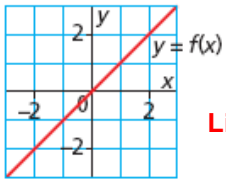
Section 5.7

Linear Relationships & Graph

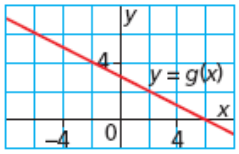
5. Which graphs represent linear relations? How do you know?

a)



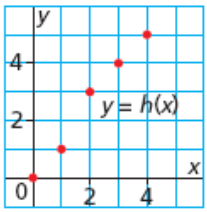
Linear

b)



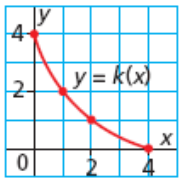
Linear

c)



Non Linear

d)



Non Linear

6. a) Create a table of values when necessary, then graph each relation.

i) $y = 2x + 8$ ii) $y = 0.5x + 12$

iii) $y = x^2 + 8$ iv) $y = 2x$

v) $x = 7$ vi) $x + y = 6$

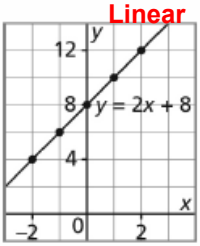
b) Which equations in part a represent linear relations? How do you know?

a) Tables of values may vary. For example:

i)

x	y
−2	4
−1	6
0	8
1	10
2	12

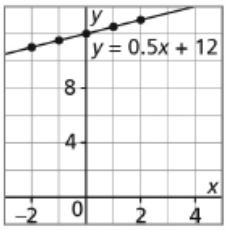
Linear



ii)

x	y
−2	11
−1	11.5
0	12
1	12.5
2	13

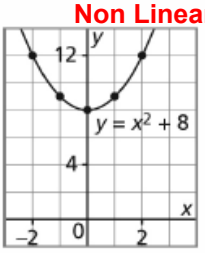
Linear



iii)

x	y
−2	12
−1	9
0	8
1	9
2	12

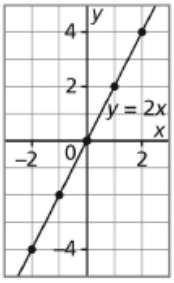
Non Linear



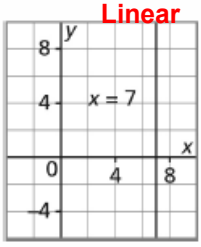
iv)

x	y
−2	−4
−1	−2
0	0
1	2
2	4

Linear



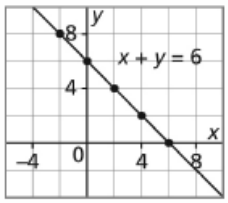
v) Linear



vi)

x	y
−2	8
0	6
2	4
4	2
6	0

Linear



b) The relations in part a, i, ii, iv, v, and vi are str
lines, so they are linear relations.

7. For each relation below:

i) Identify the dependent and independent variables.

ii) Use the table of values to determine whether the relation is linear.

iii) If the relation is linear, determine its rate of change.

a) The distance required for a car to come to a complete stop after its brakes are applied is the *braking distance*. The braking distance, d metres, is related to the speed of the car, s kilometres per hour, when the brakes are first applied.

Independent x Dependent y

s (km/h)	d (m)		
50	13	7	$\frac{7}{10}$
60	20	7	$\frac{7}{10}$
70	27	8	$\frac{8}{10}$
80	35		

10, 10

Non Linear

No

b) The altitude of a plane, a metres, is related to the time, t minutes, that has elapsed since it started its descent.

Rate $= \frac{-400}{2} = -200$ m/min

Independent Dependent

t (min)	a (m)	
0	12 000	
2	11 600	-400
4	11 200	-400
6	10 800	-400
8	10 400	-400

2, 2, 2, 2

10. Sophie and 4 of her friends plan a trip to the Edmonton Chante for one night. The hotel room is $95 for the first 2 people, plus $10 for each additional person in the room. The total cost is related to the number of people. Is the relation linear? How do you know?

C = 10 p + 95

Number of additional person (p)	Total Cost (C)
0	95
1	105
2	115
3	125

0

Linear

12. The cost, C dollars, to rent a hall for a banquet is given by the equation $C = 550 + 15n$, where n represents the number of people attending the banquet.

a) Explain why the equation represents a linear relation.

The equation is a linear equation because the cost of the hall is $ 550 just to rent the hall and you must add $15 for each person that attends the banquet

Dependent Variable: Is the cost of the hall since you need to know the number of people who attend before you can pay for the hall

Independent: Number of people

#n	Cost
0	550
1	565
2	580
3	595

+15

b) State the rate of change. What does it represent?

Rate of change= $\frac{\text{cost}}{\text{number of people}}$

$\frac{15}{1} = \$15$

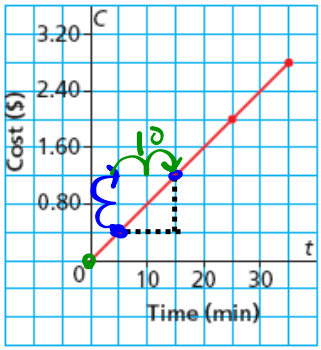
14. This graph represents Jerome's long distance phone call to his pen pal in Nunavut. Jerome is charged a constant rate.

a) Identify the dependent and independent variables.

Independent Variable: Time (min)

Dependent Variable: Cost ($)

The Cost of Jerome's Phone Call



$\frac{0.80}{10}$

b) Determine the rate of change, then describe what it represents.

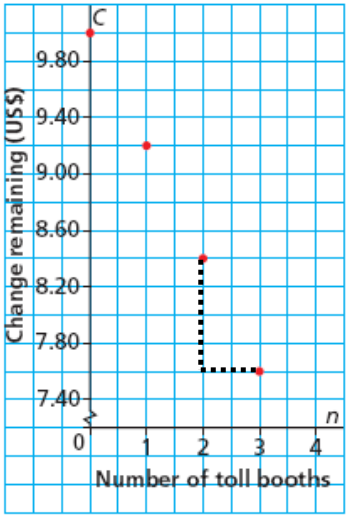
Rate of change= $\frac{\text{difference of cost}}{\text{difference of time}} = \frac{\$\ 0.80}{10\ \text{min}} =$ \$0.08/ min

in front of v

$0.08t + 0$

15. Kashala takes a cross-country trip from her home in Lethbridge through the United States. In Illinois, she drives on a toll highway. This graph represents the cost of Kashala's drive on the toll highway. She is charged a constant amount at each toll booth and she starts with US$10 in change. Determine the rate of change, then describe what it represents.

Kashala's Drive on the Toll Highway



Rate of Change = $\frac{\text{Change in Money}}{\text{Change in Tolls booth}}$

$= \frac{8.20 - 7.60}{2 - 3}$

$= \frac{\$\ 0.80}{-1}$

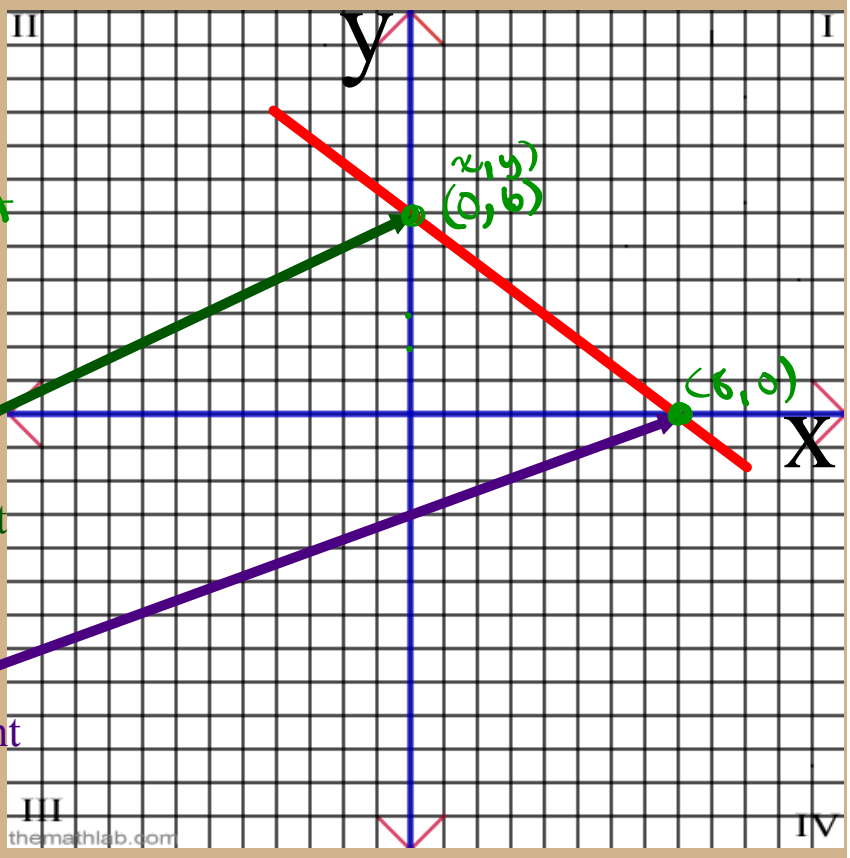
= - $0.8/ booth

1

Intercepts

y-intercept

$y = 6$ $(0,6)$



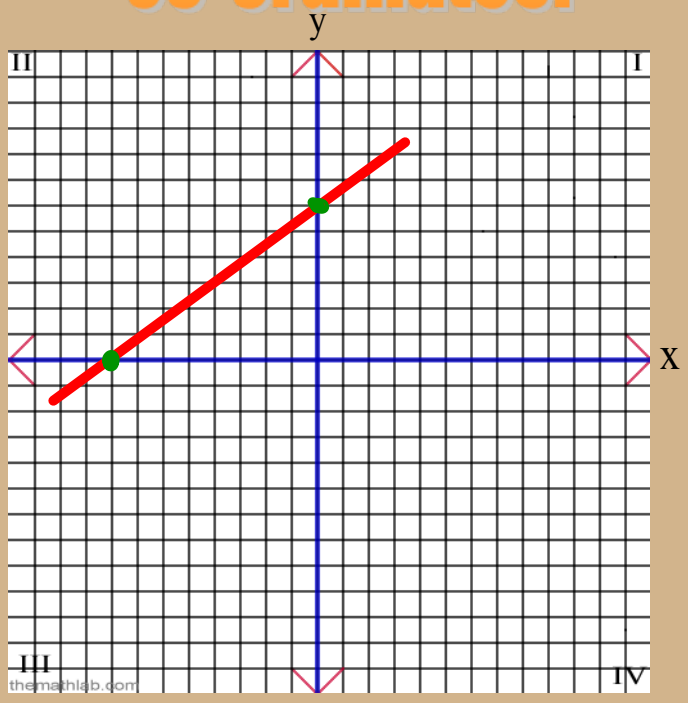
The "y-intercept is the point on the line that crosses the "y" axis.

$(8,0)$ $x=8$

The "x-intercept is the point on the line that crosses the "x" axis.

2

How do you write the co-ordinates?



x-intercept = -8

$(\underset{x}{-8}, \underset{y}{0})$

Y = 0 for the x-intercept.

y-intercept = 6

$(\underset{x}{0}, \underset{y}{6})$

X = 0 for the y-intercept.

2. Sketch a graph of the linear function $f(x) = 4x - 3$.

using x or y intercepts & Slope

$y = 4x - 3$

look for x intercept let $y = 0$

$y = 4x - 3$

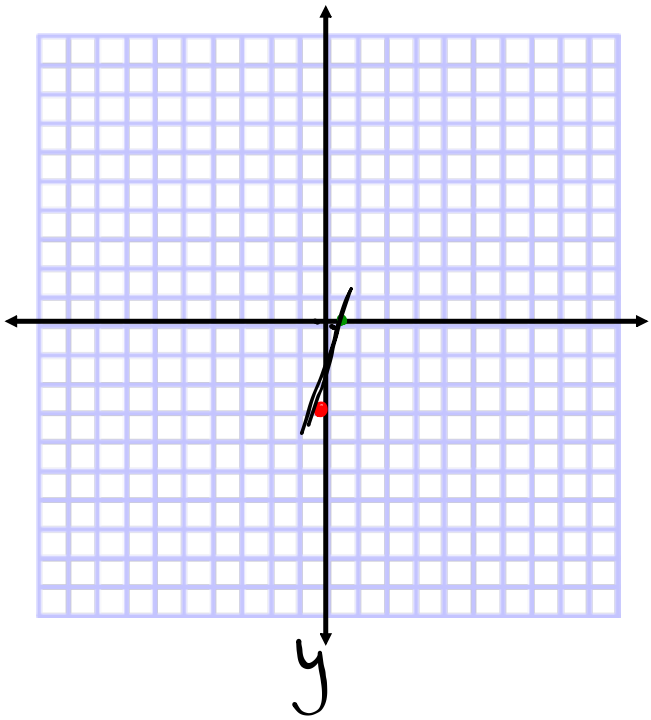
$0 = 4x - 3$

$0 + 3 = 4x - 3 + 3$

$3 = 4x$

$\frac{3}{4} = \frac{4x}{4}$

0.75 → $\frac{3}{4} = x$



Find y-intercept let $x = 0$

$y = 4x - 3$

$y = 4(0) - 3$

$0 - 3$

$y = -3$

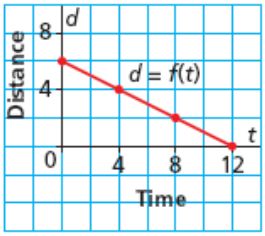
Example 3 Matching a Graph to a Given Rate of Change and Vertical Intercept

+ slope → uphill

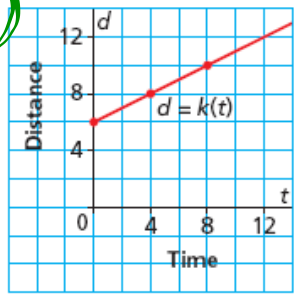
y intercept distance

Which graph has a rate of change of $\frac{1}{2}$ and a vertical intercept of 6? Justify the answer.

a)



b)



SOLUTION

CHECK YOUR UNDERSTANDING

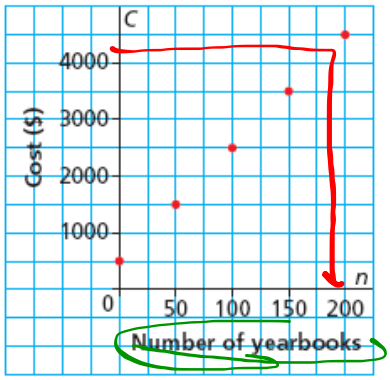
Example 4 Solving a Problem Involving a Linear Function

This graph shows the cost of publishing a school yearbook for Collège Louis-Riel in Winnipeg.

The budget for publishing costs is $4200. What is the maximum number of books that can be printed?

SOLUTION

About 190 books



CHECK YOUR UNDERSTANDING

Homework:

Page 319

Question 4 ,6, 8

4 a
b

6 b

8 a b this is matching

Test Outline on next page

13 Multiple choice

* Given sets or ordered pairs determine which are function and non-functions. (If x is repeated the Non-function)

* Given Table of Values, which is the independent variable or dependent variable. Which table of values represents a linear equation. Check Rate of change $= \frac{\Delta y}{\Delta x}$ → if same decimal

*Read info off graph. What does a certain segment mean?

*Function or Non-function and Domain/Range when given a picture of a graph. Where is the x and y- intercepts?

*Given ordered pairs or word problem, find the rate of change

5 Short Response

1) Given 2 functions (Evaluate or solve)

2) Same as Nov. 21 Warm up on Table of values and rate of change (PROVE)

3) Given a linear graph find the rate of change and x,y - intercepts

4) Given an equation a) Write the function notation, b) Evaluate when given an x value c) Solve when given a C(x) value

5) Given 2 equation solve for x(LET y=0 and solve) and y intercepts (Let x=0 and solve)

$y = 2x + 10$

x intercept: let $y=0$

$y = 2x + 10$

$0 = 2x + 10$

Rearrange

$0 - 10 = 2x + 10 - 10$

$\frac{-10}{2} = \frac{2x}{2}$

$-5 = x$

y intercept: let $x=0$

$y = 2x + 10$

$y = 2(0) + 10$

$y = 0 + 10$

$y = 10$