

Guidance for tutors



Outcome	AG4	Student can consistently:	Find the equation of a straight line, including finding the gradient.
How the topic is examined	<ul style="list-style-type: none"> <input type="checkbox"/> Examined through test paper questions. <input type="checkbox"/> Questions are equally likely to appear on calculator or non-calculator papers. <input type="checkbox"/> Questions will ask students to “Find the gradient or equation ...” of a given line drawn on a grid. 		
Prior knowledge	<ul style="list-style-type: none"> <input type="checkbox"/> Students should be confident with: <ul style="list-style-type: none"> ○ Substituting into an expression (AEx5) ○ Rearranging formulae (AEx8) <input type="checkbox"/> In addition questions involving this topic can have links to: <ul style="list-style-type: none"> ○ Linear graphs (AG1) 		

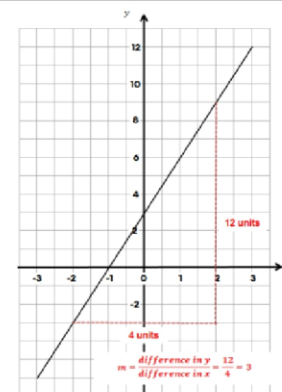
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Suggested tuition approaches

- Every straight line graph can be written in the form $y = mx + c$ (e.g. $y = 3x - 1$).
- m is the gradient (steepness) of the straight line and c is the y -intercept (the point on the y -axis where the straight line crosses).
- Therefore when students are asked to find the equation of a straight line students need to find the gradient and the point where the line crosses the x -axis.

Finding the gradient

- The gradient of a straight line is calculated by $m = \frac{\text{difference in } y}{\text{difference in } x}$. ○ Some teachers call this
- The most common method is for students to use the triangle method. This is where you draw a triangle underneath the line and work out how many x units wide and how many y units high the triangle is.
- They then divide these numbers to work out the gradient.



- If a graph slopes downwards from left to right then it has negative gradient. If the graph slopes upwards from left to right then the graph has positive gradient.
- Once you have worked out the gradient of the line, then you then need to work out where the line crosses the x -axis. In the above example, the line crosses the x -axis at 3. This is the value of c . The equation of the line above is therefore $y = 3x + 3$ (because the gradient is 3 and the y -intercept is also 3).
- If students are given two points (and no graph) and asked to find the gradient or equation of the line then students can either:
 - Draw the line of a grid and use the method above.
 - Use the co-ordinate geometry formulae below. If you are given two pairs of co-ordinates we refer to them as (x_1, y_1) and (x_2, y_2) .

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	<p>The following link has some examples http://www.mathsrevision.net/advanced-level-maths-revision/pure-maths/geometry/coordinate-geometry of how to use these formulae.</p> <ul style="list-style-type: none"> □ If two graphs are parallel then they have the same gradient. Questions sometimes ask students to find the equation of a line that is parallel to a particular line and passes through a particular point. (e.g. Find the equation of a line that is parallel to $y = 4x - 3$ that passes through (0, 5). The equation of this line would be $y = 4x + 5$)
Common errors and misconceptions	<ul style="list-style-type: none"> □ It might not be the case that one unit is equal to one square on a graph. Remember you need to use the values on the axis to calculate the number of units that the triangle is. □ Students don't recognise when a graph has a negative gradient. □ When calculating the gradient students divide y by x instead of x by y □ When using the formulae above, students try and substitute values for y and x in the equation of a straight line formula. Remember these stay as y and x so you end up an equation of a line.
Suggested resources	<ul style="list-style-type: none"> □ Questions <ul style="list-style-type: none"> ○ http://www.cimt.org.uk/projects/mepres/allgcse/bkc13.pdf (pp 25 - 30) ○ https://corbettmaths.files.wordpress.com/2013/02/gradient-pdf.pdf ○ https://corbettmaths.files.wordpress.com/2013/02/equation-of-a-line-pdf.pdf □ Video tutorials <ul style="list-style-type: none"> ○ http://corbettmaths.com/2013/05/15/gradient-of-a-line/ ○ http://corbettmaths.com/2013/05/29/finding-the-equation-of-a-straight-line/

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- Past GCSE Questions

- https://keshgcsemaths.files.wordpress.com/2013/11/66_straight-line.pdf