GCSE (9-1) Maths Revision Poster

Pearson Revise

New Content to Higher Tier Only #1 of 2

Expanding the products of more than two binomials (A4)

Here is an example using **three** binomials:

$(x + 1)(x + 3)(x - 4)$

Expand the first 2 brackets to give

$x^2 + 3x + 1x + 3$ which can be simplified to $x^2 + 4x + 3$

then multiply this expression by the third bracket

$(x^2 + 4x + 3)(x - 4)$

then expand these two brackets to give

$x^3 - 4x^2 + 4x^2 - 16x + 3x - 12$

$= x^3 - 13x - 12$

Completing the square (A11)

Find the turning point of the graph with equation

$y = x^2 + 6x + 4$

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

$y = (x + 3)^2 - 5$

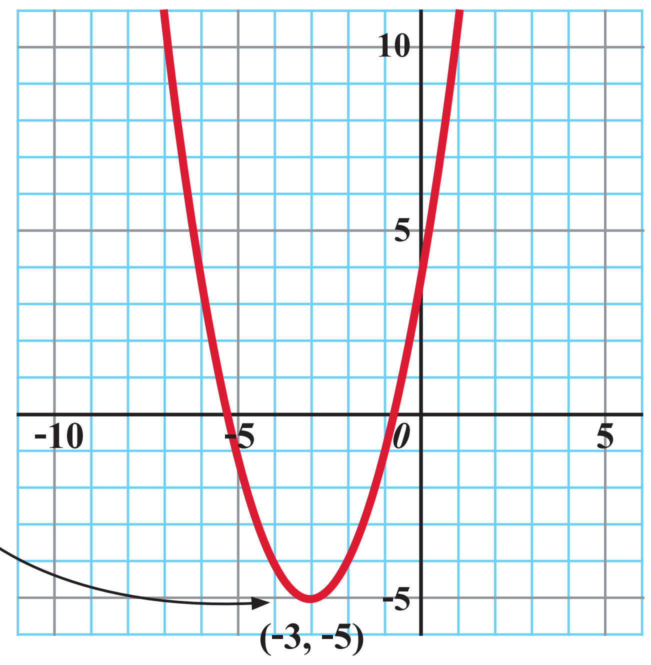
Here we are **completing the square**. The 3 comes from $6 \div 2$

The smallest value of y will occur when

$(x + 3) = 0$ ie when $x = -3$

when $x = -3, y = -5$

Coordinates of the turning point are (-3, -5)



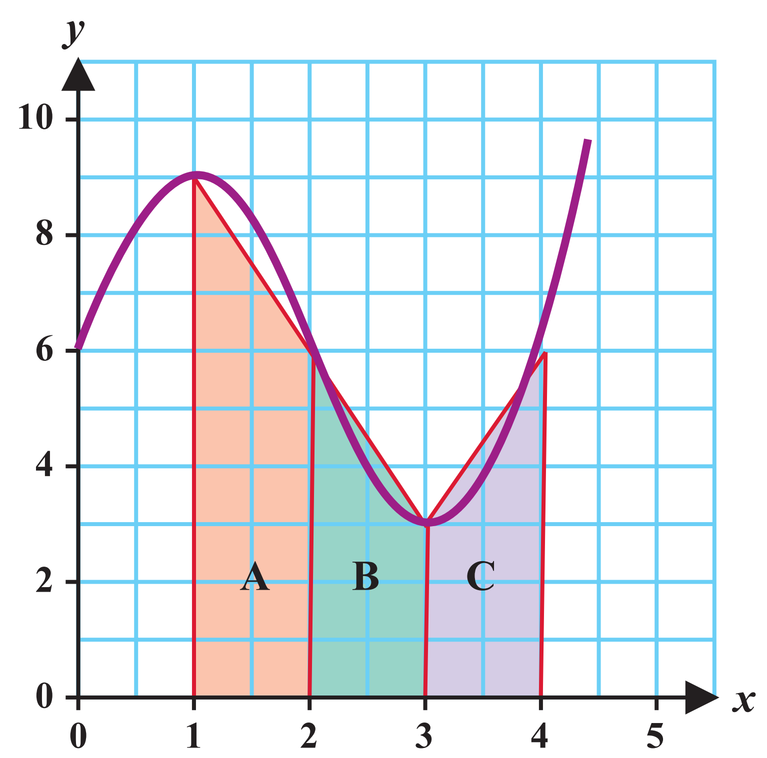
Calculate or estimate gradients of graphs and areas under graphs (A15)

You can estimate the area under a curve by drawing trapeziums.

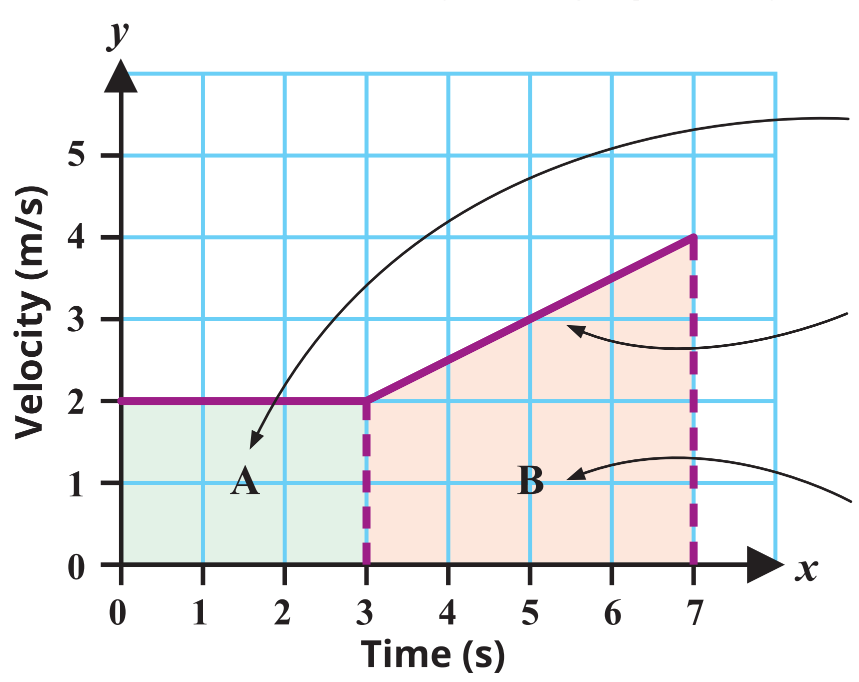
The graph shows the curve with the equation,

$y = x^3 - 6x^2 + 8x + 6$

The area under the graph from $x = 1$ to $x = 4$ can be found by working out and adding up the area of the three trapeziums.



The area under a **velocity-time graph** tells you the **distance travelled**.



The area A shows that a distance of $3 \times 2 = 6$m was travelled at a constant velocity of 2m/s for 3s

The gradient of the sloping line shows the acceleration = 0.5 m/s²

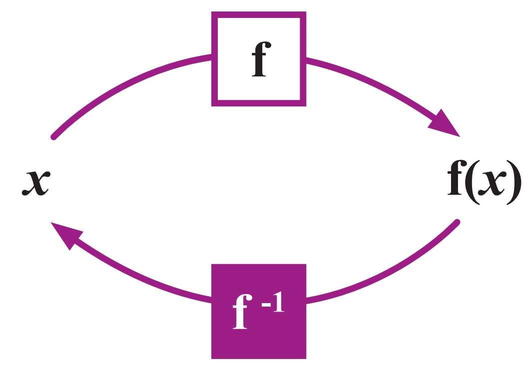
The are B shows that a distance of 1/2(2+4) x 4 = 12m was travelled while accelerating from 2 m/s to 4/ms in 4s

Inverse functions and composite functions (A7)

A function links an input value to an output value.

The inverse of a function is a function that links the output value back to the input value.

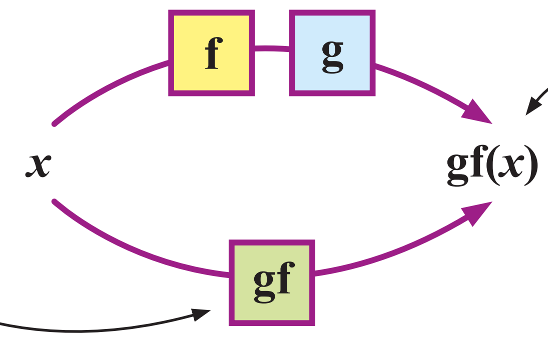
- ✔ The function that is the reverse of another function is called its **inverse**.



Composite functions

If you apply two functions one after the other, you can write a **single function** which has the same effect as the two combined functions. This is called a **composite function**.

The function gf has the same effect as applying function f **then** applying function g.



The **order** is important. The function being applied **first** goes **closest** to the x.

Recognising simple geometric progressions (including surds) and other sequences. (A24)

A **geometric progression** is a sequence of number where each term is found by **multiplying the previous term** by a fixed number

This geometric progression shows the previous term being multiplied by 4 each time

2, 8, 32, 128 ($\times 4$, $\times 4$, $\times 4$)

A geometrical progression can also involve surds

3, $3\sqrt{3}$, 9, $9\sqrt{3}$, 27 ($\times\sqrt{3}$, $\times\sqrt{3}$, $\times\sqrt{3}$, $\times\sqrt{3}$)

Find approximate solutions to equations using iteration (A20)

You can solve equations like $x^3 - 5x + 3 = 0$ by first rearranging them into a different form and then using an iteration formula to find an approximation for a solution.

$x^3 - 5x + 3 = 0$ can be rearranged to give $x = \sqrt[3]{5x - 3}$

the iteration formula is therefore $x_{n+1} = \sqrt[3]{5x_n - 3}$

start with $x_0 = -2$

$x_1 = \sqrt[3]{5 \times -2 - 3} = -2.3513\ldots$

$x_2 = \sqrt[3]{5 \times x_1 - 3} = -2.4528\ldots$

$x_3 = \sqrt[3]{5 \times x_2 - 3} = -2.4805$

$x_4 = \sqrt[3]{5 \times x_3 - 3} = -2.48810\ldots$

Therefore, one solution of $x^3 - 5x + 3 = 0$ is $x = -2.5$ correct to 1 decimal place

A Algebra