Slope-Intercept Form

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Printed: July 25, 2012

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CONCEPT 1

Slope-Intercept Form

Here you'll learn how to convert a linear equation into slope-intercept form and determine the slope and y-intercept of the line.

Suppose that you were a senior in high school and wanted to graph a linear equation that could be used to find the number of days until graduation based on the day of the year. One way to graph such an equation would be to find the slope and $y-$intercept, but how could you determine this information? The answer is by converting the equation into slope-intercept form, and in this Concept, you'll learn all about this form of a linear equation.

Guidance

So, you have learned how to graph the solutions to an equation in two variables by making a table and by using its intercepts. A previous lesson introduced the formulas for slope. This lesson will combine intercepts and slope into a new formula.

You have seen different forms of this formula. Below are several examples.

$$2x+5=y$$
$$y=\frac{-1}{3}x+11$$
$$d=60(h)+45$$

The proper name given to each of these equations is **slope-intercept form** because each equation tells the slope and the $y-$intercept of the line.

The **slope-intercept form of an equation** is: $y=(slope)x+(y-\text{intercept})$.

$y=(m)x+b$, where $m=slope$ and $b=y-\text{intercept}$

This equation makes it quite easy to graph the solutions to an equation of two variables because it gives you two necessary values:

1. The starting position of your graph (the $y-$intercept)
2. The directions to find your second coordinate (the slope)

Example A

Determine the slope and the $y-$intercept of the first two equations in the opener of this Concept.

Solution: Using the definition of slope-intercept form; $2x+5=y$ has a slope of 2 and a $y-$intercept of (0, 5).

$y=\frac{-1}{3}x+11$ has a slope of $\frac{-1}{3}$ and a $y-$intercept of (0, 11).

Slope-intercept form applies to many equations, even those that do not look like the "standard" equation.

Example B

Determine the slope and $y-$intercept of $7x=y$.

Solution: At first glance, this does not look like the "standard" equation. However, we can substitute values for the slope and $y-$intercept.

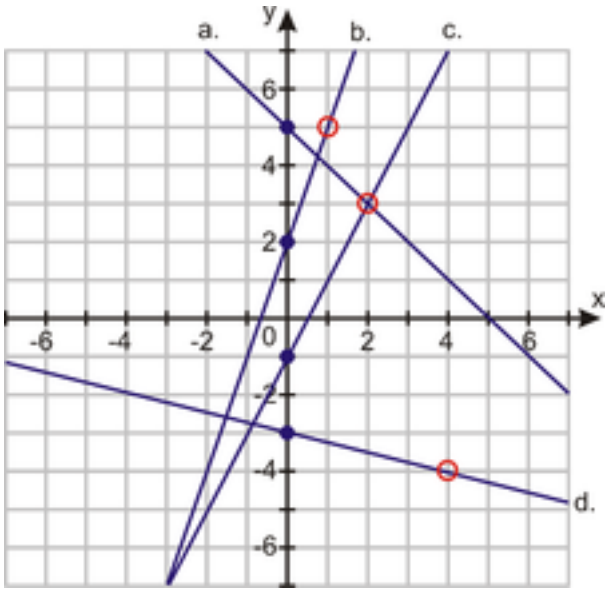
$$7x+0=y$$

This means the slope is 7 and the $y-$intercept is 0.

Example C

Determine the slope and $y-$intercept of the lines graphed below.

Solution: Beginning with line a, you can easily see the graph crosses the $y-$axis (the $y-$intercept) at (0, 5). From this point, find a second coordinate on the line crossing at a **lattice point**.



Line a: The $y-$intercept is (0, 5). The line also passes through (2, 3).

$$\text{slope } m=\frac{\triangle y}{\triangle x}=\frac{-2}{2}=-1$$

Line b: The $y-$intercept is (0, 2). The line also passes through (1, 5).

$$\text{slope } m=\frac{\triangle y}{\triangle x}=\frac{3}{1}=3$$

The remaining lines will be left for you in the Practice Set.

Vocabulary

Slope-intercept form: The ***slope-intercept form of an equation*** is: $y=(slope)x+(y-\text{intercept})$ or $y=(m)x+b$, where $m=slope$ and $b=y-$intercept.

Lattice point: At the intersection of grid lines on a graph are ***lattice points.*** A ***lattice point*** is a coordinate pair with integer values.

Guided Practice

Determine the slope and $y-$intercept of $y = 5$.

Solution:

Using what you learned in the last Concept, the slope of every line of the form $y =$ *some number* is zero because it is a horizontal line. Rewriting our original equation to fit slope-intercept form yields:

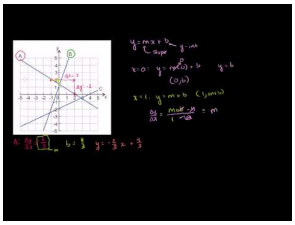
$$y = (0)x + 5$$

Therefore, the slope is zero and the $y-$intercept is (0, 5).

You can also use a graph to determine the slope and $y-$intercept of a line.

Practice

Sample explanations for some of the practice exercises below are available by viewing the following video. Note that there is not always a match between the number of the practice exercise in the video and the number of the practice exercise listed in the following exercise set. However, the practice exercise is the same in both. CK-12 Basic Algebra:Graphs Using Slope-Intercept Form (11:11)



MEDIA

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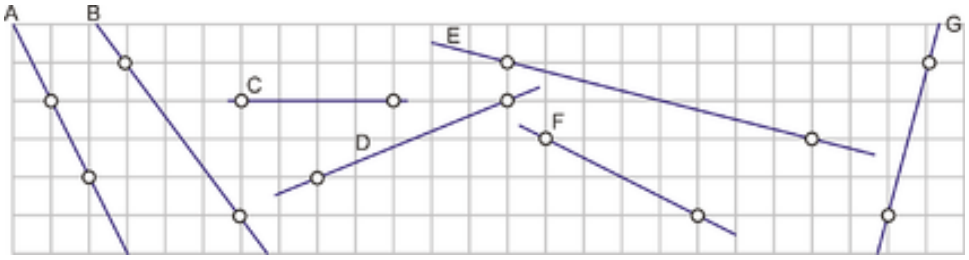
In 1 – 8, identify the slope and $y-$intercept for the equation.

1. $y = 2x + 5$
2. $y = -0.2x + 7$
3. $y = x$
4. $y = 3.75$
5. $\frac{2}{3}x - 9 = y$
6. $y = -0.01x + 10,000$
7. $7 + \frac{3}{5}x = y$
8. $-5x + 12 = 20$

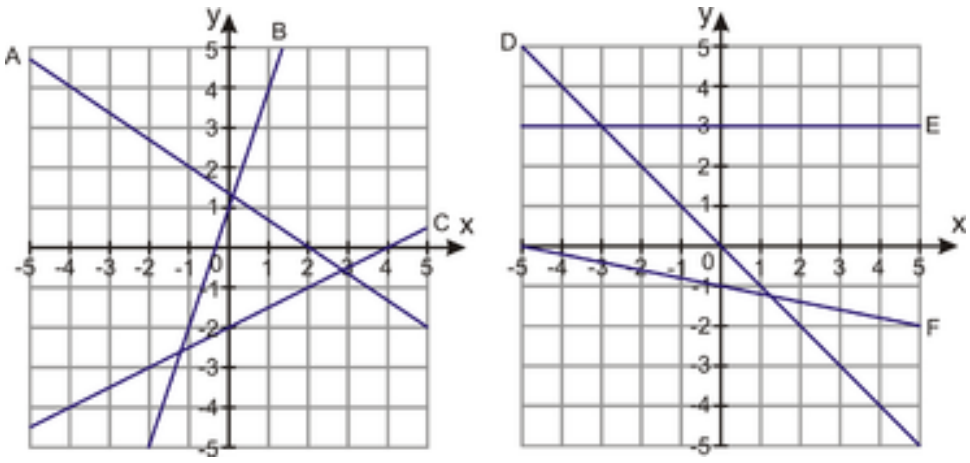
In 9 – 15, identify the slope of the following lines.



9. F

10. *C*
11. *A*
12. *G*
13. *B*
14. *D*
15. *E*

In 16 – 21, identify the slope and $y-$intercept for the following functions.



16. *D*
17. *A*
18. *F*
19. *B*
20. *E*
21. *C*