Perpendicular lines worksheet pdf

Level 6-7 Parallel lines have the same gradient. It will be the same \textcolor{green}{m} in the equation of the line y=\textcolor{green}{m}x+c For the example displayed: y=\textcolor{green}{3}x + 3 y=\textcolor{green}{3}x y=\textcolor{green}{3}x-5 All three have the same gradient \textcolor{green}{m=3}. The perpendicular lines are at right angles. When the two gradients are multiplied together, the result must be -1 \textcolor{green}{m} \times \textcolor{green}{-\dfrac{1}{m}} = -1 Look at the example on the right: y = \textcolor{red }{3} x-1 y= \textcolor{blue}{-\dfrac{1}{3}}x+5 If we multiply the gradients \textcolor{red}{3} \times \textcolor{blue}{-\dfrac{1}{3}} = -1 So they are perpendicular. Is line y=3x-4 parallel to line 3y-9x=21? [2 marks] We know that for two lines to be parallel it must have the same gradient \textcolor{green}{m}. First we need to get both equations in form y = \textcolor{green}{m}x+c First line: y =3x-4 This is in the correct format, we can see m = 3 Second line: 3y-9x =21 This is not in the correct format, so you must first rearrange. 3y=9x+21. y=3x+7. This is now in the correct form and we can see that its gradient is 3, so it must be parallel to the first line. Is line x+4y=8 perpendicular to line y=4x-13 [2 marks] The second line equation is in the desired shape, but the first is not. So, subtracting x from both sides of the first equation, 4y = -x+8. Then, by dividing both sides by 4, we get y=-\dfrac{x}{4}+2 So the gradient of this line is -\dfrac{1}{4}, and the gradient of the other line is 4. By multiplying these two values together, we get 4 \times \left(-\dfrac{1}{4}\right) = -1 Their product is - 1, so that the lines are perpendicular. We need to write all 3 equations in the form y = mx + c and see which ones have the same gradient. a) Add 1 to both sides to get 4y = 2x + 1 Then, divide both sides by 4 to get y = \dfrac{1}{2}x + \dfrac{1}{4} b) Drop 4x from both sides to get 2y = -4x + 5 Then divide both sides by 2 to get y = -2x + \dfrac{5}{2} c) Add \dfrac{1}{2}x on both sides to get y=\dfrac{1}{2}x+45 With all 3 equations written in desired shape , we can see that while b) has gradient -2, both a) and c) have gradient \dfrac{1}{2}, therefore a) and c) are parallel. We need to find the line gradient given in the question wrote it in the form y = mx + c. By dividing both sides by 5, we get y = -2x - \dfrac{3}{5} Now the line we need to draw is parallel to it, so you must have the same gradient: -2. We are not required to work the equation (although you are welcome to do so if it helps) and to know that the line has gradient -2 and goes through (1, 6) it is enough to draw it. Representation shown below. The line given in the question has a gradient \dfrac{3}{7}. The negative reciprocity of this (and therefore the perpendicular line gradient) is -\dfrac{7}{3}. Nwo Nwo since we have the gradient, and we know that the lines go through (5, -4), we can replace these values in y = mx + c in order to find c. So we get -4 = \left(-\dfrac{7}{3}\right)\times 5+c = -\dfrac{35}{3}+c The most important thing here is to be careful with fraction operations. Adding \dfrac{35}{3} on both sides, we get \betiled{aligned}c=-4+\dfrac{35}{3}&=-\dfrac{4}{1}+\dfrac{35}{3}\\\\&=-\dfra{12}{3}+dfrac{35}{3}=\dfrac{23}{3}\end{aligned} Therefore, the line equation is y=-\dfrac{7}{3}x+\dfrac{23}{3} The given line gradient is 5, which means that the line's parallel gradient must be also 5. We are given that it goes through (1, 3), and now we know the gradient to be 5, so that we can replace these values in y = mx + c in order to find c. By doing so, we get 3 = 1 \times 5 +c = 5 +c, therefore c = 3-5 = -2. So the equation of this line is y=5x-2. We now have a lot of information to plot. The result looks like the figure below. The rest of this topic is only relevant for the higher course. If two lines are perpendicular, then the product of the two gradients (i.e. the result of multiplying them together) is -1. Another way to put this is: if you have a straight line with gradient m, then a line that is perpendicular to it will have gradient -\dfrac{1}{m}. This is often referred to as negative reciprocal m. The given line gradient is -3, so the perpendicular line gradient must be -\left(\dfrac{1}{-3}\right) = \dfrac{1}{3} The two minus signs are cancelled, so that the result is a positive number. The gradient of one line and another line perpendicular to it will always have opposite signs – if one is negative, the other will always be positive and vice versa. We are given that the line passes through (-9, -2), and we now know the gradient is \dfrac{1}{3}, so that we can replace these values in y = mx + c in order to find c. By doing so, we receive -2=(-9)\times\dfrac{1}{3}+c=-3+c, therefore c=-2+3=1. So the equation of this line is y=\dfrac{1}{3}x+1. We now have a lot of information to plot. The result looks like the figure below. Try a review sheet on this topic. Worksheets > > Grade 3 Maths > Geometry > Parallel and Perpendicular Lines Parallel Lines never intersect. Lines that intersect at 90 degrees are perpendicular. In these worksheets, students identify parallel and perpendicular lines. All worksheets are printable pdf files. Classify Lines: Find Parallel and Perpendicular Lines: Similar: Lines, Segments, Rays, and Angles Right Angles Here is a graphic preview for all Parallel and Perpendicular Lines worksheets. You can select different variables to customize these worksheets parallel and perpendicular to your needs. 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