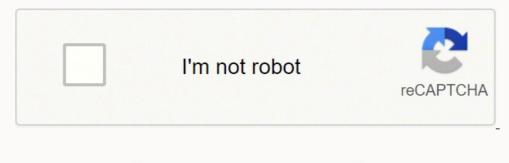
Rectangular coordinate system worksheets





By the end of this section, you will be able to: Plot points in a rectangular coordinate system Verify solutions to a linear equation in two variables Before you get started, take this readiness quiz. Evaluate \(x+3\) when \(x=-1\). If you missed this problem, review Exercise 1.5.25. Evaluate \(2x-5y\) when \(x=3\) and y=-2. If you missed this problem, review Exercise 1.5.28. Solve for y: \(40-4y=20\) If you missed this problem, review Exercise 1.5.28. Solve for y: \(40-4y=20\) If you missed this problem, review Exercise 1.5.28. Solve for y: \(40-4y=20\) If you missed this problem, review Exercise 1.5.28. Solve for y: \(40-4y=20\) If you missed this problem, review Exercise 1.5.28. Solve for y: \(40-4y=20\) If you missed this problem, review Exercise 1.5.28. Solve for y: \(40-4y=20\) If you missed this problem, review Exercise 1.5.28. Solve for y: \(40-4y=20\) If you missed this problem, review Exercise 1.5.28. 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In the rectangular coordinate of the point, and the second number is the y-coordinate of the point. An ordered pair, (x,y)(x,y), gives the coordinates of a point in a rectangular coordinate. The second number is the y-coordinate. The phrase 'ordered pair' means the order is important. What is the ordered pair of the point where the axes cross? At that point both coordinates are zero, so its ordered pair is \((0,0)\) has a special name. It is called the origin. It is the point \((0,0)\) is called the origin. It is the point \((1,3)\) as an example. First, locate 1 on the x-axis and lightly sketch a vertical line through x=1x=1. Then, locate 3 on the y-axis and sketch a horizontal line through \(y=3). Now, find the point with coordinates \((1,3)\). Figure \(\PageIndex{3}\) Notice that the vertical line through \(y=3) are not part of the graph. We just used them to help us locate the point \((1,3)\). Plot each point in the rectangular coordinate system and identify the quadrant in which the point is located: (-5,4) (-3,-4) (2,-3) \((3, \frac{5}{2})\) Answer The first number of the coordinate pair is the x-coordinate, and the second number is the ycoordinate. Since x=-5, the point is to the left of the y-axis. Also, since y=-4, the point is above the x-axis. The point is to the left of the y-axis. Since y=-3, the point is to the right of the y-axis. Since y=-3, the point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. Also, since y=-4, the point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. Since y=-3, the point is to the left of the y-axis. The point is to the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the left of the y-axis. The point is to the y-axis. The point below the x-axis. The point (2, -3) is in Quadrant IV. Since x=-2, the point is to the left of the y-axis. Since y=3, the point is to the right of the y-axis. Since y=3, the point is above the x-axis. The point is above the x-axis. (It may be helpful to write $(\frac{5}{2})$ as a mixed number or decimal.) The point $((3, \frac{5}{2}))$ is in Quadrant I. Figure (-4, -4) (-4, -4) (-4, -4) (-4, -4) (-4, -4) (-4, -4) (-4, -4) (-4, -4)located: (-4,1) (-2,3) (2,-5) (-2,5) ((-3, \frac{5}{2})) Answer How do the signs affect the location of the points? You may have noticed some patterns as you graphed the points? What about the signs of the coordinates? What about the signs of the coordinates? the coordinates of points in the third quadrant? The second quadrant? The first quadrant? The first quadrant? Can you tell just by looking at the coordinates in which quadrant is (2,-5) located? We can summarize sign patterns of the quadrants in this way. [\begin{array}{cc}{\text { Quadrant I }} & {\text { Quadrant I }} } & {\text { Quadrant III }} & {\text { Quadrant IV }} \\ {(x, y)} & {(x, y) (0,4) is on the y-axis and the point (-2,0) is on the x-axis. Points with a y-coordinate equal to 0 are on the x-axis, and have coordinates (0,5). Plot each point: (0,5) (4,0) (-3,0) (0,-1) Answer Since x=0, the point whose coordinates are (0,5) is on the y-axis. Since y=0, the point whose coordinates are (0,0) is on the x-axis. Since y=0, the point whose coordinates are (0,-1) is on the y-axis. Figure (0,-1) is on the y-axis. Figure (0,0) is the origin. Since x=0 and y=0, the point whose coordinates are (0,0) is on the x-axis. Since x=0 and y=0, the point whose coordinates are (0,0) is the origin. Since x=0 and y=0, the point whose coordinates are (0,0) is on the x-axis. Since x=0 and y=0, the point whose coordinates are (0,0) is on the x-axis. Since x=0 and y=0, the point whose coordinates are (0,0) is the origin. Answer Plot each point: (-5,0) (3,0) (0,-1) (0,4). Answer In algebra, being able to identify the coordinates of a point shown on a graph is just as important as being able to plot points. To identify the x-coordinate of a point, read the number on the x-axis directly above or below the point. To identify the y-coordinate of a point, read the number on the x-axis directly above or below the point. read the number on the y-axis directly to the left or right of the point. Remember, when you write the ordered pair use the correct order, (x,y). Name the ordered pair of each point is -3. The point is to the left of 3 on the y-axis, so the y-coordinate of the point is -3. The coordinates of the point is -3. The coordinate of the point is -3. point is 2. The point is to the right of 4 on the y-axis, so the y-coordinate of the point is 4. The coordinate of the point is 4. The point is 4. The point is 4. The point is -4. The coordinate of the point is -4. The point is -4 and -4. The point is -4 and -4. The coordinates of point E are (0,-2). Point F is on the x-axis at x=3. The coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). Name the ordered pair of each point shown in the rectangular coordinates of point F are (3,0). coordinate system. Figure \(\PageIndex{10}\) Answer A: (4,2) B: (-2,3) C: (-4,-4) D: (3,-5) E: (-3,0) F: (0,2) Up to now, all the equations with just one variable. In almost every case, when you solved the equation you got exactly one solution. The process of solving an equation ended with a statement like x=4. (Then, you checked the solution by substituting back into the equation.) Here's an example of an equations of this form are have more than one variable. Equations with two variables may be of the form Ax+By=C. Equations of this form are called linear equations in two variables. An equation of the form Ax+By=C, where A and B are not both zero, is called a linear equation in two variables. Notice the word line in linear. Here is an example of a linear equation in two variables. X and y. Figure \(\PageIndex{11}\) The equation y=-3x+5 is also a linear equation. But it does not appear to be in the form Ax+By=C. We can use the Addition Property of Equality and rewrite it in Ax+By=C form. (\begin{array}{llll} {} &{y &{=} &{-3x + 5 + 3x} \\{\text{Add to both sides.}} &{y + 3x} &{=} &{5} \\{\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{5} \(\text{Add to both sides.}} &{y + 3x} &{=} &{text{Add to both sides.}} &{text{Add to both sides. $C(text{ form.}) \& \{ \& \} (array))$ By rewriting y=-3x+5 as 3x+y=5, we can easily see that it is a linear equation is in standard form. A linear equation is a linear equation is equal to the standard form. A l and C be integers and \(A\geq 0\) when writing a linear equation in standard form, although it is not strictly necessary. Linear equations have infinitely many solutions. For every number that is substituted for x there is a corresponding y value. This pair of values is a solution to the linear equation and is represented by the ordered pair (x,y). When we substitute these values of x and y into the equation, the result is a true statement, because the value on the left side is equal to the value on the left side. An ordered pair (x,y) is a solution of the linear equation. Determine which ordered pairs are solutions to the equation and determine if the result is a true statement. Which of the following ordered pairs are solutions to the equation and determine if the result is a true statement. Which of the following ordered pairs are solutions to the equation 4x-y=8? Answer 2, 3 Which of the following ordered pairs are solutions to the equation y=5x-1? (a) (0,-1) (b) (1,4) (c) (-2,-7) Answer Substitute the x- and y-values from each ordered pairs are solutions to the equation y=4x-3? Answer 2 Which of the following ordered pairs are solutions to the equation y=-2x+6? Answer 1, 2 In the examples above, we substituted the x- and y-values of a given ordered pairs if they are not given? It's easier than you might think—you can just pick a value for xx and then solve the equation for yy. Or, pick a value for yy and then solve for xx. We'll start by looking at the solutions, as shown in Table \(\PageIndex{13}\). We can summarize this information in a table of solutions, as shown in Table \(\PageIndex{13}\). $(PageIndex{1})$ To find a third solution, we'll let x=2 and solve for y. Figure $(PageIndex{2})$ We can find more solutions to the equation by substituting in any value of x or any value of y (2,9) Table $(PageIndex{2})$ We can find more solutions to the equation by substituting in any value of x or any value of y and solving the resulting equation to get another ordered pair that is a solution. There are infinitely many solutions of this equation. Complete Table to find three solutions to the equation y=4x-2. y=4x-2. The results are summarized in Table \ Table \ (PageIndex{3}) Answer Substitute x=0, x=-1, and x=2 into y=4x-2. The results are summarized in Table \ $(PageIndex{4}), y=4x-2xy(x,y) 0 - 2(0,-2) - 1 - 6(-1,-6) 2 6(2,6) Table ((PageIndex{4})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 (0, -1) - 1 - 4(-1, -4) 2 5(2, 5) Table ((PageIndex{6})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 (0, -1) - 1 - 4(-1, -4) 2 5(2, 5) Table ((PageIndex{6})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 (0, -1) - 1 - 4(-1, -4) 2 5(2, 5) Table ((PageIndex{6})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 (0, -1) - 1 - 4(-1, -4) 2 5(2, 5) Table ((PageIndex{6})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 (0, -1) - 1 - 4(-1, -4) 2 5(2, 5) Table ((PageIndex{6})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 (0, -1) - 1 - 4(-1, -4) 2 5(2, 5) Table ((PageIndex{6})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 (0, -1) - 1 - 4(-1, -4) 2 5(2, 5) Table ((PageIndex{6})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 (0, -1) - 1 - 4(-1, -4) 2 5(2, 5) Table ((PageIndex{6})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 (0, -1) - 1 - 4(-1, -4) 2 5(2, 5) Table ((PageIndex{6})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 (0, -1) - 1 - 4(-1, -4) 2 5(2, 5) Table ((PageIndex{6})) Complete the table to find three solutions to this equation: y=3x-1 x y (x,y) 0 - 1 - 2 - 4(-1, -4) 2 - 4(-1, -$ -2 Table $(PageIndex{7})$ Answer $y=6x+1 \times y(x,y) 0 1 (0,1) 1 7 (1,7) -2 -11 (-2,-11)$ Table $(PageIndex{8})$ Complete Table $(PageIndex{9})$ to find three solutions to the equation $5x-4y=20 \times y(x,y)$ 0 5 Table $((PageIndex{9}))$ Answer Substitute the given value into the this equation: y=6x+1. $y=6x+1 \ge y \ge 0$ equation 5x-4y=20 and solve for the other variable. Then, fill in the values in the table. The results are summarized in Table (\PageIndex{10}). $5x-4y=20 \times y (x,y) 0 - 5 (0,-5) 4 0 (4,0) 8 5 (8,5)$ Table \(\PageIndex{10}\). -5 Table $(PageIndex \{11\})$ Answer $2x-5y=20 \times y$ (x,y) 0-4(0,-4) 100(10,0) - 5 - 6(-5,-6) Table \(\PageIndex{12}\) Complete the table to find three solutions to this equation: 3x-4y=12. 3x-4y=12 x y (x,y) -4 Table $(PageIndex{13})$ Answer $3x-4y=12 \times y (x,y) 0 - 3 (0,-3) 4 0 (4,0) - 4 - 6 (-4,-6) Table <math>(PageIndex{14})$ To find a solution to a linear equation, you really can pick any number you want to substitute into the equation for x or y. But since you'll need to use that number to solve for the other variable it's a good idea to choose a number that's easy to work with. When the equation is in y-form, with the y by itself on one side of the equation, it is usually easier to choose values of x and then solve for y. Find three solutions to the equation y = -3x + 2. Answer We can substitute any value we want for x or any value for y. Since the equation is in y-form, it will be easier to substitute in values of x. Let's pick x=0, x=1, and x=-1. Substitute the value into the equation. Simplify. Write the ordered pair. (0, 2) (1, -1) (-1, 5) Check. y = -3x + 2 y =are all solutions to y=-3x+2. We show them in Table \(\PageIndex{16}\). y=-3x+2 x y (x,y) 0 2 (0,2) 1 - 1 (1,-1) - 1 5 (-1,5) Table \(\PageIndex{16}\) Find three solutions to this equation: y=-2x+3. Answer Answers will vary. Find three solutions to this equation: y=-4x+1. Answer Answers will vary. We have seen how using zero as one value of x makes finding the value of y easy. When an equation is in standard form, with both the x and y on the same side of the equation, it is usually easier to first find one solution when x=0 find a second solution when x=0, and then find a third solution. Find three solutions to the equation 3x+2y=6. Answer We can substitute any value we want for x or any value for y. Since the equation is in standard form, let's pick first x=0, then y=0, and then find a third point. Substitute the value into the equation. Simplify. Solve. Write the ordered pair. (0, 3) (2, 0) \((1,\frac{3}{2})) Check. 3x+2y=6 3x $(3\cdot 1 + 2\cdot \frac{3}{2}\stackrel{?}{=} 6) (6 + 0 \stackrel{?}{=} 6) (6 + 0 \stackrel{?}$ $(PageIndex{18}). 3x+2y=63x+2y=6 x y (x,y) 0 3 (0,3) 2 0 (2,0) 1 ((frac{3}{2})) Table ((PageIndex{18})) Find three solutions to the equation <math>2x+3y=6$. Answer Answers will vary. Find three solutions to the equation 2x+3y=6. Answer Answers will vary. Find three solutions to the equation 2x+3y=6. Quadrant II }} & {\text { Quadrant IV }} \\ {(x, y)} & {(x, y)} coordinate equal to 0 are on the y-axis, and have coordinates (0,b). Solution of a Linear equation An ordered pair (x,y) is a solution of the linear equation Ax+By=C, if the equation is a true statement when the x- and y- values of the ordered pair (x,y) is a solution of the linear equation. are not both zero, is called a linear equation in two variables. ordered pair (x,y) gives the coordinates of a point in a rectangular coordinates of a point in a rectangular coordinates of a point in a rectangular coordinates of a point (0,0)(0,0) is called the origin. It is the point where the x-axis and y-axis intersect. quadrant The x-axis and the y-axis divide a plane into four regions, called quadrants. rectangular coordinate system A grid system is used in algebra to show a relationship between two variables; also called the xy-plane or the 'coordinate plane'. x-coordinate pla

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