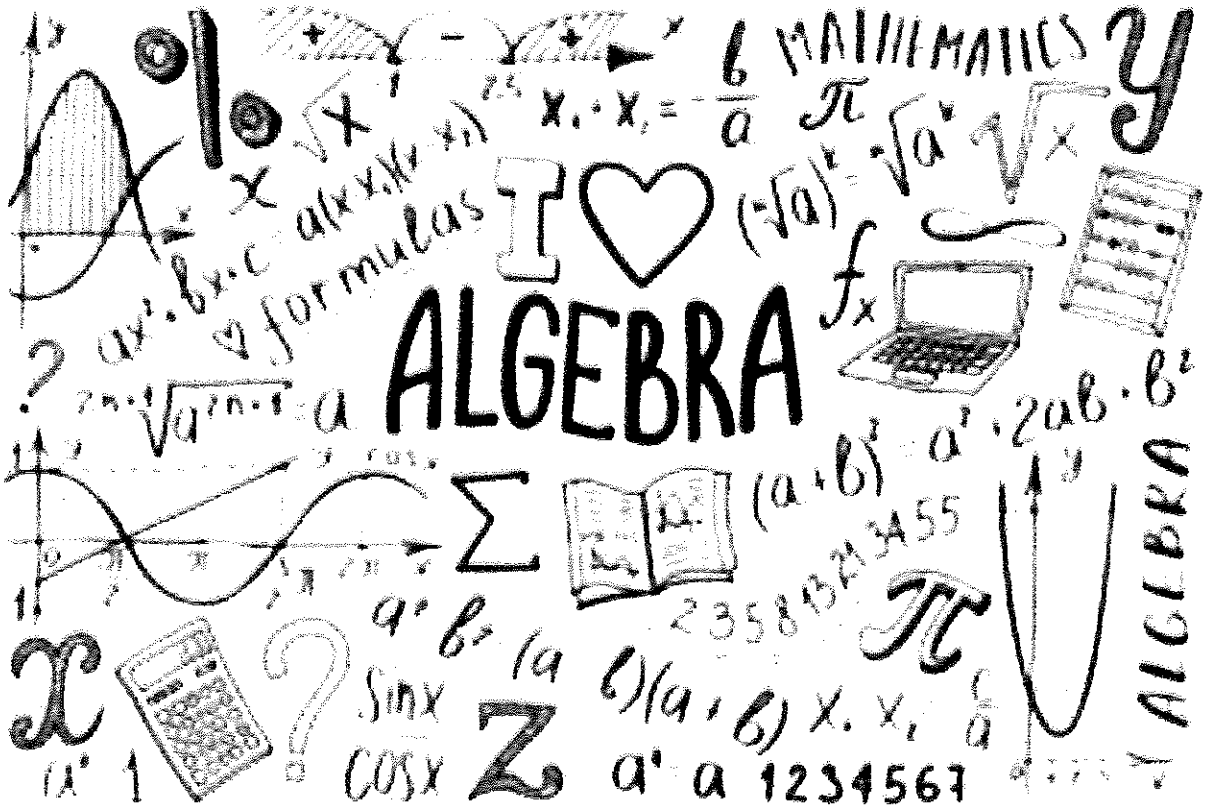
8th Grade
Summer Math Packet



Name:_____

Please complete this packet and turn it in within the first couple of weeks of school.

8th Grade
Summer Math Packet Instructions

1. There are 9 weekly review sheets in this packet. Each sheet focuses on a different topic that you may have learned in earlier grades. Your goal is to complete 1 sheet per week. **PLEASE SHOW ALL OF YOUR WORK!**
2. After completing a sheet, rate your understanding of the topic by circling the image on the following page:
    - **Smiley Face** - you understand ALL the concepts for that week and would be able to teach it to another student
    - **Neutral Face** - you understand the concepts for the most part
    - **Confused Face** - you do not understand these concepts and need help reviewing.

What do I do if I don't understand something?

- Use your resources (online help sites, videos, parents, siblings, friends, etc.)
- Use one of the referenced sites in the packet
- Make a note of the topic/question on the rating sheet and ask your teacher to review it during the first week of school

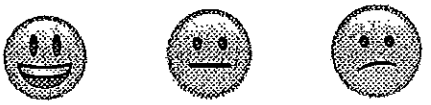
What do I do next?

- Bring your packet with you the first week of school.
- You will begin 8th grade Math class by reviewing this packet.

8th Grade Summer Math Packet

Name _____ Team: _____

As you work through the packet, please circle the image that best reflects your understanding of each of the following topics:

Week #	Topic	My Rating
1	• Scale Factor and Proportions	
2	• Integer Operations	
3	• Adding/Subtracting/Multiplying/Dividing Fractions	
4	• Order of Operations	
5	• Solving 2 Step Equations	
6	• Solving Equations With x on Both Sides	
7	• Distributing and Combining Like Terms	
8	• Writing Linear Equations from Tables	
9	• Making a Table and Graph from a Linear Equation	

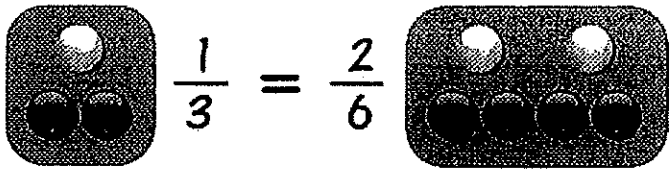
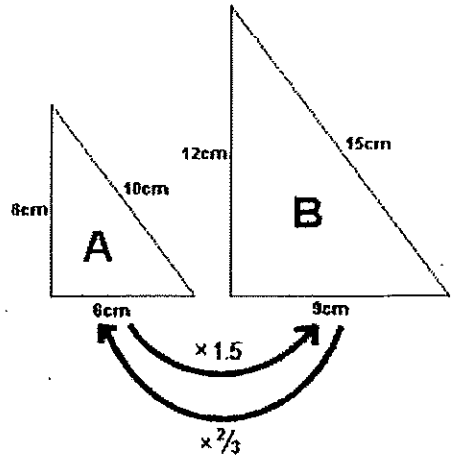
8th Grade Summer Math Packet LINKS

Week	Topic	LINKS
1	Scale Factor & Proportions	• https://www.mathsisfun.com/algebra/proportions.html • http://www.ixl.com/math/grade-7/scale-drawings-and-scale-factors
2	Integer Operations	• http://www.mathgoodies.com/lessons/vol5/addition.html • http://www.mathgoodies.com/lessons/vol5/subtraction.html • http://www.mathgoodies.com/lessons/vol5/multiplication.html • http://www.aaamath.com/div65_x2.htm
3	Fractions	• www.khanacademy.org/math/cc-fifth-grade-math/cc-5th-fractions-topic/cc-5th-add-sub-fractions/e/adding_fractions
4	Order of Operations	• https://www.khanacademy.org/math/pre-algebra/order-of-operations
5	Two-step Equations	• http://tinyurl.com/omd32c2 • http://tinyurl.com/yjrqdpb
6	Equations with variables on both sides	• https://www.khanacademy.org/math/algebra/solving-linear-equations-and-inequalities/basic-equation-practice/v/equations-3
7	Distributive Property & Combining like terms	• https://www.khanacademy.org/math/pre-algebra/pre-algebra-arith-prop/pre-algebra-ditributive-property/a/distributive-property-explained • https://www.wyzant.com/resources/lessons/math/algebra/combining-like-terms
8	Writing Linear Equations from a table	• https://www.khanacademy.org/math/algebra-basics/core-algebra-graphing-lines-slope/core-algebra-equation-of-a-line/v/slope-intercept-form-from-table
9	Linear Equations	• http://www.virtualnerd.com/middle-math/equations-functions/graphing/linear-equation-graphing-method

* These are challenge problems. Try them out !! :)

Summer Math Packet

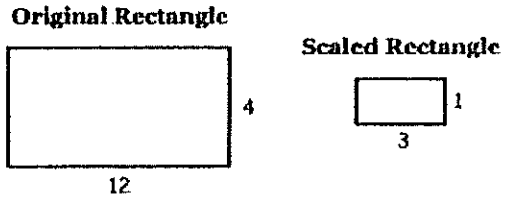
Week #1

Skill #1: Scale Factor	Skill #2: Proportions
Scale factor is the number used to multiply the lengths of a figure to stretch or shrink it to a similar image.	A **proportion** is an equation stating that two ratios are equal. 
	$\frac{x}{10} = \frac{4}{5}$ In order to identify an unknown variable: 1. Find the scale factor between the known quantities. (5 x **2** = 10) 2. Use the scale factor to find the value of the variable. (4 x **2** = x so $x = 8$)

Check out these links for more practice…

- https://www.mathsisfun.com/algebra/proportions.html
- http://www.ixl.com/math/grade-7/scale-drawings-and-scale-factors

Now try these problems



1. What is the scale factor from the original rectangle to the scaled rectangle?

2. What is the scale factor from the scaled rectangle to the original rectangle?

Solve for x in each proportion.

3. $\frac{8}{11} = \frac{16}{x}$

4. $\frac{x}{10} = \frac{10}{25}$

Check your answers on the back of this sheet…

1. $\frac{1}{4}$ 2. 4 3. $x = 22$ 4. $x = 4$

Great Work! Now it's time to practice.

1. The triangles at the right are similar.

   a. Use the side lengths of triangle *DEF* and the fact that the triangles are similar to find the lengths of sides *AC* and *AB* and the measure of angle *E*.

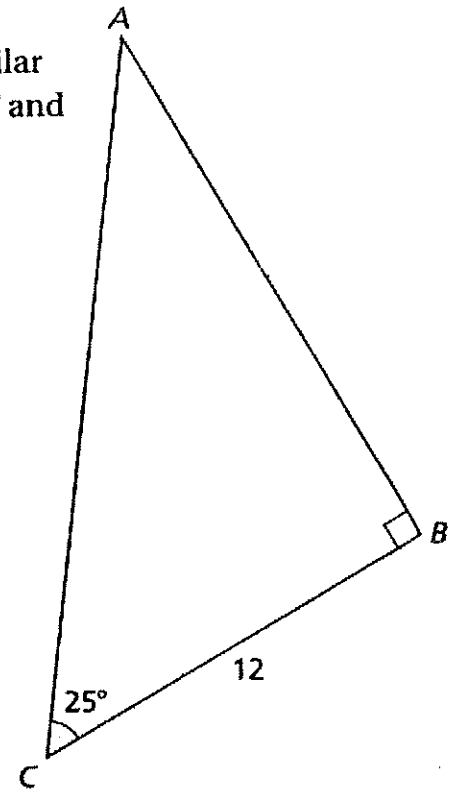
   side AC = _____

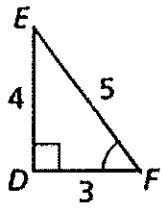
   side AB = _____

   angle E = _____

   b. What is the scale factor from triangle *DEF* to triangle *ABC*?

   c. What is the scale factor from triangle *ABC* to triangle *DEF*?





2. Find the value of x that will make each proportion true.

   a. $\frac{3}{4} = \frac{24}{x}$

   b. $\frac{2}{3} = \frac{x}{15}$

   c. $\frac{x}{5} = \frac{5}{25}$

   d. $\frac{4}{x} = \frac{10}{30}$

2)

Summer Math Packet

Week #2

Skill #1: Adding & Subtracting Integers	**Skill #2:** Multiplying & Dividing Integers
ADDITION pos. + pos. = pos. neg. + neg. = neg. pos. + neg OR neg. + pos. = Subtract the numbers and take the sign of the greater number. Examples: 10 + 25 = 35 -10 + (-25) = - 35 10 + (-25) = -15 -10 + 25 = 15	 pos. (pos.) = pos.  neg. (neg.) = pos.  OR  pos. (neg.) = neg. neg. (pos.) = neg. Examples: 10 (15) = 150 150/10 = 15 -10 (-15) = 150 -150/-10 = 15 10 (-15) = -150 150/-10 = -15 -10 (15) = -150 -150/10 = -15
SUBTRACTION "add the opposite" then follow the rules for adding integers Examples: 10 - 25 → 10 + (-25) = -15 -10 - (-25) →-10 + 25 = 15 10 - (-25) → 10 + 25 = 35 -10 - 25 → -10 + (-25) = -35 Note: A double negative makes a positive.	

Check out these links for more practice…

- http://www.mathgoodies.com/lessons/vol5/addition.html
- http://www.mathgoodies.com/lessons/vol5/subtraction.html
- http://www.mathgoodies.com/lessons/vol5/multiplication.html
- http://www.aaamath.com/div65_x2.htm

Now try these problems

1. 46 + (-13)
2. -16 + (-2)
3. -13 - (-16)
4. 13 - (-13)
5. -12 (-5)
6. $\frac{30}{-15} =$

Check your answers on the back of this sheet…

1. 33 2. -18 3. 3 4. 26 5. 60 6. -2

Great Work! Now it's time to practice. NO calculator! =)

1.) -37 + 22 = _____

2.) 4 - (-14) = _____

3.) 16 - 25 = _____

4.) -25 ÷ -5 = _____

5.) 12 (-11) = _____

6.) 56 ÷ -7 = _____

7.) -3 - (-9) = _____

8.) -19 + (-21) = _____

9.) -6 (-6) = _____

10.) -4 (8) = _____

11.) $\frac{-144}{-12}$ = _____

12.) -9 + 17 = _____

Summer Math Packet

Week #3

Skill: Fractions

Rules for Fractions

Addition: (same denominators)

$$\frac{A}{B} + \frac{C}{B} = \frac{A + C}{B}$$

Subtraction: (same denominators)

$$\frac{A}{B} - \frac{C}{B} = \frac{A - C}{B}$$

Multiplication:

$$\frac{A}{B} \times \frac{C}{D} = \frac{AC}{BD}$$

Addition: (different denominators)

$$\frac{A}{B} + \frac{C}{D} = \frac{AD}{BD} + \frac{BC}{BD} = \frac{AD + BC}{BD}$$

Subtraction: (different denominators)

$$\frac{A}{B} - \frac{C}{D} = \frac{AD}{BD} - \frac{BC}{BD} = \frac{AD - BC}{BD}$$

Division:

$$\frac{A}{B} \div \frac{C}{D} = \frac{A}{B} \times \frac{D}{C} = \frac{AD}{BC}$$

Check out these links for more practice…

- www.khanacademy.org/math/cc-fifth-grade-math/cc-5th-fractions-topic/cc-5th-add-sub-fractions/e/adding_fractions

Now try these problems

1. 3/5 + 1/5
2. 5/7 − 2/7
3. 2/4 × 1/9
4. 3/7 + 4/5
5. 5/6 − 2/5
6. 2/3 ÷ 3/2

Check your answers on the back of this sheet…

1. 4/5
2. 3/7
3. 2/36 *or* 1/18
4. 43/35 *or* 1 *and* 8/35
5. 13/30
6. 4/9

Great Work! Now it's time to practice.

1. 3/2 + 6/2
2. 8/12 + 5/12
3. 9/7 − 4/7
4. 12/5 − 8/5
5. 4/5 × 2/3
6. 5/8 × 6/9
7. 3/2 + 4/3
8. 7/8 + 2/5
9. 3/4 + 1/6
10. 3/5 − 1/6
11. 2/3 − 2/7
12. 3/5 ÷ 2/3
13. 1/4 ÷ 3/5
14. 7/5 ÷ 6/5
15. 9/12 ÷ 3/4

(6)

Summer Math Packet

Week #4

Skill: Order of Operations

Following the Order of Operations	Please
1st Parentheses and brackets	Excuse
2nd Exponents	My
3rd Multiply or Divide from left to right.	Dear
4th Add or Subtract from left to right.	Aunt
	Sally

$8 \times 2 + 3 - 10 \div 5 + 6 - 3 \times 4$

$= 16 + 3 - 2 + 6 - 12$

$= 16 + 3 - 2 + 6 - 12$

$= 19 - 2 + 6 - 12$

$= 17 + 6 - 12$

$= 23 - 12$

$= 11$

Check out these links for more practice…

- https://www.khanacademy.org/math/pre-algebra/order-of-operations

Now try these problems

1. $7 + (6 \times 5^2 + 3)$
2. $3 + 6 \times (5 + 4) \div 3 - 7$
3. $(8-1)\times(5-4)$
4. $9-(3-8\div4\div(1\times1))$
5. $(8-7)\times(2+1) +1$
6. $16 \div 2[8 - 3(4 - 2)] + 1$

Check your answers on the back of this sheet…

1. 160 2. 14 3. 7 4. 8 5. 4 6. 17

Great Work! Now it's time to practice.

a. $5 + (7 + 1^2) - 2$

b. $(6 - 9) - 3$

c. $1 + (3 + 6) + 9 \div 9$

d. $8^2 \times (8 + 2^2) \div 6 \times 3$

e. $(2 + 8 \times 5 - 4) \times 4$

f. $(2 + 7^2) - 9^2 - 8$

g. $(4 - 2 \times 2) \div 5 \times 4$

h. $(9^2 \times 9 - 9) \times 3^2 + 5$

Summer Math Packet

Week #5

Skill: 2-Step Equations	
Steps: 1) **Decide whether to use addition or subtraction to isolate the variable term.** 2) **Add or subtract the constant on both sides of the equation.** 3) **Eliminate the variable's coefficient through division or multiplication.**	Example: $3x+4=15$ $3x+4=15$ $\underline{-4 \quad -4}$ $3x=11$ $\frac{3x}{3}=\frac{11}{3}$ $x=\frac{11}{3}$

Check out these links for more practice…

- http://tinyurl.com/omd32c2
- http://tinyurl.com/yjrgdpb

Now try these problems

1. 3b+9 = −18
2. 3z−2 = −26
3. 2x+8 = 4
4. −2y−6 = 6
5. 2a+9 = 11
6. 3y−5 = −32

Check your answers on the back of this sheet…

1. $b = -9$ 2. $z = -8$ 3. $x = -2$ 4. $y = -6$ 5. $a = 1$
6. $y = -9$

Great Work! Now it's time to practice.

1.) $5x + 9 = 39$

2.) $9 - c = -13$

3.) $9p + 11 = -7$

4.) $6 - 2d = 42$

5.) $2m + 5 = 17$

Summer Math Packet

Week #6

Skill: Solving Equations With a Variable on Both Sides	
Work to get the variable isolated on one side of the equation and the number on the other side of the equation. Remember what you do to 1 side of the equation you have to do to the other side of the equation too!	Example: $-2x + 8 = -6x - 4$
1. Use addition or subtraction to move the variable to one side. Then simplify like terms.	$+2x \qquad +2x$ $8 = -4x - 4$
2. Use addition or subtraction to move the number to the opposite side of step 1. Then simplify like terms.	$+4 \qquad +4$ $12 = -4x$
3. Use multiplication or division so that the variable has a coefficient of +1.	$\frac{12}{-4} = \frac{-4x}{-4}$ $-3 = x$
4. Check your solution by substituting your answer back into your original equation!	$-2(-3) + 8 = -6(-3)$ $6 + 8 = 18 - 4$ $14 = 14$

Check out this link for more practice...
https://www.khanacademy.org/math/algebra/solving-linear-equations-and-inequalities/basic-equation-practice/v/equations-3

Now try these problems

1. $7 - 2x = x - 14$

2. $3y + 8 = 2y - 7$

3. $6 - 4x = 16 - 9x$

4. $3.6y = 5.4 + 3.3y$

Check your answers on the back of this sheet . . .

Answers:

1. $x = 7$ 2. $y = -15$ 3. $x = 2$ 4. $y = 18$

Great Work! Now it's time to practice.

1. $6 - 3x = 10 - 5x$

2. $12 - 8y = 25 - 9y$

3. $2x + 4 = 5x - 5$

4. $8 - 4x = -2x - 10$

5. $6.1x = 9.3 - 3.2x$

6. $7y - 8 = 3y + 12$

Challenge:

7. $\frac{1}{2}x - \frac{3}{4} = \frac{3}{5}x$

8. $\frac{2}{3}y - \frac{3}{4} = \frac{3}{4}y$

Summer Math Packet

Week #7

Skill #1: Distribution	**Skill #2:** Combining Like Terms
The Distributive Property says that: **a(b+c) = ab + ac** This means that: **3(2x + 4) =** **3(2x) + 3(4) =** **6x + 12** Pay attention to the signs: **-2(3x - 5) =** **-2(3x) + -2(-5) =** **-6x + 10 (this is called distributing the negative)**	If you have **2 apples** and you get **2 more apples**, you have **4 apples**. If you have **2 apples** and you get ***2 oranges***, then you have **2 apples** and ***2 oranges***. This is the idea behind combining like terms. When you add or subtract you can only combine terms that are **exactly alike**.
4(-3x + 6)= **4(-3x)+4(6)=** **-12x+24**	**3x + 4x = 7x** (these terms can be combined.) **3x + 4y = 3x +4y** (these terms cannot be combined.)

Putting the two concepts together:

3(x+2) - 6(x+1)=

3(x) +3(2) -6(x) -6(1)=

3x+6-6x-6=

-3x

Now try these problems

1. $4(2x + 2) =$
2. $-2x - 3 + 4x + 5x + 6 =$
3. $-3(x - 3) =$
4. $3y - 2y + 5 + y - 2 =$
5. $3(x + 2) + 2(2x + 1) =$
6. $-4(x - 1) + 2(x - 2) =$

Check your answers on the back of this sheet…

1. 8x+8 2. 7x+3 3. -3x+9 4. 2y+3 5. 7x+8 6. -2x

Great Work! Now it's time to practice.

1. 2x + 4 + 2x +3 + x

2. 3(x - 2)

3. -2(-3x + 6)

4. 2y + 7 - 5 - 6y + 3

5. 5(x + 2) - 3(4x + 8) (This one is tricky. Remember to distribute the negative)

6. 6(x -3) + 4(-2x - 3)

7. 12(3 - x) - 1(x + 2) (Remember to distribute the negative)

8. 9x(3x +2)

Summer Math Packet

Week #8

Skill #1: Finding Slope from a Table

x	y
-10	17
-5	10
-1	4.4
5	-4
10	-11

$$slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10-17}{-5--10} = \frac{10-17}{-5+10} = \boxed{\frac{-7}{5}}$$

x	y
-3	-8
-1	-8
0	-8
1	-8
4	-8

$$slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-8--8}{-1--3} = \frac{-8+8}{-1+3} = \frac{0}{2} = \boxed{0}$$

Skill #2: Finding y-intercept from a Table

When x = 0 IS listed in the table, the y-intercept is the corresponding y-value.

Table A

x	y
-1	-1
0	2
1	5
2	8

y-intercept = 2;

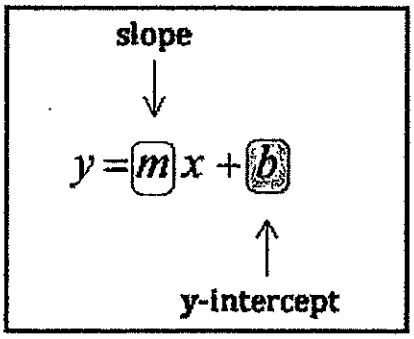
When x = 0 ISN'T listed in the table, use your slope and work backwards.

Table B

x	y
1	8
2	6
3	4

Slope = - 2/1; add 2 from the "y" to get y = 10 and subtract 1 from the "x" to get x = 0; y-intercept = 2

Skill #3: Writing an Equation from a Table



1. Find the slope (see above), and sub this in for "m".
2. Find the y-intercept (see above), and sub this in for "b".

Table A (above):
Slope: 2/1 y-intercept: 2
Equation: y = 2x + 2

Table B (above):
Slope: - 2/1 y-intercept: 10
Equation: y = - 2x + 10

Check out this link for more practice…

- https://www.khanacademy.org/math/algebra-basics/core-algebra-graphing-lines-slope/core-algebra-equation-of-a-line/v/slope-intercept-form-from-table

Now try these problems . . .

1.

x	y
0	2
1	6
2	10
3	14
4	18

Slope:

y-intercept:

Equation:

2.

x	y
0	30
3	24
6	18
9	12
12	6

Slope:

y-intercept:

Equation:

3.

x	y
1	18
2	27
3	36
4	45
5	54

Slope:

y-intercept:

Equation:

4.

x	y
1	12
2	15
3	18
4	21
5	24

Slope:

y-intercept:

Equation:

Check your answers on the next page.

Answers:

1. Slope: 4; y-intercept: 2; Equation: y = 4x + 2
2. Slope: - 2; y-intercept: 30; Equation: y = - 2x + 30
3. Slope: 9; y-intercept: 9; Equation: y = 9x + 9
4. Slope: 3; y-intercept: 9; Equation: y = 3x + 9

Great Work! Now it's time to practice.

1.

x	y
0	2
2	8
4	14
6	20
8	26

Slope:

y-intercept:

Equation:

2.

x	y
0	50
1	45
2	40
3	35
4	30

Slope:

y-intercept:

Equation:

3.

x	y
2	16
4	20
6	24
8	28
10	32

Slope:

y-intercept:

Equation:

4.

x	y
1	- 8
2	- 5
3	- 2
4	1
5	4

Slope:

y-intercept:

Equation:

Summer Math Packet

Week #9

Skill #1: Making a TABLE from an Equation

Graph the following linear equation using slope and y-intercept.

$y = \frac{2}{3}x - 1$

Steps

1) Find the slope and y-intercept.

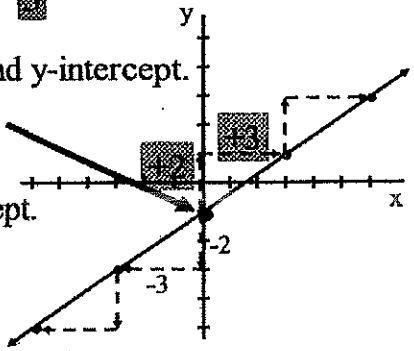
$m = \frac{2}{3}$ $b = -1$

2) Plot the y-intercept.

3) Plot the slope.

$m = \frac{2}{3}$ or $m = \frac{-2}{-3}$

4) Draw line through points.



Skill #2: Making a GRAPH from an Equation

Slope intercept form:

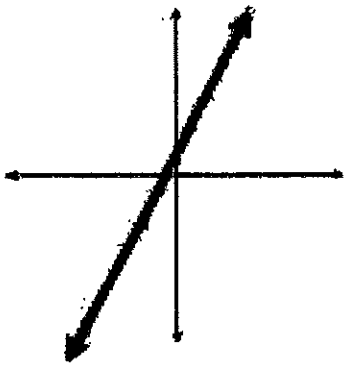
$y = mx + b$

- To graph using the slope intercept form:
  - the equation must be in slope intercept form
  - you must determine your "m" and "b"
  - plot your "b"
  - use "m" to find another point
  - then draw a line through those coordinates

Graphing a linear function using a table

(use this method when the equation is solved for y)

x	$y = 2x + 1$	y
-2	$y = 2(-2)+1$	-3
-1	$y = 2(-1)+1$	-1
0	$y = 2(0)+1$	1
1	$y = 2(1)+1$	3
2	$y = 2(2)+1$	5



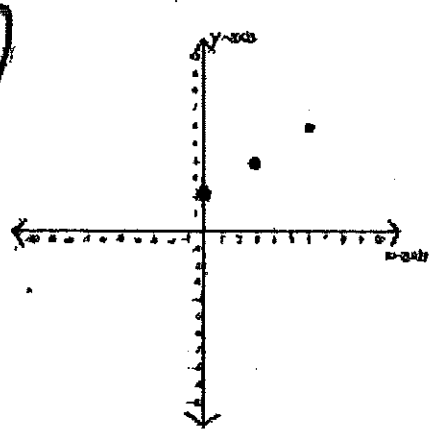
$y = \frac{2}{3}x + 2$

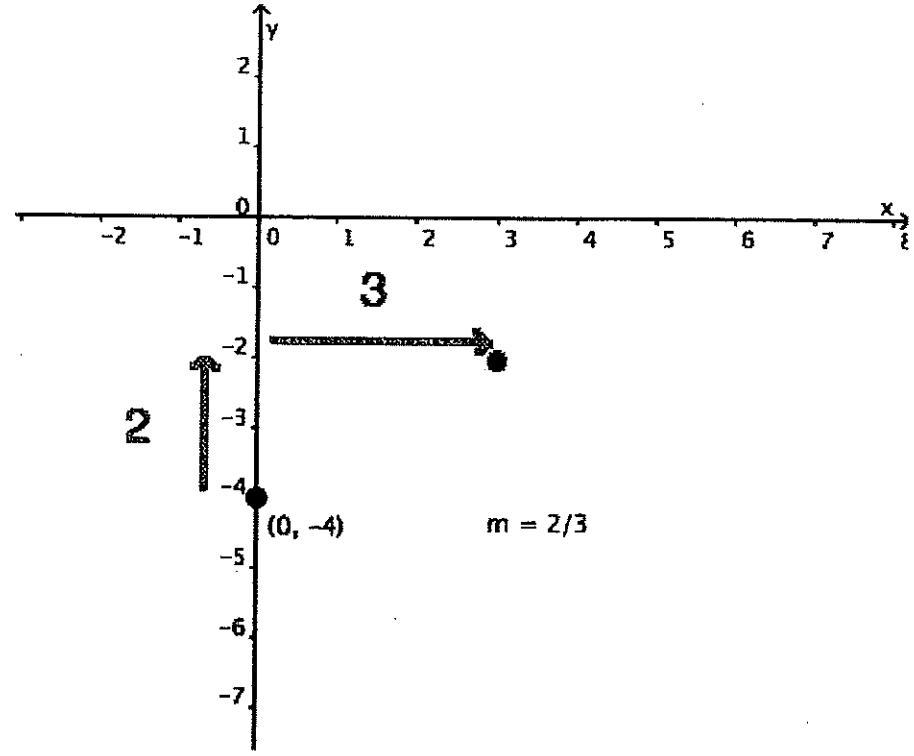
$y = mx + b$

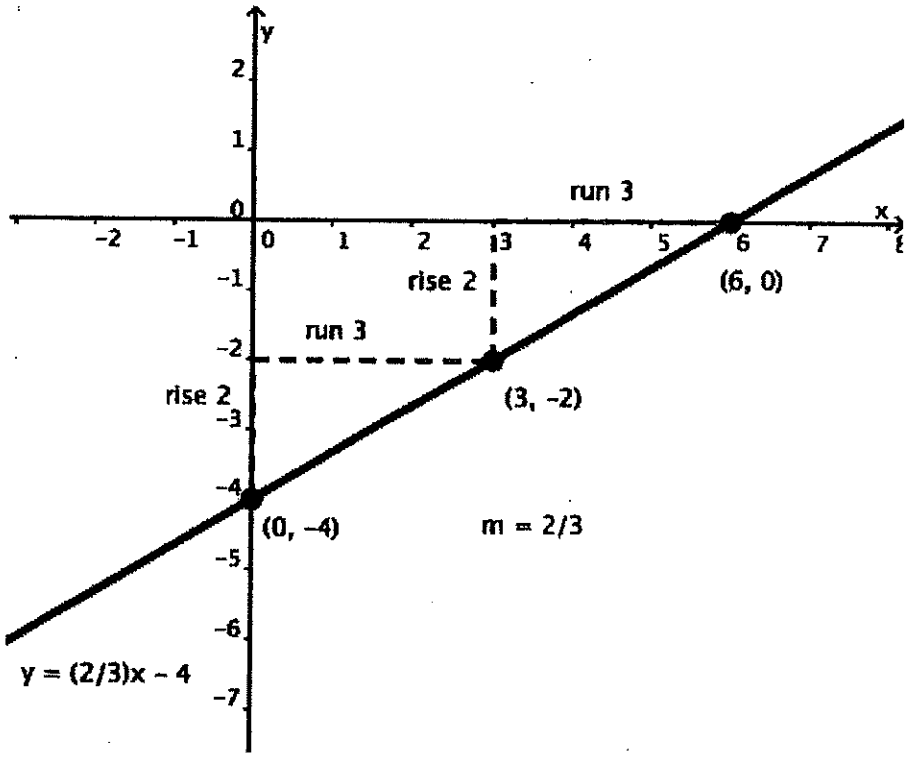
$b = 2$

$m = \frac{2}{3} \frac{\text{rise}}{\text{run}}$

$\frac{2}{3} = \frac{-2}{-3}$







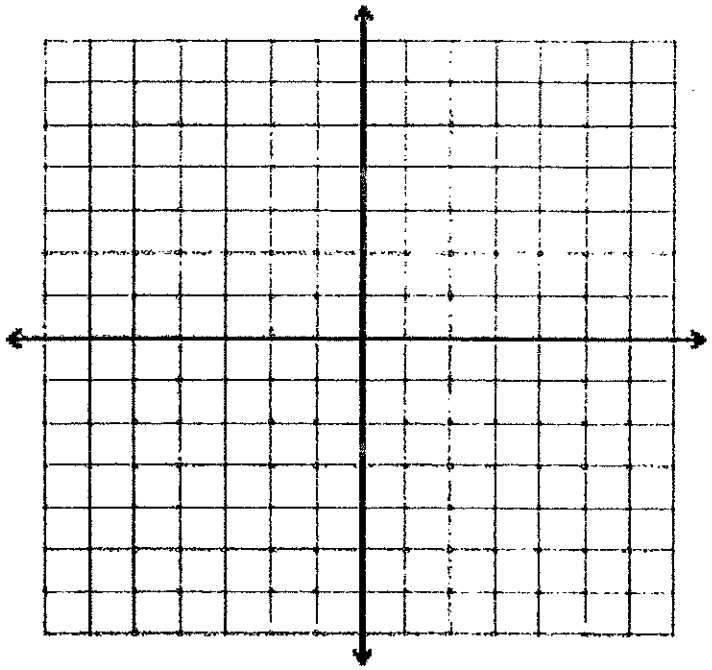
Check out these links for more practice…

- http://www.virtualnerd.com/middle-math/equations-functions/graphing/linear-equation-graphing-method

Now try these problems

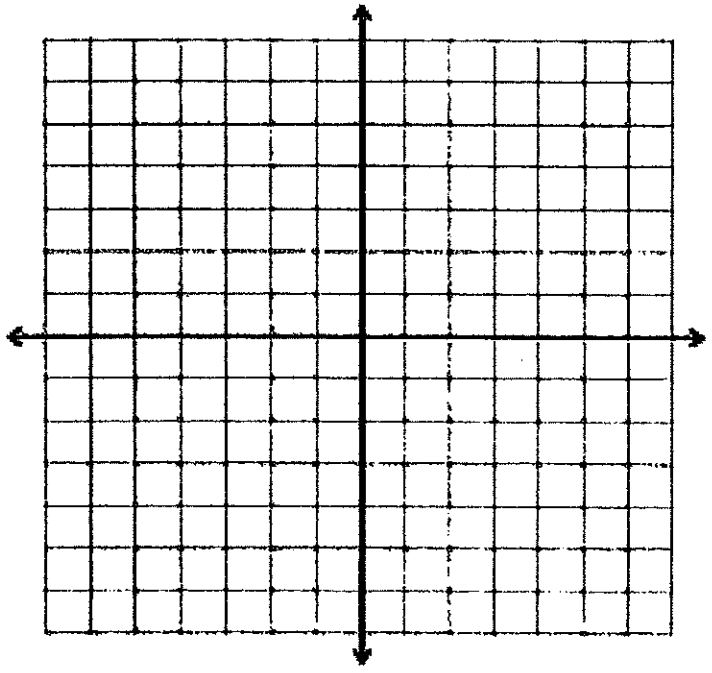
1. Equation: $y = 2x + 4$

X	Y



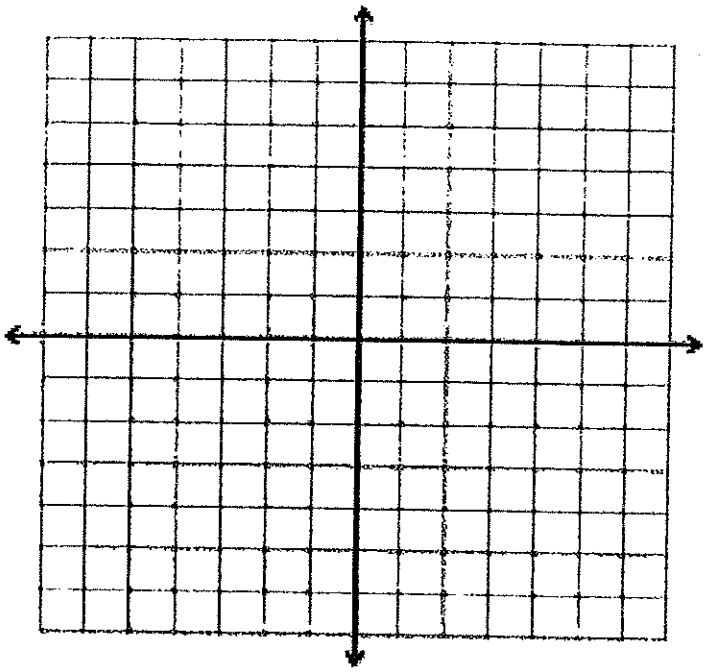
2. Equation: $y = \frac{1}{2}x + 2$

X	Y



3. Equation: $y = -2x + 10$

X	Y



4. Equation: $y = -x - 4$

X	Y

