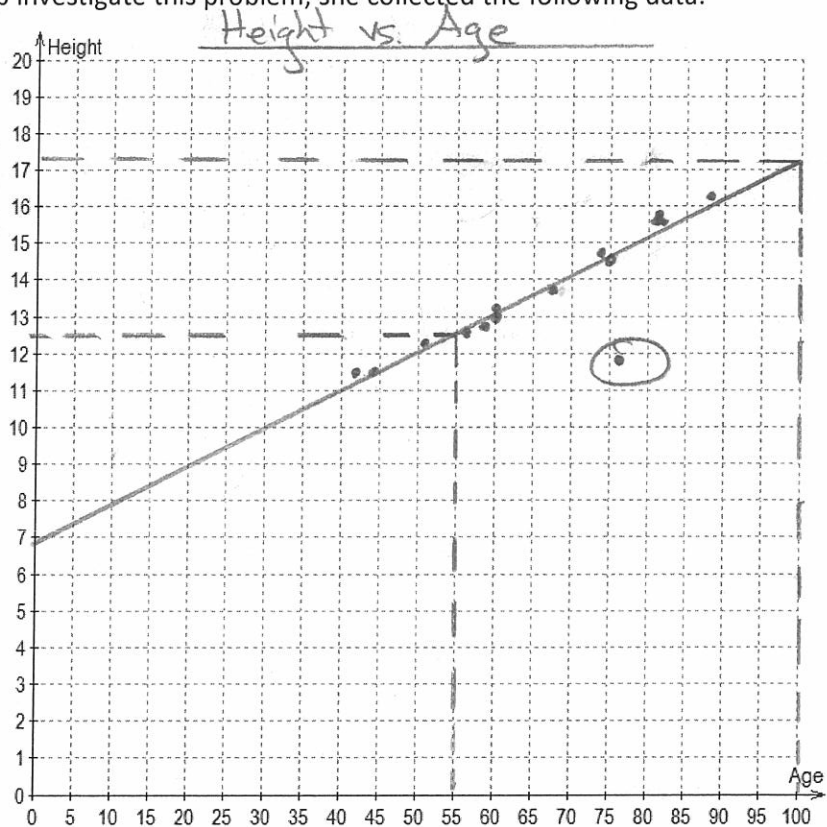


1) Samantha wants to estimate the height of a certain type of tree when it was 20 years old and when it will be 100 years old. To help investigate this problem, she collected the following data.

Age (years)	Height of Tree (m)
42	11.4
51	12.2
75	14.5
60	13.2
58	12.8
82	15.8
67.5	13.7
76	11.8
81.5	15.7
56.5	12.6
88	16.2
74	14.7
82	15.6
60	13.0
44	11.5



- a) Create a well labeled scatter plot of Samantha's data.
- b) Describe the relationship between the tree's age and its height.

As the age increases, the height increases

- c) Draw the line of best fit.
- d) Using the line of best fit, predict the height of a height of a tree that is 55 years old.

Age: 55 years      Height: 12.5m

To find this height, you used: Interpolation    Extrapolation    (circle one)

- e) Using the line of best fit, predict the height of a height of a tree that is 100 years old.

Age: 100 years      Height: 17.3m

To find this height, you used:    Interpolation    Extrapolation    (circle one)

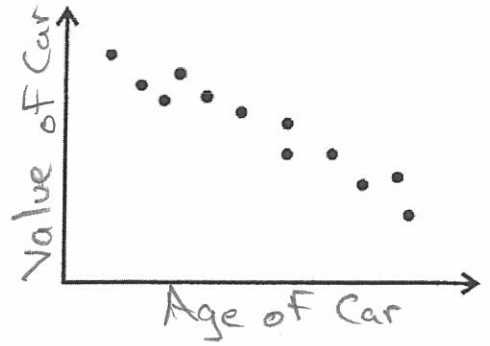
- f) If there are any outliers, circle them on the graph.

2) Consider the scatter plot shown on the right.

a) What type of correlation does this relationship display?

Negative correlation

b) Label the axes on the scatter plot to show a situation that could create this type of relationship.



3) For each of the following tables, use the first differences to determine whether the relation is linear or nonlinear.

x	y
0	5
1	8
2	11
3	14
4	17
5	20

+3  
+3  
+3  
+3  
+3

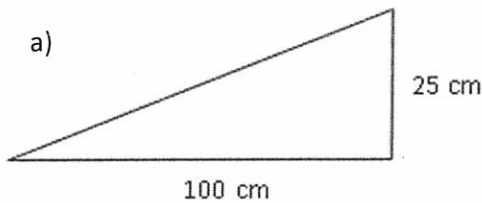
Linear

x	y
-3	50
-2	40
-1	20
0	-10
1	-50
2	-90

-10  
-20  
-30  
-40  
-40

Nonlinear

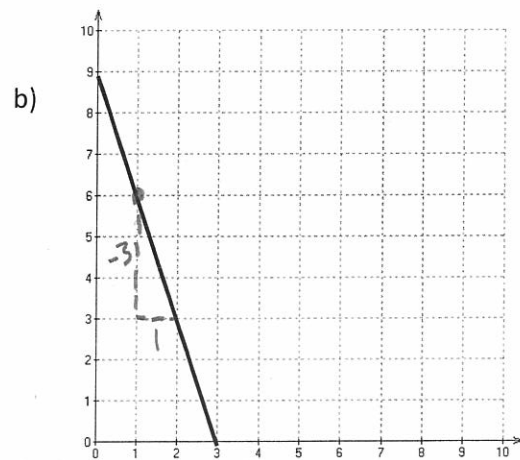
4) For each of the following, determine the slope.



$$m = \frac{\text{Rise}}{\text{Run}}$$

$$= \frac{25}{100}$$

$$= \underline{\underline{0.25}}$$



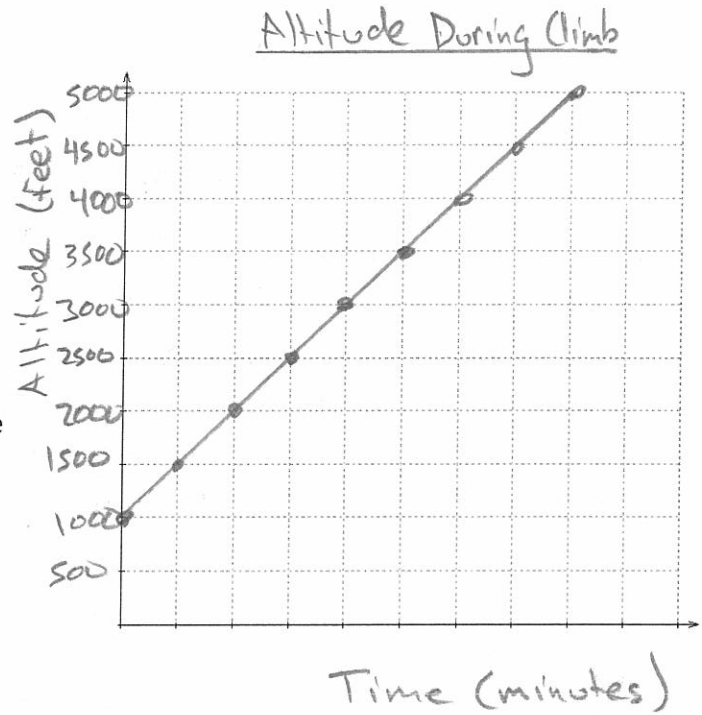
$$M = \frac{\text{rise}}{\text{run}}$$

$$= \frac{-3}{1}$$

$$= \underline{\underline{-3}}$$

5) A plane starts at an altitude of 1000 feet and climbs at a rate of 500 feet per minute.

a) Create a well labelled graph to show the plane's altitude.



b) What is the initial value in this relation?

1000

c) What is the slope in this relation?

500

d) Create an algebraic equation to model the plane's altitude.

$$A = 1000 + 500t$$

e) How high is the plane after 12 minutes?

$$\begin{aligned} A &= 1000 + 500(12) \\ &= 1000 + 6000 \\ &= \underline{7000 \text{ feet}} \end{aligned}$$

f) How long has the plane been climbing if its altitude is 9250 feet?

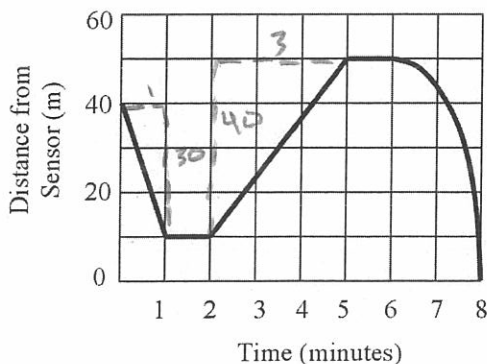
$$\begin{aligned} 9520 &= 1000 + 500t \\ 8520 &= 500t \\ \frac{8520}{500} &= \frac{500t}{500} \\ 16.5 &= t \end{aligned}$$

$\therefore$  climbing for 16.5 minutes

g) How would the graph change if the plane climbed at 900 feet per minute?

The line would be steeper (the start value would be the same).

6) The following graph shows Don's distance from a motion sensor. Describe his motion, using distances, speeds and times in your answer.



- start 40m away from sensor
- walk "quickly" toward sensor for 1 minute (30 m). Speed is 30m/min.
- stop for 1 minute
- walk away from sensor (40m in 3 minutes). Speed is 13.3 m/min
- stop for 1 minute
- move toward sensor, speeding up

7) Solve each of the following equations.

$$\begin{aligned} \text{a) } 4x - 5 &= 19 \\ 4x &= 24 \\ \frac{4x}{4} &= \frac{24}{4} \\ x &= 6 \end{aligned}$$

$$\begin{aligned} \text{b) } 5x + 8 &= 2x - 4 \\ 5x - 2x &= -2x - 12 \\ 3x &= -12 \\ \frac{3x}{3} &= \frac{-12}{3} \\ x &= -4 \end{aligned}$$

$$\begin{aligned} \text{c) } 2(x+4) &= -3x + 43 \\ 2x + 8 &= -3x + 43 \\ 2x + 3x &= -3x + 35 \\ 5x &= 35 \\ \frac{5x}{5} &= \frac{35}{5} \\ x &= 7 \end{aligned}$$

8) Simplify the following expressions.

$$\begin{aligned} \text{a) } 6x - 10 + (-4x) + 8 \\ = 6x + (-4x) - 10 + 8 \\ = 2x - 2 \end{aligned}$$

$$\begin{aligned} \text{b) } 3(2x - 4) + 9 - 2x \\ = 6x - 12 + 9 - 2x \\ = 6x - 2x - 12 + 9 \\ = 4x - 3 \end{aligned}$$

9) Evaluate the following expression.

$$\begin{aligned} 9 - 2^2 + 2(8 - 11) \quad \text{BEDMAS} \\ = 9 - 2^2 + 2(-3) \\ = 9 - 4 + 2(-3) \\ = 9 - 4 + (-6) \\ = -1 \end{aligned}$$

10) Solve the following proportion.

$$\begin{aligned} \frac{4}{7} &= \frac{x}{23} \\ 7x &= (4)(23) \\ 7x &= 92 \\ \frac{7x}{7} &= \frac{92}{7} \\ x &= 13.1 \end{aligned}$$

11) Ricardo can type 167 words in 3 minutes. At this rate, how many words could he type in 20 minutes?

$$\begin{aligned} \frac{167}{3} &= \frac{x}{20} \\ 3x &= (167)(20) \\ 3x &= 3340 \\ \frac{3x}{3} &= \frac{3340}{3} \\ x &= 1113.3 \text{ words} \end{aligned}$$

12) A map uses a scale of 1 : 250 000. If a distance of 6 cm is measured on the map, what is the corresponding distance in real life?

$$\begin{aligned} \frac{1}{250000} &= \frac{6}{x} \\ 1x &= (250000)(6) \\ x &= 1500000 \text{ cm} \end{aligned}$$

13) Gennarino can buy 15 bottles of olive oil for \$101.85. Calculate the unit rate.

$$101.85 \div 15 = \$6.79 \text{ per bottle}$$

14) Kelly is planning on buying a new shirt that is on sale for \$39.49. What will be the total cost with tax (13% HST).

$$13\% = \frac{13}{100} \\ = 0.13$$

$$\text{Tax} = 39.49 \times 0.13 \\ = 5.13$$

$$\text{Total} = 39.49 + 5.13 \\ = \underline{\underline{\$44.62}}$$

15) Determine the perimeter and area of the figure on the right.

PERIMETER

$$\text{Semicircle: } 2\pi r \div 2 \\ = 2\pi(4) \div 2 \\ = 12.6\text{m}$$

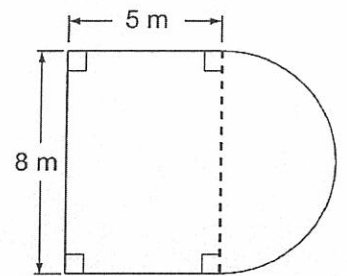
$$\therefore P = 5 + 8 + 5 + 12.6 \\ = \underline{\underline{30.6\text{m}}}$$

AREA

$$\text{Semicircle: } A = \pi r^2 \div 2 \\ = \pi \times 4 \times 4 \div 2 \\ = 25.1\text{m}^2$$

$$\text{Rectangle: } A = lw \\ = 8 \times 5 \\ = 40\text{m}^2$$

$$\text{Total area} = 25.1 + 40 \\ = \underline{\underline{65.1\text{m}^2}}$$

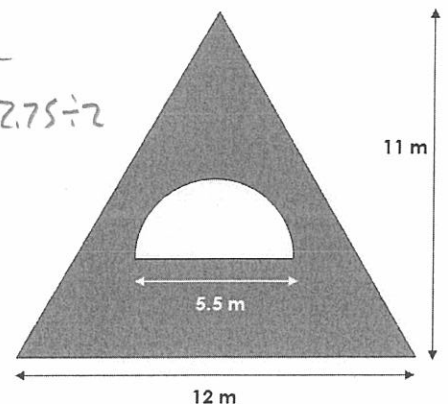


16) Determine the area of the shaded region in the figure on the right.

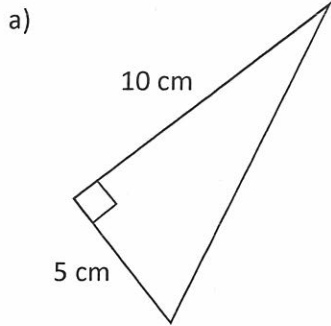
$$\text{Triangle: } A = \frac{bh}{2} \\ = \frac{12 \times 11}{2} \\ = 66\text{m}^2$$

$$\text{Semicircle: } A = \pi r^2 \div 2 \\ = \pi \times 2.75 \times 2.75 \div 2 \\ = 11.9\text{m}^2$$

$$\text{Shaded area} = 66 - 11.9 \\ = \underline{\underline{54.1\text{m}^2}}$$



17) Find the length of the unknown side for each of the following triangles.

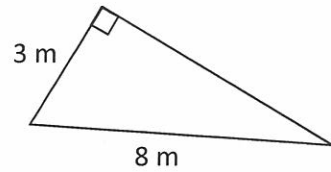


$$10 \times 10 = 100$$
$$5 \times 5 = 25$$

$$100 + 25 = 125$$

$$\sqrt{125} \doteq \underline{\underline{11.2 \text{ cm}}}$$

b)

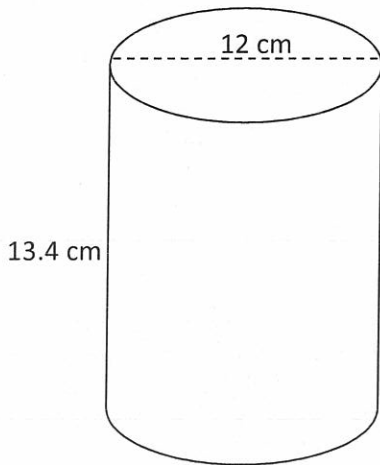


$$3 \times 3 = 9$$
$$8 \times 8 = 64$$

$$64 - 9 = 55$$

$$\sqrt{55} \doteq \underline{\underline{7.4 \text{ cm}}}$$

18) Find the volume of the following cylinder.



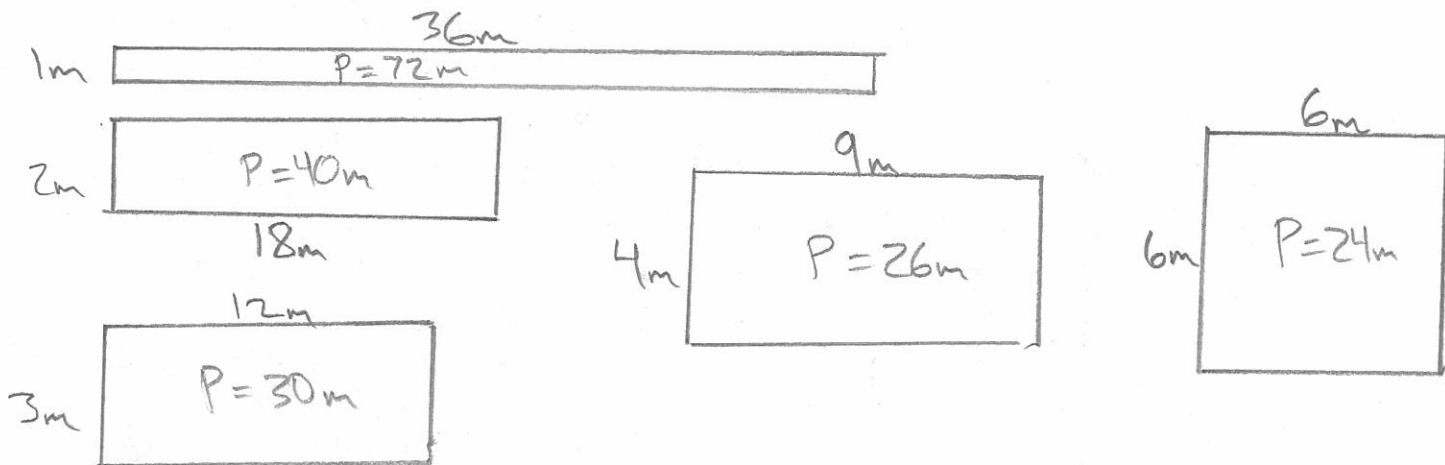
$$V = \pi r^2 h$$
$$= \pi \times 6 \times 6 \times 13.4$$
$$\doteq \underline{\underline{1515.5 \text{ cm}^3}}$$

19) A bocci ball has a radius of 5 cm. Determine the volume of the ball.

$$V = \frac{4}{3} \pi r^3$$
$$= 4 \div 3 \times \pi \times 5 \times 5 \times 5$$
$$\doteq \underline{\underline{523.6 \text{ cm}^3}}$$

20) Salvatore wants to pour a concrete patio in the shape of a rectangle. The rectangle will have an area of  $36 \text{ m}^2$ .

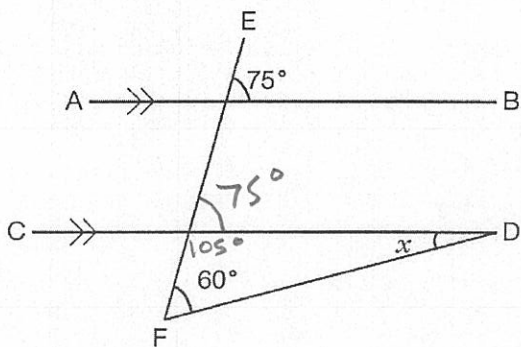
a) Draw several possible rectangles.



b) Which design will require the least amount of fence around the perimeter?

The square.

21) Determine the value of angle  $x$  in the following diagram.

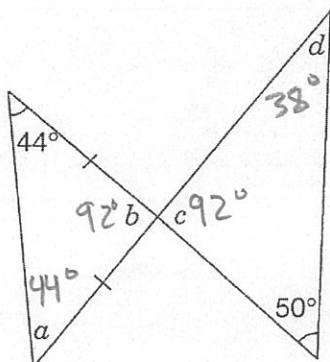


$$180^\circ - 75^\circ = 105^\circ$$

$$180^\circ - 105^\circ - 60^\circ = 15^\circ$$

$$\therefore \underline{x = 15^\circ}$$

22) Determine the value of angles  $a$ ,  $b$ ,  $c$  and  $d$  in the following diagram.



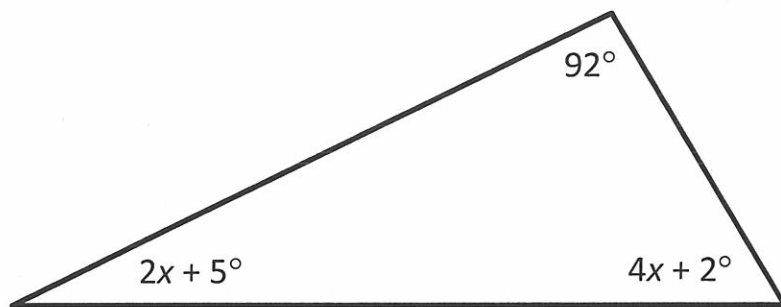
$$180^\circ - 44^\circ - 44^\circ = 92^\circ$$

$$180^\circ - 92^\circ - 50^\circ = 38^\circ$$

$$\therefore \begin{aligned} a &= 44^\circ \\ b &= 92^\circ \\ c &= 92^\circ \\ d &= 38^\circ \end{aligned}$$

23) Determine the value of  $x$  in each of the following diagrams.

a)



$$2x + 5 + 4x + 2 + 92 = 180$$

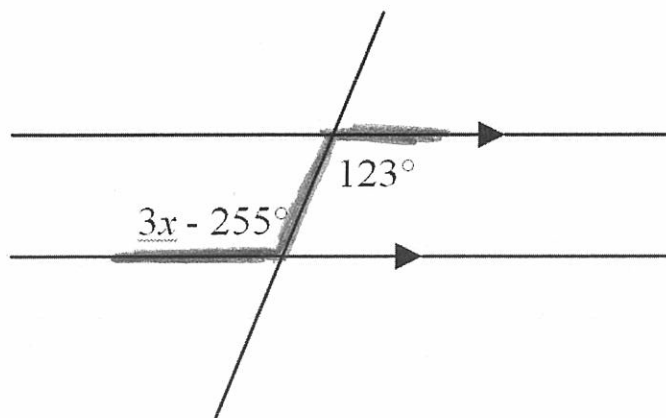
$$2x + 4x + 5 + 2 + 92 = 180$$

$$6x + 99 = 180$$

$$\frac{6x}{6} = \frac{81}{6}$$

$$x = 13.5^\circ$$

b)



$$3x - 255 = 123$$

$$\frac{3x}{3} = \frac{378}{3}$$

$$x = 126^\circ$$