

Test Review: Linear Concepts

Directions...

- Read each question carefully.
- Show all work for full credit.

1. What does the word *slope* mean and what *formula* do you use to find it?

steepness

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

2. Find the slope for each of the following.

a. $y = 2x - 7$

2

b. $y = -\frac{2}{3}x - 6$

$-\frac{2}{3}$

c.

x	y
2	4
4	2
6	0
8	-2

2 <

2	4
4	2

 > -2

$$\frac{-2}{2} = -1$$

d.

x	y
-12	10
-9	1
-6	-8
-3	-17

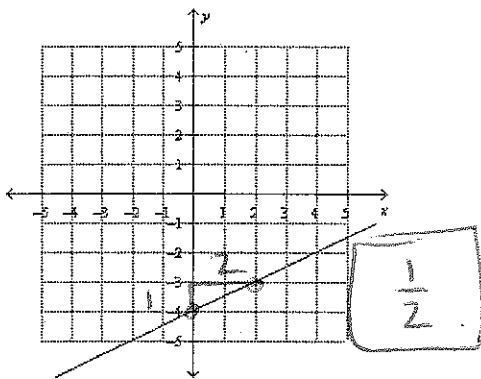
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-12	10
-9	1

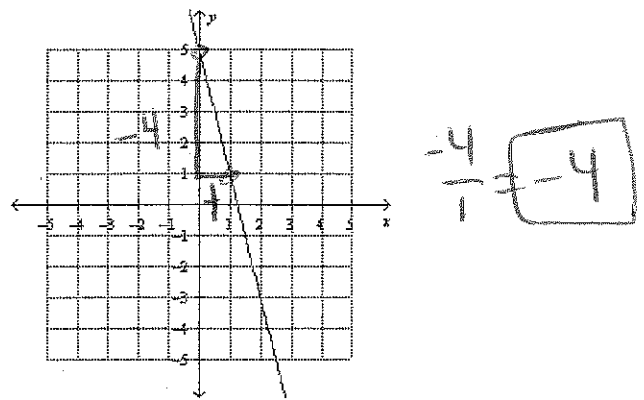
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$$\frac{-9}{3} = -3$$

e.



f.



g. $(2, -1)$ $(8, 4)$

$$\frac{4 - (-1)}{8 - 2} = \frac{5}{6} = \frac{5}{6}$$

h. $(4, 10)$ $(10, 12)$

$$\frac{12 - 10}{10 - 4} = \frac{2}{6} = \frac{1}{3}$$

i. $(-6, -4)$ $(6, 1)$

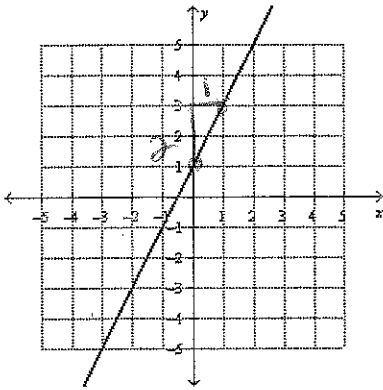
$$\frac{1 - (-4)}{6 - (-6)} = \frac{5}{12}$$

3. What is the general form of a **linear equation** and what does the m and the b stand for?

$M = \text{slope}$
 $b = y\text{-intercept}$

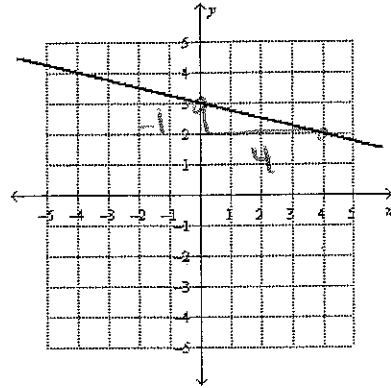
4. Write a linear equation for each of the following...

a.



$y = 2x + 1$

b.



$y = -\frac{1}{4}x + 3$

5. For each of the following, **find the slope and y-intercept, then write an equation.**

a.

x	y
-3	12
0	24
3	36
6	48
9	60

slope = $\frac{\text{rise}}{\text{run}} = \frac{12}{3} = 4$

y-intercept = $(0, 24)$

equation:

$y = 4x + 24$

b.

x	y
0	24
2	16
4	8
6	0
8	-8
10	-16

slope = $\frac{\text{rise}}{\text{run}} = \frac{-8}{2} = -4$

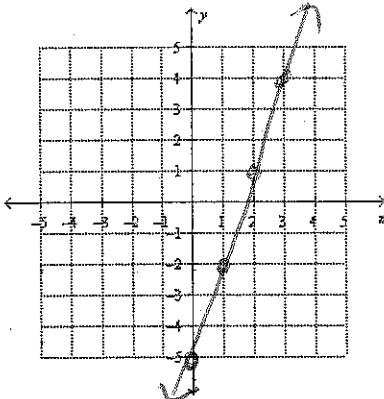
y-intercept = $(0, 24)$

equation:

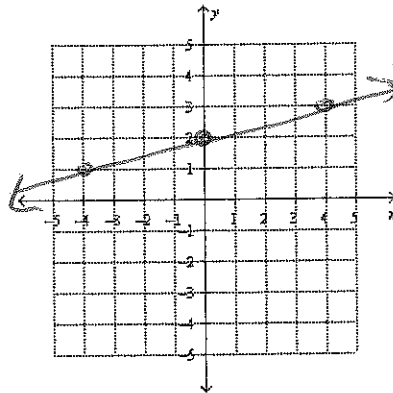
$y = -4x + 24$

6. Graph each of the following lines...

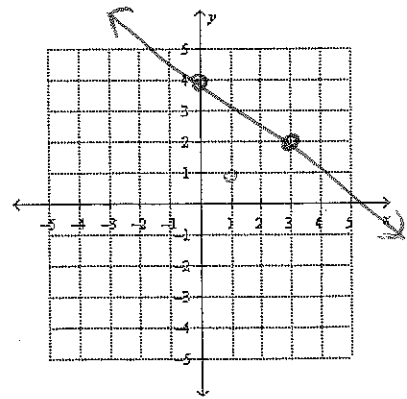
a. $y = 3x - 5$



b. $y = \frac{1}{4}x + 2$



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



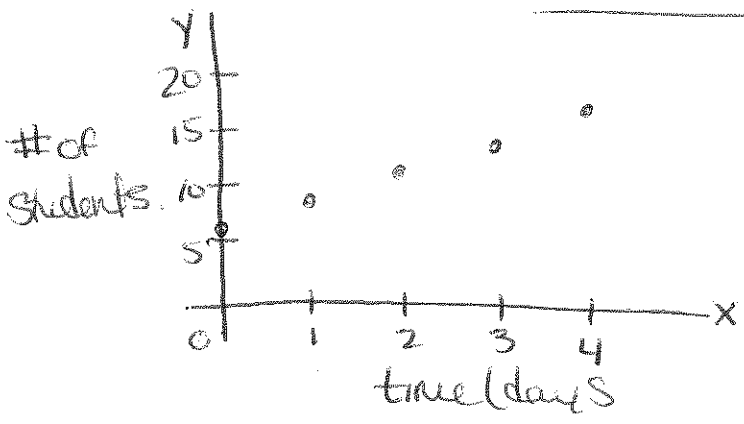
7. The golf club is looking for new members. There are currently 6 students in the club, but every day three more people sign up.

a. Identify the input and the output for the situation and create a table.

Input: time (days) Output: # of students

Input: <u>time (days)</u>	0	1	2	3	4
Output: <u># of students</u>	6	9	12	15	18

b. Draw a graph of the situation. Be sure to label each axis.



c. Write a linear equation that represents the situation.

$y = 3x + 6$

d. Use the equation you wrote in part c to answer each of the following...

i. How many students are in the club after 4 days?

$$y = 3x + 6$$

$$y = 3(4) + 6$$

$$y = 12 + 6$$

$$y = 18 \text{ students}$$

ii. If there are 27 people in the club, how many days have gone by?

$$y = 3x + 6$$

$$27 = 3x + 6$$

$$\begin{array}{r} -6 \\ \hline 21 = 3x \\ \frac{21}{3} = \frac{3x}{3} \end{array}$$

$$x = 7 \text{ days}$$

e. What is the *slope* of this situation? What is the *y-intercept* of this situation?

The slope is 3.
The y-intercept is 6.

8. Write the equation for the line that goes through each pair of points listed below...

a. $(9, 10)$ and $(3, -2)$

$$\frac{-2 - 10}{3 - 9} = \frac{-12}{-6} = 2$$

$$y = mx + b$$

$$10 = 2(9) + b$$

$$10 = 18 + b$$

$$-18 = -18$$

$$-8 = b$$

$y = 2x - 8$

b. $(-1, -5)$ and $(6, -10)$

$$y = mx + b$$

$$\frac{-10 + 5}{6 + 1} = \frac{-5}{7}$$

$$-10 = \frac{-5}{7}(6) + b$$

$$-10 = \frac{-30}{7} + b$$

$$-10 = -4\frac{2}{7} + b$$

$$+4\frac{2}{7} \quad +4\frac{2}{7}$$

$$b = -5\frac{5}{7}$$

$y = -\frac{5}{7}x - 5\frac{5}{7}$

9. Two men are climbing a mountain.

Ted:

Minutes	Height (ft)
0	200
5	240
10	280
15	320

$$\frac{40}{5} = 8 \text{ ft/min}$$

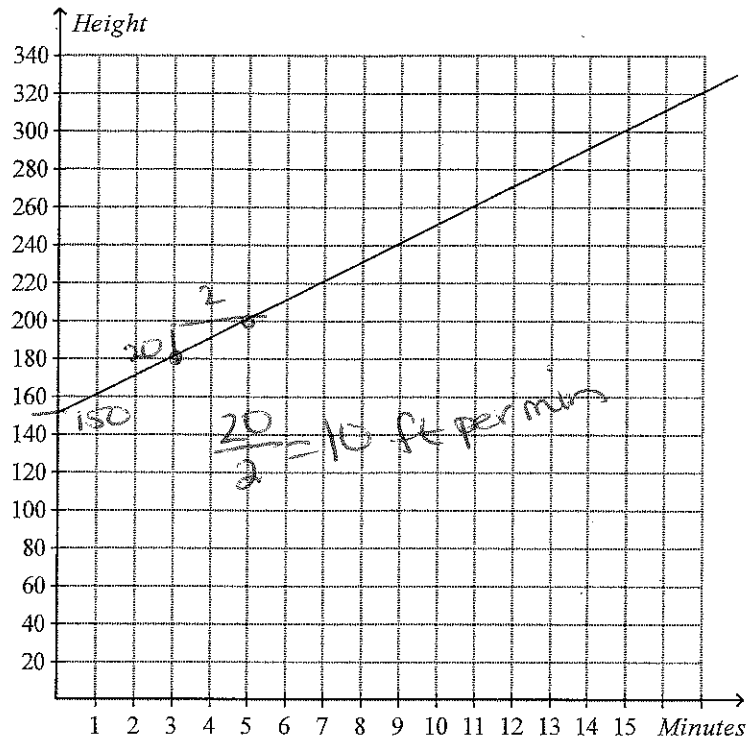
a. Who is climbing faster?

ROSS

b. Who starts out higher on the mountain?

Ted.

Ross:



c. Write an equation for each climber.

i. Ted: $y = 8x + 200$

ii. Ross: $y = 10x + 150$

10. Solve the equations...

1-Step Equations

a. $x - 2 = 12$
 $+2 \quad +2$
 $x = 14$

b. $-3.7 + x = 8$
 $+3.7 \quad +3.7$
 $x = 11.7$

c. $3x = 27$
 $\div 3 \quad \div 3$
 $x = 9$

d. $\frac{x}{6} = -9$
 $\cdot 6 \quad \cdot 6$
 $x = -54$

2-Step Equations

e. $4x - 9 = 19$
 $+9 \quad +9$
 $4x = 28$
 $\div 4 \quad \div 4$
 $x = 7$

f. $3 - \frac{3}{4}x = 43$
 $-3 \quad -3$
 $-\frac{3}{4}x = 40$
 $\cdot \frac{4}{3} \quad \cdot \frac{4}{3}$
 $x = -\frac{160}{3}$
 $x = -53 \frac{1}{3}$

g. $\frac{x}{5} - 2 = 3$
 $+2 \quad +2$
 $\frac{x}{5} = 5$
 $\cdot 5 \quad \cdot 5$
 $x = 25$

h. $\frac{x}{-4} + 7 = 7$
 $-7 \quad -7$
 $\frac{x}{-4} = 0$
 $\cdot (-4) \quad \cdot (-4)$
 $x = 0$

Solving Multi-Step Equations

i. $3(x - 6) = 8$

$$\begin{array}{r} 3x - 18 = 8 \\ +18 \quad +18 \\ \hline 3x = 26 \\ \frac{3}{3} \quad \frac{3}{3} \\ \hline x = 8\frac{2}{3} \end{array}$$

l. $6x - 8.2 - 3x = 2$

$$\begin{array}{r} 3x - 8.2 = 2 \\ +8.2 \quad +8.2 \\ \hline 3x = 10.2 \\ \frac{3}{3} \quad \frac{3}{3} \\ \hline x = 3.4 \end{array}$$

j. $\left(-\frac{1}{2}\right)(4x + 8) = 9$

$$\begin{array}{r} -2x - 4 = 9 \\ +4 \quad +4 \\ \hline -2x = 13 \\ \frac{-2}{-2} \quad \frac{-2}{-2} \\ \hline x = -6\frac{1}{2} \end{array}$$

m. $7x - 2 + 3x + 6 = 84$

$$\begin{array}{r} 10x + 4 = 84 \\ -4 \quad -4 \\ \hline 10x = 80 \\ \frac{10}{10} \quad \frac{10}{10} \\ \hline x = 8 \end{array}$$

k. $4x + 5x = 18$

$$\begin{array}{r} 9x = 18 \\ \frac{9}{9} \quad \frac{9}{9} \\ \hline x = 2 \end{array}$$

n. $4(x - 2) + 3x = 14$

$$\begin{array}{r} 4x - 8 + 3x = 14 \\ 7x - 8 = 14 \\ +8 \quad +8 \\ \hline 7x = 22 \\ \frac{7}{7} \quad \frac{7}{7} \\ \hline x = 3\frac{1}{7} \end{array}$$

Solving Equations With Variables on Both Sides

o. $2x - 8 = 5x + 8$

$$\begin{array}{r} -2x \quad -2x \\ -8 = 3x + 8 \\ -8 \quad -8 \\ \hline -16 = 3x \\ \frac{-16}{3} \quad \frac{3}{3} \\ \hline -5\frac{1}{3} = x \end{array}$$

p. $14.5x + 2 = 4.5x + 18$

$$\begin{array}{r} -4.5x \quad -4.5x \\ 10x + 2 = 18 \\ -2 \quad -2 \\ \hline 10x = 16 \\ \frac{10}{10} \quad \frac{10}{10} \\ \hline x = 1\frac{6}{10} \\ \hline x = 1\frac{3}{5} \end{array}$$

q. $6x - 6 = 2x - 8$

$$\begin{array}{r} -2x \quad -2x \\ 4x - 6 = -8 \\ +6 \quad +6 \\ \hline 4x = -2 \\ \frac{4}{4} \quad \frac{4}{4} \\ \hline x = -\frac{1}{2} \end{array}$$

r. $3\frac{1}{2}x - 2 + \frac{1}{2}x = 5x$

$$\begin{array}{r} 4x - 2 = 5x \\ -4x \quad -4x \\ \hline -2 = 1x \\ \hline x = -2 \end{array}$$

s. $3(x - 4) = 5x$

$$\begin{array}{r} 3x - 12 = 5x \\ -3x \quad -3x \\ \hline -12 = 2x \\ \frac{-12}{2} \quad \frac{2}{2} \\ \hline -6 = x \end{array}$$

t. $4x - 1 + 3x = 6x - 3x$

$$\begin{array}{r} 7x - 1 = 3x \\ -3x \quad -3x \\ \hline 4x - 1 = 0 \\ +1 \quad +1 \\ \hline 4x = 1 \\ \frac{4}{4} \quad \frac{4}{4} \\ \hline x = \frac{1}{4} \end{array}$$