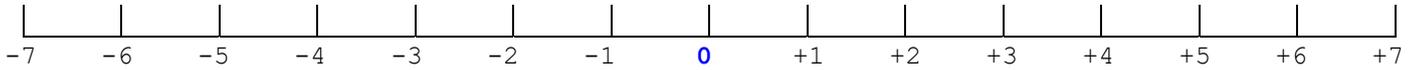


NEGATIVE NUMBERS

- (-) ← Negative number
- (-) ← Smaller numbers
- (-) ← Numbers decrease

- Positive numbers → (+)
- Larger numbers → (+)
- Numbers increase → (+)



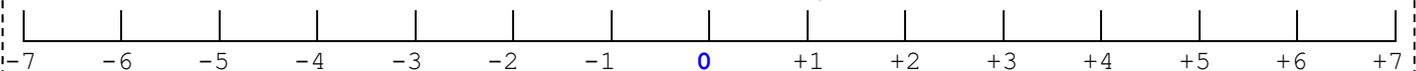
Subtraction of one positive number from another positive number

I have got 3 counters and then I take away two, I am left with 1 counter

$$3 - 2$$



$$+3 - +2 = +1$$



A minus and a plus make a minus - + = -

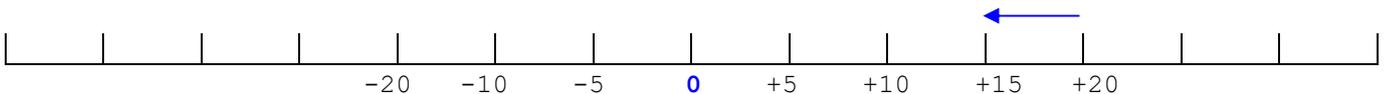
$$+3 - +2 = +1$$

Two arrows point from the minus sign and the plus sign in the equation above to the plus sign in the equation below.

Addition of a negative number to a positive number

I opened the freezer bag ready for a picnic, the temperature in the freezer bag was at room temperature (20°C). I added an ice pack to the freezer bag to reduce the temperature before placing food and drink into the bag. The ice pack would reduce the temperature inside the freezer bag by 5°C

$$+20 + -5 = +15$$



A plus and a minus make a minus + - = -

$$+20 + -5 = +15$$

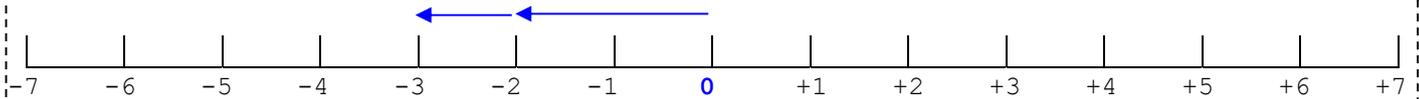
Two arrows point from the plus sign and the minus sign in the equation above to the plus sign in the equation below.

Addition of two negative numbers

My friend and I visited the cinema to see a film, during the interval I wanted to buy some chocolates. I had forgotten to take my wallet and had no money, my friend kindly loaned me £2 pounds. After eating the chocolates I decided I wanted a drink and asked my friend for another £1. I said I would pay the £3 pound back later.

I was short of £2 for some chocolates to begin with (-£2), then I was short of another £1 for a drink (-£1), how much money was I short of altogether?

$$-2 + -1 = -3 \quad (\text{think of the add sign as meaning group together})$$



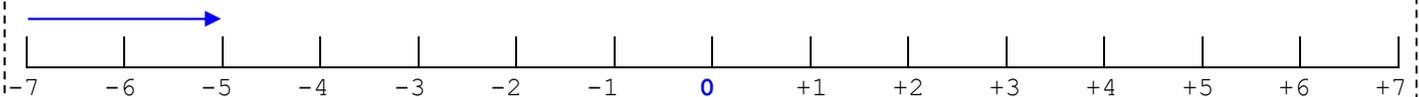
A plus and a minus make a minus $+ - = -$

$$\begin{array}{l} \swarrow \downarrow \\ -2 + -1 = -3 \end{array} \quad \text{becomes} \quad -2 - 1 = -3$$

Subtraction of one negative number from another negative number

The fridge temperature was at -7°C , I wanted some ice cubes to keep my orange drink cool. I took 2 ice cubes out of the fridge and noticed the temperature in the fridge didn't stay so cold, in fact it went up to -5°C .

$$-7 - -2 = -5 \quad (\text{think of the minus sign as meaning difference})$$



A minus and a minus make a plus $- - = +$

$$\begin{array}{l} \swarrow \downarrow \\ -7 - -2 = -5 \end{array}$$

Multiplication

The electricity has just gone off. The fridge temperature is -2°C

I have a tray of 8 **special** ice cubes which 5 minutes before loosing the electricity I had placed into a freeze bag. Each ice cube will reduce the temperature in the fridge by -1°C . The whole tray reduces the temperature in the fridge by 8×-1 (-8°C).

$$+8 \times -1 = -8 \quad (+ \times - = -)$$

$$-2 + -8 = -10$$

If I remove the tray of ice cubes the fridge will lose the cooling influence of the ice tray and start to warm up.

$$- (1 \times -8)$$

$$- (-8) = + 8 \quad (- \times - = +)$$

$$-10 + 8 = -2$$

Division

If I have a tray of 8 ice cubes and I want to share them out between 4 drinks, each drink will get 2 ice cubes. Each ice cube will reduce the temperature of the drink by -1°C

$$\frac{-8}{4} = -2 \quad (- \div + = -)$$

Each drink will be cooled by 2°C .

If I have 2 trays of ice cubes (each tray contains 8 ice cubes), I will have 16 ice cubes in total. How much cooling influence will these two trays of special ice cubes provide?

$$2 \times -8 = -16$$

therefore the opposite must be true

$$\frac{-16}{-8} = 2 \quad (- \div - = +)$$

Proof of multiplication using distributive laws

$$2 \times (+2 -2) = 0$$

$$(+ 4 - 4) = 0$$

Similarly

$$-2 \times (+2 -2) = 0$$

$$(-4 +4) = 0$$

Two like signs together make a plus	- x -	or	- ÷ -	= +
	+ x +	or	+ ÷ +	= +
Two unlike signs together make a minus	- x +	or	- ÷ +	= -
	+ x -	or	+ ÷ -	= -