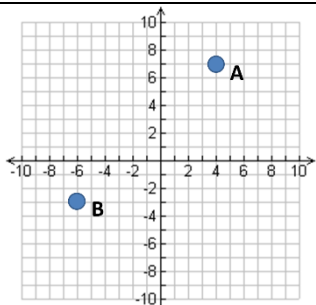
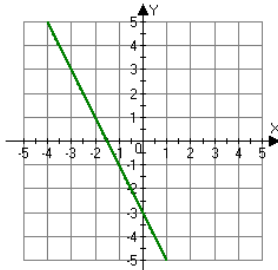
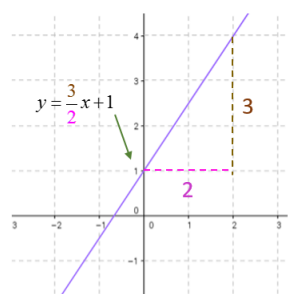
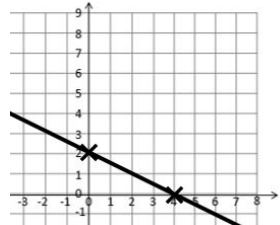
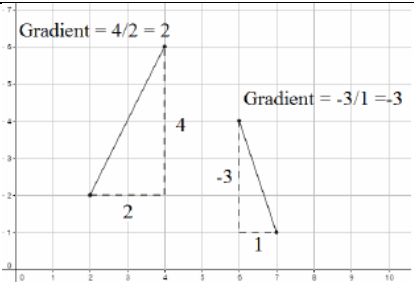
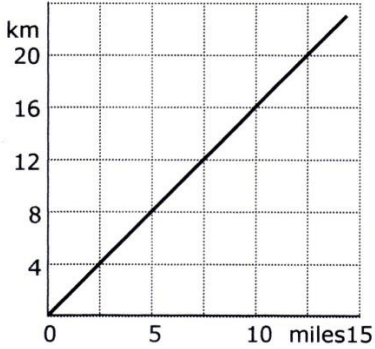


Topic: Coordinates and Graphs

Topic/Skill	Definition/Tips	Example																
Coordinates	Written in pairs . The first term is the x-coordinate (movement across). The second term is the y-coordinate (movement up or down)	 A: (4,7) B: (-6,-3)																
Midpoint of a Line	Method 1: add the x coordinates and divide by 2, add the y coordinates and divide by 2 Method 2: Sketch the line and find the values half way between the two x and two y values.	Find the midpoint between (2,1) and (6,9) $\frac{2+6}{2} = 4 \text{ and } \frac{1+9}{2} = 5$ So, the midpoint is (4,5)																
Linear Graph	Straight line graph. The general equation of a linear graph is $y = mx + c$ where m is the gradient and c is the y-intercept . The equation of a linear graph can contain an x-term , a y-term and a number .	Example:  Other examples: $x = y$ $y = 4$ $x = -2$ $y = 2x - 7$ $y + x = 10$ $2y - 4x = 12$																
Plotting Linear Graphs	Method 1: Table of Values Construct a table of values to calculate coordinates. Method 2: Gradient-Intercept Method (use when the equation is in the form $y = mx + c$) 1. Plots the y-intercept 2. Using the gradient, plot a second point. 3. Draw a line through the two points plotted. Method 3: Cover-Up Method (use when the equation is in the form $ax + by = c$) 1. Cover the x term and solve the resulting equation. Plot this on the $x - axis$. 2. Cover the y term and solve the resulting equation. Plot this on the $y - axis$. 3. Draw a line through the two points plotted.	<table border="1" data-bbox="978 1095 1434 1196"><tr><td>x</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y = x + 3</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr></table>   $2x + 4y = 8$	x	-3	-2	-1	0	1	2	3	y = x + 3	0	1	2	3	4	5	6
x	-3	-2	-1	0	1	2	3											
y = x + 3	0	1	2	3	4	5	6											

Gradient	The gradient of a line is how steep it is. Gradient = $\frac{\text{Change in } y}{\text{Change in } x} = \frac{\text{Rise}}{\text{Run}}$ The gradient can be positive (sloping upwards) or negative (sloping downwards)	
Finding the Equation of a Line <u>given a point and a gradient</u>	Substitute in the gradient (m) and point (x,y) in to the equation $y = mx + c$ and solve for c.	Find the equation of the line with gradient 4 passing through (2,7). $y = mx + c$ $7 = 4 \times 2 + c$ $c = -1$ $y = 4x - 1$
Finding the Equation of a Line <u>given two points</u>	Use the two points to calculate the gradient. Then repeat the method above using the gradient and either of the points.	Find the equation of the line passing through (6,11) and (2,3) $m = \frac{11 - 3}{6 - 2} = 2$ $y = mx + c$ $11 = 2 \times 6 + c$ $c = -1$ $y = 2x - 1$
Parallel Lines	If two lines are parallel, they will have the same gradient. The value of m will be the same for both lines.	Are the lines $y = 3x - 1$ and $2y - 6x + 10 = 0$ parallel? Answer: Rearrange the second equation in to the form $y = mx + c$ $2y - 6x + 10 = 0 \rightarrow y = 3x - 5$ Since the two gradients are equal (3), the lines are parallel.
Perpendicular Lines	If two lines are perpendicular, the product of their gradients will always equal -1. The gradient of one line will be the negative reciprocal of the gradient of the other line. You may need to rearrange equations of lines to compare gradients (they need to be in the form $y = mx + c$)	Find the equation of the line perpendicular to $y = 3x + 2$ which passes through (6,5) Answer: As they are perpendicular, the gradient of the new line will be $-\frac{1}{3}$ as this is the negative reciprocal of 3. $y = mx + c$ $5 = -\frac{1}{3} \times 6 + c$ $c = 7$

		$y = -\frac{1}{3}x + 7$ Or $3x + x - 7 = 0$
Quadratic Graph	A 'U-shaped' curve called a parabola. The equation is of the form $y = ax^2 + bx + c$, where a, b and c are numbers, $a \neq 0$. If $a < 0$, the parabola is upside down.	
Cubic Graph	The equation is of the form $y = ax^3 + k$, where k is an number. If $a > 0$, the curve is increasing. If $a < 0$, the curve is decreasing.	$a > 0$ $a < 0$
Real Life Graphs	Graphs that are supposed to model some real-life situation. The actual meaning of the values depends on the labels and units on each axis. The gradient might have a contextual meaning. The y-intercept might have a contextual meaning. The area under the graph might have a contextual meaning.	A graph showing the cost of hiring a ladder for various numbers of days. The gradient shows the cost per day. It costs £3/day to hire the ladder. The y-intercept shows the additional cost/deposit/fixed charge (something not linked to how long the ladder is hired for). The additional cost is £7.

Conversion Graph	A line graph to convert one unit to another. Can be used to convert units (eg. miles and kilometres) or currencies (\$ and £) Find the value you know on one axis, read up/across to the conversion line and read the equivalent value from the other axis.	Conversion graph miles ↔ kilometres  $8\text{ km} = 5\text{ miles}$
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Where else is the Graphs topic used: Data handling Ratio and proportion	Links to other subjects: Sciences (Physics, Biology and Chemistry) Humanities (Geography and History)
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