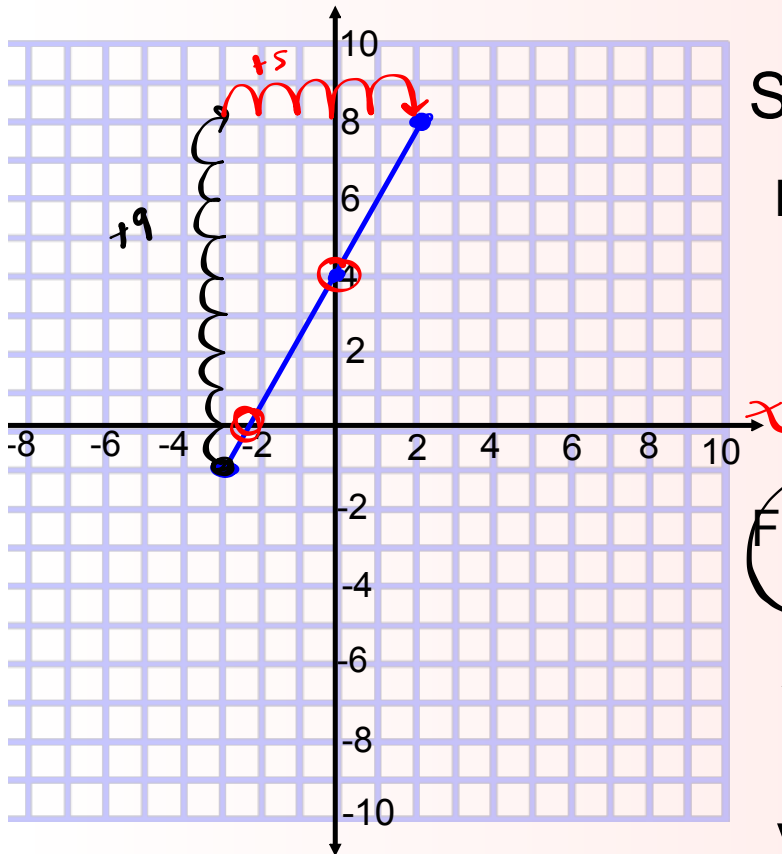
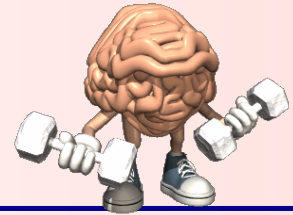


Warm Up



State the :

Domain: $\{x | -3 \leq x \leq 2, x \in \mathbb{R}\}$

Range: $\{y | -1 \leq y \leq 8, y \in \mathbb{R}\}$

Function/Nonfunction:

x Intercept = 2.3

y Intercept = 4

$$\begin{aligned} \text{Rate of change} &= \frac{\Delta y}{\Delta x} \quad \text{rise} \\ & \quad \quad \quad \text{run} \\ &= \frac{+9}{+5} \\ &= 1.8 \end{aligned}$$

Section 5.7

Linear Relationships



Graph

Homework:

Page: 308-310

Questions: 6a,b(i,ii), 7a,b, 14

Page 319

Question
4, 8

Homework
 Page: 308-310
 Questions: 6a,b(i,ii), 7a,b, 14
 Page 319
 Question 4b(i, ii, ii), 8

6. a) Tables of values may vary. For example:

i) **Linear**

x	y
-2	4
-1	6
0	8
1	10
2	12

ii) **Linear**

x	y
-2	11
-1	11.5
0	12
1	12.5
2	13

iii) **Non Linear**

x	y
-2	12
-1	9
0	8
1	9
2	12

iv) **Linear**

x	y
-2	-4
-1	-2
0	0
1	2
2	4

v) **Linear**

x	y
-2	8
0	6
2	4
4	2
6	0

vi) **Linear**

x	y
-2	8
0	6
2	4
4	2
6	0

b) The relations in part a, i, ii, iv, v, and vi are linear relations, 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.
- b) The altitude of a plane, a metres, is related to the time, t minutes, that has elapsed since it started its descent.

Independent	Dependent
s (km/h)	d (m)
50	13
60	20
70	27
80	35

Non Linear

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

5.6 Properties of Linear Relations

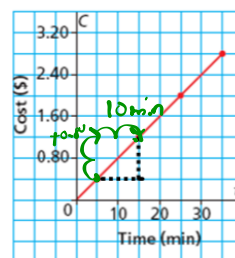
14. This graph represents Jerome's long distance phone call to his pen pal in Nunavut. Jerome is charged a constant rate.

a) Identify the dependent and independent variables.

Independent Variable: Time (min)

Dependent Variable: Cost (\$)

The Cost of Jerome's Phone Call



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

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

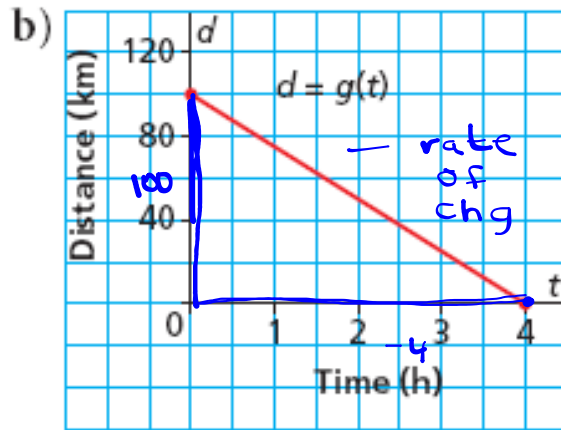
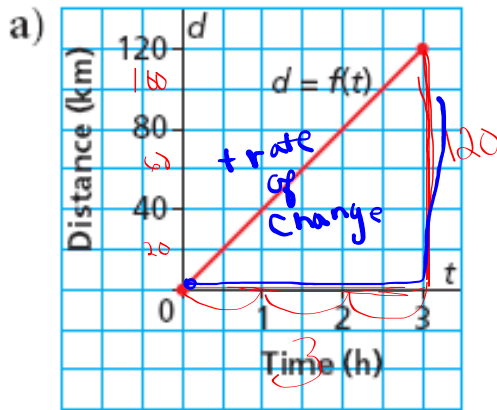
4. Each graph below shows distance, d kilometres, as a function of time,

t hours. For each graph:

- i) Determine the vertical y and horizontal x intercepts. Write the coordinates of the points where the graph intersects the axes.
- ii) Determine the rate of change.
- iii) Determine the domain and range.



next page



5.7 Interpreting Graphs of Linear Functions

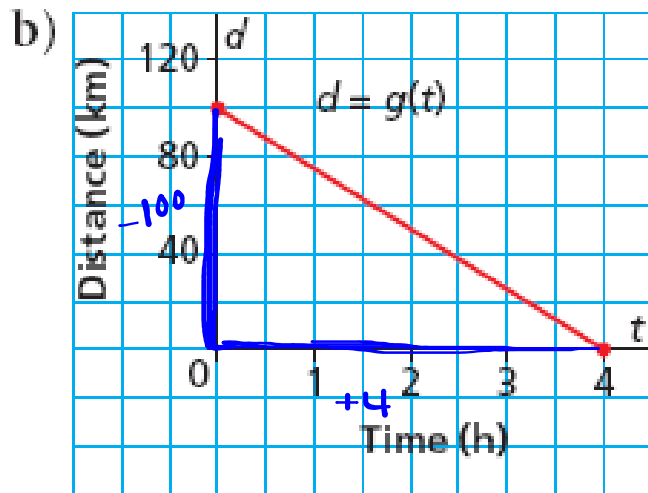
$y \text{ int} \rightarrow \odot$
 $(0,0)$

$x \text{ int} \rightarrow \odot$
 $(0,10)$

rate of change = $\frac{120 \text{ km}}{3 \text{ h}} = \frac{40 \text{ km}}{1 \text{ hr}}$

Domain
 $0 \leq x \leq 3$

Range
 $0 \leq y \leq 120$



$$x \text{ int} = 4 \\ (4, 0)$$

$$y \text{ int} = 100 \\ (0, 100)$$

Domain

$$0 \leq x \leq 4$$

Rate of change

$$= \frac{-100 \text{ km}}{4 \text{ h}}$$

$$= \frac{-25 \text{ km}}{1 \text{ h}}$$

Range

$$0 \leq y \leq 100$$

6. Sketch a graph of each linear function.

a) $f(x) = 4x + 3$

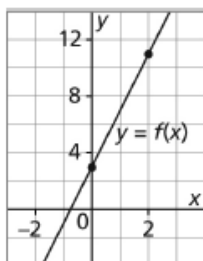
b) $g(x) = -3x + 5$

c) $h(x) = 9x - 2$

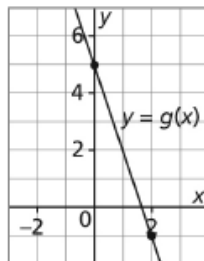
d) $k(x) = -5x - 2$



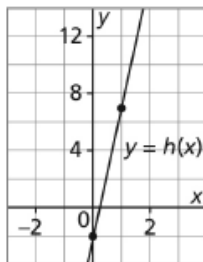
6. a)



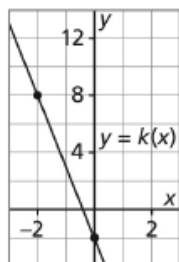
b)



c)



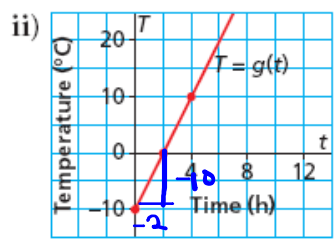
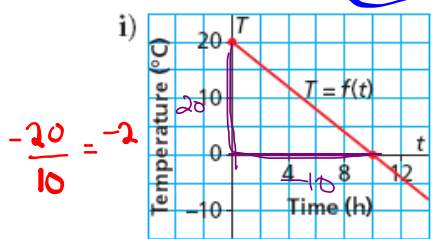
d)



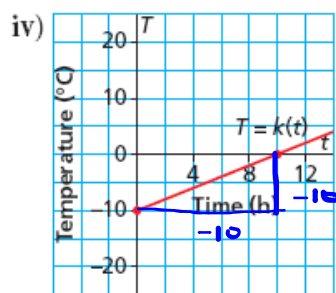
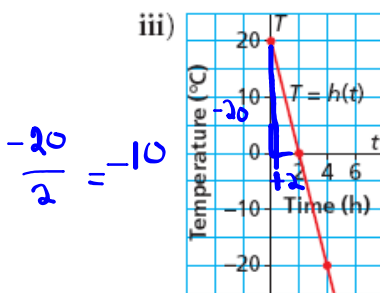
5.7 Interpreting Graphs of Linear Functions

8. The graphs below show the temperature, T degrees Celsius, as a function of time, t hours, at different locations.

- a) Which graph has a rate of change of $5^\circ\text{C}/\text{h}$ and a vertical intercept of -10°C ? y ii
- b) Which graph has a rate of change of $-10^\circ\text{C}/\text{h}$ and a vertical intercept of 20°C ? iii

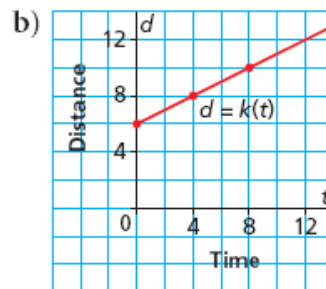
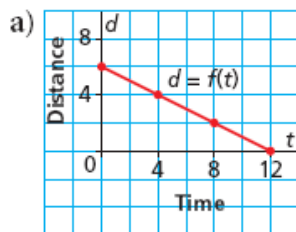


$$= \frac{-10}{2} = \frac{-5}{1}$$



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

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

**SOLUTION****CHECK YOUR UNDERSTANDING**

Did already

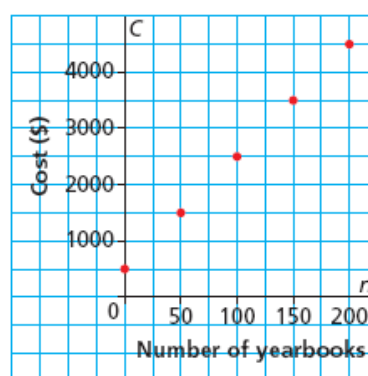
Example 4 Solving a Problem Involving a Linear Function

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**

Cost of Publishing a Yearbook



CHECK YOUR UNDERSTANDING



To find x & y Intercepts given an equation

1) To find x-intercept LET $x=0$

$$y = 3x + 7$$
$$y = mx + b$$

$$m = 3$$

2) To Find y-intercept let $y = 0$

$$y = 3x + 7$$

$$y = \textcircled{m}x + \textcircled{b}$$

#

m = Rate of Change (Slope)

b = initial cost (vertical intercept or y-int.)

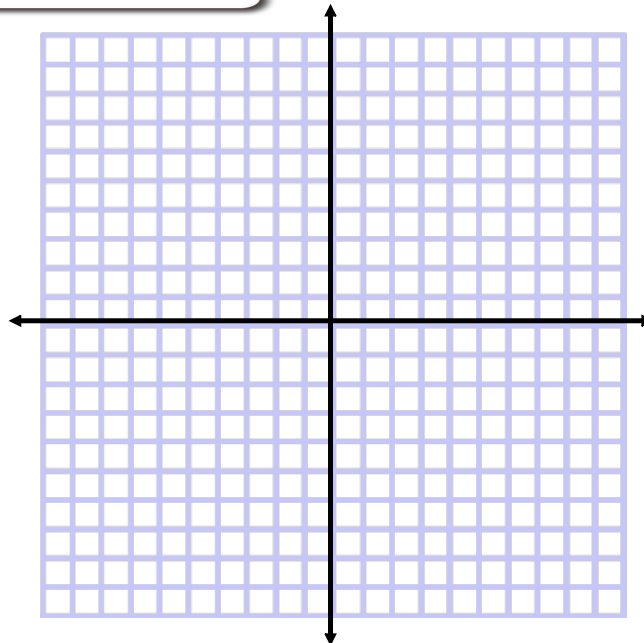
2. Sketch a graph of the linear function



$$f(x) = 3x + 1$$

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

y int =



Find the Slope and Y-intercept

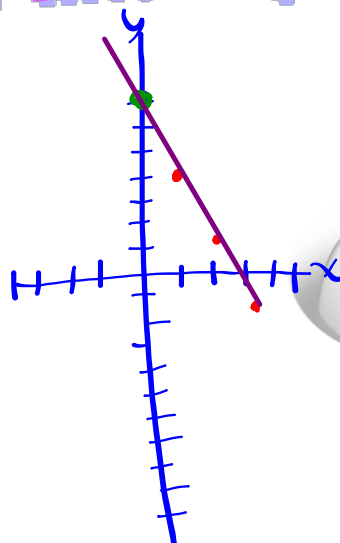
$$1) \quad y = mx + b$$

$$y = -3x + 7$$

$$m = -3 \quad -\frac{3}{1} \text{ or } \frac{3}{-1} \begin{array}{l} \text{rise} \\ \text{run} \end{array}$$

$$\text{yint} = 7$$

$$(0, 7)$$



write as ordered pair.
(Remember for y-intercept
the $x=0$)

$$2) \quad Z = 2x - 8$$

$$m = 2$$

$$\text{yint} \rightarrow -8$$

$$(0, -8)$$

$$3) \quad W = \frac{3}{5}b - 9$$

$$m = \frac{3}{5} \begin{array}{l} \text{rise} \\ \text{run} \end{array}$$

$$\text{yint} \rightarrow -9$$

$$(0, -9)$$

$$4) \quad d = 11 - \frac{5}{4}x$$

Part 10b on test looks like this

$$y = \frac{1}{2}x + 7$$

$$y = m x + b$$

Find the x and y intercept

x-intercept

let $y=0$

$$y = \frac{1}{2}x + 7$$

$$0 = \frac{1}{2}x + 7 - 7$$

$$-7 = \frac{1}{2}x$$

$$-14 = x$$

$$\boxed{-14 = x}$$

Coordinate (x,y)

$$(-14, 0)$$

①

① sub in $y=0$

② subtract

③ pt divide out by 2 or x by 2

y-intercept

let $x=0$

$$y = \frac{1}{2}x + 7$$

$$= \frac{1}{2}(0) + 7$$

$$= 0 + 7$$

$$= 7$$

Coordinate

$$(0, 7)$$

①

5 pts

$$y = -3x + 7$$

find x-intercept let $y = 0$

↓

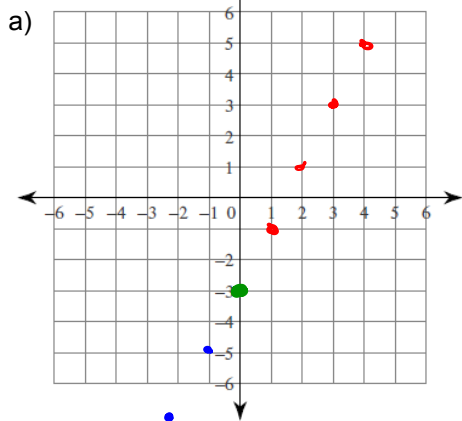
$$0 = -3x + 7 - 7$$

$$\frac{-7}{-3} = \frac{-3x}{-3}$$

$$\frac{7}{3} = x$$

$$\boxed{2.3 = x} \quad (2.3, 0)$$

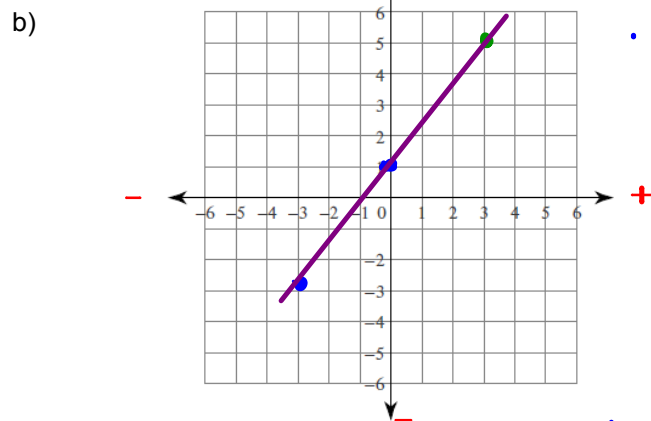
1) $y = 2x - 3$
 $y = mx + b$



$m = \frac{+2}{+1}$ or $\frac{-2}{-1}$ rise over run

Plot first -3
 $y\text{int} \rightarrow (0, -3)$

2) $y = \frac{4}{3}x + 1$
 $y = mx + b$



$m = \frac{+4}{+3}$ or $\frac{-4}{-3}$

$y\text{int} \rightarrow (0, +1)$

Example 4 Solving a Problem Involving a Linear Function

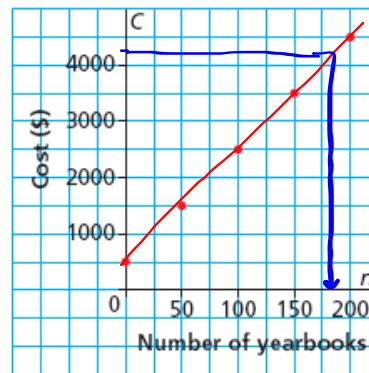
This graph shows the cost of publishing a school yearbook for Collège Louis-Riel in Winnipeg.

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

 **SOLUTION**

~ About 180 Book

Cost of Publishing a Yearbook



CHECK YOUR UNDERSTANDING





Homework

Page 319-322:

Questions: 7, 9, 13, 16