**Barron’s Let’s Review Regents – Algebra I**

# Chapter 5: Graphs of Solution Sets of Linear Equations

## 5.1 Producing a Graph by Identifying Two or More Points

A linear equation, like x + y = 10, is one where neither of the variables has an exponent greater than or equal to 2. The set of ordered pairs that makes this equation true includes (2, 8), (3, 7) and (9, 1). If each ordered pair is plotted as a point on the *coordinate plane*, the result is the *graph of the solution set of the equation*.

### Graphing the Solution Set of Linear Equation Making a Table of Values

The equation x + y = 10 has an infinite number of ordered pairs that satisfy it. For a linear equation, only two ordered pairs are needed.

|  |  |
| --- | --- |
| x | y |
| 2 | 8 |
| 3 | 7 |
| 9 | 1 |

The line on a graph contains an infinite number of points.

### Graphing the Solution Set of Linear Equations Using the Two-Intercept Method

Unless a line is vertical or horizontal, it will cross both the x-axis and y-axis. The point where the line crosses the x-axis is called the *x-intercept*, and the point where it crosses the y-axis is called the *y-intercept*. Any point on the y-axis has an x-coordinate of 0, and any point on the x-axis has a y-coordinate of 0.

A quick way to make a graph of the solution set of a two-variable equation is to calculate the x- and y-intercepts.

### Equations for Horizontal or Vertical Lines

An equation with one variable can also have a solution set of ordered pairs. One ordered pair that satisfies the equation y = 3 is (0, 3). When all ordered pairs that satisfy the equation y =3 are graphed, it becomes a horizontal line with y-intercept of (0, 3).

### Graphing Linear Equations Involving Absolute Value

The absolute value of a number is defined as the distance that number is from zero on the number line. The symbol for the absolute value of a is |a|.

### Solving Systems of Linear Equations by Graphing

The ordered pair that is the solution to a system of linear equations will be related to the point of intersection of the two lines that are graphs of the solution sets of the two equations.

x + y = 10  
x – y = 2

Using algebra, the solution was (6, 4).

A graph of x and y with a green line

AI-generated content may be incorrect.

### Check Your Understanding of Section 5.1

1. Multiple-Choice
2. Which are the coordinates of a point that will be on the line that represents the solution set of the equation 2x + 3y = 12?  
   **(4) (3,2)**
3. What is the x-intercept of the graph of the solution set of the equation 2x + 5y = 20?  
   **(1) (10, 0)**
4. What is the y-intercept of the graph of the solution of the equation 3x – 8y = 24?  
   **(1) (0, -3)**
5. The point (2, k) is on the graph of the solution set of the equation 3x + y = 15. What is the value of k?  
   **(3) 9**
6. Based on the x-intercept and y-intercept, this is the graph of the solution of which equation?  
   x-intercept (9, 0), y-intercept (0, 2)  
   **(2) 2x + 9y = 18**
7. Which is a graph of the solution set of the equation y = 5?  
   **(2)**
8. This is a graph of the solution set of which equation?  
   **(1) x = 8**
9. The equations 2x – 3y = 9 and 3x + 2y = 20 are graphed below. What is the solution to the set of equations?  
   A graph of x and y with red line

   AI-generated content may be incorrect.  
   **(4) 6, 1**
10. Below is the graph of the solution set of an equation. Based on this graph, which ordered pair does not seem to be part of the solution set of the equation ?  
    **(3) (6, 8)**
11. What is the equation of the x-axis?  
    **(2) y = 0**
12. Show how you arrived at your answers.
13. Make a table of values to graph the solution set of the equation y + 2x = 8.

|  |  |
| --- | --- |
| x | y |
| 0 | 8 |
| 4 | 0 |

1. Determine the x-intercept and y-intercept for the graph of the solution set of 4x – 6y = 24 and use them to produce a sketch of the graph.

|  |  |
| --- | --- |
| x | y |
| 0 | -4 |
| 6 | 0 |

The x-intercept is (6, 0) and the y-intercept is (0,4).

A graph of a line

AI-generated content may be incorrect.

1. Tenley says that this is the graph of the equation y = 3. Ingrid says that this is the graph of the equation x = 3. Who is correct? Explain your reasoning.  
     
   Tenley is correct, because y is always 3, no matter what value of x. Ingrid is incorrect because (0, 3) is a point in the solution set, and that is for x = 0, y = 3, which is not x = 3.
2. Graphically solve the system of equations.  
   x – y = 4  
   3x + 5y = 20  
   5x – 5y = 20  
   8x = 40, x = 5, y = 1

|  |  |  |  |
| --- | --- | --- | --- |
| x – y = 4 | | 3x + 5y = 20 | |
| x | y | x | y |
| 0 | -4 | 0 | 4 |
| 4 | 0 | *≈* | 0 |

A graph of x and y with a green line

AI-generated content may be incorrect.

1. Below is the graph for 2x + y = k with intercepts at (0, 8) and (4, 0). What must the value of k be?  
   2(0) + 8 = k, **k = 8**  
   ck: 2x + y = 8  
   2(0) + 8 = 8 ck  
   2(4) + 0 = 8 ck.