Grade 7 going into 8 Math Packet.

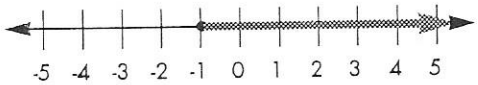
Variables and Number Lines

Variables are used to describe sets of numbers on a number line.

$x < 4$

This set of numbers includes all numbers less than, but not equal to, 4. The circle on 4 is not filled in to show that 4 is not in this set.

$x \geq -1$

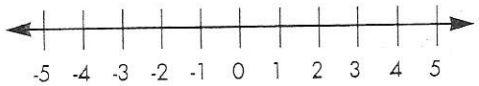


This set of numbers includes all numbers greater than OR equal to -1. The circle on -1 is filled in to show that -1 is in this set.

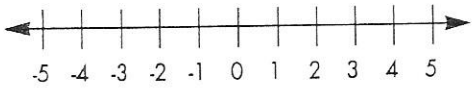
Graph the sets of numbers on the number lines.

1. $x > 3$

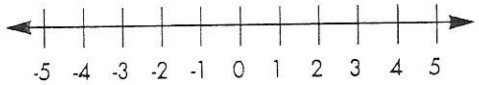
2. $t < 1$



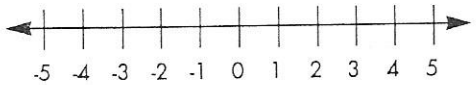
3. $s \geq -2$



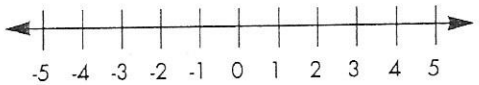
4. $w \leq 0$



5. $y > 5 + -6$

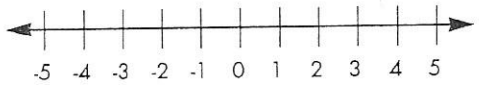


6. $q \geq -6 - -4$

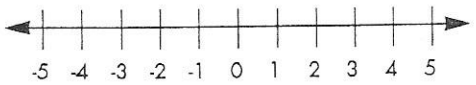


7. $r \leq 2 \cdot -2$

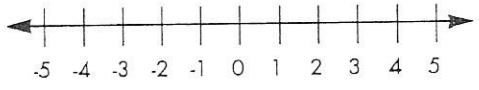
8. $v < \frac{-20}{4}$



9. $w > 15 - 17 + -1$



10. $d \leq 5 \cdot -4 + 16$



Algebraic Expressions

Word Phrase	Algebraic Expression
5 more than a number	$x + 5$
the product of a number and 7	$7x$
a number divided by the sum of 6 and 3	$\frac{x}{6 + 3}$
3 times a number decreased by 17	$3x - 17$

Match each word phrase with its equivalent algebraic expression.

_____ 1. the sum of a number and 8

_____ 2. the product of a number and 12

_____ 3. 6 less than a number

_____ 4. -7 times a number decreased by 42

_____ 5. the quotient of a number and the absolute value of -10

_____ 6. the difference between a number and -12

_____ 7. the absolute value of the sum of 4 times a number and -8

_____ 8. a number increased by 7 then divided by 11

_____ 9. the difference between 42 and -7 times a number

_____ 10. the product of -7 and the sum of a number and 42

a. $-7x - 42$

b. $x - -12$

c. $x + 8$

d. $42 - -7x$

e. $12x$

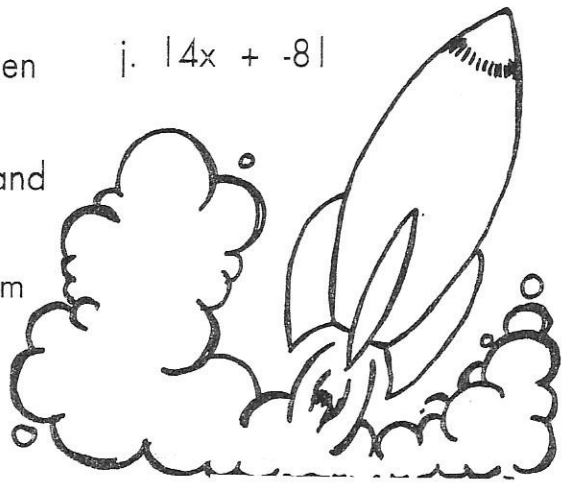
f. $\frac{x + 7}{11}$

g. $x - 6$

h. $-7(x + 42)$

i. $\frac{x}{|-10|}$

j. $|4x + -8|$



Solving Equations—Part 1

Variables are used in equations to represent unknown quantities. Equations are solved to determine the value of the unknown quantity. Equations are like balance scales. To keep the two sides equal, you have to do the same to both sides. If you take some away from one side without taking the same amount from the other side, the quantities would no longer be equal.

$$s + 36 = 127$$
$$s + 36 - 36 = 127 - 36$$
$$s = 91$$

Solve the equations to find the value of each variable.

1. $x + 17 = 41$

   $x + 17 - \_\_\_\_ = 41 - \_\_\_\_$

   $x = \_\_\_\_$

2. $t - 42 = 28$

   $t - 42 + \_\_\_\_ = 28 + \_\_\_\_$

   $t = \_\_\_\_$

3. $83 + y = 91$

   $83 \_\_\_\_ + y = 91 \_\_\_\_$

   $y = \_\_\_\_$

4. $-65 + r = 67$

   $-65 \_\_\_\_ + r = 67 \_\_\_\_$

   $r = \_\_\_\_$

5. $57 + p = 26$

   $p = \_\_\_\_$

6. $f - -52 = -12$

   $f = \_\_\_\_$

7. $-15 + g = -41$

   $g = \_\_\_\_$

8. $z + -81 = -26$

   $z = \_\_\_\_$

9. $5.7 + d = 89.6$

   $d = \_\_\_\_$

10. $c - 8.97 = -52.1$

    $c = \_\_\_\_$

Solving Equations

(with variables on both sides)

When there are variables on both sides of the equal sign, get them together all on one side and put all the numbers on the other side.

$$2x + 17 = -6x - 12$$
$$2x - -6x + 17 = -6x - -6x - 12$$
$$8x + 17 = -12$$
$$8x + 17 - 17 = -12 - 17$$
$$8x = -29$$
$$\frac{8x}{8} = \frac{-29}{8}$$
$$x = -3\frac{5}{8}$$

1. $25y + 7 = 5y - 65$

$y =$ _____

2. $3v - 6\frac{3}{8} = -3v + 1\frac{1}{8}$

$v =$ _____

3. $5n + -17.5 = 14.6 - 5.7n$

$n =$ _____

4. $6 - c = 7c - 6$

$c =$ _____

Slope

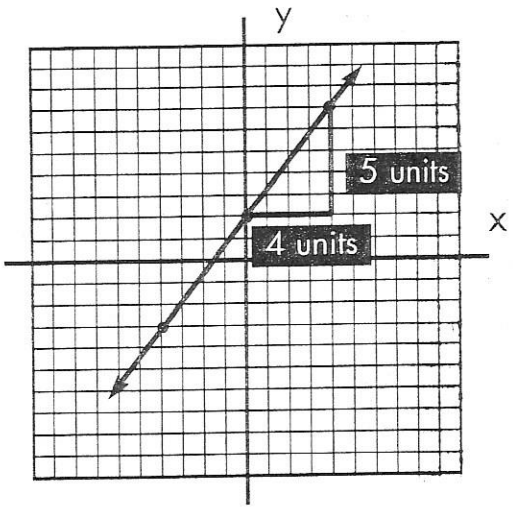
Another key to using the short cut to graphing is to understand slope. In the equation $y = mx + b$, m stands for slope. The slope of a hill tells how steep the hill is. The same is true for the slope of a line.

Slope is given a numerical value by finding two points and noticing the change in y and the change in x. (0, 2) and (4, 7) are two points on the line at the right.

Slope = $\frac{\text{change in y}}{\text{change in x}}$

Slope = $\frac{7 - 2}{4 - 0}$

Slope = $\frac{5}{4}$

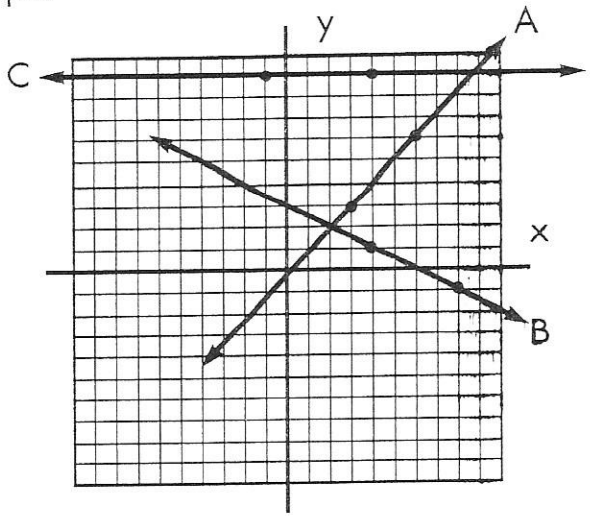


Pick any two points on the same line and the slope should be the same. Consider (-4, -3) and (4, 7)

Slope = $\frac{7 - -3}{4 - -4}$

Slope = $\frac{10}{8} = \frac{5}{4}$

Find the slope of each line on the graph.



1. Line A
   Slope = _____

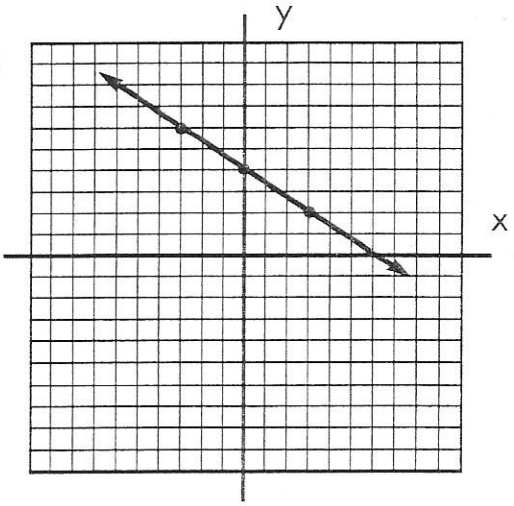
2. Line B
   Slope = _____

3. Line C
   Slope = _____

Finding Equations

When a line is in the form of $y = mx + b$, you can graph it using a short-cut. You know how to get an equation into that form. You know what slope is. Now, what does the b stand for? b represents the **y-intercept,** or the place where the line crosses the y-axis. The y-intercept for the line at the right is 4. The slope of the line is ⅔. So, the equation of this line must be

$$y = \frac{3}{2}x + 4$$



Write the equation for each line on the graph.

1. Line A

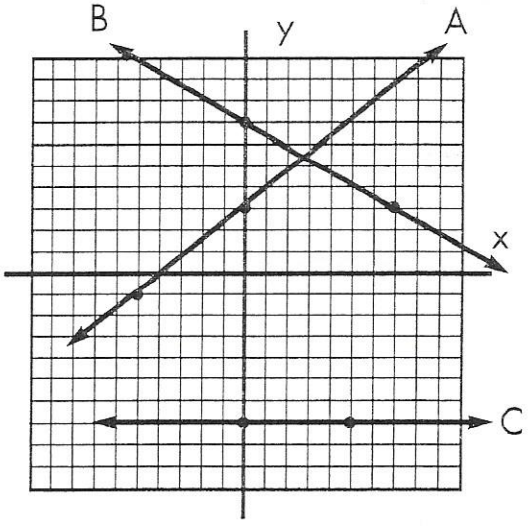
_____

2. Line B

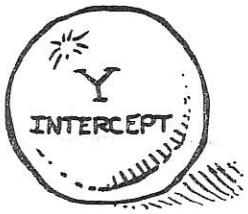
_____

3. Line C

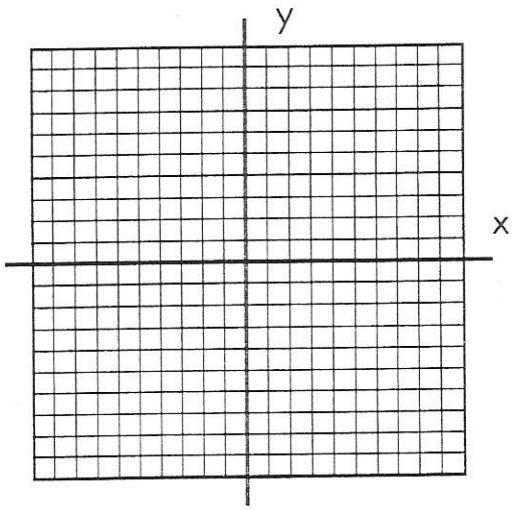
_____



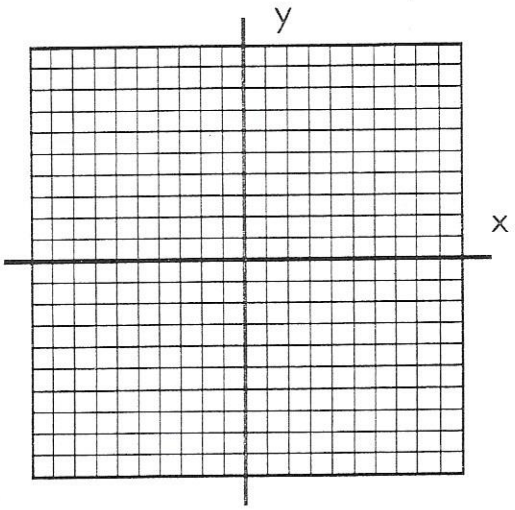
Graph each of the following lines using the short-cut method. If necessary, solve for y to get the equation in the right form.



4. $3y = -2x - 6$



5. $2x + y = 8$



6. $-3x - 2y = 12$