

# M1 Maths

## N1 -4 Negatives

- understanding negative numbers and placing them on a number line

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### Summary

Negative numbers are the opposite of positive numbers. For instance,  $-4$  is as far below zero as  $4$  is above zero.

### Lead-In

If you are at home, get a thermometer and find the temperature in your kitchen, in your fridge and in your freezer.

How much colder is the fridge than the kitchen?

How much colder is the freezer than the fridge?

### Learn

**Negative numbers** are the opposite of positive numbers.

$-4$  is as far below zero as  $4$  is above zero.

$-1.7$  is as far below  $0$  as  $1.7$  is above  $0$ .

Likewise with other numbers.

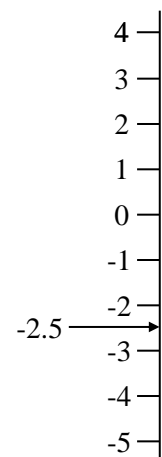
A temperature of  $-18^\circ$  is as much below freezing as a temperature of  $18^\circ$  is above freezing.

A bank balance of  $\$50$  means the bank owes you  $\$50$ .

A bank balance of  $-\$50$  means you owe the bank  $\$50$ .

Positive and negative numbers can be put on a number line like the one shown to the right. Imagine this as the scale on a thermometer if you like. Note that  $-2.5$  is between  $-2$  and  $-3$  and thus lower than  $-2$ . Likewise with other fractions.

Note too that big negative numbers are lower than (therefore less than) small negative numbers. For instance,  $-30 < -10$ .



## Practice

- Q1 Draw a number line from  $-4$  to  $4$  and show the position of the following numbers on it:  
(a)  $2$  (b)  $0$  (c)  $-2$  (d)  $-3$  (e)  $3.4$  (f)  $-1.5$  (g)  $-0.7$
- Q2 Arrange the following numbers from lowest to highest. (Put them in the order they would appear on a number line.)  
 $8, 1, -12, -11, 0, -11\frac{1}{2}, -3, 3$
- Q3 (a) If the temperature is  $3^\circ$  and it drops  $5^\circ$ , what will it become?  
(b) If the temperature is  $-5^\circ$  and it rises  $2^\circ$ , what will it become?  
(c) If the temperature is  $-3^\circ$  and it rises  $11^\circ$ , what will it become?  
(d) If the temperature is  $3^\circ$  and it drops to  $-4^\circ$ , how many degrees does it fall?  
(e) If the temperature is  $-21^\circ$  and it changes to  $-12^\circ$ , does it rise or fall? By how many degrees?
- Q4 How far apart are the following pairs of numbers on a number line  
(a)  $2, 5$  (b)  $-2, -5$  (c)  $3, -1$   
(d)  $-8, 0$  (e)  $-4, 5$  (f)  $-7, -1$
- Q5 What number is:  
(a) 2 up from 3 on the number line?  
(b) 4 down from 9 on the number line?  
(c) 5 down from 4 on the number line?  
(d) 7 down from 2 on the number line?  
(e) 6 up from  $-2$  on the number line?  
(f) 4 up from  $-4$  on the number line?
- Q6 What number is half way between each of the following pairs of numbers?  
(a)  $9, 5$  (b)  $-2, 6$  (c)  $-8, -4$   
(d)  $-6, 2$  (e)  $-5, 2$  (f)  $-1.6, 1.0$
- Q7 Give the next three numbers in each pattern:  
(a)  $6, 4, 2, \dots$  (b)  $13, 9, 5, \dots$  (c)  $-16, -11, -6, \dots$  (d)  $-2, 3, \dots$

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## Solve

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- Q51 What number is one third of the way up from  $-11$  to  $4$ ?  
Q52 What number is  $\frac{3}{4}$  of the way down from  $5$  to  $-19$ ?

- Q53 If your bank balance was  $-\$22$  (i.e. you owed the bank  $\$22$ ), how much would you have to deposit to bring it up to  $\$47$ ?
- Q54  $-2$  is above  $-12$ . What number is 2.6 times as far above  $-12$ ?
- Q55 Consider the sequence  $-53, -50, -47, -44, \dots$ . How many more terms would need to be added for it to include a positive number?

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## Revise

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### Revision Set 1

- Q61 Draw a number line from  $-4$  to  $4$  and show the position of the following numbers on it:  
 (a)  $3$                       (b)  $-1.9$
- Q62 Arrange the following numbers from lowest to highest. (Put them in the order they would appear on a number line.)  
 $5, -1, -3, -1\frac{1}{2}, 0$
- Q63 (a) If the temperature is  $1^\circ$  and it drops  $5^\circ$ , what will it become?  
 (b) If the temperature is  $-9^\circ$  and it rises  $6^\circ$ , what will it become?  
 (c) If the temperature is  $2^\circ$  and it changes to  $-15^\circ$ , does it rise or fall? By how many degrees?
- Q64 How far apart are the following pairs of numbers on a number line  
 (a)  $-9, -5$               (b)  $3, -4$
- Q65 What number is:  
 (a)  $5$  down from  $2$  on the number line?  
 (b)  $6$  up from  $-2$  on the number line?  
 (c)  $4$  up from  $-5$  on the number line?  
 (d) half way between  $-8$  and  $2$
- Q66 Give the next three numbers in this pattern:  $13, 9, 5, \dots$

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## Answers

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- Q1             $\frac{-4}{\quad\quad\quad -3} \quad \frac{-2}{\quad\quad -2} \quad \frac{0}{\quad\quad -1.5} \quad \frac{2}{\quad\quad -0.7} \quad \frac{4}{\quad\quad 0} \quad \frac{2}{\quad\quad 2} \quad \frac{3.4}{\quad\quad 3.4}$
- Q2     $-12, -11\frac{1}{2}, -11, -3, 0, 1, 3, 8$
- Q3    (a)  $-2^\circ$               (b)  $-3^\circ$               (c)  $8^\circ$               (d)  $7^\circ$               (e) rises  $9^\circ$
- Q4    (a)  $3$                   (b)  $3$                   (c)  $4$                   (d)  $8$                   (e)  $9$                   (f)  $6$
- Q5    (a)  $5$                   (b)  $5$                   (c)  $-1$                 (d)  $4$                   (e)  $0$
- Q6    (a)  $7$                   (b)  $2$                   (c)  $-6$                 (d)  $-2$                 (e)  $-1.5$               (f)  $-0.3$
- Q7    (a)  $0, -2, -4$         (b)  $1, -3, -7$         (c)  $-1, 4, 9$         (d)  $8, 13, 23$

- Q51     $-1$                       Q52     $-13$                       Q53     $\$69$                       Q54     $14$                       Q55     $15$

Q61 (a, b)  $\frac{-4}{-1.9}$   $\frac{-2}{-1.9}$   $\frac{0}{-1.9}$   $\frac{2}{-1.9}$   $\frac{4}{-1.9}$

Q62  $-3, -1\frac{1}{2}, -1, 0, 5$

Q63 (a)  $-4^\circ$  (b)  $-3^\circ$  (c) falls  $17^\circ$

Q64 (a) 4 (b) 7

Q65 (a)  $-3$  (b) 4 (c)  $-1$  (d)  $-3$

Q66  $1, -3, -7$