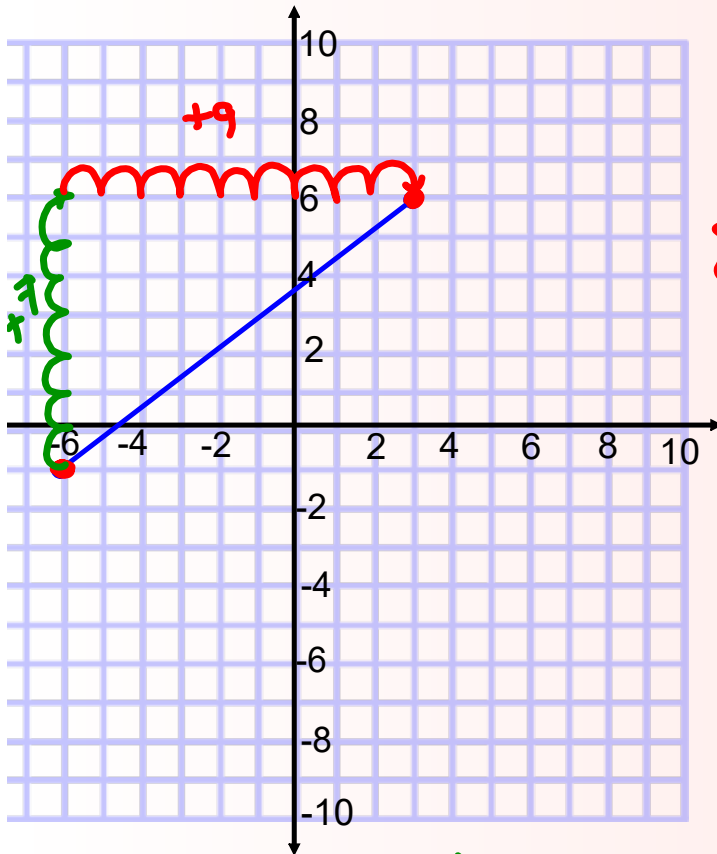
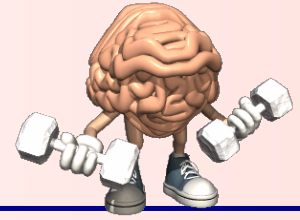


Warm Up



sec graph

State the :

Domain:

$$\{x \mid -6 \leq x \leq 3, x \in \mathbb{R}\}$$

Range:

$$\{y \mid -1 \leq y \leq 6, y \in \mathbb{R}\}$$

Function/Nonfunction:

$$x \text{ Intercept} \approx -5$$

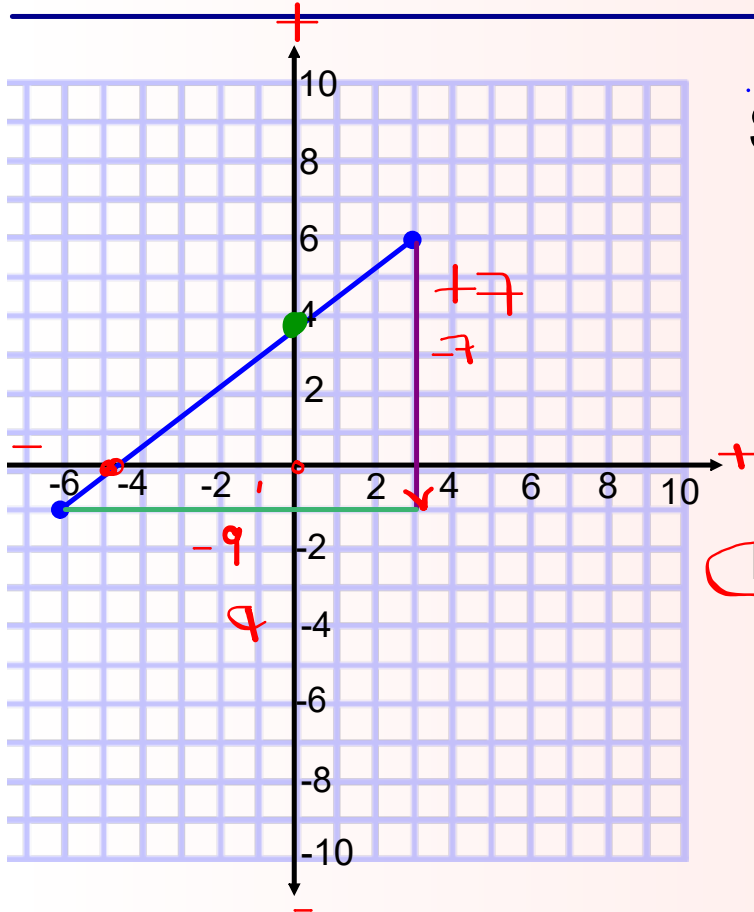
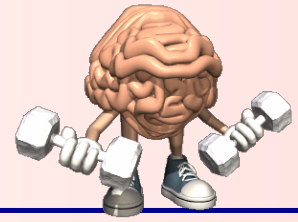
$$(-5, 0)$$

$$y \text{ Intercept} \approx 3.8$$

$$(0, 3.8)$$

$$\text{Rate of change} = \frac{\text{rise}}{\text{run}} = \frac{+7}{+9} = \frac{7}{9}$$

Warm Up



State the :

Domain:

$$D = \{x \mid -6 \leq x \leq 3, x \in \mathbb{R}\}$$

Range:

$$R = \{y \mid -1 \leq y \leq 6, y \in \mathbb{R}\}$$

Function/Nonfunction:

$$\begin{aligned} \text{x Intercept} &= -5 \\ &(-5, 0) \end{aligned}$$

$$\begin{aligned} \text{y Intercept} &= +4 \\ &(0, 4) \end{aligned}$$

$$\text{Rate of change} = \frac{\text{rise}}{\text{run}} = \frac{\text{dep change}}{\text{Ind change}}$$

$$= \frac{-7}{-9} = \frac{7}{9}$$

Section 5.7

Linear Relationships



Graph

Homework:

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Question 4, 6, 8

4b) Vertical (y-int)
horizontal (x-int)

$$\begin{array}{l} (0, 100) \\ y = 100 \quad d = 100 \\ x = 4 \quad t = 4 \\ (4, 0) \end{array}$$

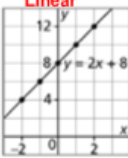
$$\text{rate of change} = \frac{\text{rise}}{\text{run}} = \frac{-100 \text{ km}}{+4 \text{ h}} = -25 \text{ km/h}$$

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:

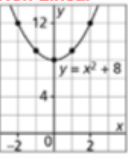
i) **Linear**

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




iii) **Non Linear**

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



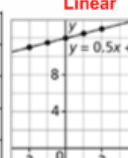
v) **Linear**

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



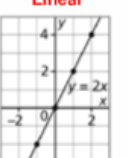
ii) **Linear**

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



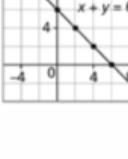
iv) **Linear**

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



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

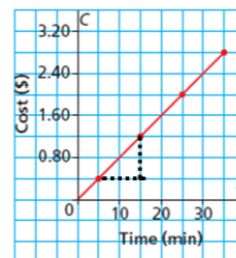
14. This graph represents Jerome's long distance phone call to his pen pal in Nunavut. Jerome is charged a constant rate.

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.

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

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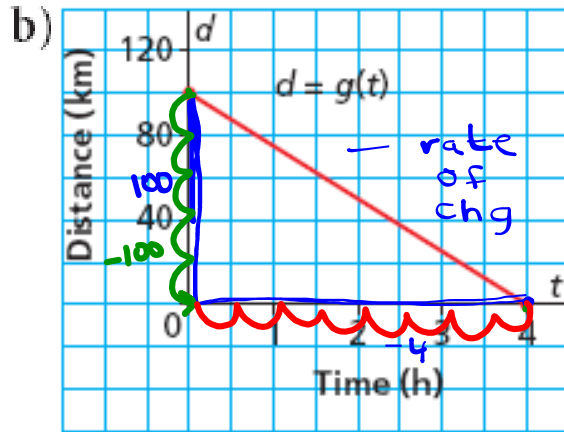
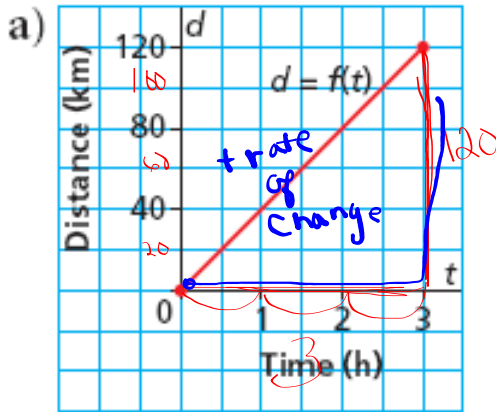


4. Each graph below shows distance, d kilometres, as a function of time, t hours. For each graph:

- 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

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

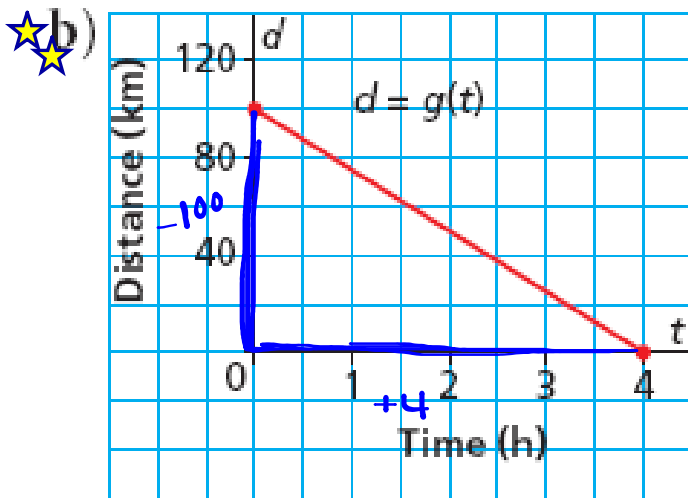
$x \text{ int} \rightarrow (0,0)$

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

Domain $0 \leq x \leq 3$

Range $0 \leq y \leq 120$

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

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

Domain

$$0 \leq x \leq 4$$

Rate of change

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

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

Range

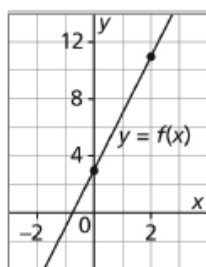
$$0 \leq y \leq 100$$

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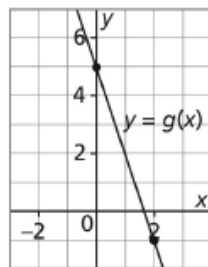
6. Sketch a graph of each linear function.

- a) $f(x) = 4x + 3$ b) $g(x) = -3x + 5$
c) $h(x) = 9x - 2$ d) $k(x) = -5x - 2$

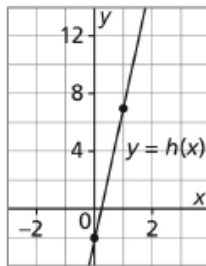
6. a)



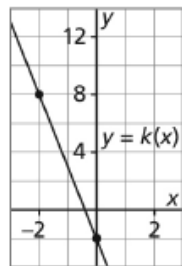
b)



c)



d)

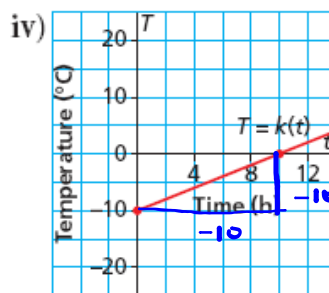
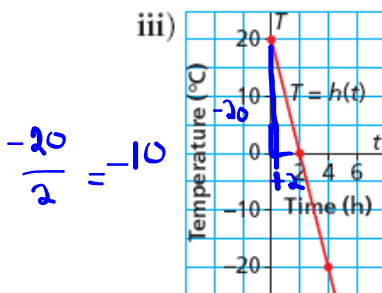
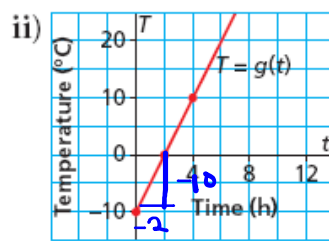
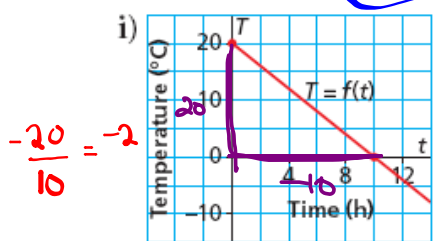


5.7 Interpreting Graphs of Linear Functions

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

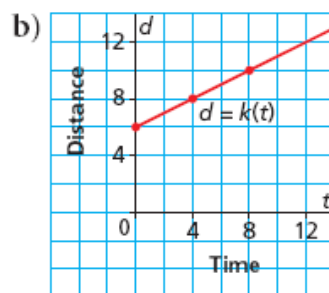
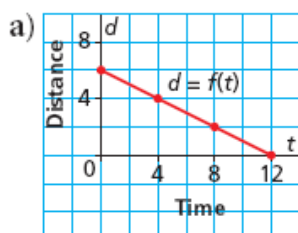
- a) Which graph has a rate of change of $5^\circ\text{C}/\text{h}$ and a vertical intercept of -10°C ? ii
- b) Which graph has a rate of change of $-10^\circ\text{C}/\text{h}$ and a vertical intercept of 20°C ? iii



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

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**

Example 4 Solving a Problem Involving a Linear Function

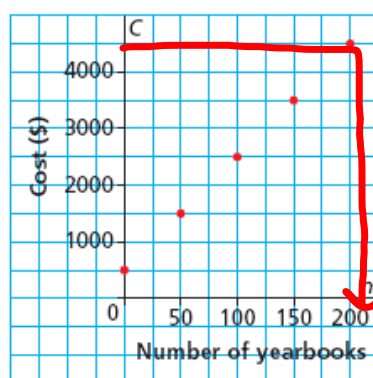
This graph shows the cost of publishing a school yearbook for Collège Louis-Riel in Winnipeg.

The budget for publishing costs is \$4200.

What is the maximum number of books that can be printed? **200**

 **SOLUTION**

Cost of Publishing a Yearbook



CHECK YOUR UNDERSTANDING



ON TEST

To find x & y Intercepts given an equation

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

$$y = 3x + 7$$

$$0 = 3x + 7 \quad \text{Solve for } x$$

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

$$-7 = 3x$$

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

$$\boxed{-\frac{7}{3} \quad -x}$$

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

$$y = 3x + 7$$

$$y = 3(0) + 7$$

$$= 0 + 7$$

$$\boxed{y = 7}$$

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

#

m = Rate of Change (Slope)

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

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



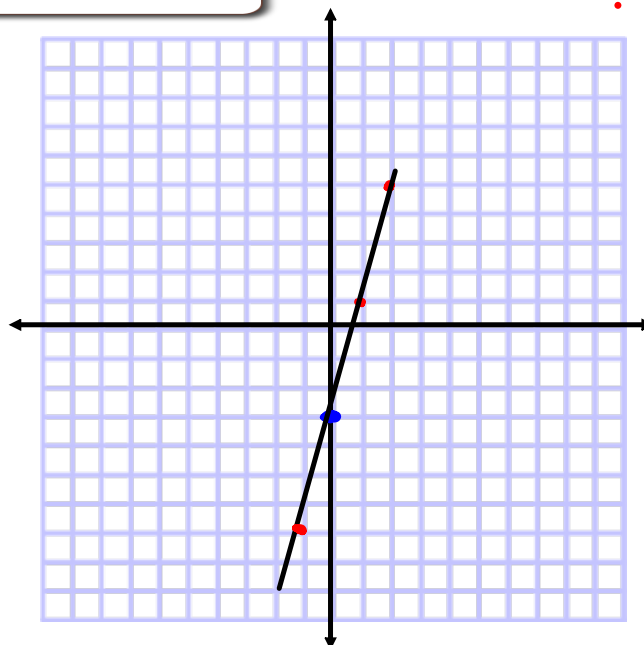
$$f(x) = 4x - 3$$

$$y = 4x - 3$$

$$m = \frac{+4}{+1} = \frac{\text{rise}}{\text{run}}$$

$$y \text{ int} = -3$$

$(0, -3)$



Find the Slope and Y-intercept

$$1) y = -3x + 7$$

$$m = -3$$

$$y\text{ int} = +7$$

$$(0, 7)$$

$$y = mx + b$$

\downarrow Slope
 \downarrow rate
 \downarrow y int



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

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

$$m = 2$$

$$y\text{ int} \rightarrow -8$$

$$(0, -8)$$

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

$$m = \frac{3}{5}$$

$$y\text{ int} \rightarrow -9$$

$$(0, -9)$$

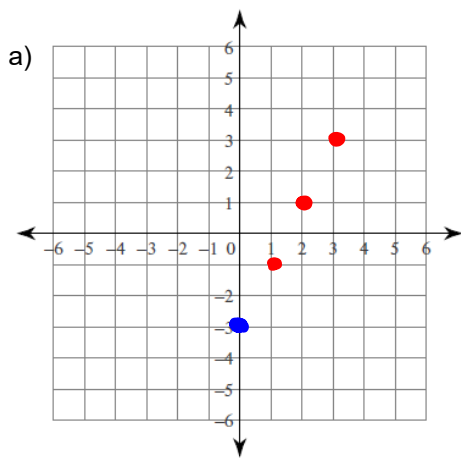
$$4) d = 11 - \frac{5}{4}x$$

$$m = -\frac{5}{4}$$

$$y\text{-int} = 11$$

$$(0, 11)$$

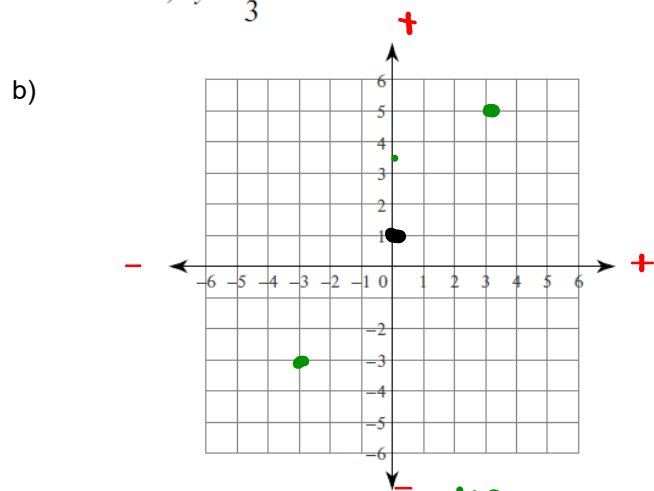
1) $y = 2x - 3$



$$m = \frac{2 \text{ rise}}{1 \text{ run}}$$

yint \rightarrow (0, -3) Plot first

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



$$m = \frac{4 \text{ rise}}{3 \text{ run}} \text{ or } \frac{-4}{-3}$$

yint \rightarrow (0, 1)

$$y = 2x + 8$$

Find the x-intercept ($y = 0$)

$$0 = 2x + 8$$

$$0 - 8 = 2x + 8 - 8$$

$$\frac{-8}{2} = \frac{2x}{2}$$

$$\boxed{-4 = x}$$

Find the y-intercept

$$y = 2x + 8$$

$$2(0) + 8$$

$$0 + 8$$

$$\boxed{y = 8}$$

