# Academic

## Grade 9 Assessment of Mathematics

2013

## RELEASED ASSESSMENT QUESTIONS

**Record your answers to the multiple-choice questions on the Student Answer Sheet (2013, Academic).**

Please note: The format of this booklet is different from that used for the assessment. The questions themselves remain the same.

**1** What is the value of $5x^3y^2$ when $x = 2$ and $y = 4$?

  a   240

  b   320

  c   480

  d   640

**2** What exponent goes in the box to make the following equation true?

$$\frac{x^\square x^6}{x^2} = x^{12}$$

  a   9

  b   8

  c   4

  d   3

**3** Mario is making fruit punch by mixing orange juice and pineapple juice in a ratio of 1:3.

How much pineapple juice should he use to make 3 L of fruit punch?

  a   0.75 L

  b   2 L

  c   2.25 L

  d   4 L

**4** Which of the following is a simplified form of the expression $4(5x - 8) - 3(2x - 7)$?

  a   $14x - 11$

  b   $14x - 53$

  c   $26x - 11$

  d   $26x - 53$

**5** The square and the triangle below have the same area.
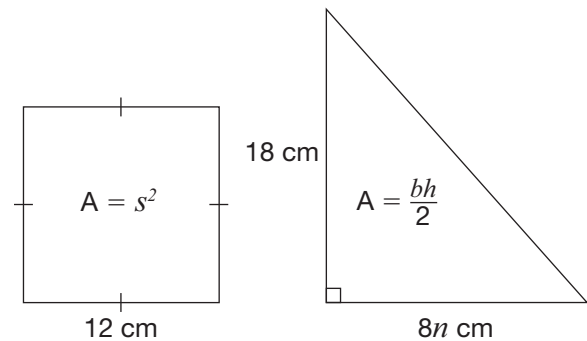


What is the value of $n$?
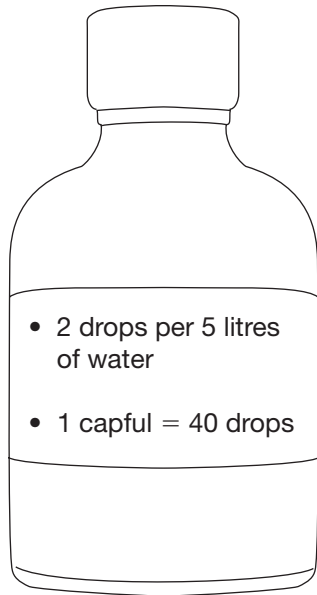
  a   1

  b   2

  c   8

  d   16

## 6 Healthy Fish

James adds vitamin drops to his fish tank to keep his fish healthy.

If James follows the instructions on the bottle of vitamins, how many capfuls should he add to his 350-litre fish tank?

Show your work.

- 2 drops per 5 litres of water

- 1 capful = 40 drops

**7** A rain barrel full of water is drained at a constant rate. Data for the first few minutes of draining is shown on the grid below.

**Volume Left in the Rain Barrel vs. Time**
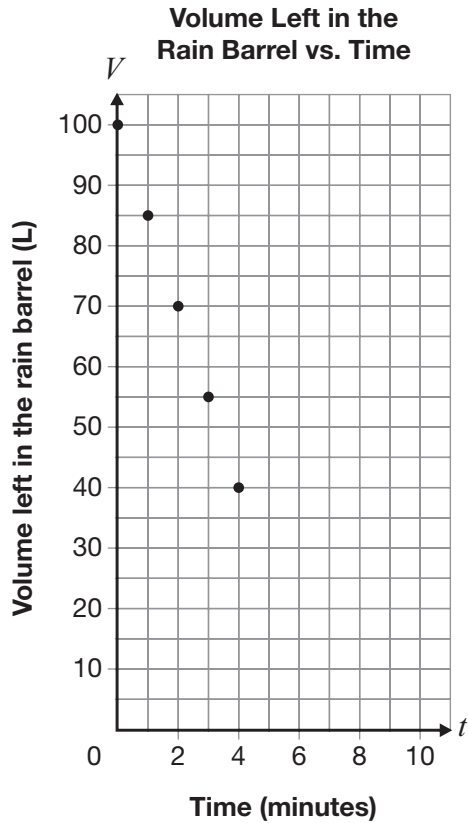


After 6 minutes, the draining is stopped.

How much water is needed to refill the rain barrel?

a  90 L

b  75 L

c  25 L

d  10 L

**8** Luisa chooses a cellphone plan that charges a flat fee of $20 per month and $0.25 for each text message sent.

Which equation best represents the cost of Luisa's cellphone plan, $C$, in dollars, where $n$ is the number of text messages sent?

a  $C = 20.25n$

b  $C = 20(0.25n)$

c  $C = 20n + 0.25$

d  $C = 0.25n + 20$

**9** There is a linear relationship between the total cost of renting a costume and the number of hours the costume is rented.

• For 3 hours, the total cost is $60.

• For 5 hours, the total cost is $80.

What type of variation is this relationship, and what is its initial value?

a  a partial variation with an initial value of $30

b  a partial variation with an initial value of $20

c  a direct variation with an initial value of $30

d  a direct variation with an initial value of $20

**10** For which scatter plot could the line $y = 5$ be the line of best fit?

**a**



**b**



**c**



**d**
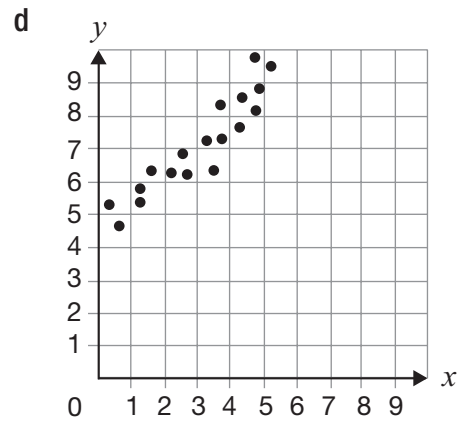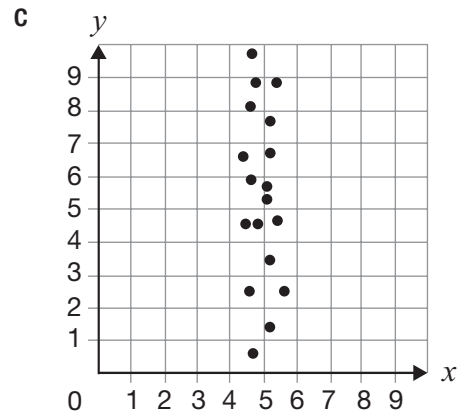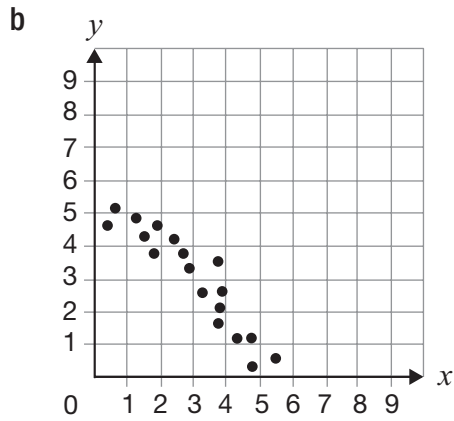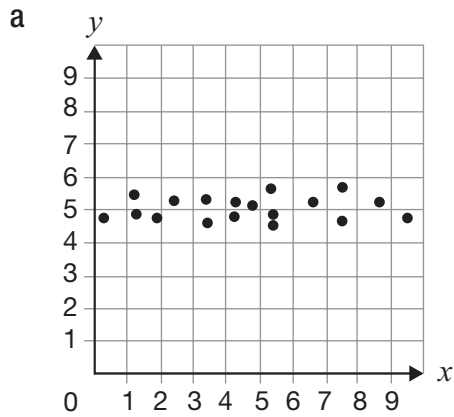
**11** Alex's distance from home is represented by the equation $D = -0.5t + 300$, where $D$ represents his distance from home, in kilometres, and $t$ represents time, in minutes.

How long will it take Alex to reach a distance of 182 km from home?

    **a**   236 minutes

    **b**   209 minutes

    **c**   64 minutes

    **d**   59 minutes

**12** Two lines are shown below.

**Cost vs. Number**
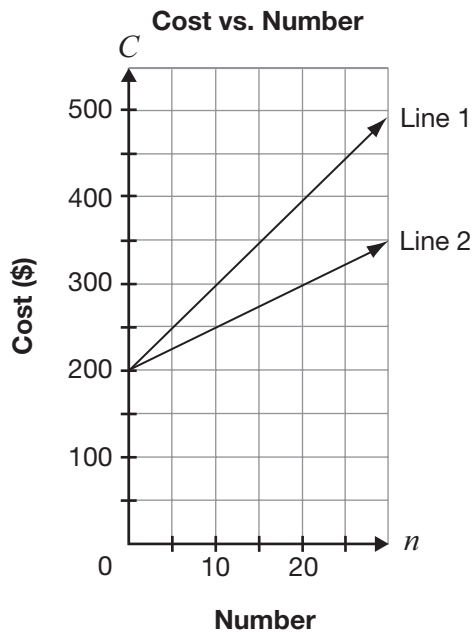


Which of the following describes a difference between Line 1 and Line 2?
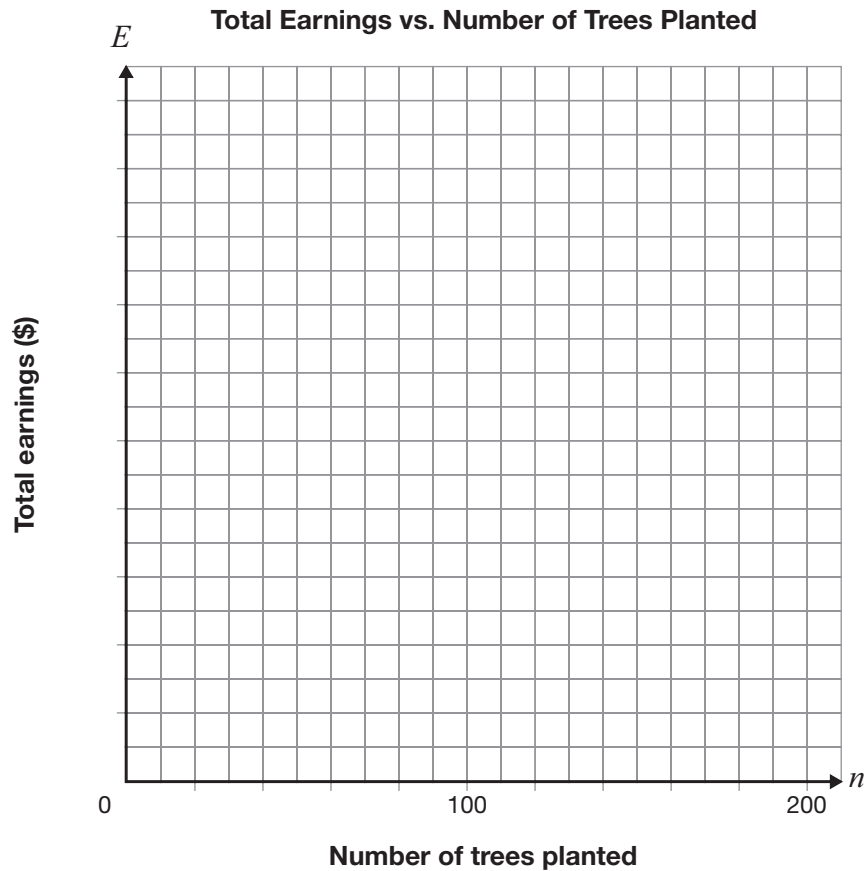
    **a**   Line 2 has a larger initial cost.

    **b**   Line 1 has a larger initial cost.

    **c**   Line 2 has a greater rate of change.

    **d**   Line 1 has a greater rate of change.

## 🔢 **Planting More Trees**

Rachel plants trees in Northern Ontario. She is paid $55 a day plus 15¢ for each tree she plants.

On the grid provided, draw the graph of the relationship between Rachel's total earnings for a single day, *E,* in dollars, and the number of trees she plants that day, *n.*

Include a scale on the vertical axis.

**Total Earnings vs. Number of Trees Planted**

*E*

Total earnings ($)

0                    100                    200                    *n*

**Number of trees planted**

Write an equation to represent the relationship between Rachel's earnings for a single day, *E,* and the number of trees she plants, *n.*

_____

## 14 Water in a Pool

The graph below represents the relationship between the amount of water, *A,* in a pool as it drains and time, *t*.
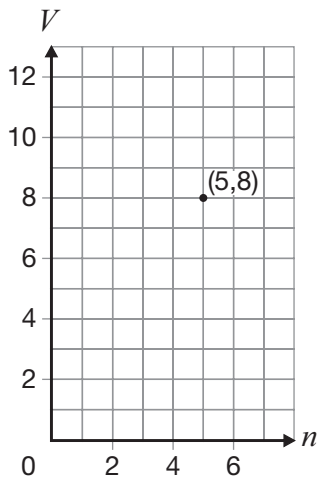
**Amount of Water vs. Time**
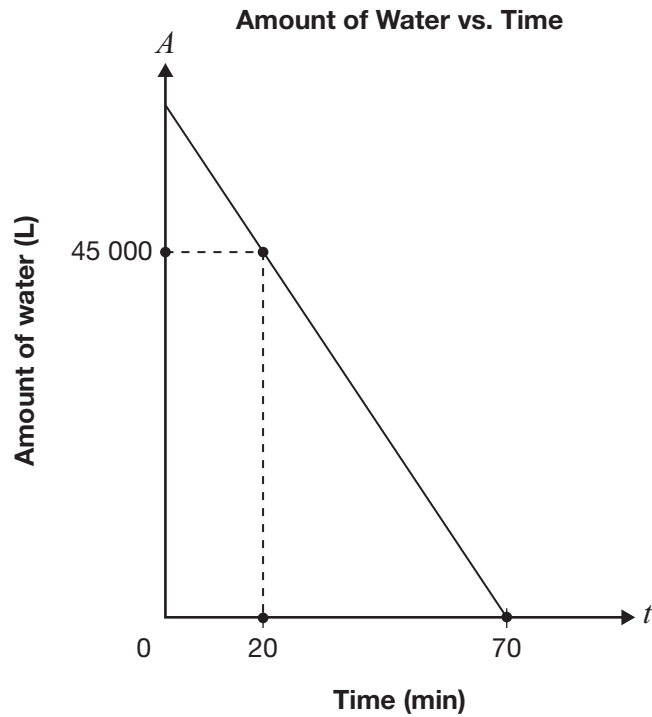


Determine the initial amount of water in the pool and the rate of change of this relation.

Show your work.

**15** Which of the following equations is equivalent to $3x - 5y = 45$?

a $y = \frac{3}{5}x - 9$

b $y = -\frac{3}{5}x + 9$

c $y = 3x - 45$

d $y = -3x + 45$

**16** The point on the grid below belongs to a linear relation that has $-\frac{3}{2}$ as its rate of change.
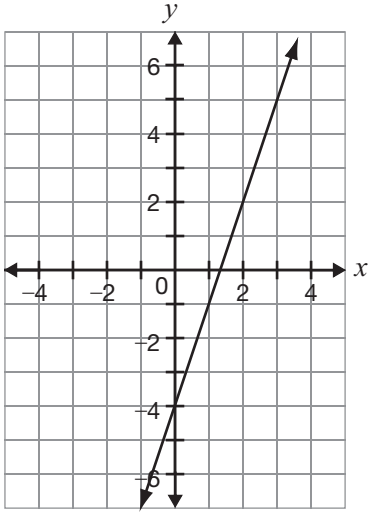
$V$


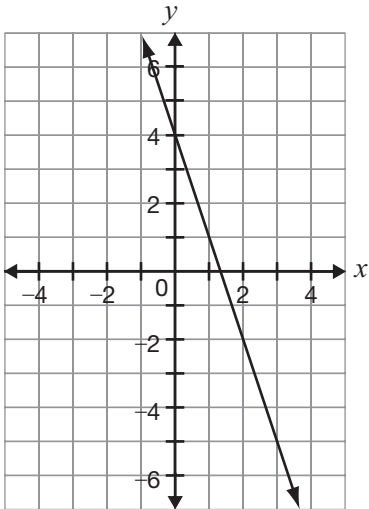
Which of the following points also belongs to this relation?

a (2,6)

b (2,10)

c (3,11)

d (7,11)

**17** Which of the following lines has the same slope as the line represented by $y = -3x + 4$?
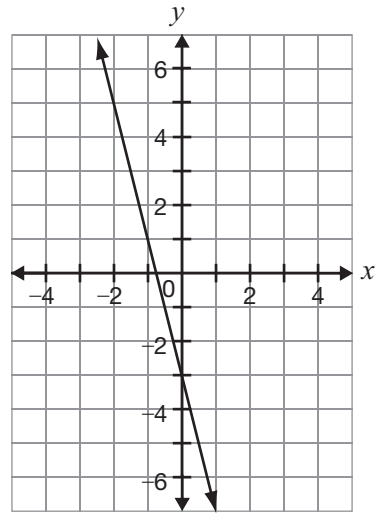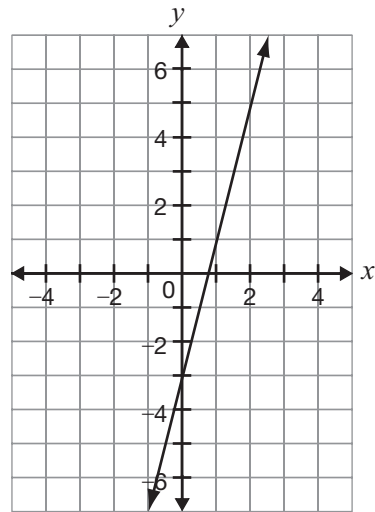
**a**



**b**



**c**



**d**



**18** Which equation below represents a line that is perpendicular to the line represented by $y = 3x - 5$?
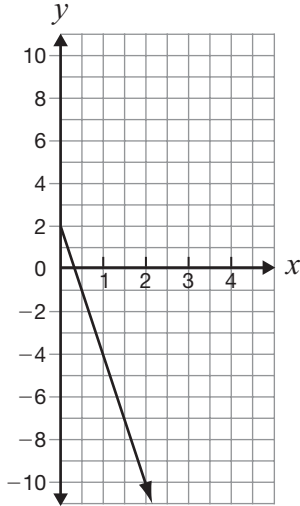
a   $y = 3x + \frac{1}{5}$

b   $y = -3x - \frac{1}{5}$
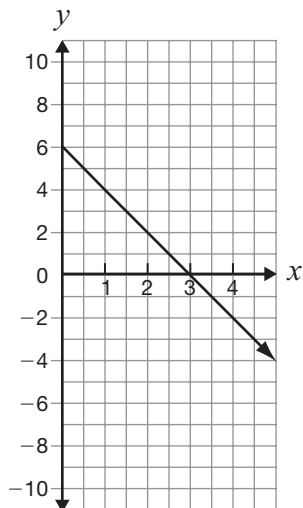
c   $y = -\frac{1}{3}x + 7$

d   $y = \frac{1}{3}x - 7$

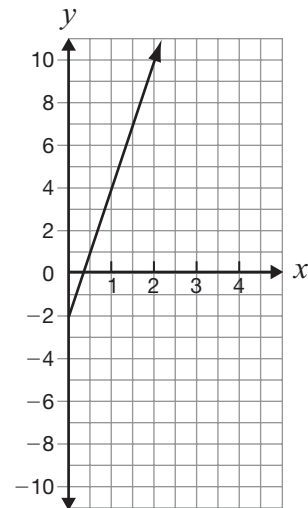**19** Which of the following is the graph of the equation $y = -2x + 6$?
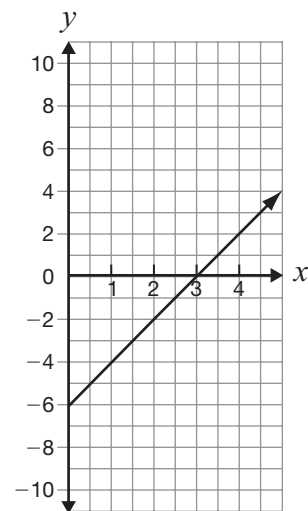
**a**



**b**



**c**



**d**

**20** The equations below represent the relationship between the total cost, $C$, in dollars, to repair a computer and the amount of time, $t$, in hours, at two computer repair stores.

Compu-Fix: $C = 10 + 15t$

Data Repair: $C = 30 + 12t$

It will take between 1 and 5 hours to repair Maria's computer.

What are the smallest and largest possible amounts Maria could pay?

 a   $10, $85

 b   $10, $90

 c   $25, $85

 d   $25, $90

**21** Tony and Mike decide to keep track of their reading. The graph below represents the relationship between the number of pages of a novel each has read and the time spent reading since they started tracking.

**Number of Pages Read vs. Amount of Time Spent Reading**
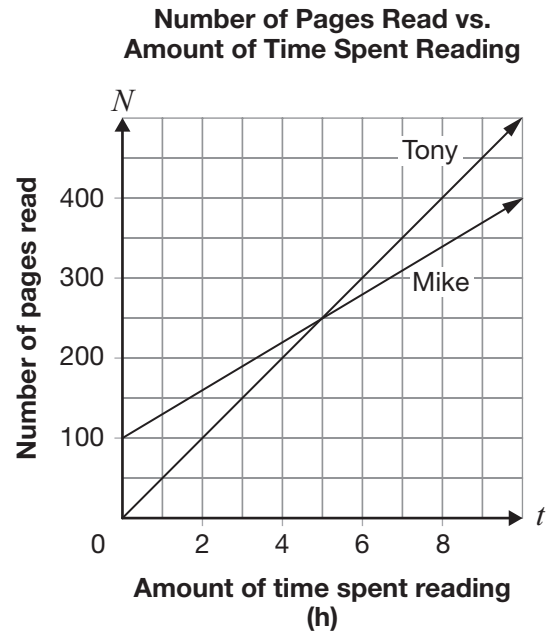


Which of the following statements is true?

 a   At 5 hours, Mike has read 100 pages more than Tony.

 b   Before 5 hours, Tony has read fewer pages than Mike.

 c   At 250 minutes, Mike has read the same number of pages as Tony.

 d   It takes 250 minutes for Tony to catch up to the number of pages that Mike has read.
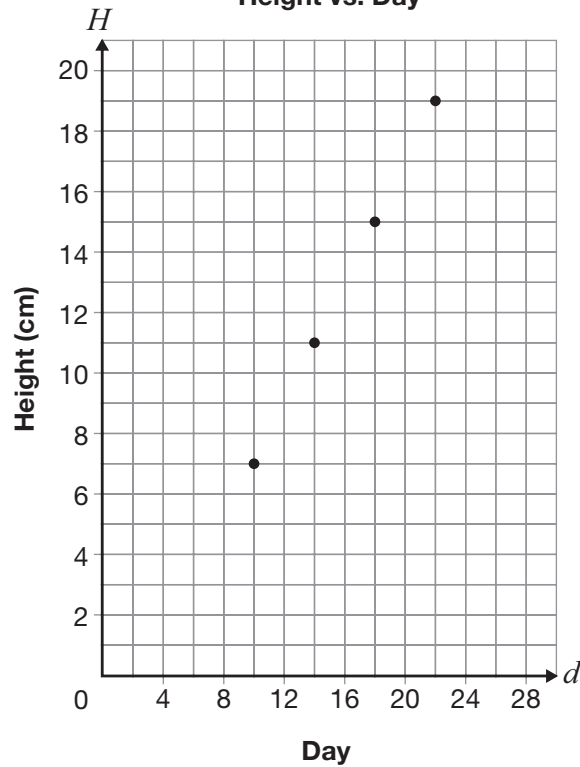
## ㉒ Growing Rates

Lucia and Paul each have a plant. Both plants grow at a constant rate.

Lucia records information about the height of her plant in a table, and Paul graphs his results as shown below.

**Lucia's Plant**

| Day | Height (cm) |
|-----|-------------|
| 4   | 8           |
| 7   | 10          |
| 10  | 12          |
| 13  | 14          |

**Paul's Plant
Height vs. Day**
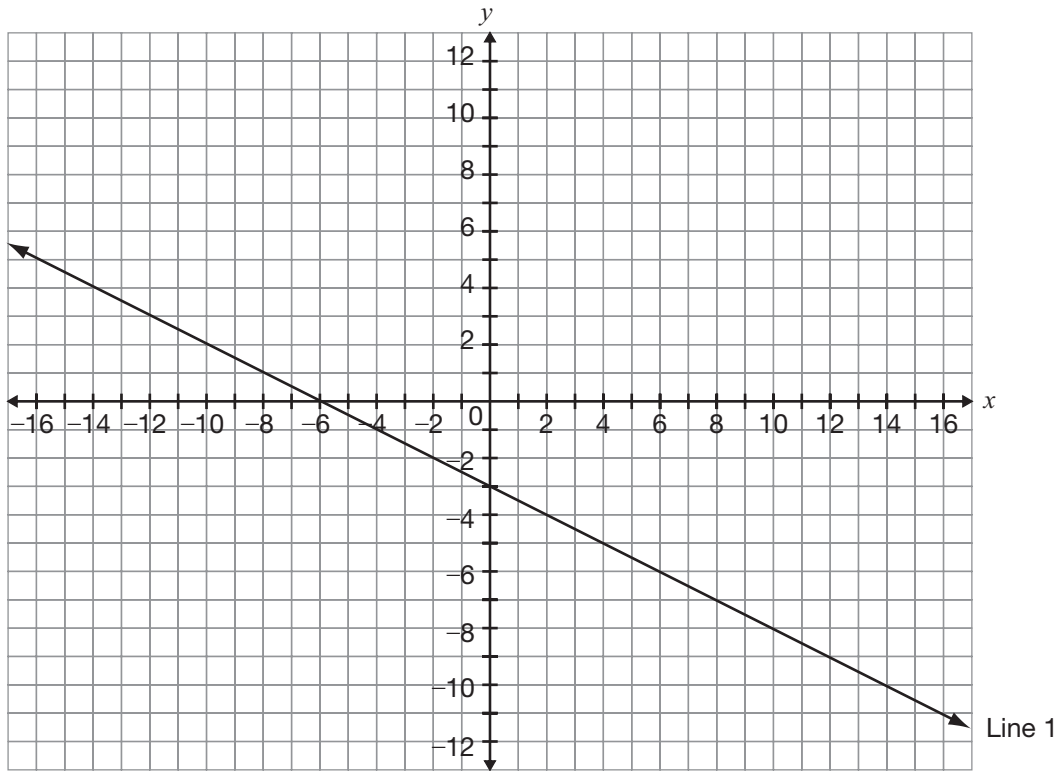


Whose plant is growing faster?

Circle one:        Lucia's        Paul's

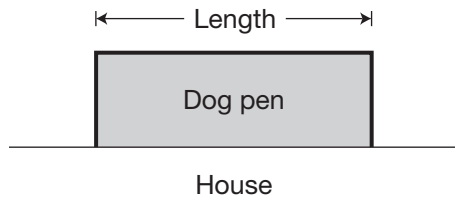Justify your answer.

## ㉓ Lovely Lines

Line 1 is shown on the grid below.



Graph Line 2 on the same grid so that it passes through A($-10, 8$) and has a slope that is three times the slope of Line 1.
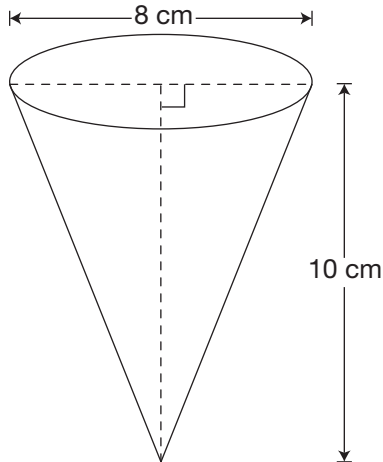
Justify your answer.

**24** Marcus is building a rectangular dog pen along the side of his house as shown below.



Marcus has 20 m of fencing for the 3 sides of the dog pen.

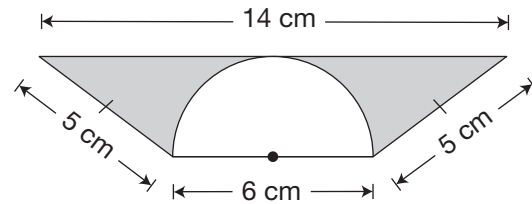What is the length of the dog pen with the maximum area?

a   4 m

b   5 m

c   10 m

d   12 m

**25** An open-topped paper drinking cup in the shape of a cone is pictured below.



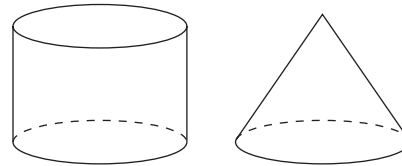Which is closest to the amount of paper required to make the cup?

a   185 cm$^2$

b   167 cm$^2$

c   135 cm$^2$

d   126 cm$^2$

**26** The diagram below is made of a trapezoid and a semicircle.



Which is closest to the area of the shaded part of the diagram?

a   2 cm$^2$

b   16 cm$^2$

c   21 cm$^2$

d   36 cm$^2$

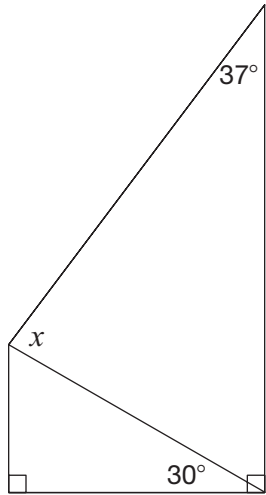**27** The cylinder and the cone shown below have the same height and radius.



Volume of cylinder  =  ?  ×  Volume of cone

What number completes this equation?

a   3

b   2

c   $\frac{1}{2}$

d   $\frac{1}{3}$
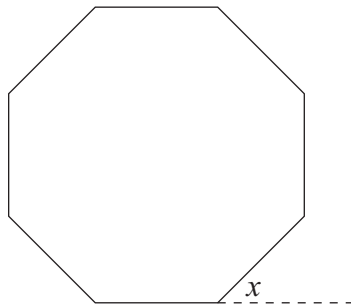
**28** Consider the diagram below.



What is the value of $x$ in the diagram?

    **a**   $30°$

    **b**   $53°$

    **c**   $60°$

    **d**   $83°$

**29** Consider the regular octagon below.



What is the value of $x$?

    **a**   $15°$

    **b**   $30°$

    **c**   $45°$

    **d**   $60°$

### ㉚ Cutting Cones

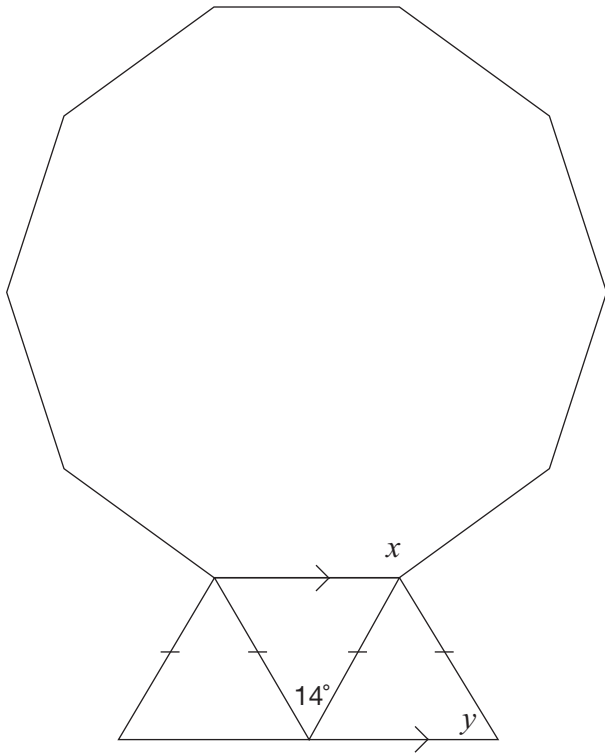The figure pictured below is a cone with its top portion removed.
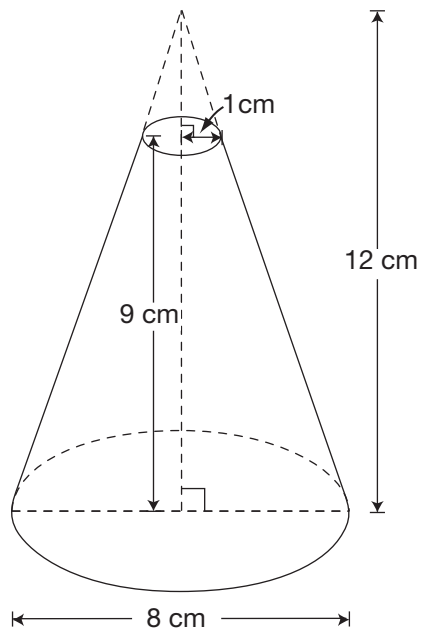


Determine the volume of this figure.

Show your work.

## 31 Diamond Cut

The diagram below shows a regular decagon and three isosceles triangles.



Determine the values of $x$ and $y$. Justify your answers using geometric properties.

| Value | Justification using geometric properties |
|---|---|
| $x = \underline{\hspace{2cm}}$ | |
| $y = \underline{\hspace{2cm}}$ | |

Academic

**Grade 9 Assessment of Mathematics**
**2013**

# Released Assessment Questions: Academic

# Answer Key

1. d

2. b

3. c

4. a

5. b

6. Respond in booklet.

7. a

8. d

9. a

10. a

11. a

12. d

13. Respond in booklet.

14. Respond in booklet.

15. a

16. c

17. b

18. c

19. b

20. d

21. b

22. Respond in booklet.

23. Respond in booklet.

24. c

25. c

26. b

27. a

28. d

29. c

30. Respond in booklet.

31. Respond in booklet.

**End of Assessment**

# Applied

## Grade 9 Assessment of Mathematics

2013

### RELEASED ASSESSMENT QUESTIONS

**Record your answers to the multiple-choice questions on the Student Answer Sheet (2013, Applied).**

Please note: The format of this booklet is different from that used for the assessment. The questions themselves remain the same.

**1** The design for a rectangular garden has a length-to-width ratio of 7:5.

Which of the following could be used to determine the width of the garden if the length is 6.5 m?

a   $\frac{5}{7} = \frac{6.5}{x}$

b   $\frac{7}{5} = \frac{x}{6.5}$

c   $\frac{6.5}{7} = \frac{5}{x}$

d   $\frac{6.5}{x} = \frac{7}{5}$

**2** What is the value of $k$ in the proportion below?

$$\frac{9}{k} = \frac{24}{32}$$

a   12

b   15

c   16

d   17

**3** Last week, Tenisha paid $65.72 for 62 kg of potatoes for her restaurant. Today, the price of potatoes is $0.02/kg lower.

How much will Tenisha pay for 50 kg of potatoes today?

a   $46

b   $47

c   $52

d   $53

**4** A bicycle has a regular price of $175. It is on sale for 20% off.

Which of the following is closest to the total cost, including 13% tax?

a   $140

b   $158

c   $163

d   $168

**5** The volume of the cylinder shown below is 408 cm³.



Hint:
$V = \pi r^2 h$

8 cm
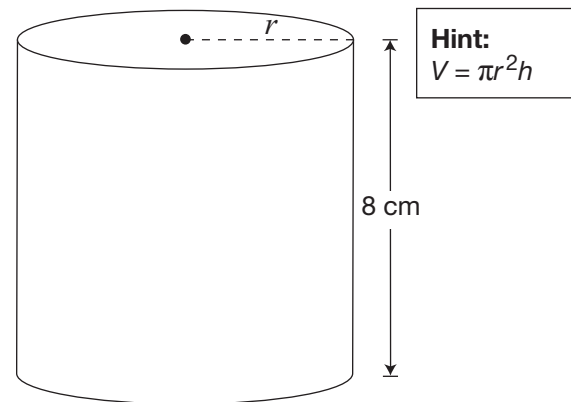
Which of the following is closest to the radius of the cylinder?

a   4 cm

b   8 cm

c   14 cm

d   16 cm

**6** What value of $x$ makes the equation $4x - 5 = -6x + 15$ true?

a   2

b   1

c   $-5$

d   $-10$

**7** An equation representing the height of a burning candle is $H = 2d - \frac{1}{2}t$, where

- $H$ is the height, in centimetres,

- $d$ is the diameter, in centimetres, and

- $t$ is the amount of time that the candle has been burning, in minutes.

A candle has a diameter of 6 cm.

If the candle burns for 2 minutes, what will its height be?

   **a**   1 cm

   **b**   4 cm

   **c**   11 cm

   **d**   13 cm

## 8 More Apples

Two stores are advertising specials on apples.

| Store A | | Store B |
| --- | --- | --- |
| 8 apples for $4.40 | | 12 apples for $5.76 |

Apples are sold individually.

How much less would 30 apples cost at Store B than at Store A?

Justify your answer.

## ⑨ The Height of Solving

The cylinder pictured below has a volume of 807 cm³.
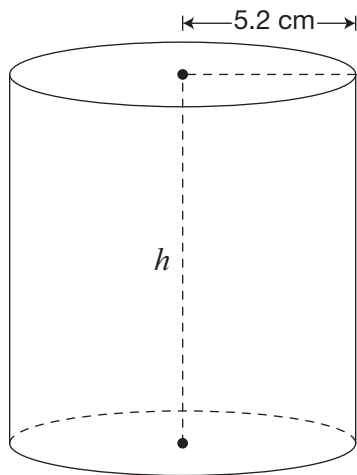


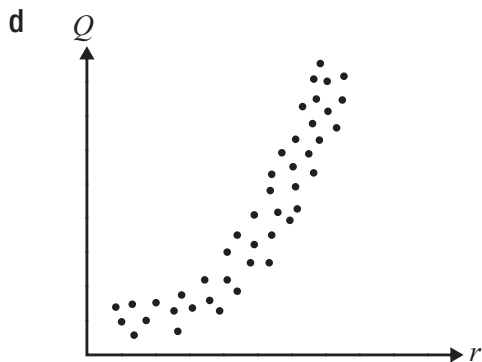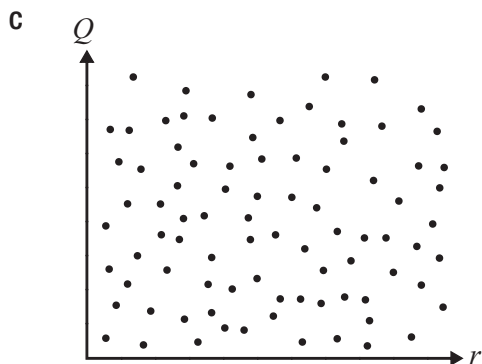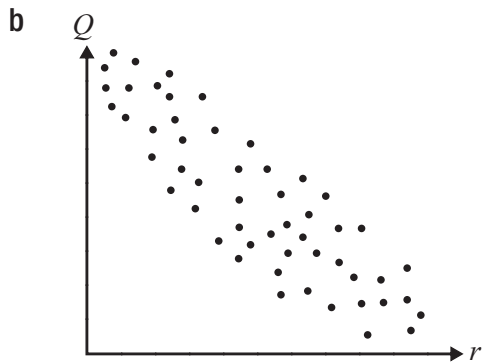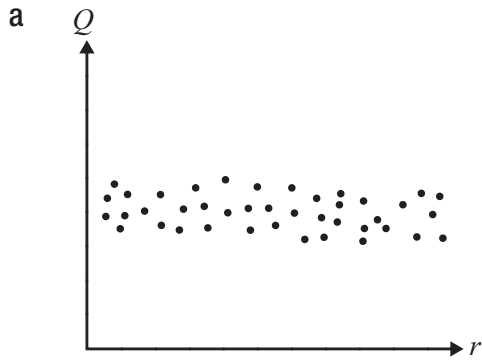The formula for determining the volume of a cylinder is

$$V = \pi r^2 h,$$

where $r$ is the radius and $h$ is the height.

Determine the height of the cylinder.

Show your work.

**10**  Which scatter plot shows data with no trend?

a



b



c



d

**11** Kim owes her mother $100. She will pay her back $5 each week.

Which table shows data about the amount Kim still owes for the first 5 weeks of payments?

a

| Week | Amount still owing |
|------|--------------------|
| 0    | $0                 |
| 1    | $5                 |
| 2    | $10                |
| 3    | $15                |
| 4    | $20                |
| 5    | $25                |

b

| Week | Amount still owing |
|------|--------------------|
| 0    | $100               |
| 1    | $105               |
| 2    | $110               |
| 3    | $115               |
| 4    | $120               |
| 5    | $125               |

c

| Week | Amount still owing |
|------|--------------------|
| 0    | $100               |
| 1    | $80                |
| 2    | $60                |
| 3    | $40                |
| 4    | $20                |
| 5    | $0                 |

d

| Week | Amount still owing |
|------|--------------------|
| 0    | $100               |
| 1    | $95                |
| 2    | $90                |
| 3    | $85                |
| 4    | $80                |
| 5    | $75                |

**12** Consider the four different relationships represented below.

A



T
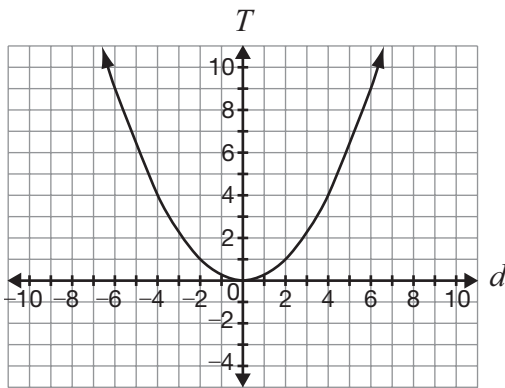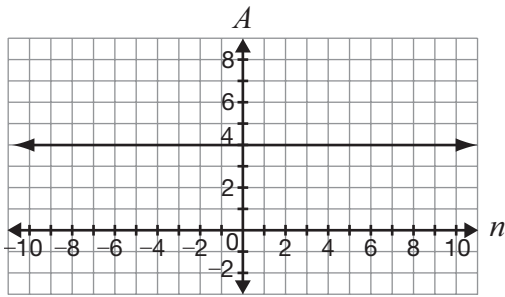


| w | A |
|---|---|
| 0 | 0 |
| 2 | 14 |
| 4 | 20 |
| 6 | 18 |
| 8 | 8 |

| n | C |
|---|---|
| 1 | 13 |
| 2 | 9 |
| 3 | 6 |
| 4 | 4 |
| 5 | 3 |

How many are linear relationships?

a   1

b   2

c   3

d   4

**13** Which of the relationships represented below has a constant rate of change?

**a**



**b**



**c**



**d**
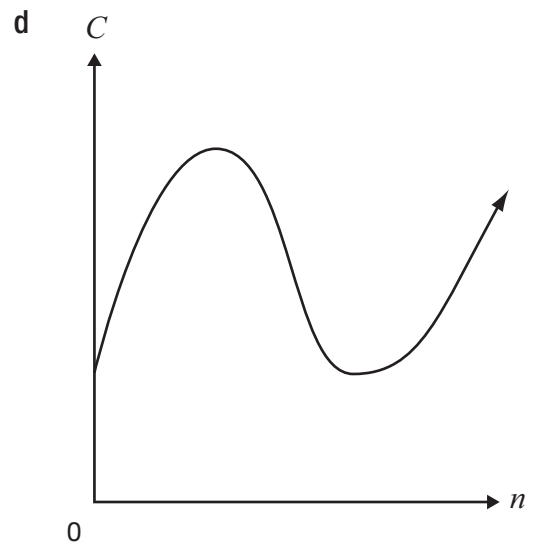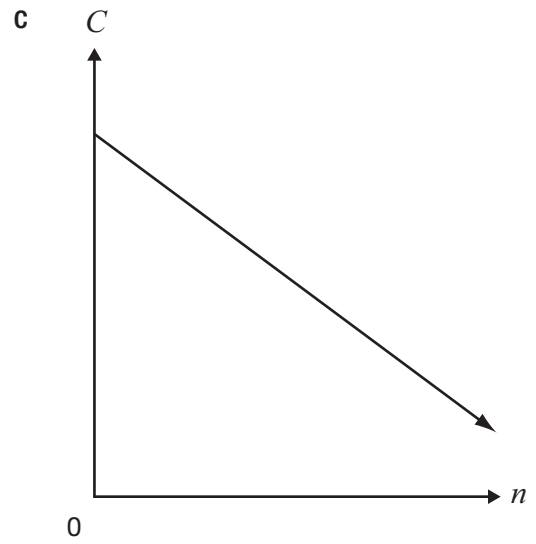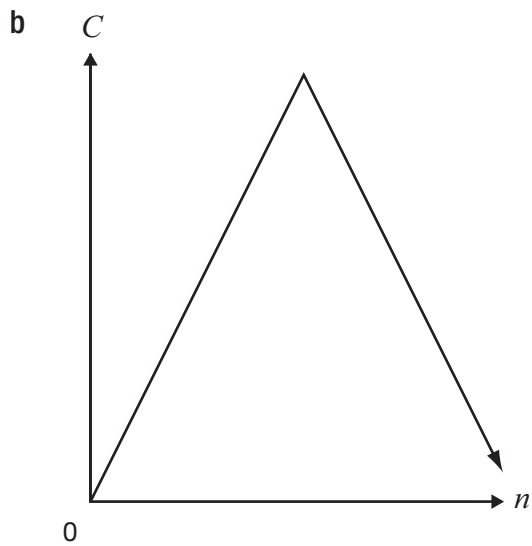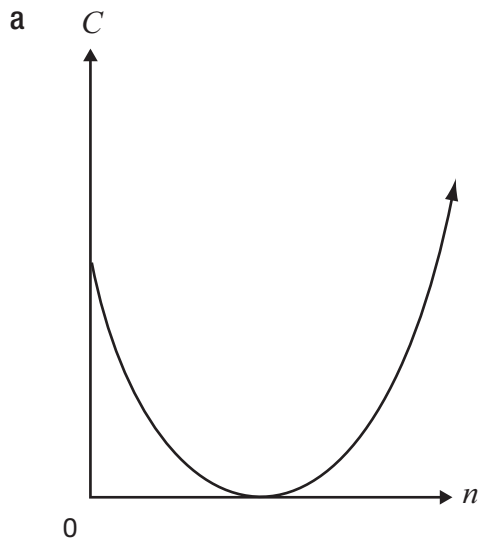
**14** Each of the three points on the grid below gives information about the altitude of a hot air balloon at a certain time.

**Altitude vs. Time**
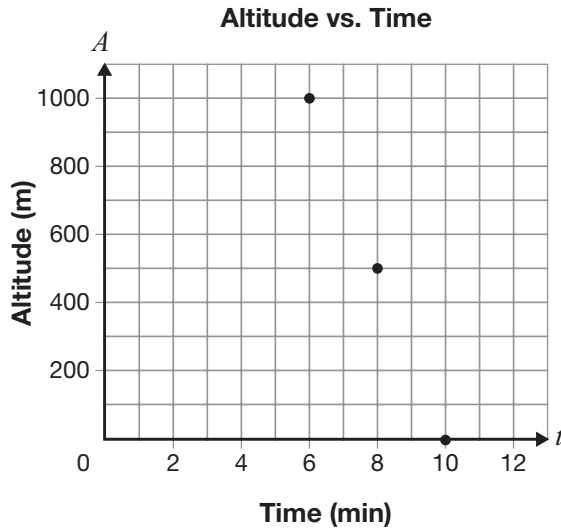


If the relationship between altitude and time is linear, what was the altitude of the balloon at 4 minutes?

   **a**   1250 m

   **b**   1500 m

   **c**   1750 m

   **d**   2000 m

**15** Dakota and Jamie have part-time jobs.

The graphs below represent the relationship between earnings and the time each of them works.

**Dakota's Earnings vs. Time**



**Jamie's Earnings vs. Time**
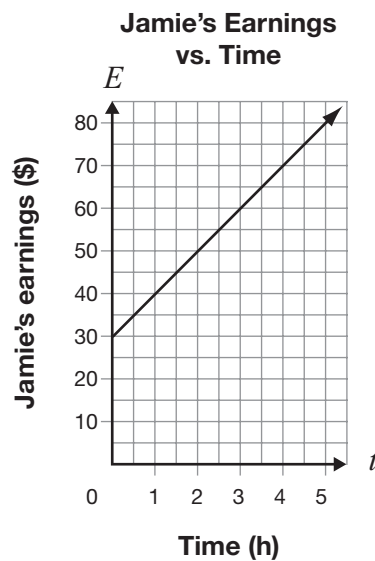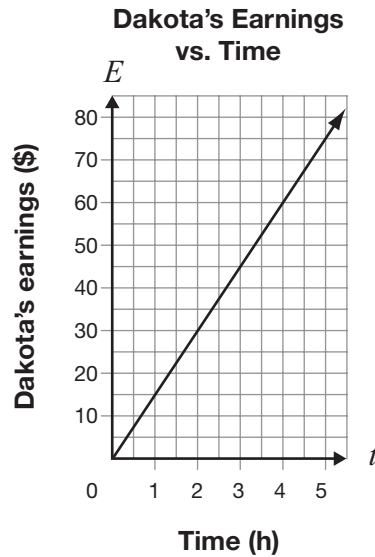


Whose graph represents a partial variation, and what is the initial value of the relationship?

   **a**   Dakota's, $0

   **b**   Dakota's, $15

   **c**   Jamie's, $30

   **d**   Jamie's, $40

**16** For babysitting, Becky charges according to the equation $C = 5n + 9$, where $C$ is the amount charged, in dollars, and $n$ is the number of hours she babysits.

Which statement about this situation is correct?

　a　Becky charges $14 per hour.

　b　Becky charges a flat fee of $14.

　c　Becky charges an initial fee of $5, plus $9 per hour.

　d　Becky charges an initial fee of $9, plus $5 per hour.

**17** Each week, Marissa withdraws the same amount from her bank account.

The equation $A = 1550 - 90w$ represents the relationship between the amount of money remaining in her account, $A$, in dollars, and the number of weeks of withdrawing, $w$.
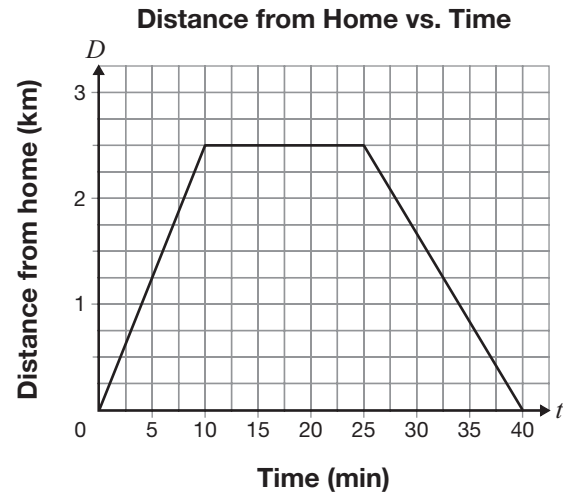
For how many weeks has Marissa made withdrawals when the amount remaining in the account is $110?

　a　14

　b　16

　c　17

　d　18

**18** Oscar rides his bicycle to the beach along a straight road. While at the beach, he realizes he has forgotten his sunscreen and returns home.

The graph below shows information about his trip.

**Distance from Home vs. Time**



Which of the following is true about Oscar's trip?

　a　The beach is 10 km from Oscar's home.

　b　His speed riding to the beach is 0.25 km/min.

　c　His speed riding home from the beach is 1.7 km/min.

　d　He stays at the beach for 25 minutes before he returns home to get sunscreen.

**19** Water is being pumped to empty a swimming pool.

At 6 a.m., the water level is 150 cm. Every 2 hours, the water level drops by 30 cm.

What is the earliest time when the pool will be empty?

　a　10 a.m.

　b　11 a.m.

　c　4 p.m.

　d　5 p.m.

**20** Data about the total monthly cost to rent video games from two online game sites are shown on the graph below.

**Total Monthly Cost vs. Number of Games Rented**
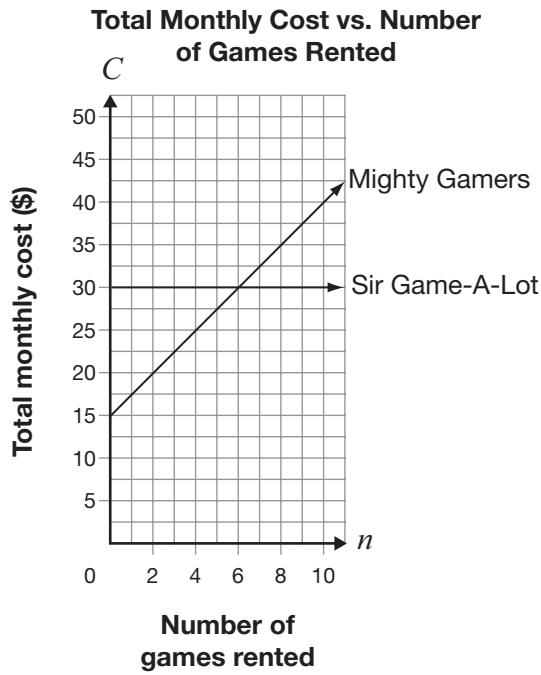


Which of the following statements is true?

**a**   It costs more to rent from Sir Game-A-Lot after 6 games.

**b**   It costs less to rent from Mighty Gamers after 30 games.

**c**   It costs the same amount to rent 6 games from the two sites.

**d**   It costs the same amount to rent 30 games from the two sites.

## 21 **Drippy Drops**

Water is leaking from a bottle at a constant rate. Julia draws the line on the graph below to model the relationship between the volume of water remaining and time.

**Volume of Water Remaining vs. Time**



**Time (min)**
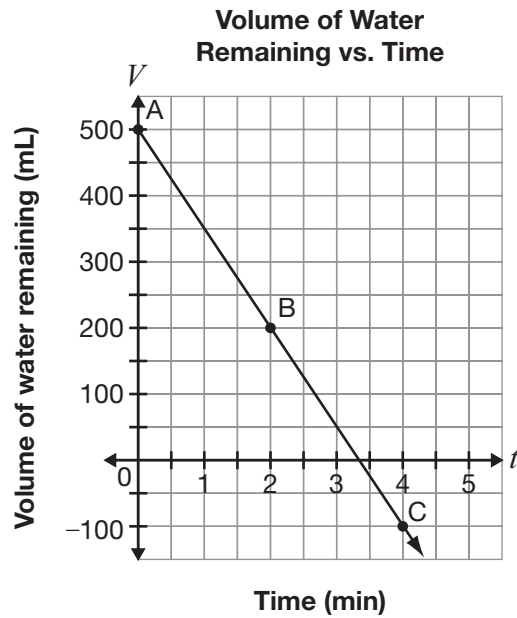
Determine whether each of the 3 points shown on the line is possible in this situation.

Write an interpretation of the meaning of each point.

| Point | Is this point possible? | Interpretation |
|-------|------------------------|----------------|
| A | **Circle one:**<br>Yes    No | |
| B | **Circle one:**<br>Yes    No | |
| C | **Circle one:**<br>Yes    No | |

## 22 **Fun Fair**

The graph below shows the linear relationship between the total cost of a day at a fair, *C,* and the number of rides taken, *n*.

**Total Cost vs.
Number of Rides Taken**
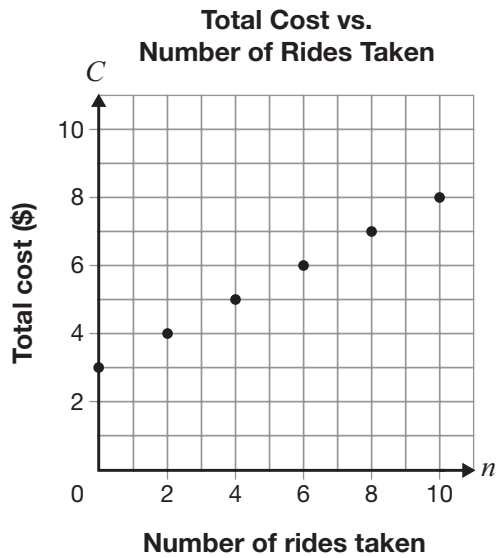
Complete the table below with information about this relationship.

| Initial value: _____ | Rate of change: _____ |
|---|---|
| **Meaning of initial value in this situation** | **Meaning of rate of change in this situation** |
| | |

## ㉓ **Happy Trails**

The total cost of horseback riding at a horse ranch is made up of a fixed fee and a cost per hour. The table below shows information about the total cost.

| Time (h) | Total cost ($) |
|---|---|
| 2 | 50 |
| 4 | 80 |
| 7 | 125 |

Graph the data in the table on the grid below.

**Total Cost vs. Time**
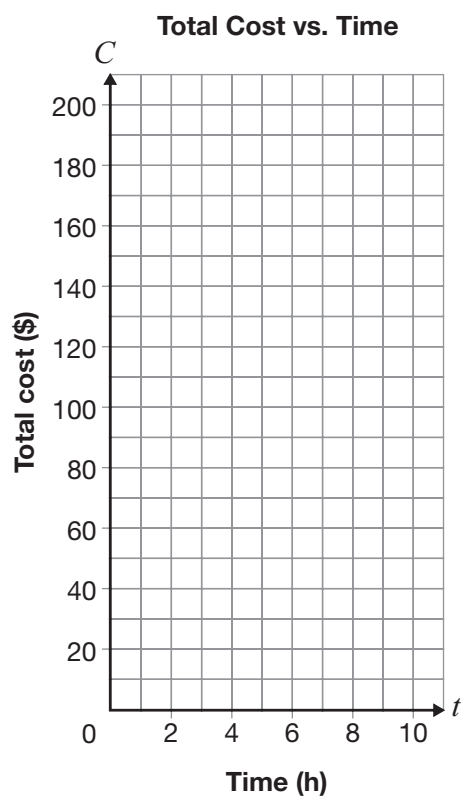


Write an equation that relates the total cost of a ride, *C*, to the time spent riding, *t*.

$C =$ _____

Show your work.

**24** Some students use 24 large square tiles to create a dance floor. They arrange the tiles to make a rectangular area with the smallest possible perimeter.

Which arrangement creates an area with the smallest possible perimeter?

- **a**   1 row of 24 tiles
- **b**   2 rows of 12 tiles
- **c**   3 rows of 8 tiles
- **d**   4 rows of 6 tiles

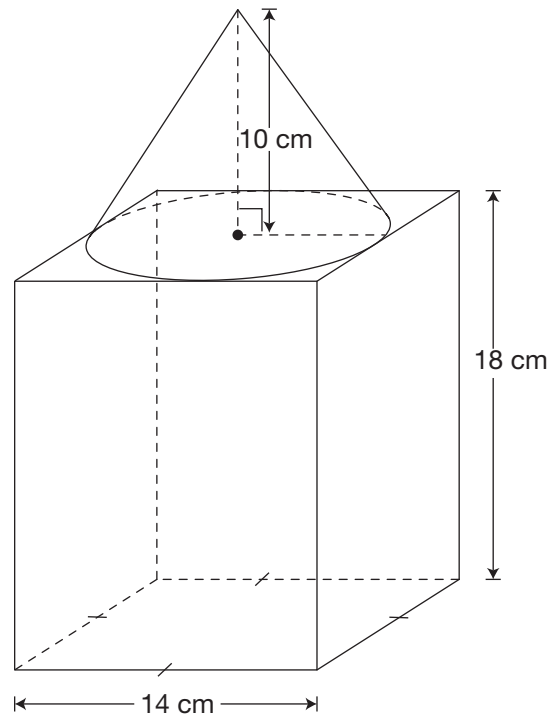**25** A wire is attached from the top of a 10 m pole to a spot on the ground 4 m away from the base of the pole, as shown below.



10 m       Wire

4 m
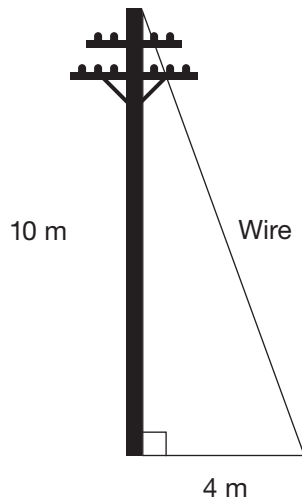
Which of the following is closest to the length of the wire?

- **a**   11 m
- **b**   14 m
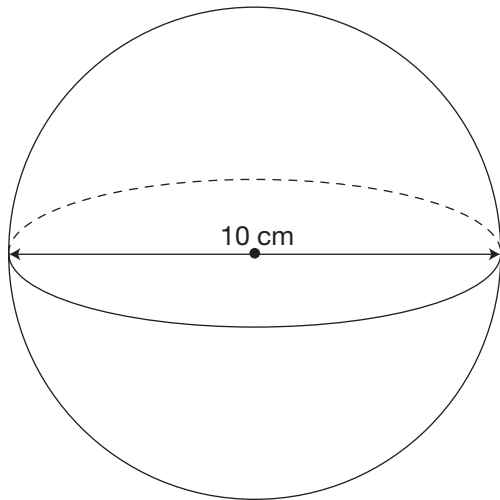- **c**   20 m
- **d**   28 m

**26** The figure below is made of a square-based prism and a cone.



10 cm

18 cm

14 cm

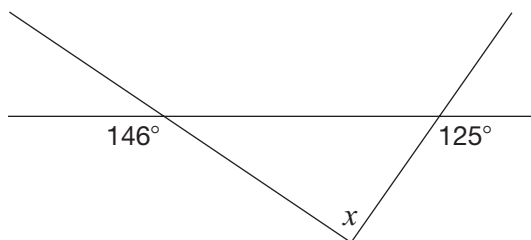Which of the following is closest to the volume of the figure?

- **a**   3675 cm$^3$
- **b**   4041 cm$^3$
- **c**   5067 cm$^3$
- **d**   5581 cm$^3$

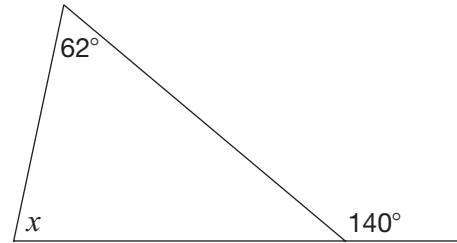**27** The sphere pictured below has a diameter of 10 cm.



10 cm

Which expression represents the volume of the sphere?

a $\frac{4\pi(5)(3)}{3}$

b $\frac{4\pi(5)^3}{3}$

c $\frac{4\pi(10)^3}{3}$

d $\frac{4\pi(10)(3)}{3}$

**28** What is the value of $x$ in the diagram below?



146°          125°

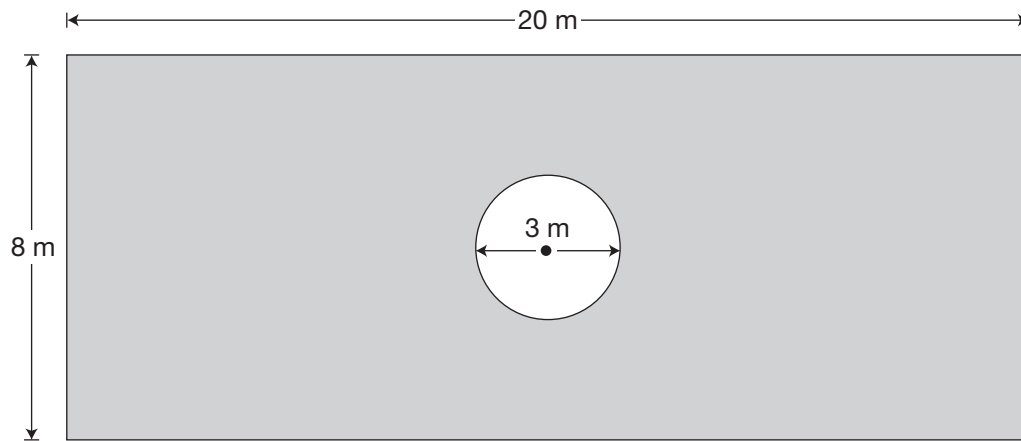$x$

a   91°

b   89°

c   55°

d   34°

**29** What is the value of $x$ in the diagram below?



62°

$x$          140°

a   40°

b   62°

c   78°

d   118°

## ㉚ Hole in the Wall

Terry is painting the shaded area of the rectangular wall shown below.
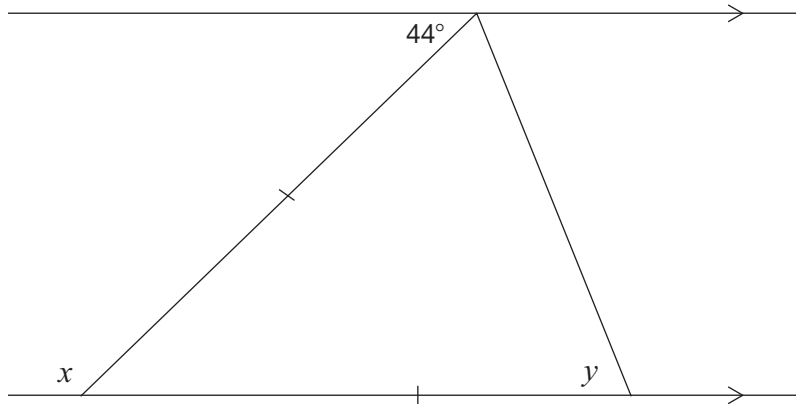


The average cost of paint is $0.40/m$^2$.

The average cost of paint is \$0.40/m².

Determine the total cost of the paint needed to cover the shaded area of the wall.

Show your work.

# 31 Outside Angles

Look at the following diagram.



Complete the chart below with the values of $x$ and $y$. Justify your answers using geometric properties.

| Value | Justification using geometric properties |
|---|---|
| $x =$ _____ | |
| $y =$ _____ | |

**Education Quality and Accountability Office**

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# Released Assessment Questions: Applied

# Answer Key

1. ⓐ ⓑ ⓒ ●
2. ● ⓑ ⓒ ⓓ
3. ⓐ ⓑ ● ⓓ
4. ⓐ ● ⓒ ⓓ
5. ● ⓑ ⓒ ⓓ
6. ● ⓑ ⓒ ⓓ
7. ⓐ ⓑ ● ⓓ
8. Respond in booklet.

9. Respond in booklet.
10. ⓐ ⓑ ● ⓓ
11. ⓐ ⓑ ⓒ ●
12. ● ⓑ ⓒ ⓓ
13. ⓐ ⓑ ● ⓓ
14. ⓐ ● ⓒ ⓓ
15. ⓐ ⓑ ● ⓓ
16. ⓐ ⓑ ⓒ ●

17. ⓐ ● ⓒ ⓓ
18. ⓐ ● ⓒ ⓓ
19. ⓐ ⓑ ● ⓓ
20. ⓐ ⓑ ● ⓓ
21. Respond in booklet.
22. Respond in booklet.
23. Respond in booklet.
24. ⓐ ⓑ ⓒ ●

25. ● ⓑ ⓒ ⓓ
26. ⓐ ● ⓒ ⓓ
27. ⓐ ● ⓒ ⓓ
28. ● ⓑ ⓒ ⓓ
29. ⓐ ⓑ ● ⓓ
30. Respond in booklet.
31. Respond in booklet.

**End of Assessment**