Do parallel lines have the same slope value

Learning Results Determine whether the lines are parallel or perpendicular to their equations Find equations of lines parallel or perpendicular to a given line The two lines of the graph below are parallel lines: they never intersect. Note that they have exactly the same slope, which means that their slopes are the same. The only difference between the two lines is the y interception. If we moved one line vertically to the interception y of the other, they would become the same line. Parallel lines. We can determine from their equations whether two lines are parallel by comparing their slopes. If the slopes are the same and the y-interceptions are different, the lines are parallel. If the slopes are different, the lines are not parallel. Unlike parallel lines, perpendicular lines intersect. Their intersection forms a right or 90-degree angle. The two lines below are perpendicular. Perpendicular lines. Perpendicular lines do not have the same slope. The slopes of the perpendicular lines are different from each other in a specific way. The slope of one line is the negative reciprocal of the slope of the other line. The product of a number and its reciprocity is 1. If [latex] {1} and {2}[/latex] are negative reciprocals of each other, they can be multiplied together to give [latex]-1[/latex]. [latex] To find the reciprocity of a number, divide 1 by the number. {2} {1} Thus, the reciprocal of 8 is [latex]-frac{1}{8}[/latex], and the reciprocal of [latex]-frac{1}{8}[/latex] is 8. To find the reciprocal negative, first find reciprocity, then change the sign. As with parallel lines, we can determine if two lines are perpendicular by comparing their slopes. The slope of each line below is the negative reciprocal of the other so that the lines are perpendicular. [latex]-begin-array-t-left (x-right)-frac{1}{4}x-2-h-fill 'text-negative reciprocal of 'frac{1}{4}'s '4'hfill' -left (x-right)--4x-3-hfill 'amp; 'text negative reciprocal of '-4'text' is 'frac{1}{4}'hfill 'end array'[/latex] The product of the slopes is -1. Two lines are parallel lines if they do not intersect.{1}{4} The slopes of the lines are the same. [latex]f-left (x-right) {1}x-{1}-text and left (x-right)m-{2}x-{2}-text are parallel if {1} m-{2}[/latex]. If and only if [latex] {1} {2}[/latex] and [latex] {1} {2}[/latex], we say that the lines coincide. The coincident lines are the same line. Two lines are perpendicular if they intersect at right angles. and 'left(x-right)'{2}x'{2}'{2}'s are perpendicular if '{1}'{2}-1,'text and '{2}'{1}-frac{1} {1}[/latex]. Based on the functions below, identify functions with a pair of parallel lines and a pair of perpendicular lines. Perpendicular. and 'hfill' and 'h'left (x-right)-2x-2-2-hfill -left (x-right)-frac{1}{2}x - 4-hfill If we know the equation of a line, we can use what we know on the slope to write the equation of a line that is either parallel or perpendicular to the line. Suppose we are given the following function: [latex]f-left (x-right)-3x-1[/latex] We know that the slope of the line is 3. We also know that the interception is there (0, 1). Any other line with a slope of 3 will be parallel to f(x). The lines formed by all the following functions will be parallel to f(x). [latex]begin-array-l'g-left (x-right)-3x-6-hfill -h-left (x-right)-3x-1-hfill -p-left ({2}{3} p-left) Then suppose that we want to write the equation from a parallel line to f and goes through the point (1, 7). We already know that the slope is 3. We just need to figure out what value to b will give the right line. We can start by using the point-slope shape of an equation for a line. We can then rewrite it as a slope interception. [latex]-begin-array-l'y-y-{1}-m-left (x-x-{1}-right)-hfill -y - 7-3-left (x - 1-right)-h-fill -y - 7-3x - 3-hfill So [latex]g-left (x-right)-3x[/latex] is parallel to [latex]f-left (x-right)-3x-1[/latex] and goes through the dot (1, 7). How: Given the equation of a linear function, write the equation of a line that crosses a given point and is parallel to the given line. Find the slope of the function. Replace the slope and the given point in the form of a point slope or slope interception. Simplify. Find a line parallel to the graph of [latex]f-left (x-right)-3x-6[/latex] that crosses the dot (3, 0). We can use a very similar process to write the equation of a line perpendicular to a given line. Instead of using the same slope, however, we use the negative reciprocal of the given slope. Suppose we are given the following function: [latex]f-left (x-right)-2x-4[/latex] The slope of the line is 2, and its negative reciprocity is [latex]--frac{1}{2}[/latex]. Any function with a slope of [latex]--frac{1}{2}[/latex] will be perpendicular to f(x). The lines formed by all the following functions will be perpendicular to f(x). [latex]begin-array-l-left (x-right)---frac{1}{2}x-4-hfill -left (x-right)---frac{1}{2}x-2-hfill -left (x-right)---frac{1}{2}x-fracci{1}{2}h-end-array we can fine-tune our choices for a particular perpendicular line if we know it goes through a given point. Suppose we want to write the equation of a line that is perpendicular to and passes through the point (4, 0). We already know that the slope is [latex]--frac{1}{2}[/latex]. Now we can use the point to find the y-intercept by substituting the values given in the line shape and resolution for b. [latex]-begin-array-l'g-left (x-right)-mx-b-h-fill -0-frac{1}{2}-left (4-right)-b-h-fill The equation for function with a slope of [latex]--frac{1}{2}[/latex] and a y-interception of 2 is [latex]g-left (x-right)--frac{1}{2}x-2[/latex]. Thus[latex]g-left (x-right)--frac{1}{2}x-2[/latex] is perpendicular to [latex]f-left (x-right)-2x-4[/latex] and passes through the point (4, 0). Be aware that perpendicular lines may not obviously appear perpendicular to a graphic calculator unless we use the square zoom function. A horizontal line has a slope of zero and a vertical line has an undefined slope. These two lines are perpendicular, but the product of their slopes is not -1. Does this fact not contradict the definition of perpendicular lines? No. For two perpendicular linear functions, the product of their slopes is -1. However, a vertical line is not a function, so the definition is not contradicted. How: Given the equation of a linear function, write the equation of a line that crosses a given point and is perpendicular to the given line. Find the slope of the given function. Determine the negative reciprocity of the slope. Replace the new slope and values with x and y from a given point in [latex]g-left (x-right)-mx-b[/latex]. Solve for b. Write the line equation. Find the equation of a line perpendicular to [latex]f-left (x-right)-3x-3[/latex] that crosses the point (3, 0). How: Given two points on a line and a third point, write the equation of the perpendicular line that crosses the point. Determine the slope of the line passing through the points. Find the negative reciprocity of the slope. Use the slope interception form or the slope shape to write the equation by substituting known values. Simplify. A line passes through the points (-2, 6) and (4, 5). Find the equation of a perpendicular line that crosses the point (4, 5). A line passes through the points, (-2, -15) and (2, -3). Find the equation of a perpendicular line that crosses the point, (6, 4). Contribute! Did you have the idea to improve this content? We would like your input. Improve this pageLearn more When you've worked with equation systems, you've seen that two coplanar lines (in the same plane) can be arranged in three different situations. Coincide (Coincidence) Lines that coincide are on each other. They are the same line with equations expressed in different forms. If two coincident lines form a system, each point of the line is a solution to the system. Parallel lines in a plane don't cross paths. Two lines are parallel if they have the same slope, or if they are vertical. If two parallel lines form a system, there are no solutions to the system. Cross If the lines intersect, the lines in one point. The angles at which the two lines intersect may vary. An intersection point creating a 90o angle forms a perpendicular. If two intersecting lines form a system, there is only one solution. When we work in three dimensions, we will add another situation to our line survey. Bias lines are lines that are not coplanar, do not intersect and are not parallel. Bias lines exist in only three dimensions or more. Let's start our investigation of the lines by looking at the parallel lines. Parallel lines are coplanar lines (in the same plane) that never intersect (never intersect). The slope of a line measures its slope (or angle to horizontal). Parallel lines have the same slope (or the same angle to the horizontal). As the parallel lines have the same slope, they have the same slope. Non-vertical parallel lines have the same slopes! The slopes are equal. Why did we specify non-vertical parallel lines? In the coordinate plane, all vertical lines are parallel to the Y axis and are parallel to each other. However, the slopes of the vertical lines are not defined since the vertical lines do not have a race. A race of zero causes the rise/run fraction to have a zero denominator. When we discuss numerical slopes, we cannot mathematically say that an undefined slope is equivalent to (or is the same as) another undefined slope. Parallel lines are marked with feathers (similar to what you see on an archery arrow) to show that they are parallel. The feathers look like larger than symbols on the lines. Line Equations: y - 2x - 1 y - 2x - 5 y - 2x - 1.3 y - 2x All the lines on the left are parallel. They all have the same slope (m). (y - mx - b) Prove slope criteria for parallel lines: Let's prove that parallel lines have equal slopes, and that equal slopes involve parallel lines. We will examine geometric evidence and algebraic evidence. If two distinct lines are parallel, the slopes of the lines are equal. Vertical lines will not be considered as their slopes are not defined and cannot be considered equal. If the lines are parallel horizontal lines, the slopes are both zero. Now consider all lines that are not vertical and not horizontal. Considering: Two distinct parallel lines m and n. Prove: The slope of m - the slope of n We will draw auxiliary lines and constructions to complete this evidence. Reasons 1. m No. 1. Given 2. Draw a line t, crossing at P and S. 2. Two points determine a line. 3. Build two perpendiculars for t that cross m to Q and n to T. 3. From a point not on a line, a single perpendicular can be built. 4. ∠QPR ∠TSU 4. If 2 lines are , the corresponding angles are congruent. 5.∠PRQ, ∠SUT are right angles 5. Perpendicular lines form rt angles. 6. ∠PRQ ∠SUT 6. All right angles are congruent. 7. 'QQ'SUT 7. AA for 8. 8. The corresponding sides of similar triangles are in proportion. 9. 9. Ownership of proportions (alternation). 10. M slope - slope of No. 10. Definition of slope (climb/race). Since we are trying to establish a link between parallel lines and equal slopes, we will also have to prove the opposite of the same theory shown above. In this way, we will connect parallel lines to equal slopes AND slopes equal to parallel lines. If the slopes of two distinct lines are equal, the lines are parallel. If the slopes of the lines are both zero, the lines are horizontal and parallel by definition. Because the slopes of vertical lines are not defined and are not considered equal, vertical lines will not be considered. Given: Two distinct lines m and n with equal slopes. Prove: m n We will draw auxiliary lines and constructions to complete this evidence. Reasons 1. m and n lines with equal slopes 1. Given 2. Draw a cross line, t, crossing at A and D. 2. Two points determine a line. 3. Choose Point B. Copy to D, Label E, so that AB- DE. 3. A segment can be copied, retaining its length. 4. Build 2 perpendicular to T to B and E. 4. From a point on a line, only one perpendicular can be built. 5. 5. Definition of slope (climb/race). 6. CB - FROM 'AB' TO FE 6. In a proportion, the proceeds of the means are equivalent to the product of extremes. 7. CB - AB - AB - FE 7. Replacement 8. CB - FE 8. Division by AB 9. 9. Congruent segments are length. 10. ABC -DEF 10. SAS for congruent triangles 11. ∠BAC ∠EDF 11. The corresponding parts of the congruent triangles are congruent. 12.m No. 12. If 2 lines are cut by a cross and the corresponding angles are congruent, the lines are parallel. Parallel.