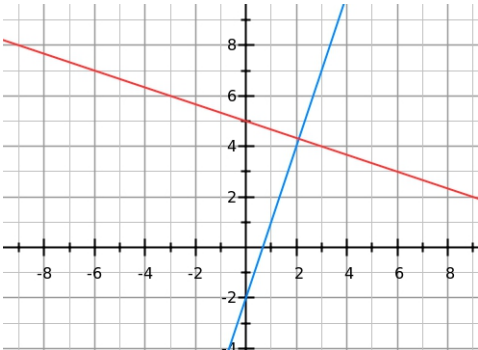


Guidance for tutors

Outcome	AG7	Student can consistently:	Find the equation of a perpendicular line.
How the topic is examined	<ul style="list-style-type: none"> Examinated through test paper questions. Questions are equally likely to appear on calculator or non-calculator papers. In the past questions at GCSE have been rare, although under the new more challenging GCSE, it is expected that the number of questions on this topic might increase. There are two questions that students could be asked <ul style="list-style-type: none"> Find the gradient of a line that is perpendicular to a given line. Find the equation of a line that is perpendicular to a given line. Lines may be drawn on a grid or just given as an equation. 		
Prior knowledge	<ul style="list-style-type: none"> Students should be confident with: <ul style="list-style-type: none"> Simplifying expressions (AEx2) Substituting into expressions (AEx5) Solving basic equations (AEq1) Drawing straight line graphs (AG1) Finding the gradient and equation of a straight line (AG4) Rearranging formulae (AEx8) 		
Suggested tuition approaches	<ul style="list-style-type: none"> Students could either be presented with a graph drawn on a grid or simply an equation (e.g. $y = 5 - 3x$). If you are given an equation that is not in the form $y = mx + c$ the first step would be to rearrange it so that it is in this form. The key fact that students need to know about the gradients of perpendicular lines is that $m_1 \times m_2 = -1$, where m_1 and m_2 are the gradients of the two lines. Some teachers explain that the gradient of a perpendicular line is the negative reciprocal of the original line. <p>Find the gradient of the line that is perpendicular to $y = 3 - 2x$</p> <ul style="list-style-type: none"> First identify the gradient of the original line. This is in the form $y = mx + c$ and so we don't need to rearrange. The letter m represents the gradient, therefore the gradient is 3 (call this m_1) The gradient of the perpendicular line m_2 is $3 \times m_2 = -1$, which can be arranged or solved so that $m_2 = -\frac{1}{3}$ 		

Guidance for tutors

	<ul style="list-style-type: none"> ○ This is the gradient of the perpendicular line. □ If instead you had been given a graph and asked to work out the gradient of a line perpendicular, you would <ul style="list-style-type: none"> ○ Find the gradient (or equation) of the line drawn (AG4) ○ Follow the steps above to find the gradient of the line perpendicular. □ If you had been asked to find an equation of a line that is perpendicular to another line and passes through a particular point see AG4. □ An example of the line $y = 3x - 2$ and a line that is perpendicular that passes through the point (0, 5). The equation of the line is $y = -\frac{1}{3}x + 5$. 
Common errors and misconceptions	<ul style="list-style-type: none"> □ The most common mistakes students tend to make <ul style="list-style-type: none"> ○ Identify the wrong gradient, particularly if they need to rearrange to the form $y = mx + c$ ○ Forgetting that $m_1 \times m_2 = -1$, they sometimes think it equals 1.
Suggested resources	<ul style="list-style-type: none"> □ Questions <ul style="list-style-type: none"> ○ http://www.cimt.org.uk/projects/mepres/allgcse/add_13.8b.pdf ○ http://www.resourceaholic.com/2014/07/linear-graphs.html ○ https://corbettmaths.files.wordpress.com/2013/02/parallel-perpendicular-linear-graphs-pdf.pdf □ Video tutorial <ul style="list-style-type: none"> ○ http://corbettmaths.com/2013/06/06/perpendicular-lines-2/