

## Number operations and the relationships between them

### As outcomes, Year 8 pupils should, for example:

Use vocabulary from previous year and extend to: associative, distributive... partition...

**Understand the operations of addition, subtraction, multiplication and division as they apply to positive and negative numbers.**

**Link to integers (pages 48–51).**

**Understand the operations of addition and subtraction as they apply to fractions.**

**Link to fractions (pages 66–9).**

Understand that multiplying does not always make a number larger and that division does not always make a number smaller.

Recognise that:

- $9.1 \div 0.1$  can be interpreted as 'How many 0.1s (or tenths) in 9.1?'
- $9.1 \div 0.01$  can be interpreted as 'How many 0.01s (or hundredths) in 9.1?'

**Link to multiplying and dividing by 0.1 and 0.01 (pages 38–9).**

### As outcomes, Year 9 pupils should, for example:

Use vocabulary from previous years and extend to: reciprocal...

**Understand the effect of multiplying and dividing by numbers between 0 and 1.**

**Understand the operations of multiplication and division as they apply to fractions.**

**Link to fractions (pages 66–9).**

Understand that multiplying a positive number by a number between 0 and 1 makes it smaller and that dividing it by a number between 0 and 1 makes it larger. Use this to check calculations and to estimate the order of magnitude of an answer.

Generalise inequalities such as:

if  $p > 1$  and  $q > 1$ , then  $pq > p$ .

Know the effect on inequalities of multiplying and dividing each side by the same negative number.

Know and understand that division by zero has no meaning. For example, explore dividing a number by successively smaller positive decimals approaching zero, then negative decimals approaching zero.

**Link to multiplying and dividing by any integer power of 10 (pages 38–9), checking results (pages 110–11), and inequalities (pages 130–1).**

**Recognise and use reciprocals.** Know that:

- A number multiplied by its reciprocal equals 1, e.g. the reciprocal of 4 is  $\frac{1}{4}$  and of 7 is  $\frac{1}{7}$ .
- The reciprocal of a reciprocal gives the original number.

Find the reciprocal of a number and use the reciprocal key on a **calculator**, recognising that the answer may be inexact. For example:

- What is the reciprocal of:  
a. 0.3                      b. 27                      c. 0.0027?
- A \* stands in the place of any missing digit.  
The reciprocal of a whole number between 0 and 100 is  $0.02 * 26$ , to four significant figures. Find the number, and the missing digit.
- The reciprocal of a whole number between 100 and 1000 is  $0.0012 * * 5$ , to five significant figures. Find the number, and the missing digits.

**Link to reciprocal function sequences (pages 108–9).**