

Grade 8 MATH

UNIT 6 NOTES

Name: \_\_\_\_\_

LINEAR EQUATIONS and their GRAPHS

Class: \_\_\_\_\_

**6.1 SOLVING Linear Equations**

- ❖ Keep equal signs above each other
- ❖ An EQUATION is like a balance:  
**LHS = RHS** so if you do something to one side, you must do it to the other
- ❖ Get variable by itself
- ❖ Solve for x

**LINEAR** equation forms a graph that forms a **STRAIGHT LINE.**

**Dots only – Discrete data**  
**Solid line – Continuous data**

Ex.6.1

$$-3x - 4 = 11 \quad \text{get variable by itself}$$

Must make -4 equal zero

$$\underline{-3x - 4 + 4 = 11 + 4} \quad \text{add 4 to both sides}$$

$$\frac{-3x}{-3} = \frac{15}{-3} \quad \text{get 1x}$$

$x = -5$

**CHECK**

$$-3x - 4 = 11 \quad \text{write out equation}$$

$$-3(-5) - 4 = 11 \quad \text{substitute}$$

$$+15 - 4 = 11 \quad \text{subtraction means}$$

ADD the opposite

$$+15 + (-4) = +11 \quad \text{Find out LHS = RHS}$$

$$+11 = +11 \quad \text{if they equal,}$$

you found the correct value for

x.   
LHS=RHS



6.1 Ex.

Solve:  $-4x + 5 = -3$

Verify that (-7) is a solution for the equation:  $-2y + 4 = 18$  (1)

6.2

$$7 + \frac{d}{4} = 13$$

$$7 + \frac{d}{4} - 7 = 13 - 7$$

Cross multiply  $\frac{d}{4} \times \frac{6}{1}$

$$d = 24$$

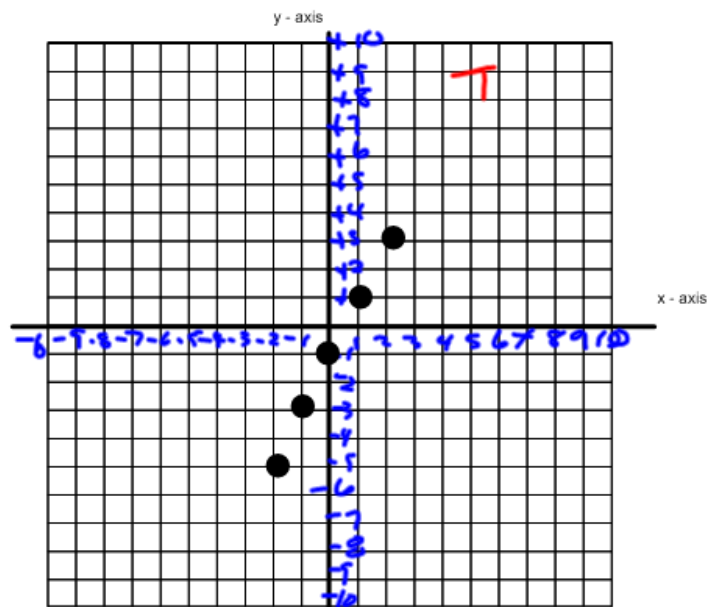
Ex. 6.2

Solve:  $-7 + \frac{d}{5} = -5$

6.4 Filling out **Table of Values** and Plotting points on the **Cartesian Plane**

$$y = 2x - 1$$

x	y
-2	-5
-1	-3
0	-1
1	1
2	3



Is this a linear graph? **yes** or **no**

Why: **first level of differences for x and y are constant**

Describe this graph: **straight line**

Describe this graph in terms of x and y:

As x increases by 1, y increases by 2

(decrease/increase)

(decrease/increase)

## 6.4 A Fill in table of Values

EQUATION  $y = x + 4$ 

x	y
-2	
-1	
0	
1	
2	

IS this a linear graph ?

YES

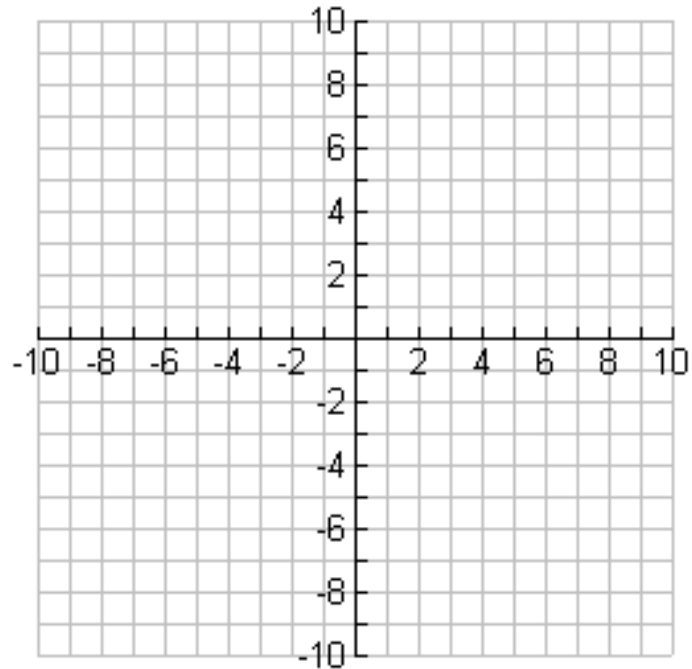
WHY?

first levels of differences are equal for x and for y

Explain the graph in terms of x and y:

As x \_\_\_\_\_ by \_\_\_\_\_

then y \_\_\_\_\_ by \_\_\_\_\_

6.4 Plot on Cartesian Plane  $y = x + 4$ 

## 6.4 A Fill in table of Values

EQUATION  $y = 2x - 4$ 

x	y
-2	
-1	
0	
1	
2	

IS this a linear graph ?

\_\_\_\_\_

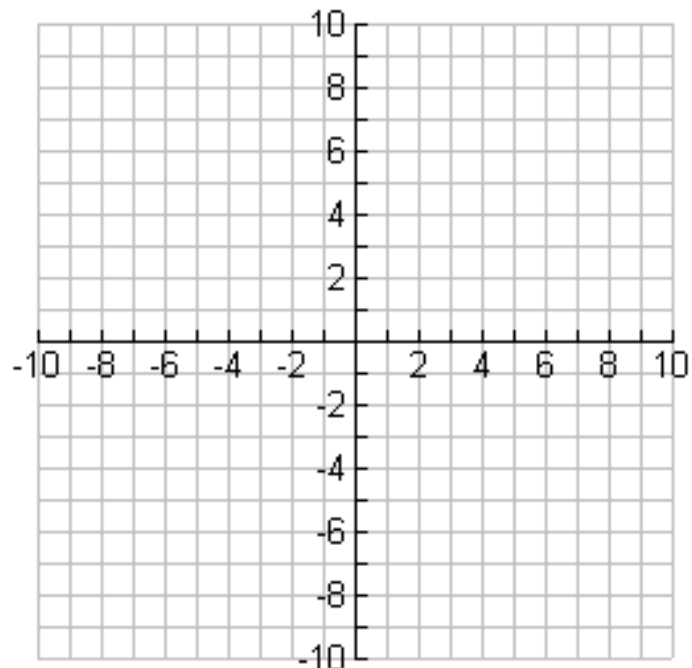
WHY?

\_\_\_\_\_

Explain the graph in terms of x and y:

As x \_\_\_\_\_ by \_\_\_\_\_

then y \_\_\_\_\_ by \_\_\_\_\_

6.4 Plot on Cartesian Plane  $y = 2x - 1$ 

6.4 A Fill in table of Values

**EQUATION**  $y = x + 4$

x	y
-2	
-1	
0	
1	
2	

IS this a linear graph ?

\_\_\_\_\_

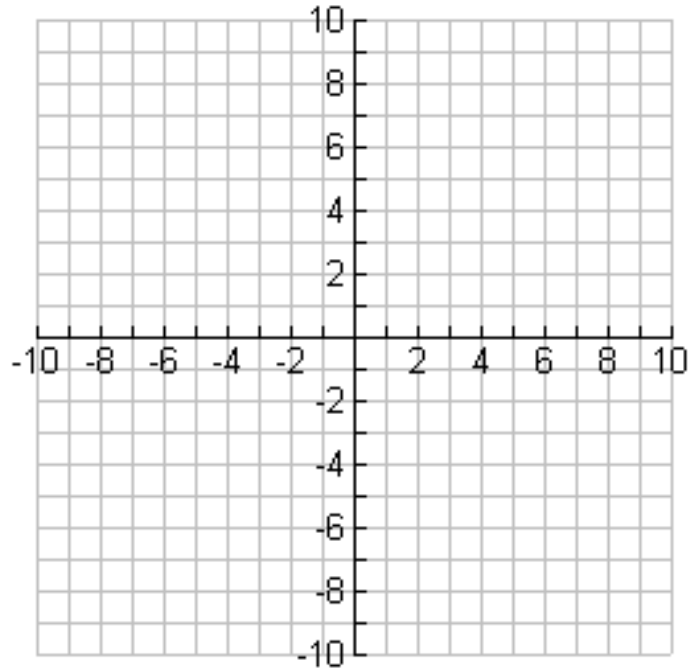
WHY?

\_\_\_\_\_

Explain the graph in terms of x and y:

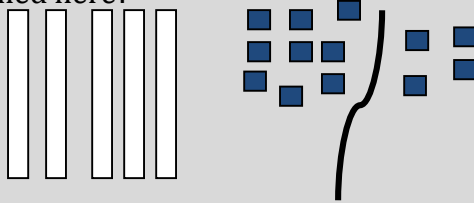
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6.4 plot on Cartesian Plane



Questions to practice

6.1 Which linear equation solution is modelled here?

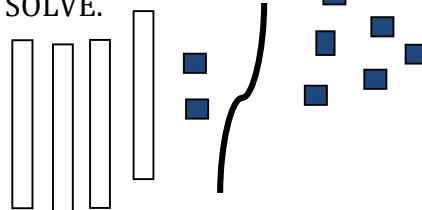


- A)  $x = -2$
- B)  $x = -1$
- C)  $x = 1$
- D)  $x = 2$

6.1 Model

A)  $3x + 1 = 10$  SOLUTION: \_\_\_\_\_

B) SOLVE.



<p>6.2 Jasmine has a party where it cost \$40 to rent a room and \$8 for each person invited? How much does it cost for 10 people to come to Jasmine's party?</p> <p>A) \$48 B) \$58 C) \$80 D) \$120</p>	<p>6.2 George has a party where it cost \$50 to rent a room and \$9 for each person invited? How much does it cost for 12 people to come to his party?</p>
<p>6.3 What is the missing value for y in (11,y) using <math>y = -3x + 4</math>?</p> <p>A) -33 B) -29 C) 29 D) 37</p>	<p>6.3</p> <p>A) What is the missing value for y in (8,y) using <math>y = -2x + 4</math>?</p> <p>B) What is the missing value for x in (x, 16) using <math>y = -2x + 4</math>?</p>
<p><b>Ex. 6.3.1 Distributive Property</b></p> $-5(3x - 4)$ $= -15x + 20$	<p><b>Ex. 6.3.2 Distributive Property</b></p> $-2(-4x + 5)$ $= 8x - 10$
<p>6.4 Distributive Property</p> <p>What is <math>-3(x-5)</math> in expanded form?</p> <p>A) <math>-8x</math> B) <math>-3x - 15</math> C) <math>-3x + 8</math> D) <math>-3x + 15</math></p>	<p>6.4. What is the expanded form?</p> <p>A) <math>-6(x - 4)</math> B) <math>9(-2x + 4)</math> C) <math>-2(-3x + 5)</math></p>
<p>6.5 Which line contains the first mistake?</p> $-3x - 4 = 11$ $-3x - 4 + 4 = 11 + 4 \text{ ..... LINE 1}$ $-3x = 15 \text{ ..... LINE 2}$ $\frac{-3x}{3} = \frac{15}{3} \text{ ..... LINE 3}$ $x = 5 \text{ ..... LINE 4}$ <p>A) LINE 1</p>	<p>6.5 Which line contains the first mistake?</p> $-3x - 4 = 11$ $-3x - 4 + 4 = 11 + 4 \text{ .... LINE 1}$ $3x = 15 \text{ .... LINE 2}$ $\frac{3x}{3} = \frac{15}{3} \text{ ..... LINE 3}$ $x = 5 \text{ .... LINE 4}$ <p>A) LINE 1</p>

- B) LINE 2  
C) LINE 3  
D) LINE 4

- B) LINE 2  
C) LINE 3  
D) LINE 4

6.6 What is the linear equation for a number divided by negative four is twelve?

- A)  $\frac{x}{12} = -4$   
B)  $\frac{x}{-4} = 12$   
C)  $x - 4 = 12$   
D)  $x + 12 = -4$

6.6

A) What is the linear equation for a number divided by negative five is twenty?

\_\_\_\_\_

B) What is the linear equation for a the sum of twice a number and five is twenty?

\_\_\_\_\_

6.7 Which statement would best describe the linear relation shown in this table?

x	y
-2	12
-1	6
0	0
1	-6
2	-12

- A) as x decreases by 1, y decreases by 6  
B) as x decreases by 1, y increases by 6  
C) as x increases by 1, y decreases by 6  
D) as x increases by 1, y increases by 6

6.7 Write a statement would best describe the linear relation shown in this table:

x	y
-2	5
-1	0
0	-5
1	-10
2	-15

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6.8 George paid \$88 to rent a boat. The rate was \$25 plus \$7 per hours. How many hours did George rent the boat?

- A) 9  
B) 33  
C) 56  
D) 63

6.8 Andrew paid \$97 to rent the bowling alley. He paid \$30 plus \$8 per hour. How many hours did he have the bowling alley?