

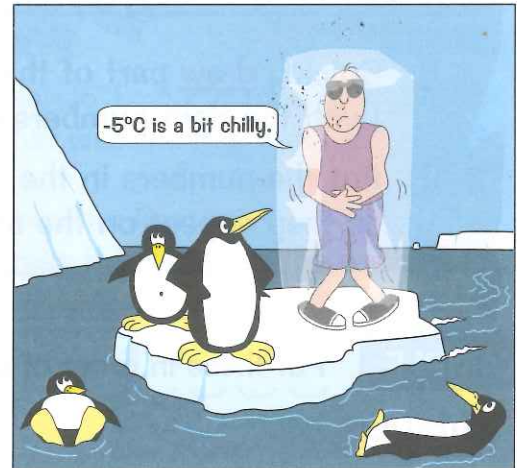
## Negative Numbers

Sometimes we need to use numbers less than zero. We call them negative numbers, and write them with a minus sign in front.

### Negative Numbers — Where do they Come From?

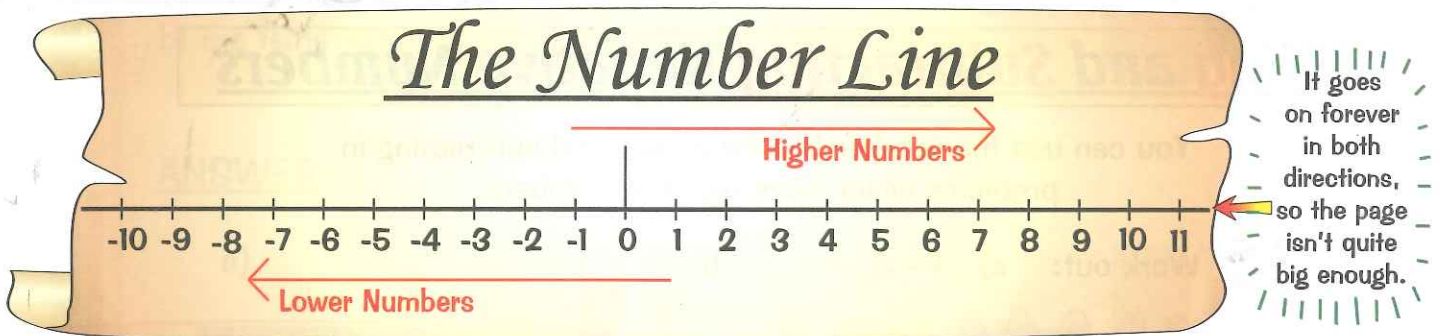
Negative numbers pop up in all sorts of places. We use them for cold temperatures like  $-5^{\circ}\text{C}$  (minus five degrees Celsius).

If you have  $-\text{£}10.00$  in the bank, then it means you owe the bank  $\text{£}10$  (a shame really).



### The Number Line

The number line is really useful for understanding negative numbers.



It's like a huge thermometer scale that goes on forever in both directions. It has every number on it in the correct order. The further right you go, the higher the numbers get. The further left, the lower the numbers. Notice that:

$-4$  is a higher number than  $-7$  because it's further to the right on the number line.



It's easy to think that  $-10$  is higher than  $-6$  because  $10$  is higher than  $6$ . But check the number line and you'll see that it's not.

## Negative Numbers

### Putting Negative Numbers in Order

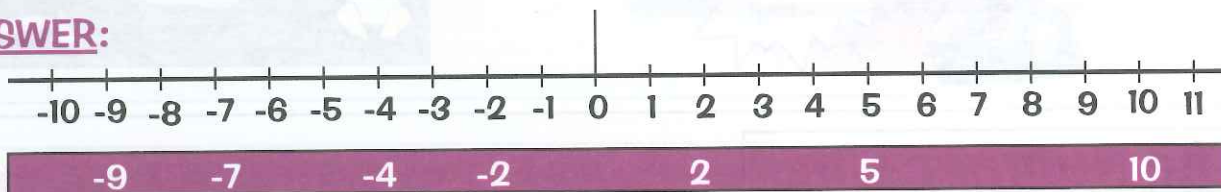
#### Ordering Negative Numbers

- 1) Quickly **draw** part of the number line (with the right numbers on).
- 2) Put the numbers in the **same order** as they appear on the number line.



**EXAMPLE:** Put these in order of size:  $-4$ ,  $5$ ,  $-2$ ,  $10$ ,  $-9$ ,  $2$ ,  $-7$ .

**ANSWER:**



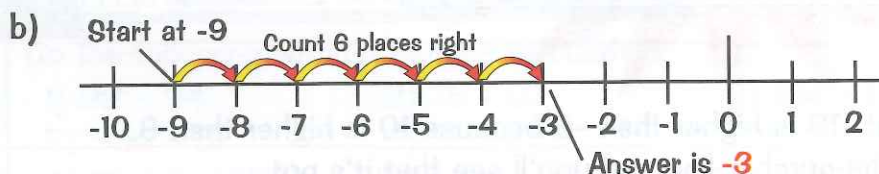
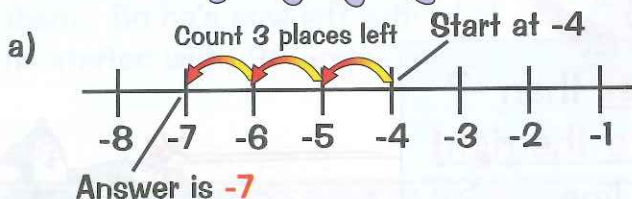
So in order of size they are:  $-9$ ,  $-7$ ,  $-4$ ,  $-2$ ,  $2$ ,  $5$ ,  $10$ .

### Adding and Subtracting Negative Numbers

You can use the number line for adding and subtracting in problems which have negative numbers.

**EXAMPLE:** Work out: a)  $-4 - 3$       b)  $-9 + 6$

All you do is draw part of the number line and then **COUNT ALONG** it to get to the answer:



#### Adding and Subtracting

- 1) Start from the first number.
- 2) When **ADDING**, count **RIGHT** along the number line.
- 3) For **SUBTRACTING**, count **LEFT**.

# Negative Numbers

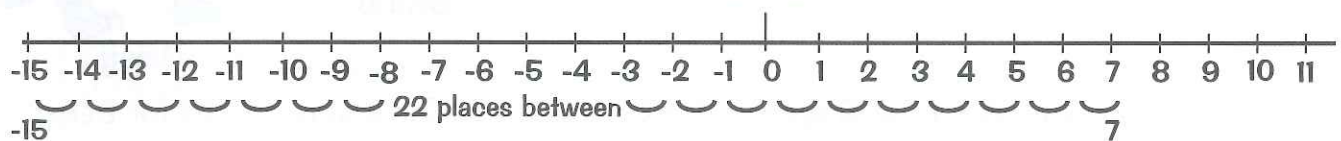
## Working Out Temperature Changes

Test questions often ask about changes in **TEMPERATURE** — especially for places where it goes below freezing at night.



**EXAMPLE:** One day the temperature in Neil's freezer was  $-15^{\circ}\text{C}$ , but it rose to  $7^{\circ}\text{C}$  after he filled it with fermenting cheesecakes. What was the **rise** in temperature?

**ANSWER:** Once again, just do a quick sketch of the number line, mark the two temperatures on it and then just **count how many degrees** it is between them:



So the answer is: The rise in temperature of Neil's freezer was  **$22^{\circ}\text{C}$** .

### EXAMPLE:

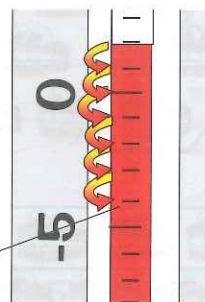
What would the thermometer on the left read if:  
a) the temperature dropped by  $6^{\circ}\text{C}$   
b) the temperature then rose by  $3^{\circ}\text{C}$ ?



### ANSWER:

a)

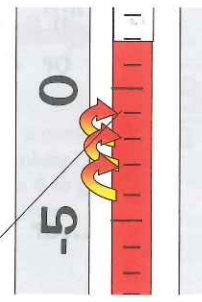
Count down  
6 places



Answer is  **$-4^{\circ}\text{C}$**

b)

Count up  
3 places



Answer is  **$-1^{\circ}\text{C}$**

## Stay cool — don't get hot under the collar...

- Put these temperatures in order (the coldest first):  $4^{\circ}\text{C}$ ,  $-10^{\circ}\text{C}$ ,  $7^{\circ}\text{C}$ ,  $-12^{\circ}\text{C}$ ,  $-6^{\circ}\text{C}$ ,  $0^{\circ}\text{C}$ .
- One day the temperature changes from  $-5^{\circ}\text{C}$  to  $8^{\circ}\text{C}$ . What is the temperature rise?
- If the temperature starts off at  $5^{\circ}\text{C}$  and falls by  $15^{\circ}\text{C}$ , what is the final temperature?
- Use a number line to help you work out the following:
  - $-5 - 4$
  - $-11 + 6$
  - $3 - 15$
  - $-156 - 7$