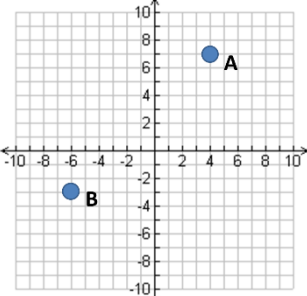
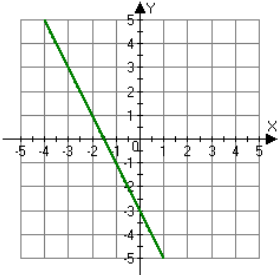
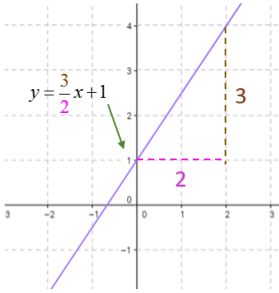
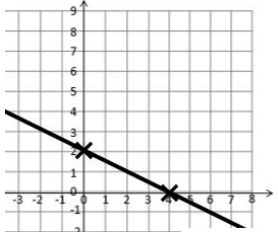
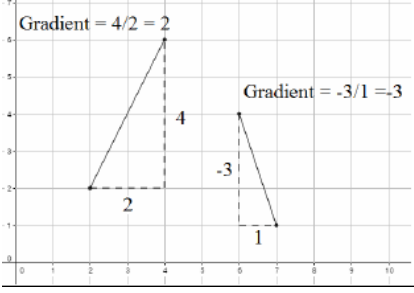


## Topic: Coordinates and Linear Graphs

Topic/Skill	Definition/Tips	Example																
1. Coordinates	Written in <b>pairs</b> . The <b>first</b> term is the <b>x-coordinate</b> (movement <b>across</b> ). The <b>second</b> term is the <b>y-coordinate</b> (movement <b>up or down</b> )	 <p style="text-align: right;">A: (4,7) B: (-6,-3)</p>																
2. Midpoint of a Line	<p>Method 1: <b>add the x coordinates and divide by 2, add the y coordinates and divide by 2</b></p> <p>Method 2: Sketch the line and find the values half way between the two x and two y values.</p>	<p>Find the midpoint between (2,1) and (6,9)</p> $\frac{2+6}{2} = 4 \text{ and } \frac{1+9}{2} = 5$ <p>So, the midpoint is (4,5)</p>																
3. Linear Graph	<p><b>Straight line</b> graph.</p> <p>The general equation of a linear graph is <math>y = mx + c</math></p> <p>where <b>m</b> is the <b>gradient</b> and <b>c</b> is the <b>y-intercept</b>.</p> <p>The <b>equation</b> of a linear graph can contain an <b>x-term</b>, a <b>y-term</b> and a <b>number</b>.</p>	<p>Example:</p>  <p style="text-align: right;">Other examples:  <math>x = y</math>  <math>y = 4</math>  <math>x = -2</math>  <math>y = 2x - 7</math>  <math>y + x = 10</math>  <math>2y - 4x = 12</math></p>																
4. Plotting Linear Graphs	<p>Method 1: <b>Table of Values</b> Construct a table of values to calculate coordinates.</p> <p>Method 2: <b>Gradient-Intercept Method</b> (use when the equation is in the form <math>y = mx + c</math>)</p> <ol style="list-style-type: none"> <li>Plots the y-intercept</li> <li>Using the gradient, plot a second point.</li> <li>Draw a line through the two points plotted.</li> </ol> <p>Method 3: <b>Cover-Up Method</b> (use when the equation is in the form <math>ax + by = c</math>)</p> <ol style="list-style-type: none"> <li>Cover the x term and solve the resulting equation. Plot this on the x – axis.</li> <li>Cover the y term and solve the resulting equation. Plot this on the y – axis.</li> <li>Draw a line through the two points plotted.</li> </ol>	<table border="1" style="margin-bottom: 10px;"> <tr> <td style="background-color: #FFD700;"><b>x</b></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 style="background-color: #FFD700;"><b>y = x + 3</b></td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> </table>   <p style="text-align: right;"><math>2x + 4y = 8</math></p>	<b>x</b>	-3	-2	-1	0	1	2	3	<b>y = x + 3</b>	0	1	2	3	4	5	6
<b>x</b>	-3	-2	-1	0	1	2	3											
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5. Gradient	<p>The gradient of a line is how <b>steep</b> it is.</p> <p><b>Gradient =</b></p> $\frac{\text{Change in } y}{\text{Change in } x} = \frac{\text{Rise}}{\text{Run}}$ <p>The gradient can be positive (sloping upwards) or negative (sloping downwards)</p>	
6. Finding the Equation of a Line <u>given a point and a gradient</u>	<p><b>Substitute</b> in the <b>gradient (m)</b> and <b>point (x,y)</b> in to the equation <math>y = mx + c</math> and <b>solve for c.</b></p>	<p>Find the equation of the line with gradient 4 passing through (2,7).</p> $y = mx + c$ $7 = 4 \times 2 + c$ $c = -1$ $y = 4x - 1$
7. Finding the Equation of a Line <u>given two points</u>	<p>Use the two points to <b>calculate the gradient</b>. Then <b>repeat the method above</b> using the gradient and either of the points.</p>	<p>Find the equation of the line passing through (6,11) and (2,3)</p> $m = \frac{11 - 3}{6 - 2} = 2$ $y = mx + c$ $11 = 2 \times 6 + c$ $c = -1$ $y = 2x - 1$
8. Parallel Lines	<p>If two lines are <b>parallel</b>, they will have the <b>same gradient</b>. The value of m will be the same for both lines.</p>	<p>Are the lines <math>y = 3x - 1</math> and <math>2y - 6x + 10 = 0</math> parallel?</p> <p>Answer: Rearrange the second equation in to the form <math>y = mx + c</math></p> $2y - 6x + 10 = 0 \rightarrow y = 3x - 5$ <p>Since the two gradients are equal (3), the lines are parallel.</p>
9. Perpendicular Lines	<p>If two lines are <b>perpendicular</b>, the <b>product</b> of their <b>gradients</b> will always equal <b>-1</b>. The gradient of one line will be the <b>negative reciprocal</b> of the gradient of the other line.</p> <p>You may need to rearrange equations of lines to compare gradients (they need to be in the form <math>y = mx + c</math>)</p>	<p>Find the equation of the line perpendicular to <math>y = 3x + 2</math> which passes through (6,5)</p> <p>Answer: As they are perpendicular, the gradient of the new line will be <math>-\frac{1}{3}</math> as this is the negative reciprocal of 3.</p> $y = mx + c$

$$5 = -\frac{1}{3} \times 6 + c$$
$$c = 7$$

$$y = -\frac{1}{3}x + 7$$

Or

$$3x + x - 7 = 0$$