# GCSE (9-1) Maths Revision Poster

## New Content to Foundation Tier Only #1 of 2

**Pearson Revise**

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## Standard form (N9)

### Writing numbers in standard form

You can count the number of places that the decimal point has to move to make a number that is greater than or equal to 1, and less than 10.

**3 jumps**
$$7\,9\,0\,0 = 7.9 \times 10^3$$

7900 > 10 so the power is positive

**4 jumps**
$$0.0\,0\,0\,3\,5 = 3.5 \times 10^{-4}$$

0.00035 < 1 so the power is negative

Numbers in **standard form** have two parts:

This part is a number $\geq 1$ and less than **10**.

This part is a power of **10**.

$$7.3 \times 10^{-6}$$

To covert a number in standard form to an ordinary number, you can count the number of places the decimal point has to move.

$$7.9 \times 10^3 = 7900$$
If the power is **positive** then the decimal point moves to the right that number of places

$$7.9 \times 10^{-3} = 0.079$$
If the power is **negative** then the decimal point moves to the right that number of places
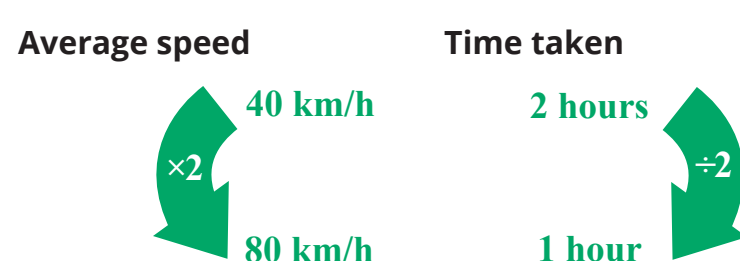
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## Direct and Inverse proportion (numeric and algebraic) (R10)

If two quantities are in **direct** proportion then, for example, one doubles so will the other.

| Number of tickets bought | Total cost |
|---|---|
| 3 | £135 |
| ×2 | ×2 |
| 6 | £270 |
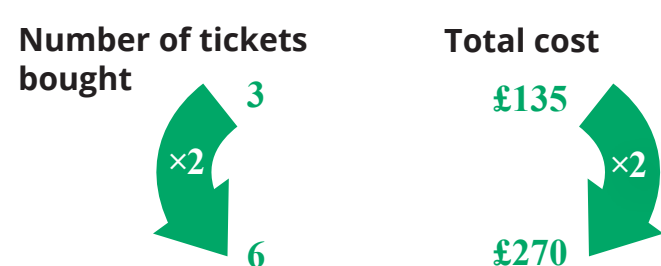
If two quantities are in **inverse** proportion then, for example, when one doubles the other one will halve.

| Average speed | Time taken |
|---|---|
| 40 km/h | 2 hours |
| ×2 | ÷2 |
| 80 km/h | 1 hour |

### Example question

The number of days, d, that it will take to build a house is given by d = 720/n where n is the number of workers used each day. How many days will it take 8 workers to build the house?

✔ $720 \div 8 = 90$

What if 10 workers were used?

✔ $720 \div 10 = 72$

As the number of workers increases, then number of days decreases.

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## Solve simultaneous equations (A19)

The most common method for solving simultaneous equations is the **elimination method**.

- Multiply one or both equations to make coefficients of one variable equal
- Add or subtract the equations to eliminate one of the variables
- Solve, then substitute back into one equation to find the value of the other variable

$$3x + y = 20$$
$$x + 4y = 14$$

× by **4** to make **4y** in each equation

$$12x + 4y = 80$$
$$-\ \ x + 4y = 14$$

Subtract the equations and solve

$$11x = 66$$
$$x = 6$$

$$3 \times 6 + y = 20$$
$$18 + y = 20$$
$$y = 2$$

Substitute back into one of the equations

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## Solve quadratic equations by factorisation (A18)

To solve the equation $x^2 + 6x + 5 = 0$ we need to follow these steps.

**1** Factorise the left-hand side of the equation:
$(x + 5)(x + 1) = 0$

**2** Set each factor equal to zero:
$(x + 5) = 0$
$(x + 1) = 0$

**3** Solve the two linear equations to find the two solutions:
$x + 5 = 0 \quad x + 1 = 0$
$x = -5 \quad \text{or} \quad x = -1$

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## Compound interest and reverse percentages (R16)

In **Compound Interest**, interest is added to the account at the end of each year so a new calculation must be worked out.

The table shows how an investment of **£40 000** grows with a compound interest rate of **3%** per annum (per year).

| End of year | Balance |
|---|---|
| 1 | 40 000 × 1.03 = 41 200 |
| 2 | 41 200 × 1.03 = 42 346 |
| 3 | 42 346 × 1.03 = 43 709.08 |

The multiplier for a **3%** increase is **1.03**

The normal price of a coat is £45
The price is reduced by 15% in a sale.
The multiplier for a 15% decrease is 0.85
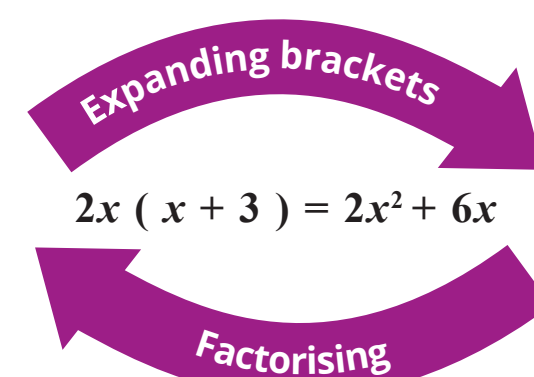
× 0.85

£45

÷ 0.85

15% OFF = £38.25
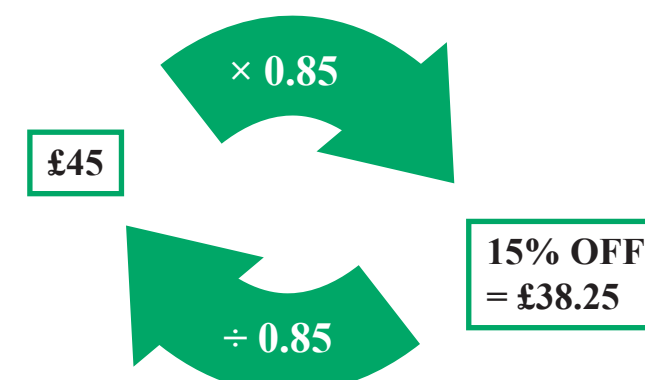
If you are given a final amount, divide by the multiplier to find the original amount.

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## Factorise quadratic expressions (A4)

To factorise an expression in the form $x^2 + bx + c$ you need to find two numbers that **add up to make** $b$, and that **multiply to make** $c$.

Example: $x^2 + 5x + 6$

**2** and **3 add** to make **5** and **multiply** to make **6**

So $x^2 + 5x + 6 = (x + 2)(x + 3)$

Check by expanding

**Expanding brackets**
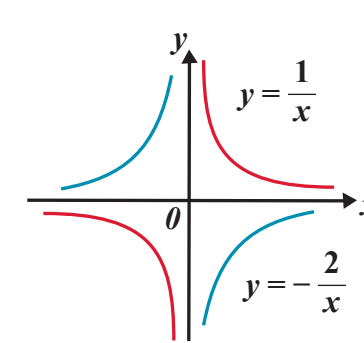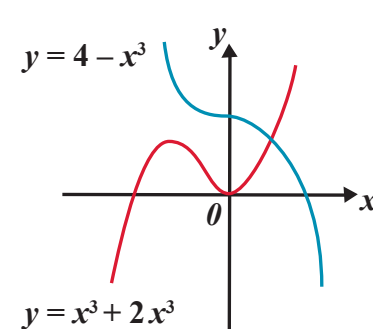$$2x(x + 3) = 2x^2 + 6x$$
**Factorising**

**Expanding**
$$(x + 2)(x + 3) = x^2 + 3x + 2x + 6$$
$$= x^2 + 5x + 6$$

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## Plot cubic and reciprocal graphs, recognise quadratic and cubic graphs (A12)

To plot cubic and reciprocal graphs **substitute** values of $x$ to find values of $y$ then plotting points to draw the graph.

Graphs that contain an $x^3$ term and no higher are **cubic graphs**.

$y = 4 - x^3$
$y = x^3 + 2x^3$

$y = \dfrac{1}{x}$
$y = -\dfrac{2}{x}$

Graphs of the form $y = \dfrac{k}{x}$ are **reciprocal graphs**.

The points where $y = x^2 - 6x$ crosses the $x$-axis are the solutions to the quadratic equation $x^2 - 6x = 0$. The $x$-coordinate of the turning point is halfway between these points.

$y = x^2 - 6x$
Line of symmetry
Turning Point $(3, -9)$

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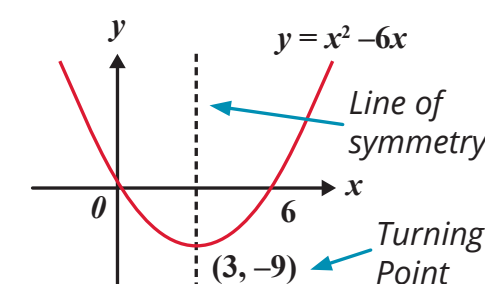
## Trigonometric ratios in right-angled triangles (G20)

For right-angled triangles only:

✔ Use **SOH CAH TOA** to remember the rules for sin, cos and tan:

**1** $\sin x = \dfrac{\text{opp}}{\text{hyp}}$

**2** $\cos x = \dfrac{\text{adj}}{\text{hyp}}$

**3** $\tan x = \dfrac{\text{opp}}{\text{adj}}$

hypotenuse
opposite
adjacent

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**N** Number   **A** Algebra   **R** Ratio   **G** Geometry