

GRADE 9 ACADEMIC MATH EQAO SOLUTIONS (SAMPLE QUESTIONS 2009–2010)

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Sample Assessment Questions: Academic

Answer Key

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

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

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

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

End of Assessment

Multiple Choice Solutions

- 1** What is the value of $6x^2$ when $x = \frac{1}{3}$?

a $\frac{2}{9}$

☒ b $\frac{2}{3}$

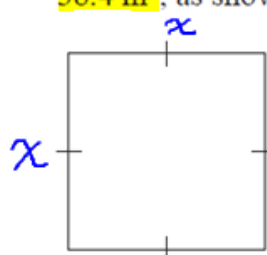
☒ c 2

☒ d 4

Too big

$$\begin{aligned}
 6x^2 &= 6\left(\frac{1}{3}\right)^2 \\
 &= \frac{6}{1}\left(\frac{1}{3}\right)^2 \\
 &= \frac{6^2}{1}\left(\frac{1}{3}\right)^2 \\
 &= \frac{2}{3}
 \end{aligned}$$

- 2** Chris has a square garden with an area of 38.4 m^2 , as shown in the diagram.



$$\begin{aligned}
 x^2 &= 38.4 \\
 \therefore x &= \sqrt{38.4} \\
 &\approx 6.2
 \end{aligned}$$

He decreases the length of each side by 1.7 m to make a smaller garden.

Which is closest to the perimeter of the smaller garden?

a 37 m

b 32 m

c 25 m

☒ d 18 m

$$\begin{aligned}
 P &= 4(6.2 - 1.7) \\
 &= 18
 \end{aligned}$$

- 3 The sum of the perimeters of two shapes is represented by $13x + 4y$.

The perimeter of one shape is represented by $4x - 2y$.

Which expression represents the perimeter of the other shape?

a $9x + 2y$

b $9x + 6y$

c $17x + 2y$

d $17x + 6y$

$P = \text{perimeter of other shape}$
 $P = 13x + 4y - (4x - 2y)$
 $= 13x + 4y - 4x + 2y$
 $= 9x + 6y$

- 4 Consider the expression below.

$3x^2(5x^2 - 2x + 1)$ Distributive

Which of the following is equivalent to this expression?

~~a~~ $8x^2 - 2x + 1$

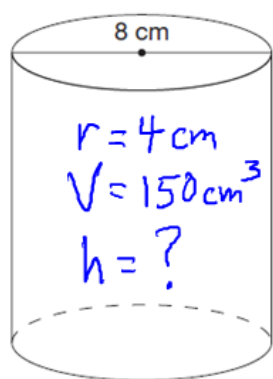
~~b~~ $8x^2 + x + 4$

c $15x^4 - 2x + 1$

d $15x^4 - 6x^3 + 3x^2$

Property

- 5 The cylinder below has a volume of 150 cm^3 .



$V = 150$
 $\therefore \pi r^2 h = 150$
 $\therefore \pi (4)^2 h = 150$
 $\therefore 16\pi h = 150$
 $\therefore h = \frac{150}{16\pi}$
 ≈ 3

Which of the following is closest to the area of the lateral surface of the cylinder?

Hint:

$V_{\text{cylinder}} = \pi r^2 h$

$A_{\text{lateral surface}} = 2\pi r h$

a 38 cm^2

b 75 cm^2

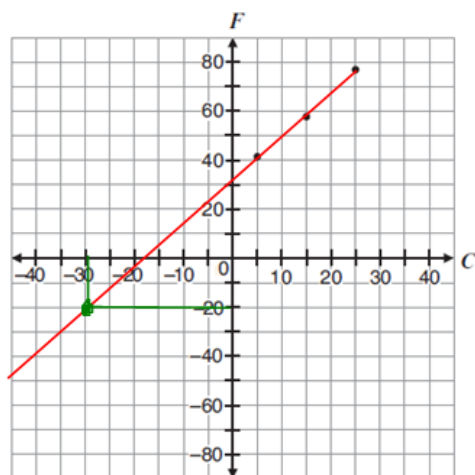
c 150 cm^2

d 300 cm^2

$A_{\text{lat.}} = 2\pi(4)(3)$
 $= 24\pi$
 $\approx 24(3.14)$
 ≈ 75

- 7 Consider the following chart and graph.

Temperature in degrees Celsius, C	Temperature in degrees Fahrenheit, F
5°	41°
15°	59°
25°	77°



What temperature in degrees Celsius is equivalent to -20°F ?

a -4°C

b -18°C

c -29°C

d -40°C

Estimate from graph

- 8 A bus is rented for a class field trip. The transportation cost for the trip is made up of \$225 to rent the bus, \$50 for gas and \$2 for each bus seat.

Which relation below describes the total transportation cost for the trip if C is the total cost in dollars and n is the number of seats?

~~a~~ $C = 2n + 225$

~~b~~ $C = 2n + 275$

c $C = 2n + 225$

d $C = 2n + 275$

$$\begin{array}{r} 225 \\ + 50 \\ \hline 275 \end{array}$$

 $2n = \text{total cost of seats}$

- 9 A sports company uses the equation $C = 8t + 5$ to represent the relationship between the total amount charged to rent a canoe, C , in dollars and the rental time, t , in hours.

What is the initial charge to rent a canoe?

a \$0

b \$5

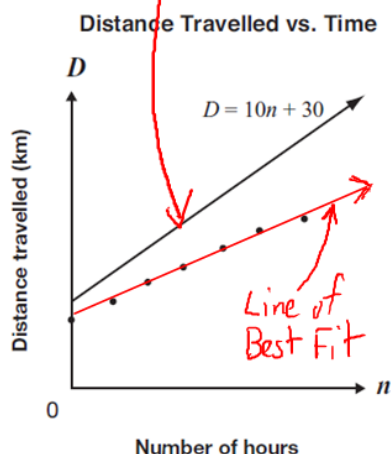
c \$8

d \$13

y-intercept
(vertical intercept)

- 10 Data on distance travelled and the number of hours spent travelling are shown on the graph below.

The line $D = 10n + 30$ is also shown on the graph.



Which equation best represents the line of best fit for the data shown?

a $D = 5n + 33$

b $D = 8n + 23$

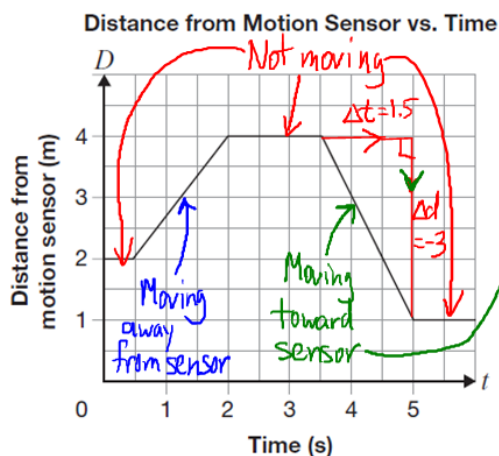
c $D = 10n + 18$

d $D = 12n + 25$

Line of best fit

- slightly less steep than given line ✓
→ slope smaller than 10
- vertical intercept is smaller than 30 ✓

- 11 Tyler walks along a line leading from a motion sensor. The graph below shows information about Tyler's walk.



Which of the following is closest to Tyler's speed in metres per second as he walks toward the motion sensor?

a 2.0

b 1.3

c 0.8

d 0.5

direction speed

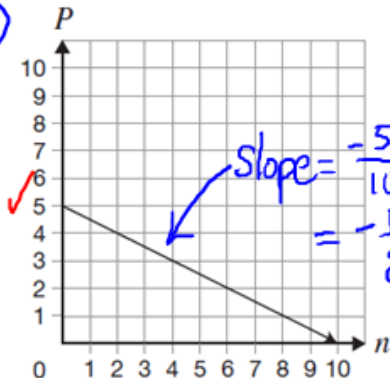
$$\text{slope} = \frac{\Delta d}{\Delta t} = \frac{-3}{1.5} = -2$$

Distance from motion sensor decreases
rate of change is negative
∴ distance decreases

12 Which graph represents the equation

$$P = -\frac{1}{2}n + 5$$

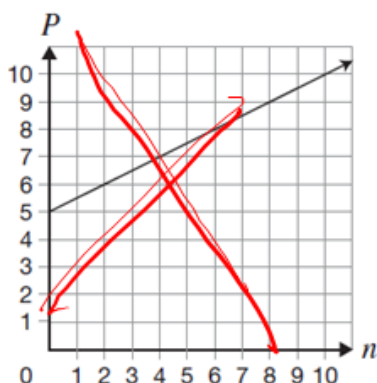
a



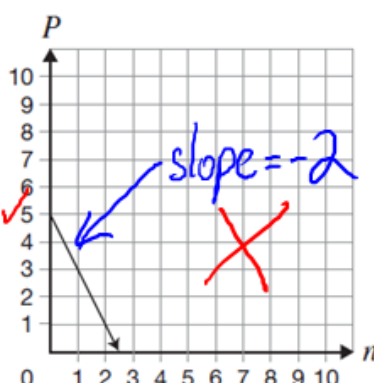
c



b



d



15 Which of the following represents an equation of a line?

~~a~~ $y = 2^x$

~~b~~ $y = x^2 - 5$

~~c~~ $x^2 + y^2 - 25 = 0$

d $2x + 3y - 5 = 0$ ✓

16 What are the slope, m , and y-intercept, b , of the line represented by

$$3x - 2y + 16 = 0$$

a $m = \frac{3}{2}, b = 8$

b $m = \frac{2}{3}, b = -16$

c $m = -\frac{2}{3}, b = -8$

d $m = -\frac{3}{2}, b = 16$

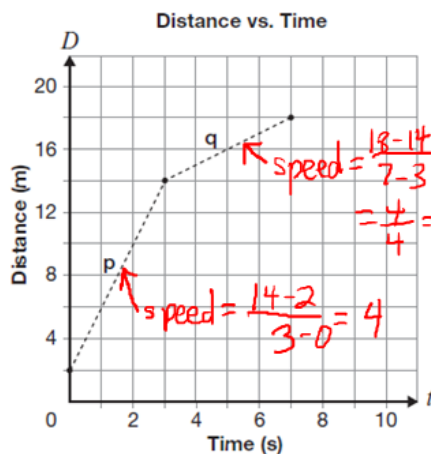
Change to $y = mx + b$ form

$$m = -\frac{A}{B}, b = -\frac{C}{B}$$

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

$$= -\frac{16}{-2} = 8$$

17 The graph below represents the relationship between distance and time on Javier's walk.



How much greater is Javier's speed in section p than in section q?

a 0.5 m/s

b 1.5 m/s

c 2.0 m/s

d 3.0 m/s

4 m/s - 1 m/s = 3 m/s

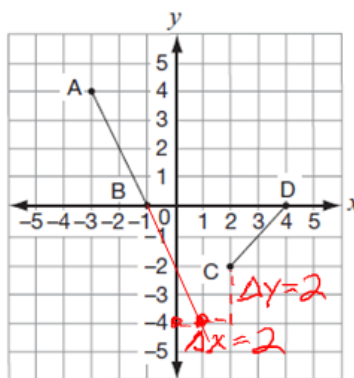
- 18 The total cost of hiring Beth's Plumbing Services is represented by the equation $C = 50t + 70$, where C is the total cost in dollars and t is the time in hours.

Next month, the rate will change to \$60 per hour, but the initial charge will stay the same.

Which of the following describes how the graph of the relation will change?

- ☐ a The steepness of the line will increase.
- ☐ b The steepness of the line will decrease.
- ☒ c The vertical intercept will increase by 10 units.
- ☒ d The vertical intercept will decrease by 10 units.

- 19 Consider the following graph.

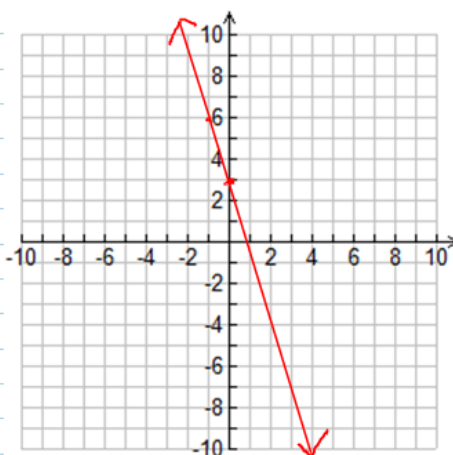


Which statement is false?

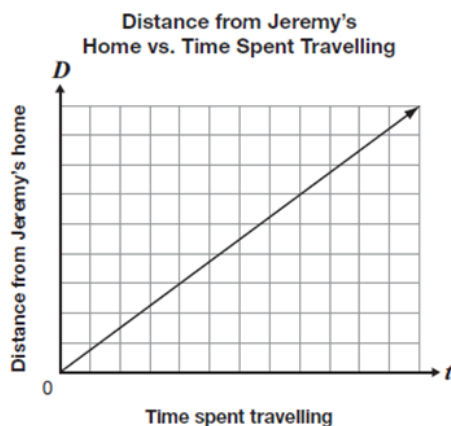
- ☐ a The slope of AB is -2. ✓
- ☐ b The slope of CD is 1. ✓
- ☐ c The y-intercept of the line through CD is -4. ✓
- ☒ d The y-intercept of the line through AB is -1. ✗

- 20 Janelle draws a line that passes through the points $(-1, 6)$ and $(0, 3)$. If Janelle writes the equation of the line in $y = mx + b$ form, what are the values of m and b ?

- ☒ a $m = -9$
 $b = 3$ Too steep = $\frac{3-6}{0-(-1)} = -3$
- ☒ b $m = -3$
 $b = 6$ Wrong y-intercept
- ☒ c $m = -9$
 $b = 6$ Wrong y-intercept
- ☐ d $m = -3$
 $b = 3$



- 21 Last weekend, Jeremy travelled from his home to a friend's house. The graph below represents the relation between D , the distance from Jeremy's home, and t , the time spent travelling to his friend's house.



Start at higher point
This weekend, Jeremy travels to his friend's house but leaves from school. Jeremy's school is between his house and his friend's house.

If he travels at a faster rate this weekend, how will the line representing this trip compare to the line representing the previous trip?

This new line will

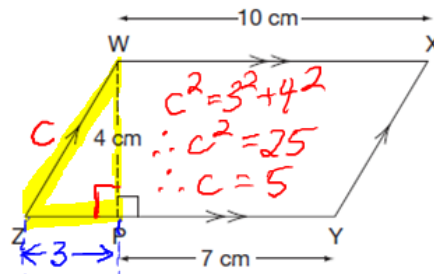
- ☒ a start at a higher point and be steeper.
- ☐ b start at a higher point and be less steep.
- ☐ c start at the current point and be steeper.
- ☐ d start at the current point and be less steep.

- 24 Ella wants a rectangle with
- a perimeter of 100 cm and
 - the largest possible area.

What are the dimensions of the rectangle that satisfies her conditions?

- ~~a~~ 10 cm \times 10 cm $P=40$
 b 20 cm \times 30 cm $P=100, A=600$
 c 25 cm \times 25 cm $P=100, A=625$
~~d~~ 40 cm \times 60 cm $P=200$

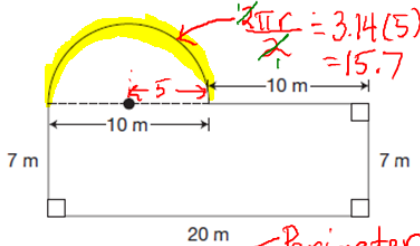
- 25 Consider the parallelogram shown below.



What is the perimeter of WXYZ?

- a 28 cm
 b 30 cm $P = 2(10) + 2(5) = 20 + 10 = 30$
 c 31 cm
 d 34 cm

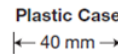
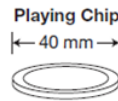
- 26 A garden is in the shape of a rectangle and a semicircle as shown below.



Which of the following is closest to the amount of fencing needed to enclose the garden?

- a 60 m $P = 15.7 + 10 + 2(7) + 20 = 59.7$
 b 70 m
 c 75 m
 d 85 m

- 27 The playing chips of a board game are stored in cylindrical plastic cases. The plastic cases have a volume of 25 120 mm³ and a diameter of 40 mm.



$r = 20 \text{ mm}$

$V = 25120$

$h_{\text{case}} = ?$

$\pi r^2 h = 25120$

$\pi (20)^2 h = 25120$

$400\pi h = 25120$

Which of the following is closest to the height of one playing chip if 50 playing chips can fit tightly into the plastic case as shown above?

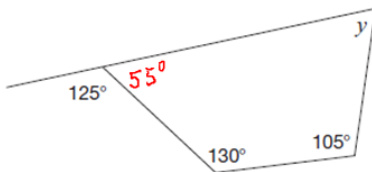
- a 0.1 mm
 b 0.4 mm
 c 1.3 mm
 d 2.5 mm

$50(0.4) = 20$

$h = \frac{25120}{400\pi}$

$\therefore h = 20$
Height of one chip = $\frac{20}{50} = 0.4$

- 28 Consider the diagram below.

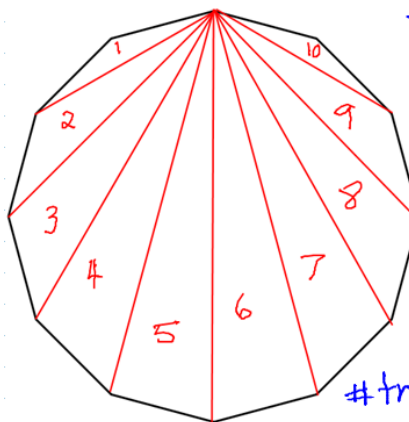


Which of the following is the value of y in the diagram?

- a 55° $y + 55^\circ + 130^\circ + 105^\circ = 360^\circ$
 b 70° $\therefore y + 290^\circ = 360^\circ$
 c 125° $\therefore y = 360^\circ - 290^\circ = 70^\circ$
 d 130°

- 29 What is the sum of the interior angles of a 12-sided regular polygon?

- a 1080° $n = \text{\#sides} = 12$
 b 1800° $(n-2)180^\circ$
 c 1980° $= (12-2)180^\circ$
 d 2160° $= 10(180^\circ) = 1800^\circ$



The dodecagon can be divided into 10 triangles. By ASTT, the sum of the interior angles must be $10(180^\circ) = 1800^\circ$
#triangles = #sides - 2

6 Part-Time Job

Ezre works part-time at a clothing store. He earns \$80 per week plus 6% of the value of his weekly sales.

This week Ezre earns \$119.

What is the total value of his sales this week?

Show your work.

Let s represent the weekly sales in dollars.

Let A represent the total amount earned in dollars

$$\therefore A = \underbrace{0.06s}_{\text{6\% of weekly sales}} + \underbrace{80}_{\text{base weekly salary}}$$

$$\therefore 119 = 0.06s + 80$$

$$\therefore 119 - 80 = 0.06s + 80 - 80$$

$$\therefore 39 = 0.06s$$

$$\therefore \frac{39}{0.06} = \frac{0.06s}{0.06}$$

$$\therefore 650 = s$$

Ezre's total sales for the week were \$650.

13 What's the Charge?

The table below represents the linear relationship between cost and repair time at an appliance store.

Repair time, t (h)	Cost, C (\$)
t_1 3	205 C_1
t_2 6	385 C_2
8	505

Is this relationship a direct or a partial variation?

Circle one: Direct variation Partial variation

Justify your answer.

When $t=0$, $C=25$.

Therefore, the line does not pass through the origin

Determine the initial value of this relationship. Show your work.

Initial value: 25

$$\text{slope} = m$$

$$= \frac{\Delta C}{\Delta t}$$

$$= \frac{C_2 - C_1}{t_2 - t_1}$$

$$= \frac{385 - 205}{6 - 3}$$

$$= \frac{180}{3} = 60$$

The equation of the linear relation must take the form

$$C = 60t + b$$

Since $(3, 205)$ lies on the line,

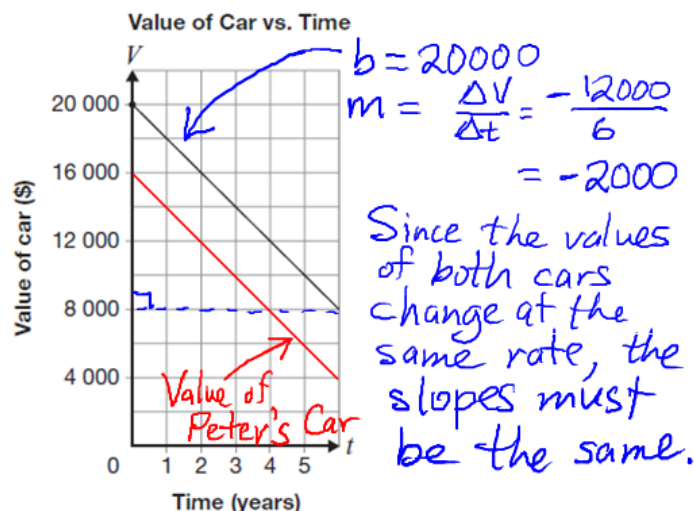
$$205 = 60(3) + b$$

$$\therefore 205 = 180 + b$$

$$\therefore b = 205 - 180 = 25$$

14 Hot New Wheels

Cybelle and Peter each buy a car. The graph below represents the value of Cybelle's car over time.



Peter's car costs less than Cybelle's. The value of both cars changes at the same rate.

Determine a possible equation to represent the relationship between the value of Peter's car, V , in dollars, and time, t , in years.

$V = -2000t + 16000$

Value of the car decreases at a rate of \$2000 per year

Initial value must be smaller than 20000 since Peter's car is less expensive than Cybelle's

Justify your equation.

22 The New Line

A line has

l_1 • the same slope as the line represented by $4x - 3y + 15 = 0$ and

l_2 • the same y-intercept as the line represented by $2x + y + 6 = 0$.

Determine an equation of this line.

Show your work.

Slope can be found by changing to $y = mx + b$ form

Set $x = 0$ to find y-intercept

slope of $l_1 = -\frac{A}{B} = -\frac{4}{-3} = \frac{4}{3}$

y-intercept of l_2 : set $x = 0$

$2(0) + y + 6 = 0$

$\therefore y + 6 = 0$

$\therefore y = -6$

Therefore, for the required line,
 $m = \frac{4}{3}$, $b = -6$

\therefore an equation of the required line is $y = \frac{4}{3}x - 6$

23 Event-full

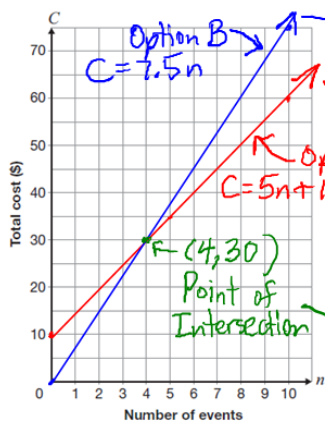
At Lowell High School, the cost to attend special events depends on whether or not a student has purchased a \$10 discount card.

Option A: The student buys a discount card. The cost is \$5 per event. $C = 5n + 10$

Option B: The student does not buy a discount card. The cost is \$7.50 per event. $C = 7.5n$

Graph the relationship between total cost and number of events for each option on the grid.

Total Cost vs. Number of Events



Determine the conditions under which a student at Lowell High School should choose each option.

Justify your answer.

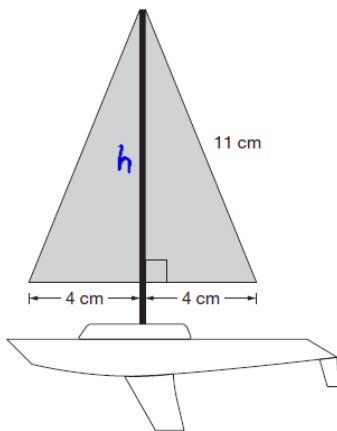
If the student attends fewer than 4 events, option B is better.

If the student attends more than 4 events, option A is better.

For exactly 4 events, both options have the same total cost (\$30).

30 Toy Sailboats

Emelina makes toy sailboats as shown below.



By the Pythagorean Theorem,

$$h^2 + 4^2 = 11^2$$

$$\therefore h^2 + 16 = 121$$

$$\therefore h^2 + 16 - 16 = 121 - 16$$

$$\therefore h^2 = 105$$

$$\therefore h = \sqrt{105}$$

$$\therefore h \approx 10.25$$

$$\begin{aligned} \therefore A &= \frac{bh}{2} \\ &= \frac{8(10.25)}{2} \\ &= 41 \text{ cm}^2 \end{aligned}$$

The area of the shaded sails is about 41 cm^2 .

Determine the total area of the shaded sails.

Show your work.

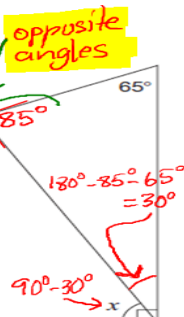
31 What's Missing?

Consider the diagram below.

$$180^\circ - 85^\circ - 65^\circ = 30^\circ$$

supplementary angles

supplementary angles



Complete the table below.

Justify your answers using geometric properties.

Angle measure	Justification
$x = 60^\circ$	The missing angles in the triangle can be found using opposite angles and sum of angles in a triangle (180°). $\therefore x = 90^\circ - 30^\circ$ (right angle)
$y = 133^\circ$	The missing angles in the quadrilateral can be found using supplementary angles. $y + 95^\circ + 60^\circ + 72^\circ = 360^\circ$ $\therefore y = 360^\circ - 95^\circ - 60^\circ - 72^\circ$

sum of interior angles of a quadrilateral