

Helping Your Child with Algebra: Graphs & Functions

Algebra · Year 7 to Year 10 · Australian Curriculum Mathematics

A **graph** is a picture of a mathematical relationship. Instead of just working with numbers, your child learns to visualise patterns — straight lines, curves, and parabolas. A **function** is a rule that connects every input to exactly one output. Graphs of functions appear everywhere: tracking distance over time, modelling temperature, describing how a ball rises and falls, and showing how money grows.

Year	What your child learns	What this looks like at home
Year 7	Plotting coordinates and recognising linear relationships coordinate — a pair of numbers (x, y) that locates a point on a grid: (3, 5) means 3 across, 5 up linear relationship — a relationship that makes a straight line when graphed Your child plots points on a Cartesian (number) plane and: Identifies relationships from tables of values Recognises whether a pattern makes a straight line Links a table of values to its equation: $y = 2x + 1$ x: 0 1 2 3 → y: 1 3 5 7 The rule: multiply x by 2 and add 1	'Plot these points: (1,3), (2,5), (3,7). Do they make a straight line?' 'If $y = 3x - 1$, what is y when $x = 4$?' ($y = 3 \times 4 - 1 = 11$) Distance vs time: 'If you walk 5 km/h, plot your distance at each hour on a graph.'
Year 8	Gradient, y-intercept and the equation $y = mx + c$ gradient — how steep a line is; the rate of change: gradient = rise ÷ run (how much y changes for each 1 unit of x) y-intercept — where the line crosses the y-axis (when $x = 0$) $y = mx + c$ — the standard form for a straight line: m = gradient c = y-intercept e.g. $y = 3x + 2$: gradient = 3, y-intercept = 2 Your child graphs lines from their equations and writes equations from graphs. They also recognise parallel lines (same gradient) and perpendicular lines (gradients multiply to -1).	'Look at this graph. Where does the line cross the y-axis?' (That is the y-intercept, c) 'For every 1 across, how much does the line go up or down?' (That is the gradient, m) 'What does a negative gradient look like on the graph?' (Line goes downhill left to right)
Year 9	Parabolas and non-linear graphs parabola — the U-shaped curve made by a quadratic function: $y = x^2$ vertex — the turning point (top or bottom) of a parabola x-intercepts — where the curve crosses the x-axis (these are the solutions to the equation $y = 0$) Your child graphs $y = ax^2 + bx + c$ and explores how: Changing a makes it wider or narrower, or flips it upside down Changing c moves it up or down They also recognise circles, exponentials, and hyperbolas on graphs. They use graphs to solve equations — where two graphs meet = the solution.	'What shape is the graph of $y = x^2$?' (A parabola — U-shape) 'If the parabola opens downward, what does that mean about a in $y = ax^2$?' (a is negative) 'Where does $y = x^2$ and $y = 4$ intersect?' ($x^2 = 4 \rightarrow x = 2$ or $x = -2$) Use a free graphing tool like Desmos.com to explore different equations together.
Year 10	Functions, transformations and modelling function — a rule where every input (x) gives exactly one output (y): $f(x) = 2x + 3$ means 'the function of x' transformation — shifting, flipping or stretching a graph: $y = f(x) + k$ shifts up by k units $y = f(x - h)$ shifts right by h units $y = -f(x)$ flips the graph upside down Your child selects appropriate functions to model real-world data: Linear: $y = mx + c$ (constant rate of change — salary over time) Quadratic: $y = ax^2$ (ball thrown in the air) Exponential: $y = a^x$ (population growth, compound interest)	'What does $f(3) = 7$ mean?' (When x is 3, the output is 7) 'If $y = x^2$ is moved up 4, what is the new equation?' ($y = x^2 + 4$) 'Which type of graph models a car slowing down? A rocket taking off? Bacteria growing?'

★ Types of graphs — what they look like and when we see them

Graph type	Equation example	What it models
Linear (straight line)	$y = 2x + 3$	Constant speed, wages, temperature change at a steady rate
Quadratic (parabola)	$y = x^2 - 4$	Ball thrown in air, arch of a bridge, area of a square
Exponential (curve)	$y = 2^x$	Population growth, compound interest, bacteria doubling
Hyperbola	$y = 1/x$	Speed $\times$ time = constant; pricing (more items = lower unit cost)

Reading a straight-line graph ($y = mx + c$): m is the gradient (steepness) — how much y changes for every 1 unit of x . c is the y -intercept — where the line starts on the y -axis. A positive m goes up left-to-right. A negative m goes down.

Try at home: Go to [desmos.com/calculator](https://www.desmos.com/calculator) — type in $y = 2x + 1$ and see the graph. Then change the 2 to 5, or -1 , and watch what happens to the slope. This is the best way to build graph intuition!

Helping at Home — Algebra: Graphs & Functions

Worked examples and questions to ask · Year 7 to Year 10

How it works — worked examples

Year 7–8 — Graphing $y = 2x + 1$

Complete the table of values for $y = 2x + 1$, then describe the graph.

x =	0	1	2	3	4
y =	1	3	5	7	9
How?	$2(0)+1$	$2(1)+1$	$2(2)+1$	$2(3)+1$	$2(4)+1$

Plot these points. They form a straight line. **Gradient = 2** (goes up 2 for every 1 across). **y-intercept = 1** (crosses y-axis at 1).

Year 8 — Finding the equation of a line

A line passes through (0, 3) and (2, 7). Find its equation.

Gradient	rise ÷ run = $(7-3) \div (2-0) = 4 \div 2 = 2$
y-intercept	(0, 3) → the line crosses y-axis at 3, so c = 3
Equation	$y = 2x + 3$ (gradient = 2, y-intercept = 3)

Year 9 — Key features of a parabola $y = x^2 - 4$

Identify the vertex and x-intercepts of $y = x^2 - 4$.

Vertex	The turning point. Here: $x = 0 \rightarrow y = 0^2 - 4 = -4$. Vertex = (0, -4)
x-intercepts	Set $y = 0$: $x^2 - 4 = 0 \rightarrow x^2 = 4 \rightarrow x = 2$ or $x = -2$
y-intercept	Set $x = 0$: $y = 0^2 - 4 = -4$. y-intercept = -4
Shape	U-shaped parabola opening upward, lowest point at (0, -4)

Questions to ask your child

You don't need to solve these. Ask them and let your child explain their thinking!

7 Year 7

- Plot the points (1,3), (2,5), (3,7). Do they form a straight line?
- What does the coordinate (4, 6) mean? How do you plot it?
- Complete the table for $y = 3x$: $x = 0, 1, 2, 3$. What do you notice?
- Is the relationship ' $y = 2x$ ' linear? How can you tell?

8 Year 8

- What is the gradient of $y = 4x - 1$?
- Where does $y = 3x + 5$ cross the y-axis?
- A line has gradient 2 and passes through (0, -3). What is its equation?
- If two lines are parallel, what do they have in common?

9 Year 9

- What shape is the graph of $y = x^2$? Where is the vertex?
- How does changing a in $y = ax^2$ affect the shape of the parabola?
- Where does $y = x^2 - 9$ cross the x-axis?
- Use desmos.com: graph $y = x^2$ and $y = 5$. Where do they meet?

10 Year 10

- What does $f(x) = 2x + 3$ mean? What is $f(5)$?
- If $y = (x - 2)^2$, how is it different from $y = x^2$?
- What type of graph would you use to model a population growing by 3% per year?
- Match each equation to its graph type: $y = 3x$, $y = x^2 + 1$, $y = 2^x$, $y = 1/x$.

Things to try at home

Year 7: Plot coordinates on grid paper: (1,2), (2,4), (3,6). Ask: 'Do these points make a line? What is the rule?'	Year 7: Distance-time graph: walk at the same pace for 3 minutes, record distance each minute, and plot the points.
Year 8: Visit desmos.com/calculator . Type $y = 2x + 1$. Change the 2 to other numbers. What happens to the line?	Year 8: Find a graph in the newspaper or online. Discuss: 'What does the slope tell us? Is it going up or down?'
Year 9: Use Desmos: graph $y = x^2$ and then $y = x^2 + 3$. What changed? Now try $y = (x-2)^2$.	Year 10: Look up a population growth graph online. Is it linear or exponential? How can you tell?

Key words to learn together

coordinate: a pair of numbers (x, y) that shows a point's position on a grid	x-axis: the horizontal line on a graph
y-axis: the vertical line on a graph	linear: straight line — a constant rate of change between x and y
gradient: steepness of a line — $\text{rise} \div \text{run}$; how much y changes per 1 unit of x	y-intercept: where the line crosses the y-axis — the value of y when $x = 0$
$y = mx + c$: equation of a straight line: m = gradient, c = y-intercept	parabola: U-shaped curve produced by a quadratic function like $y = x^2$
vertex: the turning point of a parabola — the highest or lowest point	x-intercepts: where the graph crosses the x-axis — these are the solutions
function: a rule where each input (x) has exactly one output (y): $f(x) = 2x + 1$	transformation: shifting, flipping, or stretching a graph: up, down, left, right, or reflected