

Mathematical Formulae

Compound interest

$$\text{Total amount} = P \left(1 + \frac{r}{100} \right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4 \pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} a b \sin C$$

$$\text{Arc length} = r \theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum f x}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum f x^2}{\sum f} - \left(\frac{\sum f x}{\sum f} \right)^2}$$

Answer **all** the questions.

- 1 (a) Use a calculator to evaluate $\sqrt[3]{5832} \times \left(\frac{0.19}{\pi}\right)^2 \div \frac{2}{7}$, leaving your answer in standard form.

Answer (a)..... [1]

- (b) Given that x is a positive integer, rearrange the following terms in ascending order.

$$x, \quad -\frac{8}{9}x, \quad \frac{9}{8}x, \quad -0.1x.$$

Answer (b).....,,, [1]

- 2 Caleb has a rectangular box of length 18 cm, a breadth of 11 cm and a height of 48 cm. Caleb wants to pack cubes of sides 2cm each into the box. What is the greatest possible number of the cubes that can fill the box?

Answer[2]

- 3 Write as a single fraction in its simplest form $\frac{1}{2(x-5)} + \frac{2}{(5-x)}$.

Answer [3]

- 4** A graph has the equation $y = -(x + 2)(2x - 3)$. Find the coordinates of the point where the graph cuts the x axis.

Answer: , [4]

- 5** A cyclist cycles at a speed of 21 km/h for $1\frac{3}{4}$ hours.

(a) Calculate the distance travelled.

Answer (a) km [1]

(b) He then cycles for 16 km at a speed of 24 km/h. Calculate the total average speed of the cyclist for the entire journey.

Answer (b) km/h [3]

6 Given that $\sqrt[3]{\left(\frac{u^{-3}v}{v^2}\right)^{-1}} = u^{n+2}v^m$, find the values of n and m .

Answer $n = \dots\dots\dots, m = \dots\dots\dots$ [4]

7 Solve the inequalities $-20 < 14 - 4x < 2$.

Answer $\dots\dots\dots$ [3]

8 (a) Make x the subject of the formula $y = \sqrt{\frac{2x}{x+5}}$.

Answer (a) $x = \dots\dots\dots$ [3]

(b) Find x when $y = -2$.

Answer (b) $x = \dots\dots\dots$ [1]

9 A land of area 7500 km^2 is represented on a map by an area of 300 cm^2 .

(a) If the map has a scale of $1:n$, find the value of n .

Answer (a) $\dots\dots\dots$ [2]

(b) The actual distance between two towns is 31 km , find the distance on the map between the two towns.

Answer (b) $\dots\dots\dots \text{cm}$ [1]

10 SingPhone is offering a salary increase to its employees. They can choose based on one of the schemes:

Scheme A: A one-third increase of their present salary.

Scheme B: An increase of 7% of their present salary and additional \$316.

Susan finds that both schemes will give him the same wage increase. Given that her present salary is \$ x , form an equation in terms of x , hence solve for x .

Answer $x = \$ \dots\dots\dots$ [3]

11 (a) Factorise $3a^2 - ab + bc - 3ac$.

Answer (a).....[2]

(b) Expand $(p^2 - q)(p^2 + q) - 4(p^2 + q)^2$.

Answer (b)[3]

12 (a) Expand $(2p - q)^2$.

Answer (a)[1]

(b) Hence, given that $4p^2 + q^2 = 40$ and $2p - q = -8$, find the value of pq .

Answer (b) [3]

13 Show that $(8k - 1)^2 + 3$ is a multiple of 4 for all integer values of k .

Answer :

[2]

14 Given that y is directly proportional to the cube root of x and $y = \frac{1}{4}$ when $x = \frac{1}{8}$. Find

(a) An equation in terms of x for y ,

Answer (a)[2]

(b) the value of x when $y = 2\frac{1}{2}$,

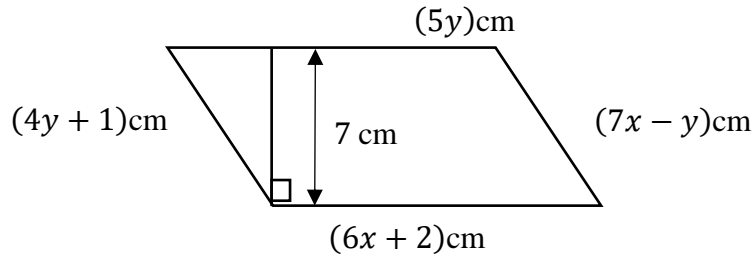
Answer (b) $x =$ [1]

(c) the value of y when $x = (4y - 1)^3$,

Answer (c) $y =$ [2]

15 The sides of the parallelogram shown in the figure are given in centimetres.

(a) Form two different equations involving x and y .



Answer (a).....[1]

.....[1]

(b) Find the values of x and y by solving the equations in part (a) simultaneously.

Answer (b) $x =$ [1]

$y =$ [1]

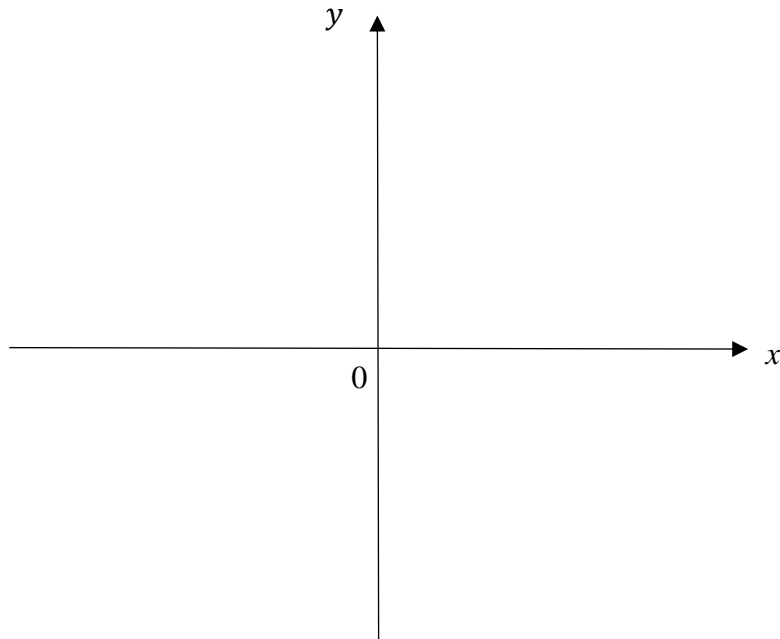
(c) Find the area of the parallelogram.

Answer (c)..... cm^2 [1]

16 (a) Sketch the graph $y = -(x + 1)^2 + 5$ on the axes below:

Answer

[3]



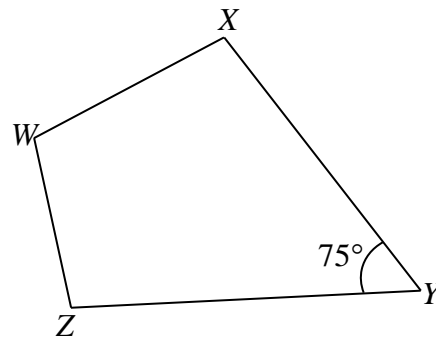
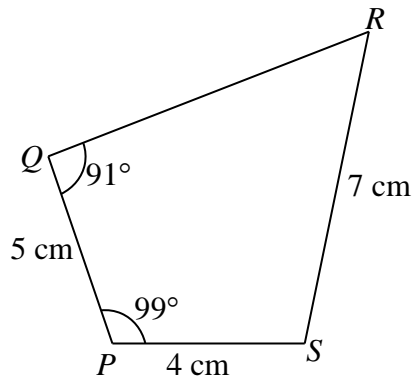
(b) State the line of symmetry of the graph.

Answer (b).....[1]

(c) Write down the equation of a suitable line that should be drawn on the same axes to solve for the equation $-(x + 1)^2 + 0.5 = 0$.

Answer (c).....[1]

17 The diagrams below are not drawn to scale.



If $WXYZ$ is congruent to $PQRS$,

(a) Write down the length of WZ .

Answer (a) $WZ = \dots\dots\dots\text{ cm}$ [1]

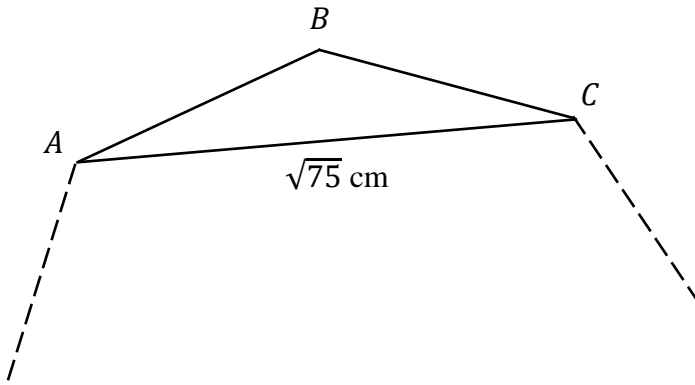
(b) Evaluate $\angle WZY$,

Answer (b) $\angle WZY = \dots\dots\dots^\circ$ [2]

(c) Evaluate XZ .

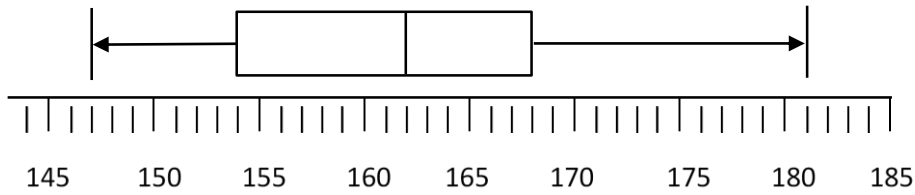
Answer (a) $WZ = \dots\dots\dots\text{ cm}$ [2]

- 18** The diagram below shows part of a regular hexagon and $AC = \sqrt{75}$ cm.
Find the length of AB , showing your working clearly.



Answer $AB = \dots\dots\dots[4]$

19 The box and whisker plot below illustrates the height, in centimetres, of students in a class.



Find the

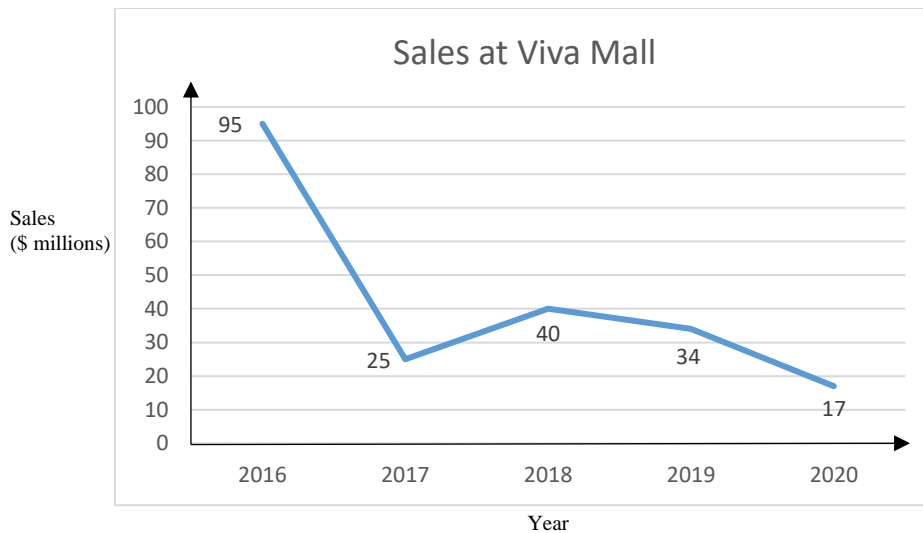
(a) median,

Answer (a) cm [1]

(b) interquartile range.

Answer (b) cm[2]

20 The line graph shows the sales at Viva Mall over the years.



Explain why calculating the mean sales from 2016-2020 is not a good indication as a central measure. [1]

21

(a) Draw a Venn Diagram to represent the following.

$$\xi = \{x: x \text{ is an integer and } 1 \leq x < 17\}$$

$$\mathbf{S} = \{x: x \text{ is a prime number}\}$$

$$\mathbf{T} = \{x: x \text{ is divisible by } 5\}$$



[2]

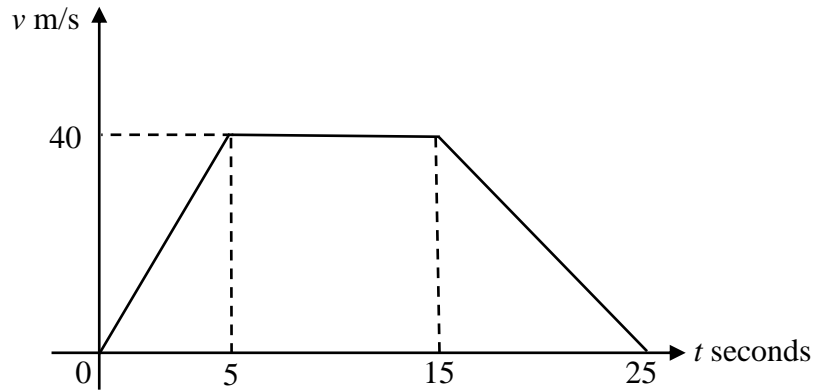
(b) Find $n(\mathbf{S} \cup \mathbf{T})$.

Answer (b).....[1]

(c) List out the elements of \mathbf{S}' .

Answer (c).....[1]

22 The speed-time graph of a car is shown below.



(a) Write down the duration of non-acceleration.

Answer (a) s [1]

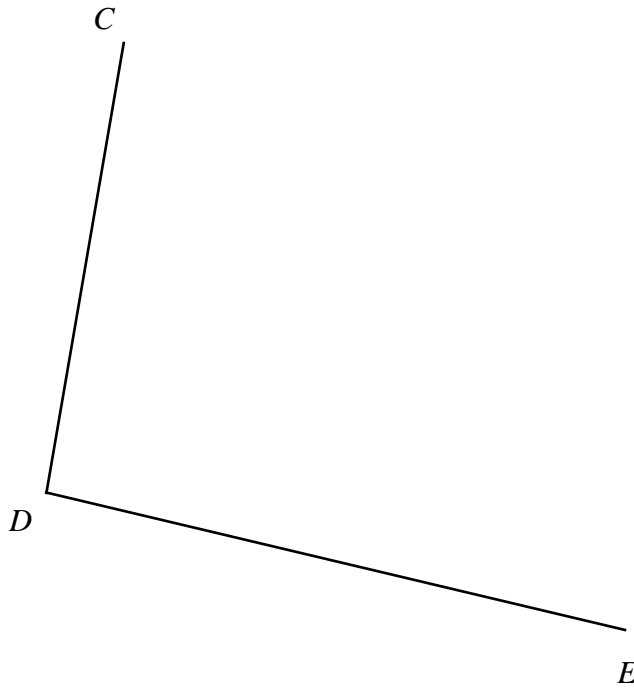
(b) Find the speed of the car at 18 s.

Answer (b) m/s [2]

23 The diagram shows lines CD and DE .

- (a) Mark and label point F such that $EF = 8$ cm and $CF = 10$ cm. [1]
- (b) Mark and label point G such that G is equidistant from points C , D , and E . [2]
- (c) Draw a line DX , where DX is equidistant from line CD and DE . [1]

Answer



End of Paper