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10 examples of linear equations in two variables

A linear equation is defined as a first-degree equation in one, two, or three variables. It can be represented by equations of the form ax + b = 0, ax + by + c = 0, or ax + by + cz + d = 0, where a, b, c, and d are real numbers not equal to zero at any given time. Examples of linear equations include x = 1, 2x + 3 = 0, x + 4y = 7, 5x – 2y = 3, and x + 3y – 4z = 1. In coordinate geometry, linear equations can represent various geometric shapes such as straight lines parallel to the axes on a two-dimensional plane, oblique straight lines on a two-dimensional plane, or planes in three-dimensional space. A linear equation in two variables, x and y, is of the form ax + by + c = 0. For instance, 2x + 3y = 6 and x + 4y = 7 are examples of linear equations in two variables. These equations can also be written as 2x + 3y – 6 = 0 and x + 4y – 7 = 0. Solving a linear equation involves finding the points (x, y) that satisfy the given equation. For example, the point (2, 3) is a solution to the linear equation 2x + 3y – 13 = 0 because it satisfies the equation when x = 2 and y = 3. To solve a linear equation in two variables, one can express the value of any variable in terms of another variable. By choosing some values for the second variable, one can find the corresponding values of the first variable. For instance, to solve the linear equation y – 3x = 4, one can express y as 4 + 3x and then choose various values of x to find the corresponding values of y. Similarly, to solve the linear equation 3x + 4y = 10, one can express x as (10 – 4y)/3 and then choose different values of y to find the corresponding values of x. Linear equations in two variables are like building blocks of algebra, essential for solving problems in various fields such as physics, economics, and engineering. These equations have infinitely many solutions and can be graphed on a coordinate plane as straight lines. Some key points to remember: x=0 is the equation of the y-axis, y=0 is the equation of the x-axis, while graphs like x=a and y=b are parallel lines to the axes. When solving linear equations in two variables, it's helpful to start by finding some solutions, or points that satisfy the equation. These can be used to plot a graph and join them with a straight line. For example, let's take the equation x + y = 7. We can find three solutions: (4, 3), (3, 4), and (2, 5). Plotting these points on a graph and joining them gives us the graph of the linear equation. The standard form of a linear equation in two variables is ax+by=c, where x and y are variables, and a, b, and c are constants with a and b not both being zero. This represents a straight line when graphed on a coordinate plane. Understanding linear equations in two variables is crucial for progressing to more advanced mathematical concepts and applications. By studying these equations, you'll learn how to recognize them, formulate them algebraically and graphically, analyze relationships between variables, interpret the meaning of slopes and intercepts, and apply these concepts to real-life scenarios. Mastery of this topic will help students tackle complex problems and enhance their logical thinking abilities. The standard form of a linear equation in two variables is given by Ax + By = C, where A, B, and C are integers and A and B are not both zero. This form is useful for finding the intercepts of the line quickly. Another useful form is the slope-intercept form y = mx + b, where m represents the rate of change of y with respect to x and b is the y-intercept. The point-slope form $y - y_1 = m(x - x_1)$ is also useful when a point on the line and its slope are known. To visualize linear equations in two variables, graphing the equation on a coordinate plane is helpful. To graph a linear equation, find two or more points that satisfy the equation, plot them on a coordinate plane, and draw a line through them. The intercepts occur where the line crosses the axes; the x-intercept occurs when y = 0, and the y-intercept occurs when x = 0. Solving linear equations in two variables involves finding the values of x and y that satisfy both equations simultaneously. There are three primary methods to solve systems of equations: substitution method, elimination method, and graphical method. The substitution method involves solving one equation for one variable in terms of the other and substituting this expression into the other equation. Solving for the remaining variable and then substituting back to find the other variable is also a step. Elimination method involves aligning the equations vertically, adding or subtracting them to eliminate one variable, and then solving for the remaining variable. Graphical method involves graphing both equations on the same coordinate plane and identifying the point where the two lines intersect, which is the solution to the system of equations. Given article text here Looking forward to seeing everyone at the meeting tomorrow and discussing our strategies. To find the equation of a line given two points, use the formula y = mx + b, where m is the slope and b is the y-intercept. The equation 3x+4y=12 can be rewritten in this form as y = (-3/4)x + 3. Now we need to graph this equation. First, find the x and y intercepts by setting each variable equal to zero and solving for the other variable. For the given equation 5x−y=155x−y=155x−y=15, set y = 0 to find the x-intercept: 5x - 0 = 15, so x = 3. Set x = 0 to find the y-intercept: 5(0) - y = 15, so y = -15. The intercepts are (3,0) and (0,-15). Next we need to find the solution of this system of equations: x+2y=82x−y=3. To do this, solve for one variable in terms of the other using either equation. Then substitute that expression into the second equation. If you don't have a graphing calculator, this is where the process will get quite laborious but we will show it here. For now, consider how to find the solution by inspection as a means of learning. There are many different methods for solving systems of linear equations including using your computer or calculator. To solve a system of two equations in two variables graphically, you can follow these steps: First, convert each equation to the form y = mx + b by solving for y. Then, start putting in values for x and find the corresponding value of y or vice versa. Next, identify where both lines intersect, which is the solution to the system. The point of intersection can be seen as a unique solution. If the lines do not intersect, they are parallel and have no solution. Sometimes, the lines may coincide with each other, resulting in an infinite number of solutions. When discussing systems of linear equations, we categorize them into consistent or inconsistent based on whether they have a solution or not. Additionally, we can classify them as independent if there is only one solution or dependent if there are multiple solutions. To solve a system using the substitution method, you need to follow these steps: First, solve one equation for one variable. Then, substitute this expression into the other equation and solve for that variable. Finally, use either of the equations to find the value of the other variable. For example, given the system x + 2y - 7 = 0 and 2x - 5y + 13 = 0, you can solve it using the substitution method by solving one equation for y and then substituting that expression into the other equation. The solution to this system is x = 1 and y = 3. The cross-multiplication method involves writing the coefficients of each variable and constant as follows: Then, multiply the entire top row with the bottom right coefficient, the entire bottom row with the top left coefficient, and subtract the products. This will give you an equation in terms of x that can be solved for its value. **Solving Systems of Linear Equations** To solve systems of linear equations in two variables, we can use various methods such as Elimination, Determinant Method (Crammer's Rule), and substitution. **Elimination Method** 1. Write the equations in standard form: ax + by + c = 0 or ax + by = c. 2. Check if adding or subtracting the equations cancels out a variable. 3. If not, multiply one or both equations to make the coefficients of x or y equal to each other but with opposite signs. 4. Add or subtract the modified equations to eliminate one variable. 5. Solve for the remaining variable. **Example: Solving using Elimination Method** Given 2x + 3y - 11 = 0 and 3x + 2y - 9 = 0, we can add the first equation multiplied by 3 and the second equation multiplied by -2 to eliminate x. This results in (6x + 9y - 33) + (-6x - 4y + 18) = 0, simplifying to 5y - 15 = 0. Solving for y yields y = 3. Substituting y back into one of the original equations gives x = 1. **Determinant Method (Crammer's Rule)** To solve systems using determinants: 1. Calculate the determinant Δ = a1b2 - a2b1. 2. Calculate Δx by replacing the first column with constants: c1b2 - c2b1. 3. Calculate Δy by replacing the second column with constants: a1c2 - a2c1. The solution is given by: x = Δx / Δ y = Δy / Δ **Important Points on Linear Equations** * The elimination method involves adding or subtracting equations to eliminate one variable. * The determinant method uses determinants to solve systems of linear equations. * These methods can be used to solve systems with two variables. Two Variables: A Linear Equation in Two Variables A linear equation in two variables is of the form ax + by + c = 0, where x and y are variables. A pair of linear equations can be represented as a1x + b1y + c1 = 0 and a2x + b2y + c2 = 0. The solution to these equations is a pair of values (x, y) that satisfy both equations. To solve linear equations in two variables, we must have at least two equations. A linear equation in two variables has infinitely many solutions. Given text here: Using the last two columns of the table, we can form a pair of linear equations in two variables: x-y=15 x+y=17 Adding both equations we get: 2x = 32 ⇒ x=16 Substitute x=16 in x+y=17 16+y= 17 y=1 Answer: Therefore, the speed of the boat is 16 miles per hour and the speed of the current is 1 mile per hour. Show Answer > go to slidego to slidego to slide Great learning in high school using simple cues Indulging in rote learning, you are likely to forget concepts. With Cuemath, you will learn visually and be surprised by the outcomes. Book a Free Trial Class FAQs on Linear Equations in Two Variables A linear equation is an equation with degree 1. A linear equation in two variables is a type of linear equation in which there are 2 variables present. For example, 2x - y = 45, x+y =35, a-b = 45 etc. How do you Identify Linear Equations in Two Variables? We can identify a linear equation in two variables if it can be expressed in the form ax+by+c = 0, consisting of two variables x and y and the highest degree of the given equation is 1. Can You Solve a Pair of Linear Equations in Two Variables? Yes, we can solve pair of linear equations in two variables using different methods and ensure there are two equations present in the given system of equations so as to obtain the values of variables. If there is one solution it means that the given lines are intersecting, if there is no solution possible, then it means that the given equations are of parallel lines. If there are infinitely many solutions possible, it means that the given equations are forming coincidental lines. How to Graphically Represent a Pair of Linear Equations in Two Variables? We can represent linear equations in two variables graphically using the steps given below: Step 1: A system of two equations in two variables can be solved graphically by graphing each equation by converting it to the form y=mx+b by solving the equation for y. Step 2: The points where both lines meet are identified. Step 3: The point of intersection is the solution of the given pair of linear equations in two variables. How Does One Solve the System of Linear Equations in Two Variables? We have different methods to solve the system of linear equations: How Many Solutions Does a Linear Equation with Two Variables Have? Suppose we have a1x + b1y + c1 = 0 and a2x + b2y + c2 = 0. The solutions of a linear equation with two variables are: One and unique if a1/a2 ≠ b1/b2 None if a1/a2 = b1/b2 ≠ c1/c2 Infinitely many if a1/a2 = b1/b2 = c1/c2 How is a Linear Inequality in Two Variables like a Linear Equation in Two Variables? A linear inequality in two variables and a linear equation in two variables have the following things in common: The degree of a linear equation and linear inequality is always 1. Both of them can be solved graphically. The way to solve a linear inequality is the same as linear equations except that it is separated by an inequality symbol. But note that the inequality rules should be taken care of. Q1: Cost of 4 tables and 3 chairs is $225 and 3 tables 4 chairs cost $195. Find the price of 2 chairs and 1 table: 95 + 65 + 85 + 75 = ? Q2: Solve the system of equations 2x - y = 6 and x - y = 4. Q3: Which is a linear equation in two variables? y - 11 = 0 x + 9 > 0 x^3 - 5 = 0 x + y = 20 Q4: How many solutions can a linear equation in two variables have? two, zero, three, or infinite Q5: Which coordinate is represented by the pair of equations x = a and y = b? intersecting at (1, -a), intersecting at (-b, a), intersecting at (b, a), or intersecting at (a, b)