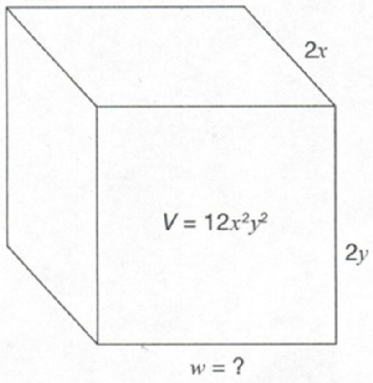
1 A box with a volume of $12x^2y^2$ is shown below.



Hint: $V = lwh$

What is the width of the box?

a $2xy$

b $3xy$

c $4x^3y^3$

d $8x^3y^3$

$(3xy)(2x)(2y) = 12x^2y^2$

Check! $3xy(2x)(2y)$
$= 3(2)(2)xxyy$
$= 12x^2y^2$

2 Which of the following is equivalent to the expression below?

$(4x - 5) + (2x + 1)$ $= 4x-5+2x+1$
$= 4x+2x-5+1$
$= 6x - 4$

a $2x - 6$

b $2x - 4$

c $6x - 6$

d $6x - 4$

Brackets can be removed without making any changes because "+" is insensitive to order.

3 Alfredo and his wife, Jody, work in a restaurant.

Last week Alfredo received an average of $15 in tips for each of the 55 tables he served. Jody received an average of $20 in tips for each of the 60 tables she served.

They are planning a weekend trip. Alfredo will pay a total of $220 for their hotel room and Jody will pay a total of $160 for their rental car.

How much of their combined tips will be left over after they have paid for their hotel room and rental car?

a $1620

b $1645

c $2025

d $2405

$55(\$15) + 60(\$20)$
$= 2025$

$2025 - 220 - 160$

4 Keepin' Tabs

A student council collects aluminum pop tabs to raise money to purchase a wheelchair. A company buys the pop tabs for $0.88 per kilogram.

If 1267 pop tabs have a mass of one pound, how many pop tabs are needed to purchase a wheelchair worth $1500?

Show your work.

Hint:
1 kilogram = 2.2 pounds

Given: $0.88/kg
1267 pop tabs per pound

Required: # pop tabs required to raise $1500

Solution:

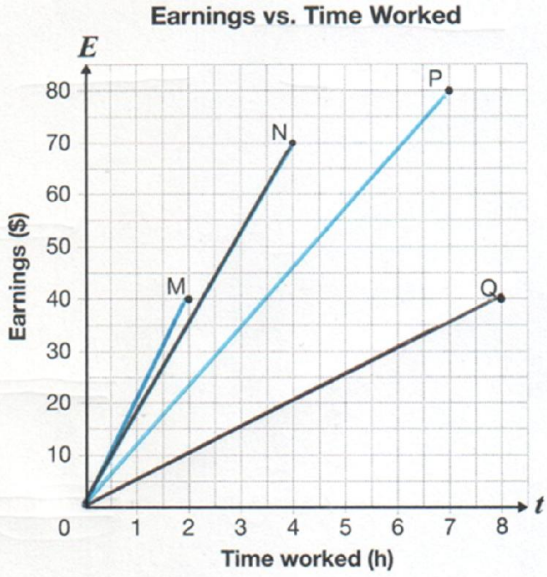
pop tabs per kg
= 1267(2.2)
= 2787.4

kg required to raise $1500
$$= \frac{\$1500}{\$0.88/kg}$$
≈ 1704.55

pop tabs required to raise $1500
= 2787.4(1704.55)
≈ 4751263

About 4751263 pop tabs would be needed to purchase a wheelchair worth $1500.

5 The graph below represents the relationship between earnings and time worked.



Which of the following points represents the highest rate of pay?

a M
b N
c P
d Q

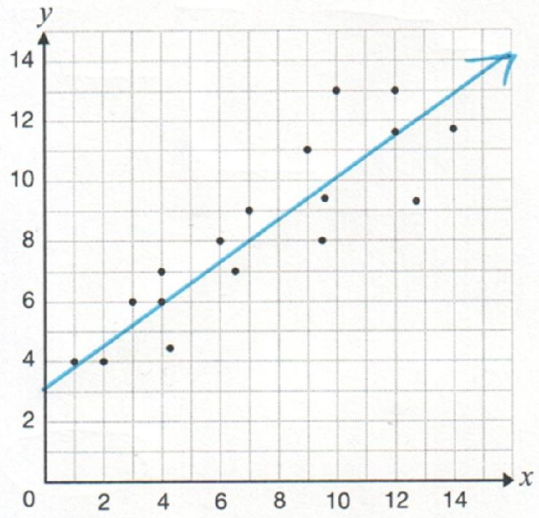
steepest slope
∴ highest rate of pay

$\text{slope} = \frac{40-0}{2-0}$

$= 20$

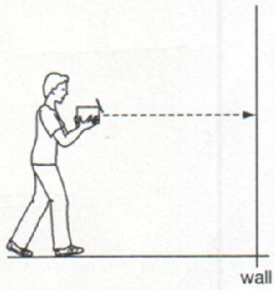
∴ rate of pay is \$20/h

6 Which of the following could be the slope of a line of best fit for the data shown in the scatter plot below?



a −2
b −1
} upward trend → slope can't be negative
c 1
d 2 too steep

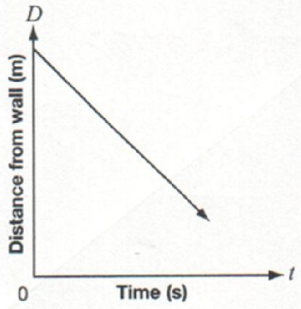
7 In an investigation, a student holds a motion detector, points it at a wall and walks toward the wall.



The student walks slowly at first and then speeds up as he approaches the wall.

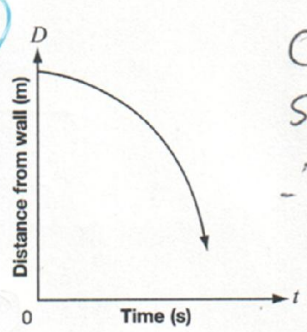
Which of the following graphs would be produced on the graphing calculator?

a



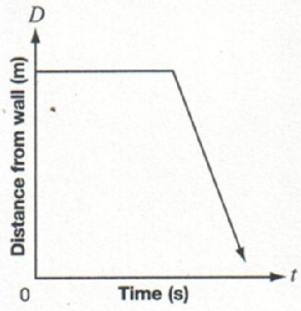
Constant speed

b



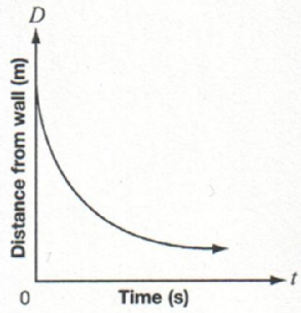
Curve gets steeper - speed is increasing

c



Not moving at all at first Then moves at a constant speed

d



Slowing down because curve gets less steep

8 The table of values below displays the cost of renting a bicycle.

Time, t (h)	Cost, C ($)
0	25
1	30
2	35
3	40

b=25

Which equation models the cost of renting a bicycle?

a $C = 5t$

b $C = 25t$

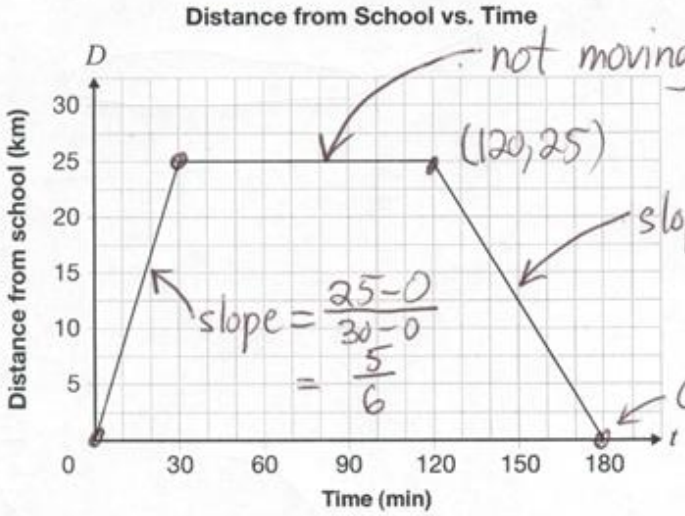
c $C = 5t + 25$

d $C = 25t + 5$

The only equation with b=25

9 Dogs Versus Cats

The Bryant Bulldogs basketball team takes the bus to play the Jordan High Thundercats.



not moving → slope = 0
∴ speed = 0

(120, 25)

slope = $\frac{0-25}{180-120} = \frac{-25}{60} = \frac{-5}{12}$

slope = $\frac{25-0}{30-0} = \frac{5}{6}$

(180, 0)

Describe the three parts of the Bulldogs' bus trip, using the information on the graph.

Include information about distance, time, direction and speed in kilometres per minute for each section of the graph.

Zero to Thirty Minutes

- Moving toward Jordan High (away from Bryant high school) at a speed of $\frac{5}{6}$ km/min $\doteq$ 0.83 km/min (see graph).
- Travel a distance of 25 km
- Arrive at Jordan High 30 minutes after leaving Bryant

30 Minutes to 120 Minutes

There is no motion during this period. The Bryant Bulldogs must be at Jordan High playing their game. We know this because the slope of the graph is zero, meaning that the speed is zero. (Obviously, distance travelled is zero.)

120 Minutes to 180 Minutes

- Moving back toward Bryant High School at a speed of $\frac{5}{12}$ km/min $\doteq$ 0.42 km/min. (see graph)
- Travel a distance of 25 km
- Arrive back at Bryant High at 180 minutes (60 minutes after leaving Jordan High)

10 Which of the following equations does **not** represent a linear relation?

a $x = -2$ vertical line

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

c $y = x^2 + 3$

d $3x - 2y - 1 = 0$ $Ax+By+C=0$

11 For the slope of a line, the change in x is greater than the change in y. Which of the following could represent the slope of this line?

a $\frac{4}{3}$

b 2

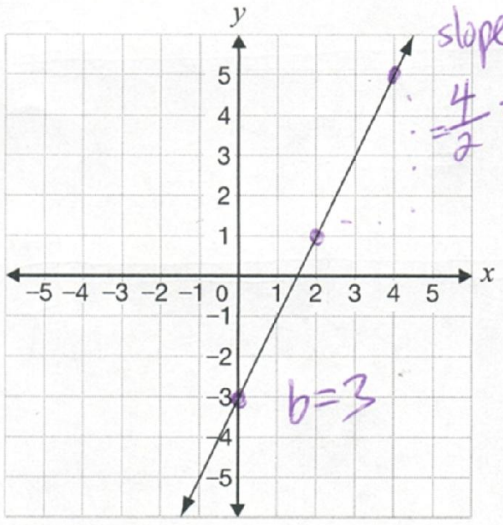
c 1

d $\frac{2}{5}$

Δy is smaller than Δx

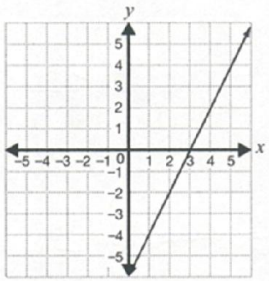
$\therefore$ d is the only answer that makes sense

12 The graph of a line is shown below.



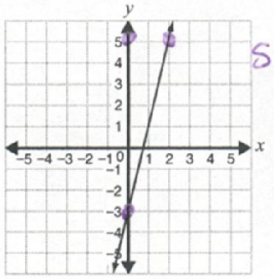
If the slope is doubled and the y-intercept remains constant, which graph below best represents the new line?

a



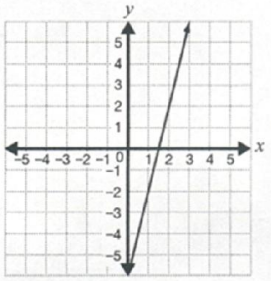
Wrong y-intercept

b



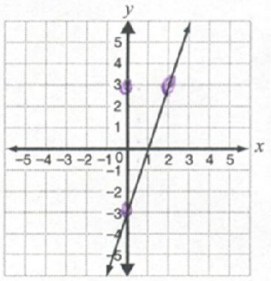
slope $=\frac{8}{2}=4$, which is double the slope

c



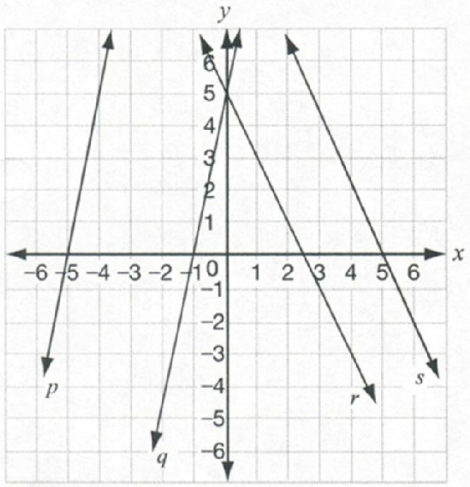
Wrong y-intercept

d



Slope $=\frac{6}{2}=3$

13 Consider the following linear relations.



Which line represents the graph of the equation $y = -2x + 5$?

a Line p } Both have positive slopes
b Line q
(c) Line r
d Line s Wrong y-intercept

14 The following table shows values for a linear relation.

x	y	
−15	−33	
−9	−25	
3	−9	y_1
12	3	y_2

x_1 x_2

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-(-9)}{12-3} = \frac{12}{9} = \frac{4}{3}$$

Which of the following equations represents the relationship shown in the table of values?

a $y = \frac{4}{3}x - 16$
(b) $y = \frac{4}{3}x - 13$
c $y = \frac{3}{4}x - 9$ } Wrong slope
d $y = \frac{3}{4}x - 6$

The equation must take the form $y = \frac{4}{3}x + b$.

Since $(3, -9)$ lies on the line, its co-ordinates satisfy the equation,

$\therefore -9 = \frac{4}{3}(\frac{3}{1}) + b$

$\therefore -9 = 4 + b$

$\therefore b = -13$

15 A Tale of Two Lines

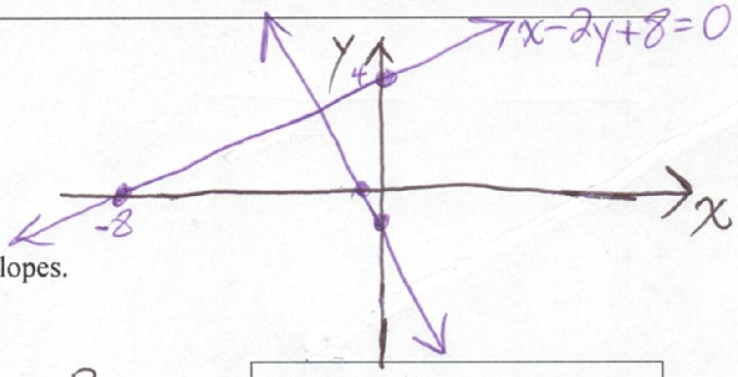
Below are the equations of two lines.

Line A: $x - 2y + 8 = 0$

Line B: $2x + y + 1 = 0$

Compare the two lines by considering their slopes.

Justify your answer.



Hint:
Include information about
- steepness,
- direction and
- whether the lines are parallel or perpendicular, or whether they are neither.

Line A

$x-2y+8=0$

x-intercept $\rightarrow y=0$

$\therefore x+8=0$

$\therefore x=-8$

$\therefore (-8,0)$ lies on line A

y-intercept $\rightarrow x=0$

$\therefore -2y+8=0$

$\therefore y=4$

$\therefore (0,4)$ lies on line A

slope

$m_A = \frac{4-0}{0-(-8)} = \frac{4}{8} = \frac{1}{2}$

Line A slopes upward to the right. For every increase in x by 2 units, y increases by 1 unit.

Line B

$2x+y+1=0$

x-intercept $\rightarrow y=0$

$\therefore 2x+1=0$

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

$\therefore (-\frac{1}{2},0)$ lies on line B

y-intercept $\rightarrow x=0$

$\therefore y+1=0$

$\therefore y=-1$

$\therefore (0,-1)$ lies on line B

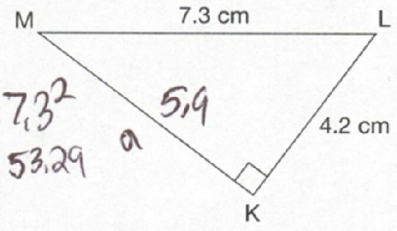
slope

$m_B = \frac{-1-0}{0-(-\frac{1}{2})} = \frac{-1}{(\frac{1}{2})} = -1 \div \frac{1}{2} = \frac{-1}{1} \times \frac{2}{1} = \frac{-2}{1}$

Line B slopes downward to the right. For every increase in x by 1 unit, y decreases by 2 units

Line B is steeper than line A. Line A and line B are perpendicular because their slopes are negative reciprocals.

16 Triangle KLM is shown below.

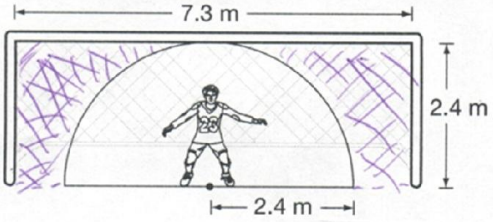


$a^2+4.2^2=7.3^2$
$a^2+18.49=53.29$
$a^2=34.8$
$a=\sqrt{34.8}$
$\doteq 5.9$

Which of the following is closest to the perimeter of triangle KLM?

a 12.6 cm
b 16.3 cm
c 17.5 cm
d 21.0 cm

17 A soccer goalie is standing in a goal opening. From this position, she can guard the area represented by the semicircle below.



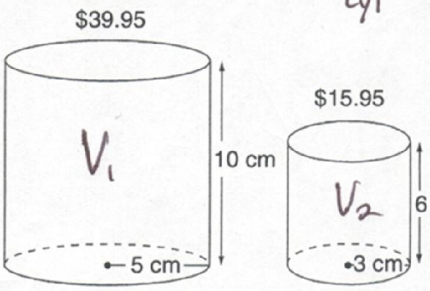
How much of the goal opening is she not guarding?

a 0.6 m²
b 8.5 m²
c 9.0 m²
d 26.6 m²

$A_{shaded} = A_{rect} - A_{semi\text{-}circle}$
$= lw - \frac{\pi r^2}{2}$
$\doteq 7.3(2.4) - \frac{3.14(2.4)^2}{2}$
$\doteq 8.5\ m^2$

18 Two different stores sell coffee in cylindrical packages. The prices and dimensions of the packages from the two stores are shown below.

$V_{cyl} = \pi r^2 h$



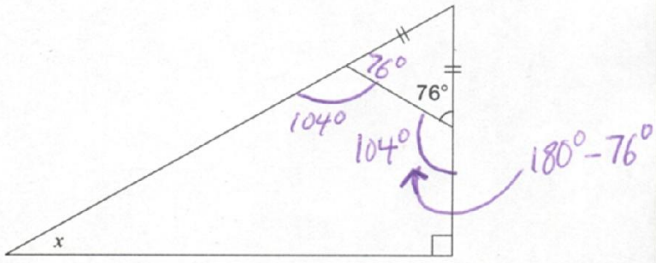
$\frac{39.95}{785} = 0.05$
$\frac{\$15.95}{169.56} = 0.09$

Which is closest to the difference between the unit prices of these two packages?

a $0.04/cm³
b $0.05/cm³
c $0.09/cm³
d $0.24/cm³

$V_1 \doteq 3.14(5)^2(10)$
$\doteq 785\ cm^3$
$V_2 \doteq 3.14(3)^2(6)$
$\doteq 169.56\ cm^3$

19 Consider the following diagram.

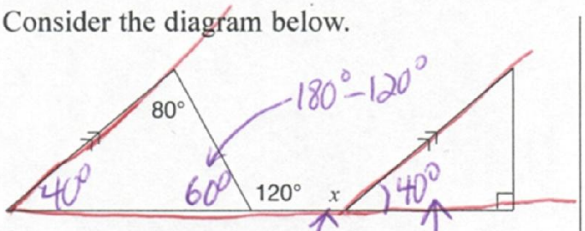


What is the value of x?

a 14°
b 28°
c 62°
d 76°

$x+104+104+90=360$
$\therefore x=62$

20 Consider the diagram below.



What is the value of x?

a 80°

b 120°

c 140°

d 170°

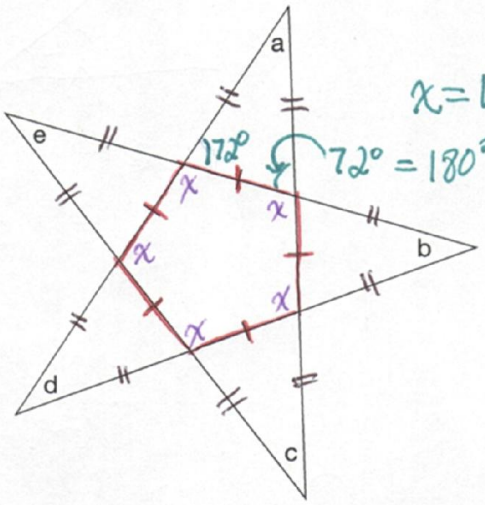
$180° - 120°$

By F pattern

$x = 180° - 40°$
$= 140°$

21 Twinkle Twinkle

Nicole notices the star design shown below on the pavement outside a movie theatre.



Determine the sum of the angle measures in the corners of this star: a + b + c + d + e.

Justify your answer using geometric properties.

Sum of interior angles of the pentagon $= (5-2)\times 180^\circ = 540^\circ$

Since the pentagon is regular, all interior angles have the same measure

$\therefore x = \frac{540^\circ}{5} = 108^\circ$

Each of the triangles built upon a side of the pentagon is isosceles because the base angles all have a measure of 72° ($180^\circ - 108^\circ = 72^\circ$, supplementary angles)

$\therefore a = b = c = d = e = 180^\circ - 2(72^\circ) = 36^\circ$

(sum of interior angles of a triangle is 180°)

$\therefore a+b+c+d+e = 5(36^\circ) = 180^\circ$