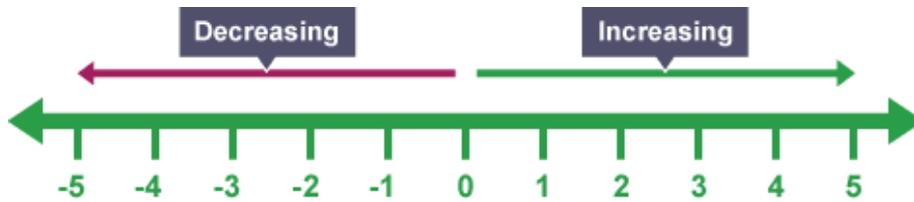


Directed Numbers

What are positive and negative numbers?



Any number above zero is a **positive** number. Positive numbers are written with no sign or a + sign in front of them and they are counted up from zero to the right on a number line.

Any number below zero is a **negative** number. Negative numbers are always written with a - sign in front of them and they are counted down from zero to the left on a number line.

Always look at the sign in front of a number to see if it is positive or negative.

Zero, 0, is neither positive nor negative.

Adding and subtracting positive and negative numbers

To add and subtract numbers always begin counting from zero.

When **adding** positive numbers, count to the **right**.

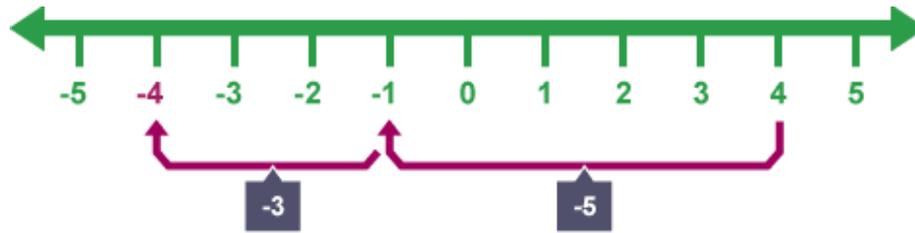
When **subtracting** positive numbers, count to the **left**.

Calculate $4 - 5 - 3$



Imagine moving up and down a number line to get to the answer.

Starting from 4. Then subtract 5. Then subtract 3. The answer is -4.

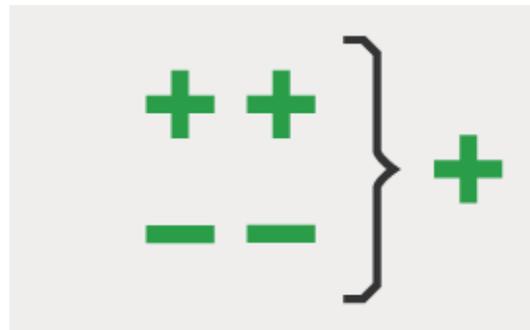
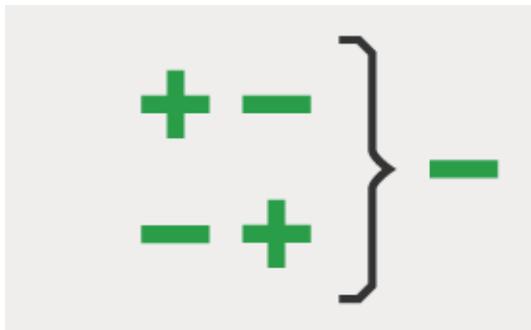


Two signs

- When **adding** positive numbers, count to the **right**.
- When **adding** negative numbers, count to the **left**.
- When **subtracting** positive numbers, count to the **left**.
- When **subtracting** negative numbers, count to the **right**.

Remember:

- **subtract** when two different signs appear next to each other
- **add** when two of the same signs appear next to each other



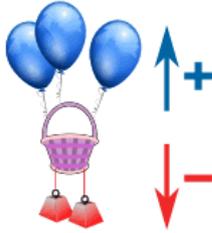
Example

$$3 + (-5) = 3 - 5 = -2$$

$$3 - (-5) = 3 + 5 = +8 \text{ (or } 8)$$

$$(+10) + (-7) = 10 - 7 = 3$$

$$4 - (-3) = 4 + 3 = 7$$



Adding and subtracting directed numbers could be explained with balloons (positive) and weights (negative):

This basket has balloons and weights tied to it:

The balloons pull up (**positive**)
and the weights drag down (**negative**)

Adding a Positive Number

Adding positive numbers is just simple addition.



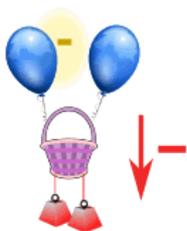
We can add balloons (we are **adding positive** value)

the basket gets pulled upwards (positive)

Eg. $5 + (+3) = 5 + 3 = 8$

Subtracting a Positive Number

Subtracting positive numbers is just simple subtraction.



We can take away balloons (we are **subtracting positive** value)

the basket gets pulled downwards (negative)

Eg. $7 - (+4) = 7 - 4$

Adding a Negative Number



We can add weights (we are **adding negative** values)

the basket gets pulled downwards (negative)

Eg. $6 + (-3) = 6 - 3 = 3$

Subtracting a Negative Number



We can take away weights (we are **subtracting negative** values)

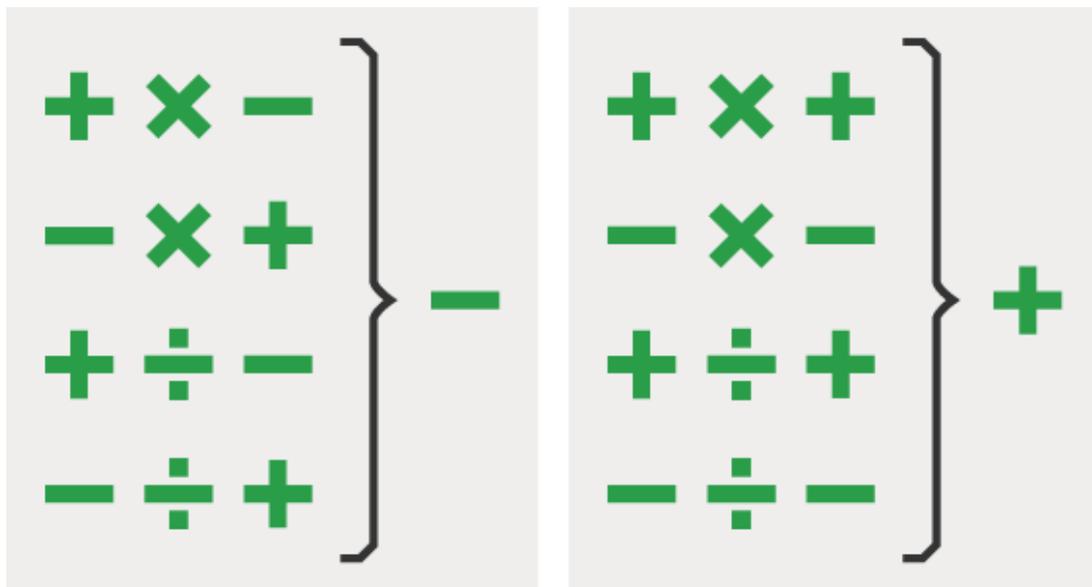
the basket gets pulled upwards (positive)

$$6 - (-3) = 6 + 3 = 9$$

Multiplying and dividing positive and negative numbers

The rule for multiplying and dividing is very similar to the rule for adding and subtracting.

- When the signs are **different** the answer is **negative**.
- When the signs are **the same** the answer is **positive**.



First 'work out' the signs, then multiply or divide.

Eg. $(-6) \times (+3) = -18$

$$5 \times (-4) = -20$$

$$(-2) \times (-2) \times (-2) = -8$$

$$(-15) \div (-3) = +5$$

$$125 \div (-5) = -25$$