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Write in slope intercept form

Recognize the Relation Between the Graph and the Slope–Intercept Form of an Equation of a Line In the following exercises, use the graph to find the slope and y-intercept of each line. Compare the values to the equation . slope and y-intercept slope and y-intercept slope and y-intercept Identify the Slope and y-Intercept From an Equation of a Line In the following exercises, identify the slope and y-intercept of each line. Graph a Line Using Its Slope and Intercept In the following exercises, graph the line of each equation using its slope and y-intercept. Choose the Most Convenient Method to Graph a Line In the following exercises, determine the most convenient method to graph each line. Graph and Interpret Applications of Slope–Intercept The equation models the relation between the amount of Tuyet's monthly water bill payment, P, in dollars, and the number of units of water, w, used. ⓐ Find Tuyet's payment for a month when 0 units of water are used. ⓑ Find Tuyet's payment for a month when 12 units of water are used. ⓒ Interpret the slope and P-intercept of the equation. ⓓ Graph the equation. The equation models the relation between the amount of Randy's monthly water bill payment, P, in dollars, and the number of units of water, w, used. ⓐ Find the payment for a month when Randy used 0 units of water. ⓑ Find the payment for a month when Randy used 15 units of water. ⓒ Interpret the slope and P-intercept of the equation. ⓓ Graph the equation. ⓐ ?28 ⓑ ?66.10 ⓒ The slope, 2.54, means that Randy's payment, P, increases by ?2.54 when the number of units of water he used, w, increases by 1. The P–intercept means that if the number units of water Randy used was 0, the payment would be ?28. ⓓ Bruce drives his car for his job. The equation models the relation between the amount in dollars, R, that he is reimbursed and the number of miles, m, he drives in one day. ⓐ Find the amount Bruce is reimbursed on a day when he drives 0 miles. ⓑ Find the amount Bruce is reimbursed on a day when he drives 220 miles. ⓒ Interpret the slope and R-intercept of the equation. ⓓ Graph the equation. Janelle is planning to rent a car while on vacation. The equation models the relation between the cost in dollars, C, per day and the number of miles, m, she drives in one day. ⓐ Find the cost if Janelle drives the car 0 miles one day. ⓑ Find the cost on a day when Janelle drives the car 400 miles. ⓒ Interpret the slope and C–intercept of the equation. ⓓ Graph the equation. ⓐ ?15 ⓑ ?143 ⓒ The slope, 0.32, means that the cost, C, increases by ?0.32 when the number of miles driven, m, increases by 1. The C-intercept means that if Janelle drives 0 miles one day, the cost would be ?15. ⓓ Cherie works in retail and her weekly salary includes commission for the amount she sells. The equation models the relation between her weekly salary, S, in dollars and the amount of her sales, c, in dollars. ⓐ Find Cherie's salary for a week when her sales were 0. ⓑ Find Cherie's salary for a week when her sales were 3600. ⓒ Interpret the slope and S–intercept of the equation. ⓓ Graph the equation. Patel's weekly salary includes a base pay plus commission on his sales. The equation models the relation between his weekly salary, S, in dollars and the amount of his sales, c, in dollars. ⓐ Find Patel's salary for a week when his sales were 0. ⓑ Find Patel's salary for a week when his sales were 18,540. ⓒ Interpret the slope and S-intercept of the equation. ⓓ Graph the equation. ⓐ ?750 ⓑ ?2418.60 ⓒ The slope, 0.09, means that Patel's salary, S, increases by ?0.09 for every ?1 increase in his sales. The S-intercept means that when his sales are ?0, his salary is ?750. ⓓ Costa is planning a lunch banquet. The equation models the relation between the cost in dollars, C, of the banquet and the number of guests, g. ⓐ Find the cost if the number of guests is 40. ⓑ Find the cost if the number of guests is 80. ⓒ Interpret the slope and C-intercept of the equation. ⓓ Graph the equation. Margie is planning a dinner banquet. The equation models the relation between the cost in dollars, C of the banquet and the number of guests, g. ⓐ Find the cost if the number of guests is 50. ⓑ Find the cost if the number of guests is 100. ⓒ Interpret the slope and C–intercept of the equation. ⓓ Graph the equation. ⓐ ?2850 ⓑ ?4950 ⓒ The slope, 42, means that the cost, C, increases by ?42 for when the number of guests increases by 1. The C-intercept means that when the number of guests is 0, the cost would be ?750. ⓓ Use Slopes to Identify Parallel Lines In the following exercises, use slopes and y-intercepts to determine if the lines are parallel. Use Slopes to Identify Perpendicular Lines In the following exercises, use slopes and y-intercepts to determine if the lines are perpendicular. Equations of lines have lots of different forms. One form you're going to see quite often is called the slope intercept form and it looks like this: y=mx+b, where m stands for the slope number and b stands for the y intercept.So, when you're doing problems where you're asked to write the equation in slope intercept form, you only need two pieces of information. The first piece of information you need is the slope number and the second piece of information you need is the y intercept. Once you have those two pieces, those two numbers, you just plug them in there and you're on your way. To write a slope-intercept equation from two points, first find the slope, m. Then, use the slope and either point to figure out the y-intercept, b. There are a few different ways to write the equation of a line. One of the most common ways is called "slope-intercept" form. It's called this because it clearly identifies the slope and the y-intercept in the equation. The slope is the number written before the x. The y-intercept is the constant written at the end. Let's look at an example: y = 3x + 2. The coefficient of the x-term is 3, this means the line has a slope of 3. The constant being added at the end is 2. This means the y-intercept (where the line crosses the y-axis) is at positive 2. What do you do if there's a minus sign in between the two terms? For example, what about the equation y = 5x - 8? We can rewrite subtracting 8 as adding a negative 8. This means the y-intercept is at -8. If you know two points on a line, you can use them to write the equation of the line in slope-intercept form. The first step will be to use the points to find the slope of the line. This will give you the value of m that you can plug into y = mx + b. The second step will be to find the y-intercept. Once you know m and b, you can write the equation of the line. The slope of the line through two points (x1,y1) and (x2,y2) can be found by using the formula below. Make sure to check out our lesson on using points to find slope if you need extra help on this step. Don't forget slope is rise over run: subtract the y-values in the numerator to get the rise and subtract the x-values in the denominator (in the same order!) to get the run. Once you know the slope of the line, plug it in for m in y = mx + b. For example, if you used the formula and found that the slope is 2, you would write y = 2x + b. The example below shows the first steps you would take if you needed to write an equation of the line through the points (2,5) and (4,13). Welcome to Kate's Math Lessons! Teachers,make sure to check out the study guides and activities. Once you know the slope (m), you're halfway there. Now all that's left to find is the y-intercept (b). To find the y-intercept, choose one of the points on the line. It does not matter which point you choose (just pick the one that looks easiest to you). Plug in the values for x and y into the equation and solve for b. At this point, you've solved for both m and b. All that's left to do is to plug them both in and write the equation in slope-intercept form (y = mx + b). It's always a good idea to check your work when possible. To double check the accuracy of your equation, you can use the other point that's on the line (the one you didn't use in Step 2 to find b). Plug in the x value from this point into your y = mx + b equation and see if it comes out to the correct y value. Step 1: Find the slope (m).Use the formula to find the slope between the two points. Once you know the slope, plug it in for m in y = mx + b. This gives you y = 3x + b.Step 2: Find the y-intercept (b).Pick one of the points on the line and use the x and y values to find b. It does not matter which point you choose. We'll pick the first point (4,7) and plug in 4 for x and 7 for y. Step 3: Write the equation in slope-intercept form (y = mx + b)Now that we know m = 3 and b = -5, we can plug these values in and write the equation in slope-intercept form. Step 4: Check your answerWe used the point (4,7) in Step 2, so to check our equation we need to use the other point: (6,13). If you use the same point twice, it will not find a mistake. Make sure to use the point you didn't use to find the y-intercept in Step 2.Plug in the x value from the other point and see if it works. If we plug in 6 for x in our equation, the y value should come out to 13. 3(6) - 5 = 18 - 5 = 13. It works!If we had plugged in 6 and it came out to a number that wasn't 13, that would tell us that we had made a mistake somewhere along the way. If this happens to you, start by double checking to make sure you calculated the slope correctly. You may have used the formula incorrectly or missed a negative sign somewhere. Ready to try a few problems on your own? Click the START button below to try a practice quiz! The slope intercept form calculator will teach you how to find the equation of a line from any two points that this line passes through. It will help you to find the coefficients of slope and y-intercept, as well as the x-intercept, using the slope intercept formulas. Read on to learn what is the slope intercept form of a linear equation, how to find the equation of a line and the importance of the slope intercept form equation in real life. Any line on a flat plane can be described mathematically as a relationship between the vertical (y-axis) and horizontal (x-axis) positions of each of the points that contribute to the line. This relation can be written as y = [something with x]. The specific form of [something with x] will determine what kind of line we have. For example $y = x^2 + x$ is a parabola, also called a quadratic function. On the other hand y = mx + b (with m and b representing any real numbers) is the relationship of a straight line. In this slope intercept calculator, we will focus only on the straight line, but those interested in knowing more about the parabolic function should not worry. We have two special calculators dedicated to such an equation, namely the parabola calculator and the quadratic formula calculator. There you can find a full description of these types of functions! Linear equations, or straight line equations, can be quickly recognized as they have no terms with exponents in them. (For example, you will find an x or a y, but never an x^2.) Each linear equation describes a straight line, which can be expressed using the slope intercept form equation. As we have seen before, you can write the equation of any line in the form of y = mx + b. This is the so-called slope intercept form, because it gives you two important pieces of information: the slope m and the y-intercept b of the line. You can use these values for linear interpolation later. The term slope is the incline, or gradient, of a line. It tells us how much y changes for a fixed change in x. If it is positive, the values of y increase when x increases. If it is negative, y decreases with an increasing x. You can read more about it in the description of our slope calculator. The y-intercept is the value of y at which the line crosses the y-axis. To find it, you have to substitute x = 0 in the linear equation. You will see later, why the y-intercept is an important parameter in linear equations and you will also learn about the physical meaning of its value in certain real-world examples. Still need to know how to find the slope intercept form of a linear equation? We will assume you know two points that the straight line goes through. The first one will have coordinates (x_1, y_1) and the second one (x_2, y_2). Your unknowns are the slope m and the y-intercept b. Firstly, substitute the coordinates of the two points into the slope intercept equation: (1) $y_1 = mx_1 + b$ (2) $y_2 = mx_2 + b$ Then, subtract the first equation from the second: $y_2 - y_1 = m(x_2 - x_1)$ Finally, divide both sides of the equation by $(x_2 - x_1)$ to find the slope: $m = (y_2 - y_1)/(x_2 - x_1)$ Once you have found the slope, you can substitute it into the first or second equation to find the y-intercept: $y_1 = x_1(y_2 - y_1)/(x_2 - x_1) + b$ $b = y_1 - x_1(y_2 - y_1)/(x_2 - x_1)$ This slope intercept form calculator allows you to find the equation of a line in the slope intercept form. All you have to is give two points that the line goes through. You need to follow the procedure outlined below. Write down the coordinates of the first point. Let's assume it is a point with $x_1 = 1$ and $y_1 = 1$. Write down the coordinates of the second point as well. Let's take a point with $x_2 = 2$ and $y_2 = 3$. Use the slope intercept formula to find the slope: $m = (y_2 - y_1)/(x_2 - x_1) = (3-1)/(2-1) = 2/1 = 2$. Calculate the y-intercept. You can also use x_2 and y_2 instead of x_1 and y_1 here. $b = y_1 - m * x_1 = 1 - 2*1 = -1$ Put all these values together to construct the slope intercept form of a linear equation: It is also always possible to find the x-intercept of a line. It is the value of x at which the straight line crosses the x-axis (it means the value of x for which y equals 0). You can calculate it in the following way: 0 = mx + b x = -b/m Our slope intercept form calculator will display both the values of x-intercept and y-intercept for you. We have already seen what is the slope intercept form, but to understand why the slope intercept form equation is so useful you should know some applications it has in the real world. Let's see a couple of examples. We will start with simple ones from physics so that you can get an intuitive idea of what the y-intercept and x-intercept mean. Imagine a car moving at a fixed speed towards you. It's movement can be plotted as time versus the distance the car is from you (as shown above). This means that the x-axis will represent the time passed and the y-axis will represent the distance to the car. You can even imagine the car has started to move before you started the timer (that is: before t = 0). Now, if you look at the y-intercept (x = 0), the point at which you started to keep track of time is t = 0. And so, the value of y at this point will indicate the starting position (distance) of the car with respect to you. This value is, like we have discussed before, the same as the value of b in the slope intercept form of a straight line equation. Looking now at the x-intercept (y = 0), this will be the point at which the distance from the car to you will be 0. Then the value of x at this point will be the time when you and the car were at the same place. Let's hope that means you were inside the car, and not under. The car example above is a very simple one that should help you understand why the slope intercept form is important and more specifically, the meaning of the intercepts. In this article, we will mostly talk about straight lines, but the intercept points can be calculated for any kind of curve (if it does cross an axis). In fact, the example above does not fit a linear equation and still has both intercepts. The same is true for any other parabola or other shape. One equation that is guaranteed to have a y-intercept but not necessarily an x-intercept is a parabola. This is equation is shown in the image above. It has a maximum or a minimum (depending on the orientation). If this maximum is below the x-axis or the minimum is above the x-axis, there will never be an x-intercept. However, unlike humans, not all equations are equal. Some of the formulas describe curves that might never intercept the x-axis, or the y-axis or both. Let's see in a bit more detail how this can be. We can distinguish 3 groups of equations depending on whether they have a y-intercept only, an x-intercept only or neither. The first group (y-intercept only) can have almost any type of equation, including linear equations. A good easy example is y = 3 (or any other constant value of y except for 0) since this is a line parallel to the x-axis and will, thus, never cross or intercept it. Please don't try to calculate these types of intercepts on this slope intercept form calculator as these types of equations can potentially break the Internet. The second and third group of equations are a bit more tricky to imagine and to understand them well we need to introduce the concept of an asymptote. An asymptote is a line (that can be expressed as a linear equation) to which the function or curve, we are talking about gets closer and closer to, but never actually crosses or touches that line. The definition might not seem totally clear but if we look at an example equation we will have fewer problems with understanding. Let's take the equation y = 1/x. If we try to find the y-intercept by substituting x = 0 we arrive at what is called a mathematically undefined expression since it makes no sense to divide by 0. If we take values closer and closer to 0 (something like 0.1, then 0.001, 0.000001...) we can see that the value of y increases very rapidly. So around the point x = 0, we know that y would have a huge value, but because of how maths work it does not have a defined value for that exact point. Sometimes people may say $1/0 = \infty$ but the reality is that infinity is not a number but a concept. In this case the linear equation x = 0 represents the asymptote of the function y = 1/x which means that y = 1/x will never intercept that line, and thus will not have a y-intercept. In general, any time that a function has an asymptote that lies on one of the axis, it will be missing at least one of the intercepting points. In fact, the example we have shown you with y = 1/x also has an asymptote for y = 0, i.e., the x-axis. For the same reason as before, y = 0 is never achievable by the formula because it would require $x = \infty$ and as we said before, it is impossible to achieve that since infinity is a concept and not a number. Before we move to our next topic, it is important to note that we have made extreme over-simplifications when talking about infinity, but we feel it is a good and fast approach for those that are not used to the concept of working with infinity in maths. We recommend that you learn more about the proper ways of the infinity, starting with the undefined expressions in maths. One could easily think that the usefulness of linear equations is very limited due to their simplicity. However, the reality is a bit different. Linear equations are at the core of some of the most powerful methods to solve minimization and optimization problems. Minimization problems are a type of problem in which one would like to find how to make one of the variables as small as possible. This variable could be, for example, the difference between a prediction made by a model and the reality. These types of problems are one of the most common problems and are at the core of machine learning and scientific experiments. One of the most common and powerful methods to find the minimum value of an equation or formula is the so-called Newton Method, named after the genius that invented it. The way it works is by using derivatives, linear equations, and x-intercepts: This method consists of choosing a value of x for the equation and calculating the derivative of the equation at that point. Using the derivative as the slope of a linear equation that passes through that exact (x, y) point, the x-intercept is then calculated. This is one of the situations in which the slope intercept form comes in handy. Once the x-intercept is calculated, that value of x is used to repeat the process above, a specific number of times, until we arrive at a value of y that is minimum (which means that the derivative will be 0). In real life, arriving at the exact minimal point is not possible to do in a finite amount of time, so typically people will settle for a "close enough" value. One very common example is when using the Chi Square method to fit some data to a formula or trend. In this case, the value that we want to minimize is the sum of the squared distanced from the trend line to the data points, where the distance is calculated along a perpendicular line from the point to the trend line.