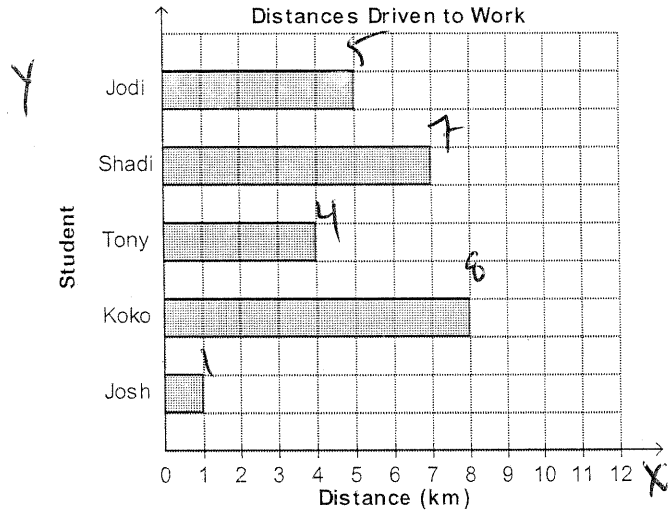


Key

Math 10C
Relations and Functions Exam

1. Consider the relation represented by this graph. Represent the relation as a set of ordered pairs.



- a. $\{(5, \text{Jodi}), (7, \text{Shadi}), (4, \text{Tony}), (8, \text{Koko}), (1, \text{Josh})\}$
- b. $\{(5, \text{Jodi}), (7, \text{Shadi}), (1, \text{Tony}), (8, \text{Koko}), (4, \text{Josh})\}$
- c. $\{(\text{Jodi}, 5), (\text{Shadi}, 7), (\text{Tom}, 4), (\text{Koko}, 8), (\text{Steven}, 1)\}$
- d. $\{(\text{Jodi}, 5), (\text{Shadi}, 7), (\text{Tony}, 4), (\text{Koko}, 8), (\text{Josh}, 1)\}$

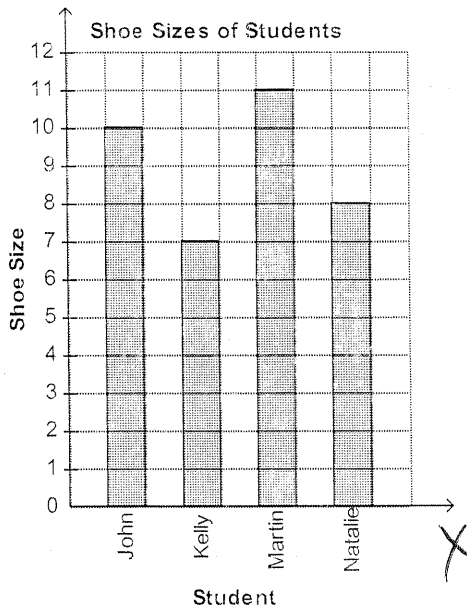
2. Capital cities can be associated with the province or territory they are in.

Capital City	Province/Territory
Victoria	British Columbia
Edmonton	Alberta
Regina	Saskatchewan
Winnipeg	Manitoba
Whitehorse	Yukon
Yellowknife	Northwest Territories
Iqaluit	Nunavut

Describe this relation in words.

- a. The relation shows the association "is in the province/territory of" from a set of provinces and territories to a set of capital cities.
- b. The relation shows the association "is the largest city of" from a set of capital cities to a set of provinces and territories.
- c. The relation shows the association "is the capital of" from a set of provinces and territories to a set of capital cities.
- d. The relation shows the association "is the capital of" from a set of capital cities to a set of provinces and territories.

3. Consider the relation represented by this graph. Represent the relation as a table.



a.

Shoe Size	Student
10	John
7	Kelly
11	Natalie
8	Martin

b. *not* *if*

Student	Shoe Size
John	10
Kelly	7
Martin	11
Natalie	8

c.

Shoe Size	Student
7	John
10	Kelly
8	Martin
11	Natalie

d.

Student	Shoe Size
John	7
Kelly	10
Martin	8
Natalie	11

4. Which set of ordered pairs does not represent a function?

- a) $\{(4, 6), (5, -7), (7, 9), (8, -10)\}$ ✓
- b) $\{(-3, -8), (-1, -6), (-2, 5), (0, 7)\}$ ✓
- c) $\{(2, 5), (3, 8), (4, 11), (2, -1)\}$
- d) $\{(7, 0), (4, -1), (-6, 5), (-8, 0)\}$ ✓

not mean *input*
multiple out.

5. Identify the domain of this relation.

$\{(3, 10), (5, 7), (9, -11), (6, -8)\}$

$0 = x$
5, 6, 8, 9.

- a. $\{-8, 7, 9, 10\}$ b. $\{5, 6, 8, 9\}$
c. $\{-11, -8, 7, 10\}$ d. $\{5, 6, 9, 10\}$

6. For the function $f(x) = -3x + 8$, determine $f(-2)$.

$x = -2$
 $6 + 8 = 14$

- a. 2 b. 3 c. 7 d. 14

7. For the function $f(x) = -3x + 8$, determine x when $f(x) = -25$.

$-25 = -3x + 8$

- a. -67 b. -11 c. 11 d. 83

8. For the function $g(x) = 2x - 9$, determine $g(3.4)$.

$2(3.4) - 9 = -2.2$

- a. -3.6 b. -2.2 c. 2.2 d. 6.2

9. For the function $g(x) = 2x - 9$, determine x when $g(x) = -15$.

$-15 = 2x - 9$

- a. 12 b. -3 c. -12 d. -39

10. Write $y = 10x - 10$ in function notation.

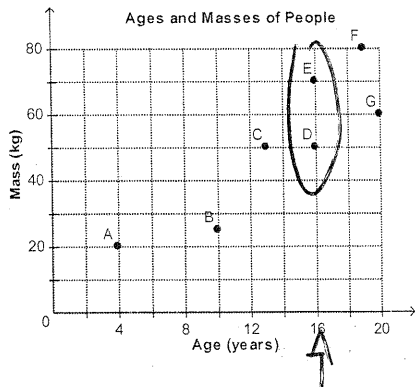
$F(x) = 10x - 10$

- a. $f(x) = 10y - 10$ b. $f(y) = 10y - 10$
c. $f(x) = 10x - 10$ d. $f(y) = 10x - 10$

11. The function $C(f) = \frac{5}{9}(f - 32)$ converts a temperature, f degrees Fahrenheit, to C degrees Celsius. Determine $C(39)$ to the nearest degree.

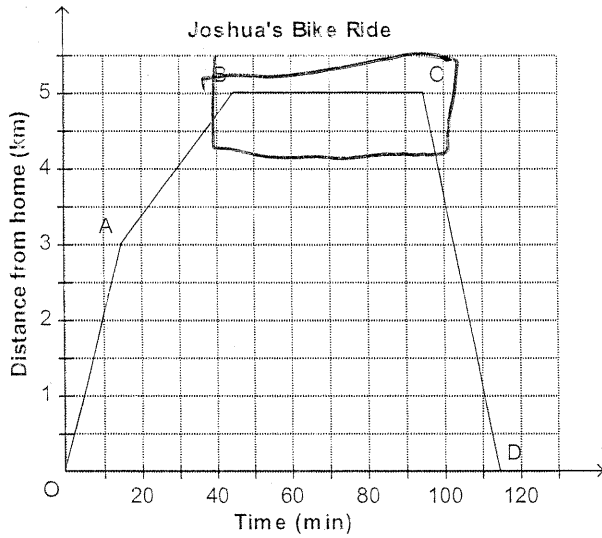
- a. -4°C b. 4°C c. 38°C d. 102°C

12. Each point on this graph represents a person. Which two people are the same age?



- a. B and C b. D and E
c. C and D d. E and F

13. Joshua went on a bike ride. For part of the ride, Joshua stopped to play in a park with a friend. Which segment of the graph best describes this part of his bike ride?



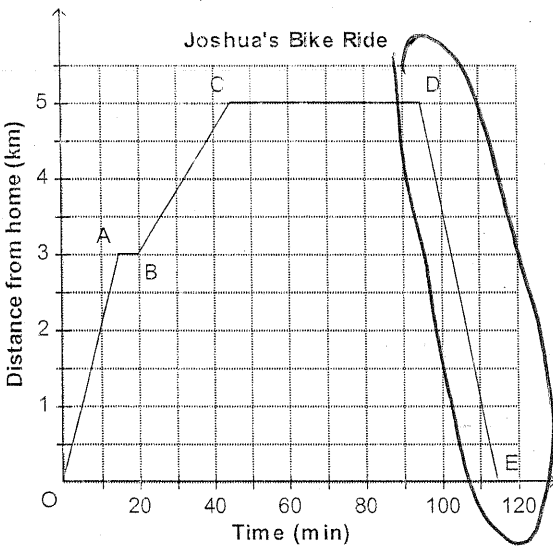
a. OA

b. AB

c. BC

d. CD

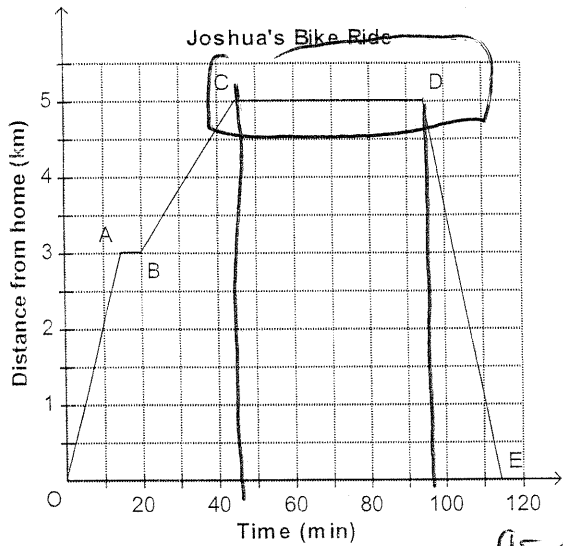
14. Joshua went on a bike ride. Which statement best describes what is happening for line segment DE in this graph?



going home as
D from home
is decreasing.

- a. Joshua spends time at the park.
b. Joshua leaves home.
c. Joshua cycles to the park.
 d. Joshua returns home.

15. Joshua went on a bike ride. During the ride, he stopped to play at a park, as shown by line segment CD. How much time did Joshua spend at the park?



a. 45 min.

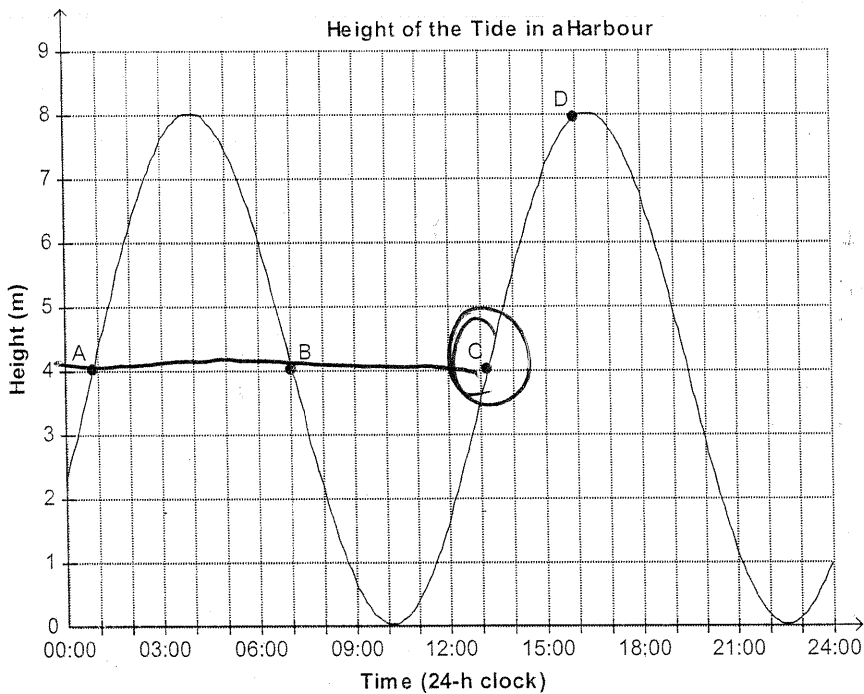
b. 50 min.

c. 70 min.

d. 95 min.

$$45 \text{ min} = 95 \text{ min} - 50 \text{ min} = 45 \text{ min}$$

16. This graph shows the height of the tide in a harbour as a function of time in one day. Which statement best describes the tide at Point C?



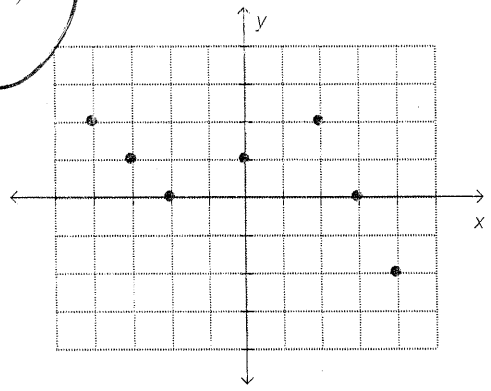
- a. The tide is at its maximum height.
c. The tide is at its minimum height.

- b. The tide is 7.1 m high.
 d. The tide is 4 m high.

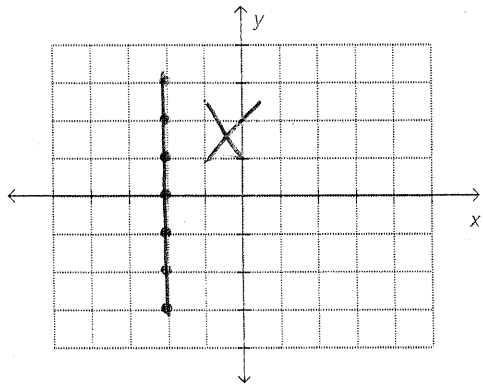
light touch. Use VLT.

17. Which of these graphs represents a function?

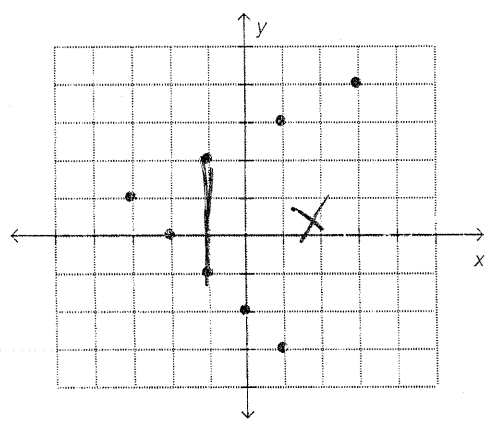
a)



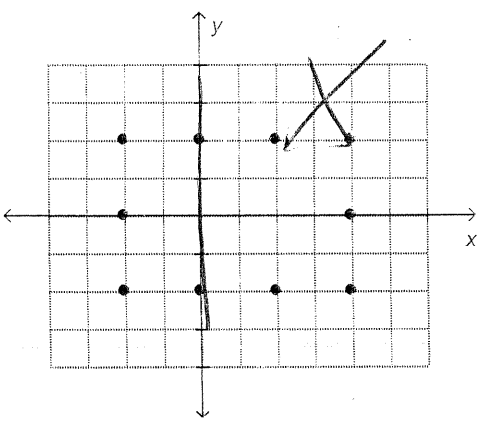
b) ✓



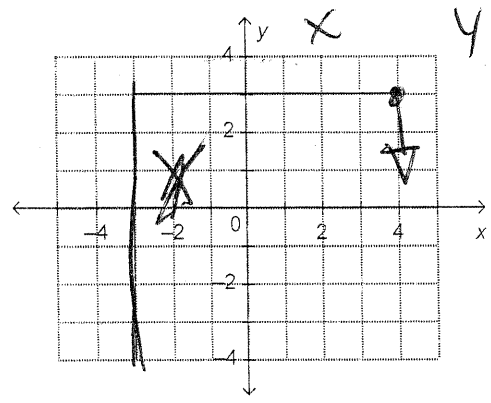
c)



d)



18. Determine the domain and range of this graph.



$x = -3 \rightarrow 4$

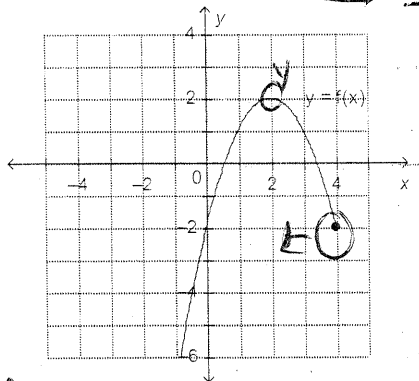
$-3 \leq x \leq 4$

$y \leq 3$

- ~~A~~ $3 \leq x \leq 4; y \leq -3$
- ~~B~~ $x \leq 3; -3 \leq y \leq 4$

- ~~C~~ $-3 \geq x \geq 4; y \leq 3$
- D $-3 \leq x \leq 4; y \leq 3$

19. Determine the domain and range of the graph of this function.



~~x ≤ 4~~

x ≤ 4

y ≤ 2

a

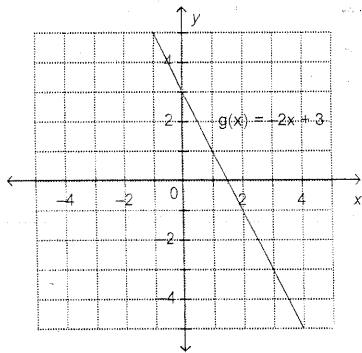
$2 \leq x \leq 4, y \leq 2$

$x \leq 4, y \leq 2$

~~x ≤ 2, y ≤ 4~~

~~x ≤ 4, -2 ≤ y ≤ 2~~

20. This is a graph of the function $g(x) = -2x + 3$. Determine the range value when the domain value is 2.



$-2(2) + 3$

$-4 + 3 = -1$

y

x = 2

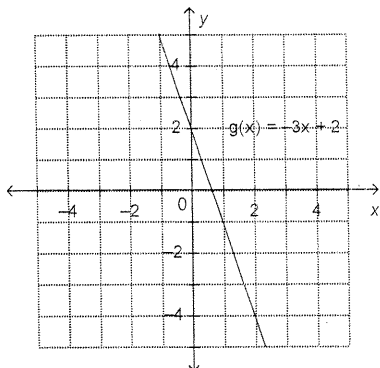
a. 7

b. 1

c. 0.5

d. -1

21. This is a graph of the function $g(x) = -3x + 2$. Determine the domain value when the range value is -4.



$-4 = -3x + 2$

$-2 = -3x$

$-6 = 3x$

$-2 = x$

x = 2

y

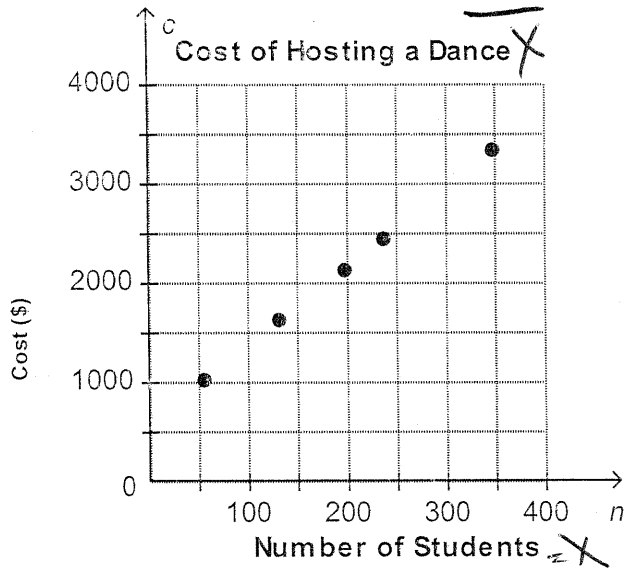
a. -2

b. 0.5

c. 2

d. 11

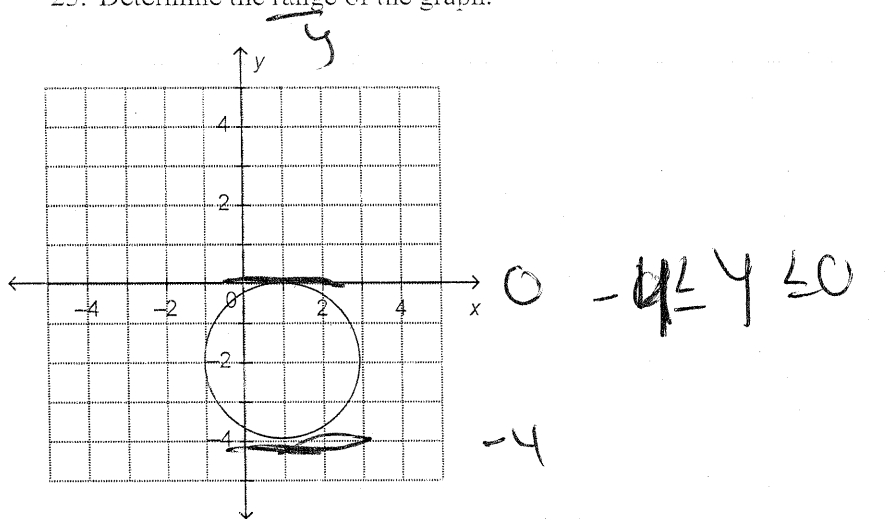
22. This graph shows the cost of hosting a dance, c , as a function of the number of students attending, n . What is a restriction on the domain?



Students can't be $\frac{1}{2}$ or $\frac{3}{4}$, or -

- a. The domain can only contain integer numbers.
 b. The domain can only contain whole numbers.
 c. The domain can only contain rational numbers.
 d. The domain can only contain whole numbers that are multiples of 50.

23. Determine the range of the graph.



- a. $-1 \leq y \leq 0$
 c. $-4 \leq y \leq 0$
 b. $-1 \leq x \leq 3$
 d. $-4 \leq y \leq 3$

24. Which table of values represents a linear relation?

input output
+
constant change.

a)

Distance (m)	0	5	10	15	20
Time (s)	0	1	2	3	4

15 15

b)

Time (s)	0	3	6	9	12
Distance (m)	0	10	22	36	52

1 1 1
3 3

c)

Time (s)	0	1	2	3	4
Speed (m/s)	0	1	2	4	8

10 10
1 1 1

d)

Distance (m)	0	4	16	36	64
Speed (m/s)	0	2	4	6	8

4 16
2 4
2 2

25. The relation between x and y is linear. Which number would complete this table?

x	3	7	11	15	19
y	19	13	7	1	-5

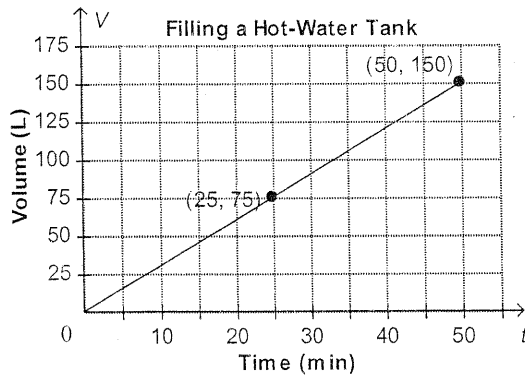
a. 6

b. 1

c. -6

d. -7

26. This graph represents a 150-L hot-water tank being filled at a constant rate. Determine the rate of change of the relation.



a. 0.33 L/min

c. 25 L/min

b. 3 L/min

d. 75 L/min

$m = \text{slope}$

$$\frac{y_2 - y_1}{x_2 - x_1}$$

$$\frac{150 - 75}{50 - 25}$$

$$\frac{75}{25} = 3 \text{ L/min}$$

$$\frac{15-0}{3-0} = 5$$

27. This table of values represents a linear relation. Determine the rate of change of the relation.

Time (s)	0	1	2	3	4
Distance (m)	0	5	10	15	20

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

- a. 10 m/s b. 5 m/s c. 2 m/s d. 1 m/s

28. Which situation represents a linear relation?

- ~~a~~ The number of cells decays at a rate of 12% each day.
b A taxi company charges a \$3 flat fee plus \$1 for each kilometre travelled.
~~c~~ A population of bacteria doubles every hour for 6 h.
~~d~~ An investor's portfolio increases in value by 6% each year.

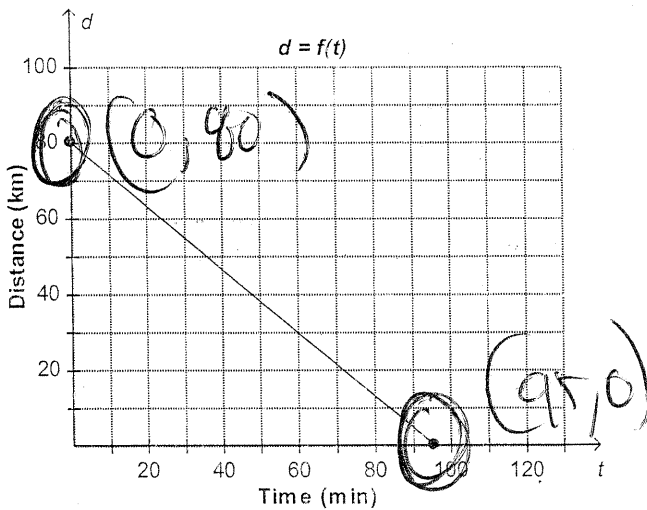
not as it depends on previous
 12% of 1
 ≠
 12% of 3
 A

29. Which equation does not represent a linear relation?

- a) $y = x^2 - 10$
 b) $x = -5$
 c) $y = -6x + 10$
 d) $6x + 11y = 13$

$x^2 \neq$ linear

30. This graph shows distance, d , kilometres, as a function of time, t minutes. Determine the vertical and horizontal intercepts.

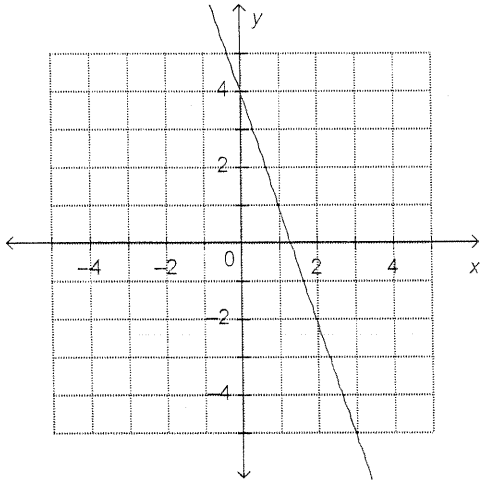


- ~~a~~ Vertical intercept: 80
 Horizontal intercept: 64
~~b~~ Vertical intercept: 96
 Horizontal intercept: 80
~~c~~ Vertical intercept: 64
 Horizontal intercept: 96
d Vertical intercept: 80
 Horizontal intercept: 96

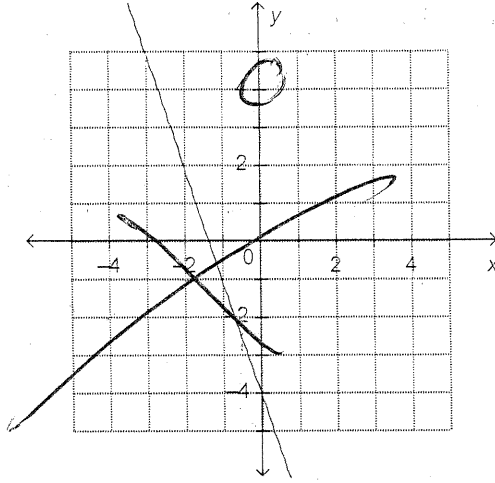
31. Which graph represents the linear function $f(x) = -3x + 4$?

$A \rightarrow y = y \text{ intercept}$
 $\text{Slope} = -3$
 $= -\text{slope} \downarrow$

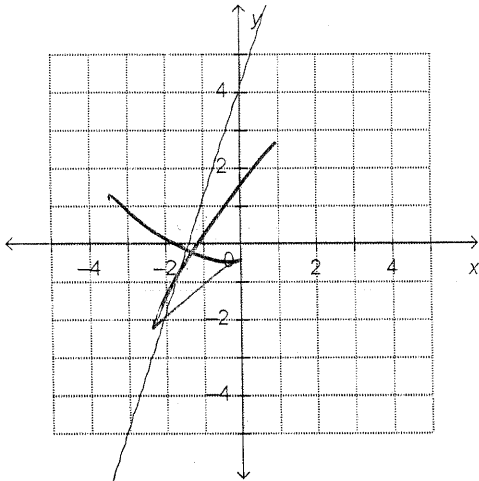
a.



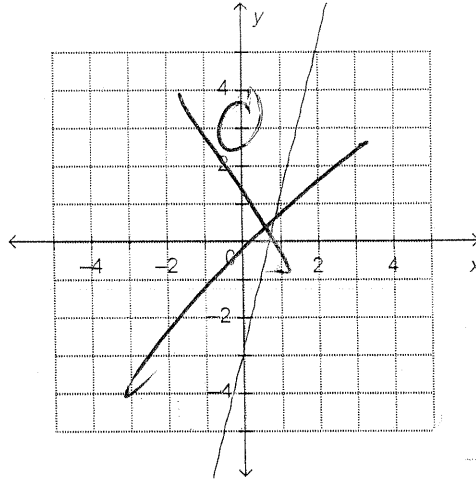
b.



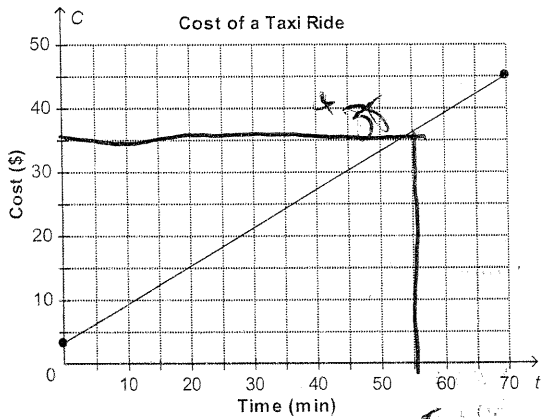
c.



d.



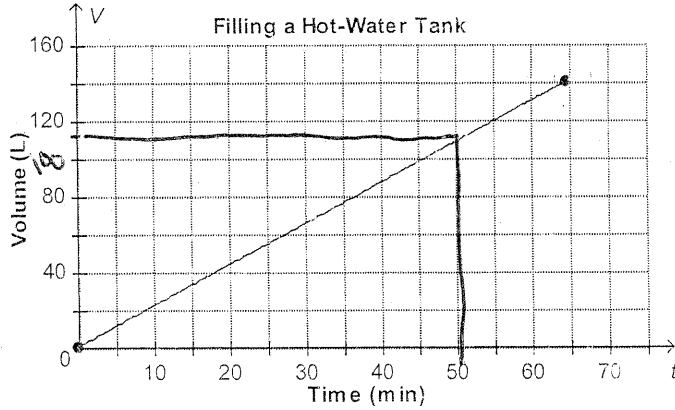
32. This graph shows the cost of a taxi ride. The cost, C dollars, is a function of the duration of the ride, t min. What is the duration of the ride when the cost is \$35?



- a. 58 min
- c. 50 min

- b. 53 min
- d. 45 min

33. This graph represents the time it takes to fill a 140-L hot-water tank. Determine the volume of water in the tank after 50 min.



- ~~a.~~ about 23 L
~~c.~~ about 97 L

- b. about 119 L
 d. about 108 L

Numerical Response

1. The volume of a cone with a slant height of 5.0 cm and a radius of 3.0cm, to the nearest tenth, is _____ cm³.

$$V = \frac{1}{3} \pi r^2 h$$

$$SA = \pi r^2 + \pi r s$$

NO

2. The polynomial $6x^2 + 7x - 24$ can be factored to $(2x - 3)(3x + b)$. The value of b is _____.

NO

3. When $\sqrt{45}$ is expressed in mixed radical form $a\sqrt{b}$, where a and b are whole numbers, the largest value of a is _____.

NO

4. When $(3x + 2)(2x + 1)$ is expanded the answer is $ax^2 + bx + c$. The value of a, b, c is _____

NO

All good practice \uparrow

Written Response

1. The set of ordered pairs below shows Aboriginal ice-hockey players who have played in the NHL and their heritage. Represent the relation as a table.

x y x y x y
 {(Jordin Tootoo, Inuit), (Jonathan Cheechoo, Moose Cree), (Sheldon Souray, Metis),
 (Wade Redden, Metis), (Chris Simon, Ojibwa), (Sandy McCarthy, Mi'kmaq)}

Name	Heritage
Jordin T.	Inuit
Jonathan C.	Moose Cree
Sheldon S.	Metis
Wade R.	Metis
Chris S.	Ojibwa
Sandy M.	Mi'kmaq

2. For the function $f(x) = 4x - 7$, determine $f(-7.5)$.

$$4(-7.5) - 7 = -30 - 7 = -37$$

3. For the function $g(x) = -\frac{2}{3}x + 5$, determine x when $g(x) = 25$.

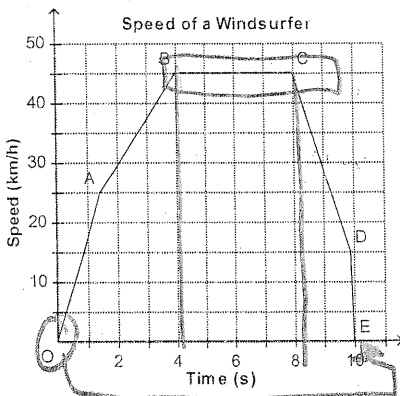
$$+25 = -\frac{2}{3}x + 5 - 5$$

$$20 = -\frac{2}{3}x \times 3$$

$$\frac{60}{-2} = \frac{-2x}{-2}$$

$x = -30$

4. The graph shows the speed of a windsurfer as a function of time.



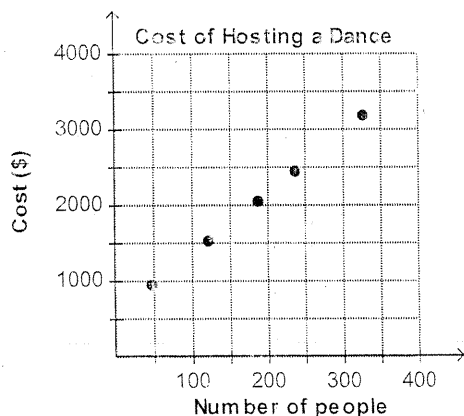
- a) For how long did the windsurfer travel at a speed of 45 km/h?
 b) How long did the windsurfer's ride last?

4 - 8 seconds

4 seconds

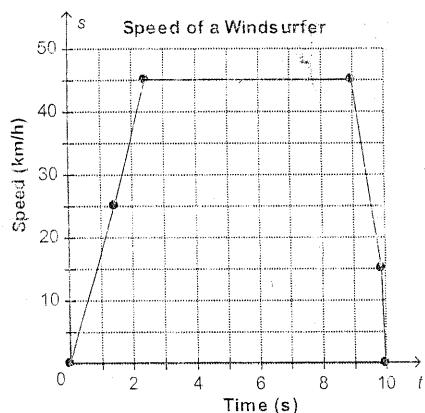
10 seconds

5. Explain why the points on this graph are not joined.



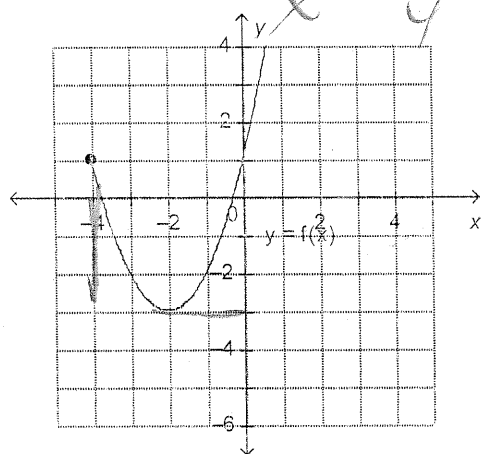
It's discrete data
b/c people can't be
 $\frac{1}{2}$ or -

6. This graph shows the speed of a windsurfer, s , as a function of time, t . Why are the points on the graph connected?



It shows his ride
that wouldn't stop, it's
continuous data.

7. Determine the domain and range of the graph of this function.



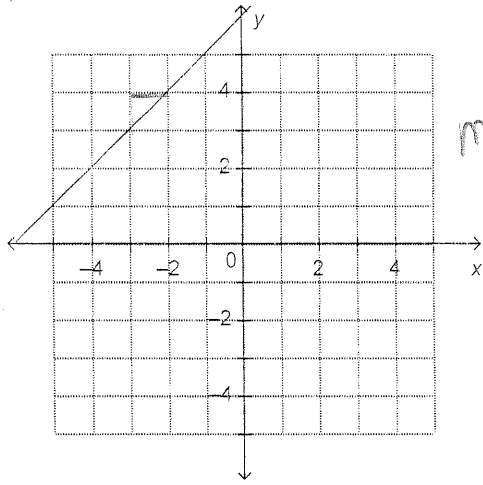
$$-4 \leq x \quad x \mid -4 \leq x, x \in \mathbb{R} \quad [-4, \infty)$$

$$y \geq -3 \quad y \mid -3 < y, y \in \mathbb{R} \quad (-3, \infty)$$

Slope

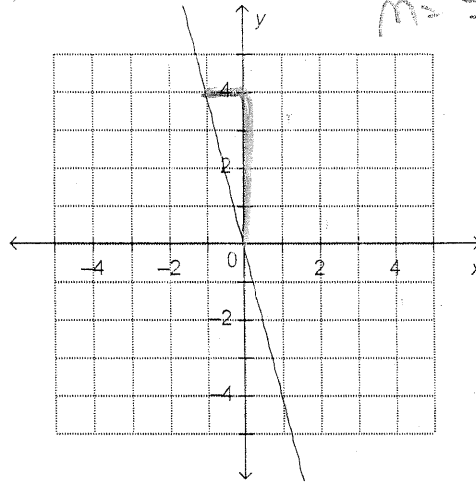
8. Determine the rate of change for each graph.

a)



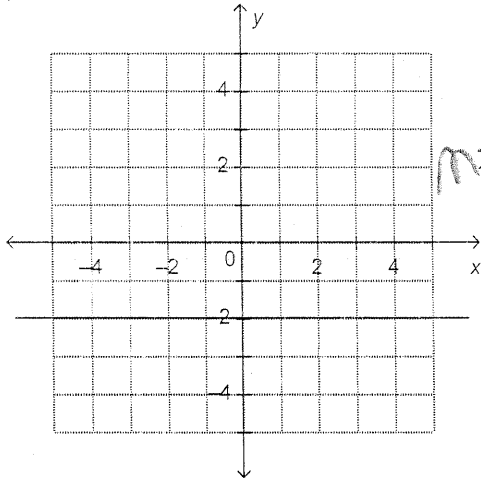
$m = 1$

b)



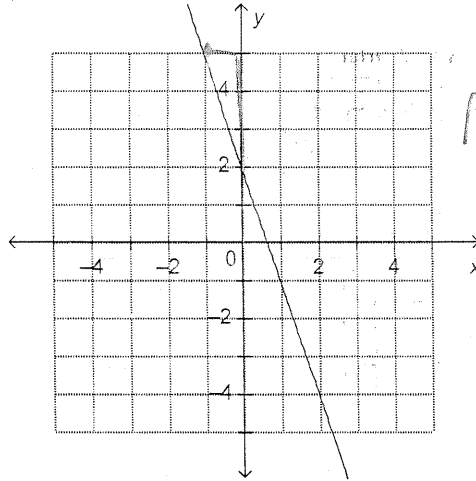
$m = -\frac{1}{4}$

c)



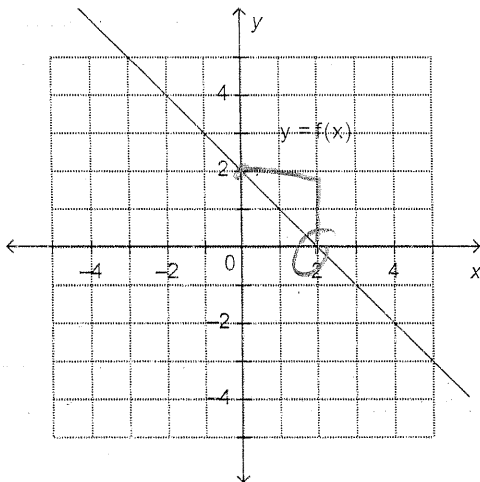
$m = 0$

d)



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

9. Determine the rate of change and the horizontal and vertical intercepts of this graph.



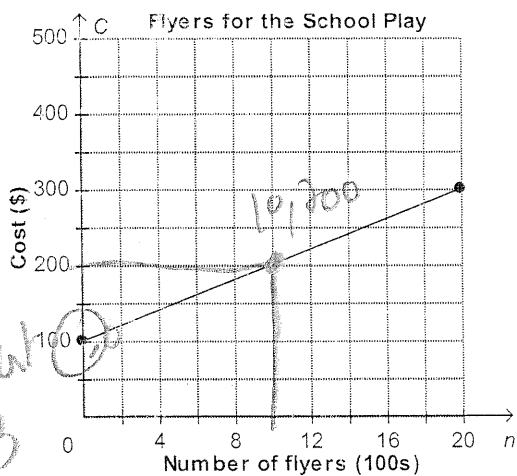
$m = \frac{-2}{2} = -1$

$\frac{2-0}{0-2} = \frac{2}{-2} = -1$

horiz (y) = (0, 2)

vert (x) = (2, 0)

10. This graph shows the cost, C dollars, of printing an advertising flyer for the school play as a function of the number of flyers printed, n . What is the cost when 1000 flyers are printed?



need eqn.

Slope $\frac{200-100}{10-0} = \frac{100}{10} = 10$

$y = 10x + 100$

11. Graph the following information.

Temperature of water being heated

	Time (min)	Temperature ($^{\circ}\text{C}$)
a	0	80
b	2	85
c	4	91
d	6	97
e	8	99
f	10	99
g	12	99
h	14	99
i	16	103
j	18	108

