair

THIS IS THE SAME AS SAYING,
"FIND THE FACTORS OF 30."

The factors of 30 are 1, 2, 3, 5, 6, 10, 15, and 30. The product of each pair of numbers is 30.

Here are some shortcuts to find an integer's factors:

★ An integer is divisible by **2** if it ends in an even number.

EXAMPLE: **10, 92, 44, 26, and 8** are all divisible by **2** because they end in an even number.

★ An integer is divisible by **3** if the sum of its digits is divisible by **3**.

EXAMPLE: **42** is divisible by **3** because $4+2=6$, and **6** is divisible by **3**.

★ An integer is divisible by **5** if it ends in **0** or **5**.

EXAMPLE: **10, 65, and 2,320** are all divisible by **5** because they end in either **0** or **5**.

★ An integer is divisible by **9** if the sum of the digits is divisible by **9**.

EXAMPLE: **297** is divisible by **9** because $2+9+7=18$, and **18** is divisible by **9**.

★ An integer is divisible by **10** if it ends in **0**.

EXAMPLE: **50, 110, and 31,330** are all divisible by **10** because they end in **0**.

Prime Numbers

A **PRIME NUMBER** is a number that has only two factors (the number itself and 1). Some examples of prime numbers are 2, 3, 7, and 13.

2 IS ALSO THE ONLY
EVEN PRIME NUMBER.

Common Factors

Any factors that are the same for two (or more) numbers are called **COMMON FACTORS**.

EXAMPLE: What are the common factors of 12 and 18?

The factors for 12 are 1, 2, 3, 4, 6, 12.

The factors for 18 are 1, 2, 3, 6, 9, 18.

The common factors of 12 and 18 (factors that both 12 and 18 have in common) are 1, 2, 3, and 6.

The largest factor that both numbers share is called the **GREATEST COMMON FACTOR**, or **GCF** for short.

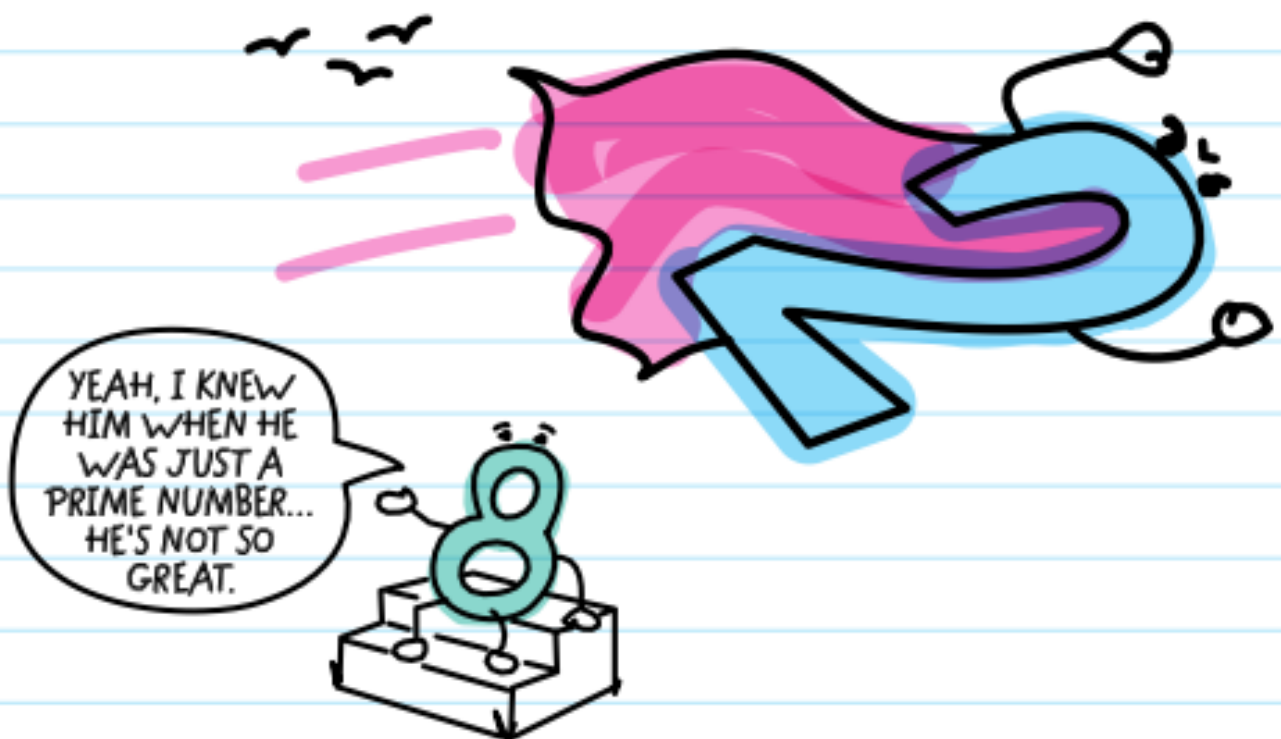
The GCF of 12 and 18 is 6.

EXAMPLE: What is the GCF of 4 and 10?

Factors of 4 are 1, 2, 4.

Factors of 10 are 1, 2, 5, 10.

So the GCF of 4 and 10 is 2.



EXAMPLE: What is the GCF of 18 and 72?

Factors of 18 are 1, 2, 3, 6, 9, 18.

Factors of 72 are 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72.

18 is the GCF of 18 and 72.





CHECK YOUR KNOWLEDGE

1. What are the factors of 12?
2. What are the factors of 60?
3. Is 348 divisible by 2?
4. Is 786 divisible by 3?
5. Is 936 divisible by 9?
6. Is 3,645,211 divisible by 10?
7. Find the greatest common factor of 6 and 20.
8. Find the greatest common factor of 33 and 74.
9. Find the greatest common factor of 24 and 96.
10. Sara has 8 red-colored pens and 20 yellow-colored pens. She wants to create groups of pens such that there are the same number of red-colored pens and yellow-colored pens in each group and there are no pens left over. What is the greatest number of groups that she can create?

ANSWERS

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CHECK YOUR ANSWERS



1. 1, 2, 3, 4, 6, and 12
2. 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, and 60
3. Yes, because 348 ends in an even number.
4. Yes, because $7 + 8 + 6 = 21$, and 21 is divisible by 3.
5. Yes, because $9 + 3 + 6 = 18$, and 18 is divisible by 9.
6. No, because it does not end in a 0.
7. 2
8. 1
9. 24
10. 4 groups. (Each group has 2 red-colored pens and 5 yellow-colored pens.)