

NUMBERS AND THE NUMBER SYSTEM

Pupils should be taught to:

Order, add, subtract, multiply and divide positive and negative numbers

As outcomes, Year 7 pupils should, for example:

Use, read and write, spelling correctly: integer, positive, negative, plus, minus... and know that -6 is read as 'negative six'.

Order integers and position them on a number line. For example:

- Put a $>$ or $<$ sign between these pairs of temperatures: $-6^{\circ}\text{C} \square 4^{\circ}\text{C}$ $6^{\circ}\text{C} \square -4^{\circ}\text{C}$ $-6^{\circ}\text{C} \square -4^{\circ}\text{C}$ $-4^{\circ}\text{C} \square -6^{\circ}\text{C}$
- On a number line, mark numbers half way between two given negative numbers, or between a given positive number and a given negative number.
- Use a **graphical calculator** to generate ten random numbers lying between -20 and $+20$, then arrange them in order. For example, enter:

Int (Ran# × 4 0) - 2 0

then keep pressing the EXE button.

[Link to plotting coordinates in all four quadrants \(pages 218–19\).](#)

Begin to add and subtract integers.

Extend patterns such as:

$2 + 1 = 3$	$-3 - 1 = -4$
$2 + 0 = 2$	$-3 - 0 = -3$
$2 + -1 = 1$	$-3 - -1 = -2$
$2 + -2 = 0$	$-3 - -2 = -1$
$2 + -3 = -1$	$-3 - -3 = 0$

Use negative number cards to help answer questions such as:

$-3 + -5 = \square$	$-13 + -25 = \square$
$-146 + -659 = \square$	$-99 + -99 = \square$
$-9 - -4 = \square$	$-43 - -21 = \square$
$-537 - -125 = \square$	$-99 - -99 = \square$

Answer open-ended questions such as:

- The answer to a question was -8 . What was the question?
- The result of subtracting one integer from another is -2 . What could the two integers be?
- The temperature is below freezing point. It falls by 10 degrees, then rises by 7 degrees. What could the temperature be now?

Solve simple puzzles or problems involving addition and subtraction of positive and negative numbers, such as:

- Complete this magic square.

-5	2	-6
	-8	-1

[Link to substituting positive and negative numbers in expressions and formulae \(pages 138–41\).](#)

NUMBERS AND THE NUMBER SYSTEM

Pupils should be taught to:

Order, add, subtract, multiply and divide positive and negative numbers (continued)

As outcomes, Year 7 pupils should, for example:

Use positive and negative numbers in context.

For example, find:

- the final position of an object after moves forwards and backwards along a line;
- a total bank balance after money is paid in and taken out;
- the total marks in a test of 10 questions, with +2 marks for a correct answer and -1 mark for an incorrect answer;
- the total of scores above and below par in a round of golf;
- the mean of a set of temperatures above and below zero...

Know how to, for example:

- find the distance between two floors using a lift, including above and below ground level;
- calculate game scores which include positive and negative points;
- identify measurements above and below sea-level, using contour lines on maps;
- interpret world weather charts to find differences in temperatures around the globe;
- identify the level of accuracy in measurements, e.g. $20\text{ cm} \pm 0.5\text{cm}$...

Link to work in other subjects.

As outcomes, Year 8 pupils should, for example:

Multiply and divide positive and negative numbers.

Link known multiplication tables to negative number multiplication tables. For example:

- $-2 \times 1 = -2$, $-2 \times 2 = -4$, $-2 \times 3 = -6$
and so on ...
- Write tables, continuing the pattern:

$2 \times 2 = 4$	$2 \times -2 = -4$
$1 \times 2 = 2$	$1 \times -2 = -2$
$0 \times 2 = 0$	$0 \times -2 = 0$
$-1 \times 2 = -2$	$-1 \times -2 = 2$
$-2 \times 2 = -4$	$-2 \times -2 = 4$
$-3 \times 2 = -6$	$-3 \times -2 = 6$

Complete a multiplication table. Shade positive and negative numbers, and zero, using different colours.

×	-3	-2	-1	0	1	2	3
3	-9	-6	-3	0	3	6	9
2	-6	-4	-2	0	2	4	6
1	-3	-2	-1	0	1	2	3
0	0	0	0	0	0	0	0
-1	3	2	1	0	-1	-2	-3
-2	6	4	2	0	-2	-4	-6
-3	9	6	3	0	-3	-6	-9

Look for patterns.

Recognise that division by a negative number is the inverse of multiplication by a negative number. Use this, and the negative number multiplication tables, to show, for example, that $-4 \div -2 = 2$, and relate this to the question 'How many -2s in -4?'

For a fact such as $-3 \times 2 = -6$, write three other facts, i.e. $2 \times -3 = -6$, $-6 \div 2 = -3$, $-6 \div -3 = 2$.

Answer questions such as:

- How many negative twos make negative four? (Two.)
- The answer to a question was -24. What was the question?

Use the sign change key on a **calculator** to work out:

48×-53	-74×3	$9.02 \div -22$
68×-49	-8×-73.7	$-6450 \div -15$

Solve puzzles such as:

- Complete this multiplication grid. Find two ways to do it.

×	4	-9	
	-8	18	
-3	-12		
	35		-14
			12

Extend to the distributive law. For example:

$$-1 \times (3 + 4) = -1 \times 7 = -7$$

$$-1 \times (3 + 4) = (-1 \times 3) + (-1 \times 4) = -3 + -4 = -7$$

[Link to substituting positive and negative numbers in expressions and formulae \(page 138-41\).](#)

As outcomes, Year 9 pupils should, for example: