

Part A

Answer all questions on this question paper itself.

- Area of the curved surface of a right circular cylinder of radius r and height h is $2\pi rh$.

1. Customs duty of 9% is charged for a certain item that is imported. If the value of this item is 6000 rupees, find the amount that has to be paid as customs duty.

Rs. 540 _____ ②

$6000 \times \frac{9}{100}$ _____ 1

2. Find the factors: $x^2 + 3x - 10$

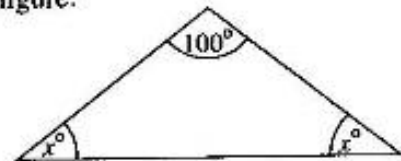
$(x + 5)(x - 2)$ _____ ②

$x^2 + 5x - 2x - 10$ _____ 1

3. Find the value of x according to the information given in the figure.

40 or $x = 40$ _____ ②

$x + x + 100 = 180^\circ$ _____ 1



4. If it is given that $\log_2 a = 5$, write the value of a as a power of 2.

$a = 2^5$ _____ ②

or

2^5

5. Find the time it takes to fill a tank of capacity 420 litres using a pipe through which water flows at a rate of 60 litres per minute.

7 minutes _____ ②

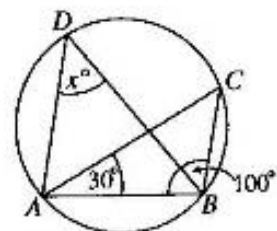
$\frac{420}{60}$ _____ 1

6. The points A, B, C and D lie on the circle shown in the figure.

$\hat{A}BC = 100^\circ$ and $\hat{C}AB = 30^\circ$. Find the value of x .

50 or $x = 50$ _____ ②

$\hat{A}CB = x^\circ / 30^\circ + 100^\circ + \hat{A}CB = 180^\circ$ _____ 1



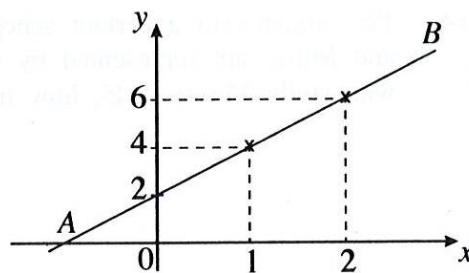
7. The base radius of a solid right circular cylinder is 7 cm. Its height is 10 cm. Find the area of the curved surface of the cylinder. (Use $\frac{22}{7}$ for the value of π .)

440 cm^2 _____ ②

$2 \times \frac{22}{7} \times 7 \times 10$ _____ 1

8. Find the gradient of the straight line represented by AB in the figure.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 4}{2 - 1} = 2$$

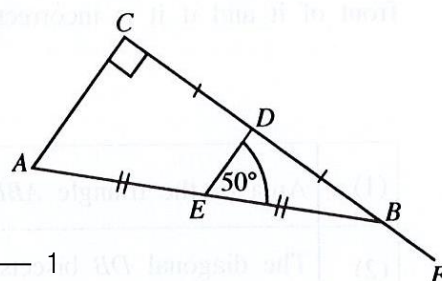


9. Simplify : $\frac{ax}{2} \div \frac{3a}{4x}$

$$\frac{2x^2}{3}$$

$$\frac{ax}{2} \times \frac{4x}{3a} = 2x^2$$

10. In the given figure, the side CB of the right angled triangle ABC is produced to F . The midpoints of AB and CB are E and D respectively. If $\hat{DEB} = 50^\circ$, find the magnitude of \hat{EBF} .



$$140^\circ \text{ or } \hat{EBF} = 140^\circ$$

$$AC \parallel ED \quad / \quad \hat{EAC} = 50^\circ \quad / \quad \hat{EDB} = 90^\circ$$

11. Solve: $2x^2 - 8 = 0$

$$2 \text{ and } -2$$

$$x^2 - 4 = 0 \quad / \quad 2(x - 2)(x + 2) = 0 \quad / \quad x = +2 \quad / \quad x = -2$$

12. A man takes a loan of 5000 rupees for two years at an annual interest of 8% with the interest compounded annually. How much is the interest for the second year for this loan amount?

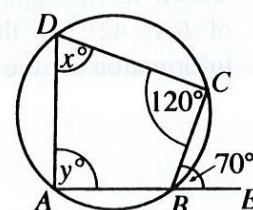
$$\text{Rs. } 432$$

$$5000 \times \frac{8}{100} = 400 \quad / \quad 5400 \times \frac{8}{100} = 432$$

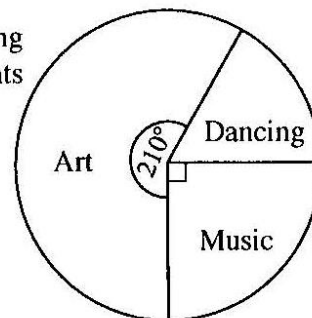
13. A cyclic quadrilateral $ABCD$ is shown in the figure. The side AB is produced to E . Moreover, $\hat{BCD} = 120^\circ$ and $\hat{CBE} = 70^\circ$. Find the values of x and y according to the given information.

$$x = 70$$

$$y = 60$$



14. The students in a certain school who study the subjects Art, Dancing and Music are represented by the pie chart. If the number of students who study Music is 45, how many students study Dancing?

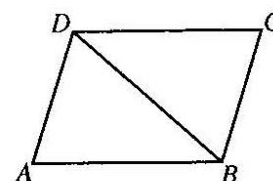


30 _____ ②
 Obtaining $60^\circ / \frac{60^\circ}{90^\circ} \times 45$ _____ 1

15. Express the sixth term in the geometric progression 9, 27, 81, ... as a power of 3.

3^7 _____ ②
 $9(3)^{6-1} / 3^2 \times 3^5$ _____ 1

16. A parallelogram ABCD is given in the figure. For each statement in the table, if it is correct mark a '✓' in front of it and if it is incorrect mark a '✗' in front of it.



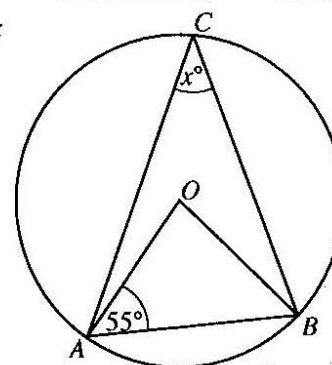
(1)	Area of the triangle ABD = $\frac{1}{2}$ × area of the parallelogram ABCD	✓	_____ 1
(2)	The diagonal DB bisects \hat{ADC} .	✗	_____ 1

②

17. Find the least common multiple of the following three algebraic terms:

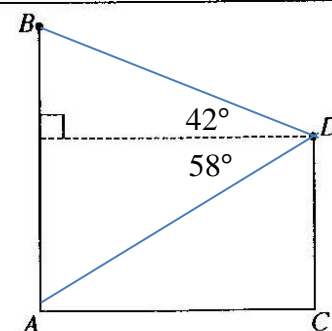
$3x^2, 6xy, 2y$ $6x^2y$ _____ ②
 $3x^2 = 3 \times x \times x$
 $6xy = 3 \times 2 \times x \times y$ } / $3 \times 2 \times x \times x \times y$ _____ 1
 $2y = 2 \times y$

18. The centre of the circle in the given figure is O. Find the value of x according to the information indicated in it.



$x = 35$ or 35 _____ ②
 $\hat{ABO} = 55^\circ / \hat{AOB} = 70^\circ / \hat{AOB} = 2x$ _____ 1

19. Two vertical pillars AB and CD located on a level ground are shown in the figure. When observed from D, the angle of elevation of B is 42° and the angle of depression of A is 58° . Represent this information in the figure.



Marking 42° _____ 1 ②
 Marking 58° _____ 1

20. A bag contains 35 identical marbles. A certain number of them are white while the rest are black. If the probability of a marble picked randomly from the bag being black is $\frac{5}{7}$, how many black marbles are there in the bag?

$$\frac{5}{7} \times \frac{5}{5} = \frac{25}{35} \quad / \quad \frac{5}{7} \times 35 = \text{—————} 1$$

25 _____ ②

21. Fill in the blanks in the following statement using suitable geometric terms.
 “The straight line joining the centre of a circle to the **midpoint** _____ 1 _____ of a chord of the circle is **perpendicular** _____ 1 _____ to the chord”. ②

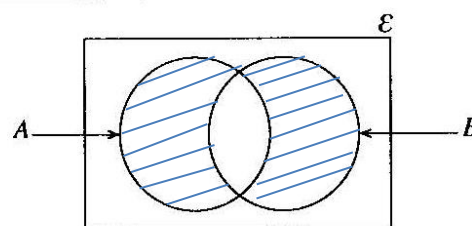
22. Find the value of x if

$$\begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix} \begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 5 & x \\ -4 & 3 \end{pmatrix}$$

$$x = -2 \text{ or } \begin{pmatrix} 5 & -2 \\ -4 & 3 \end{pmatrix} \text{ ————— } ②$$

$$3 \times -1 + 1 \times 1 = x \text{ ————— } 1$$

23. From the group of students who are represented in the given Venn diagram, the set of students who like Mathematics is represented by A and the set of students who like Science is represented by B . In the Venn diagram, shade the regions that represent the students who like only one of these two subjects.



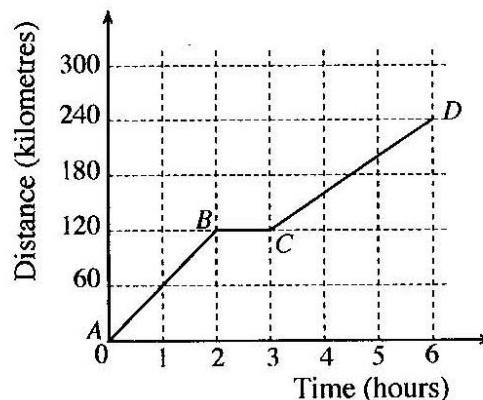
Shading the relevant regions _____ ②

24. A distance-time graph that represents the motion of a motor vehicle is shown in the figure. Which part of the graph represents the motor vehicle travelling with the greater speed? What is this speed?

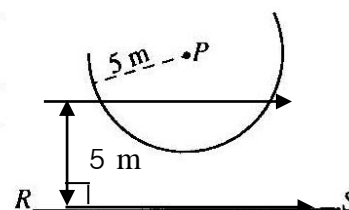
From A to B / Time from 0 to 2 hours /

Distance from 0 to 120 km _____ 1

$$\frac{120}{2} = 60 \text{ kmh}^{-1} \text{ ————— } 1 \quad ②$$



25. A portion of the locus of a point that moves at a constant distance of 5 m from the given point P is indicated by the arc in this sketch. The straight line RS is at a distance of 7 m from P . Indicate by a sketch on this figure, how the points on the arc which are at a distance of 5 m from the straight line RS also, are found.



Indicating the parallel lines such that they intersect the arc _____ 1

Indicating 5 m _____ 1 ②

Part B

Answer all questions on this question paper itself.

1. $\frac{7}{15}$ of the total length of a drain was dug on the first day and $\frac{1}{4}$ of the remaining length was dug on the second day.

- (i) At the end of the first day, what fraction of the total length of the drain remained to be dug?

$$1 - \frac{7}{15} = \frac{8}{15} \quad \text{_____} \quad 1 \quad \text{①}$$

- (ii) What fraction of the total length of the drain was dug on the second day?

$$\frac{8}{15} \times \frac{1}{4} \quad \text{_____} \quad 1 \quad \frac{2}{15} \quad \text{_____} \quad 1 \quad \text{②}$$

- (iii) At the end of the first two days, a further length of 600 metres of the total length of the drain remained to be dug. Find the total length of the drain.

$$\begin{aligned} \text{Remaining fraction} &= 1 - \left(\frac{7}{15} + \frac{2}{15} \right) \quad \text{_____} \quad 1 & \text{Length of drain} &= 600 \times \frac{15}{6} \quad \text{_____} \quad 1 & \text{④} \\ &= \frac{6}{15} \quad \text{_____} \quad 1 & &= 1500 \text{ m} \quad \text{_____} \quad 1 \end{aligned}$$

- (iv) It has been estimated that 4 men will require 3 days to dig the remaining 600 metres of the drain. How many more men need to be engaged to dig this length in two days?

$$\begin{aligned} \text{Amount of work} &= 4 \times 3 \text{ man days} \quad \text{_____} \quad 1 \\ \text{Number of men needed for 2 days} &= \frac{4 \times 3}{2} = 6 \quad \text{_____} \quad 1 & \text{③} \\ \therefore \text{Extra men needed} &= 2 \quad \text{_____} \quad 1 & \text{⑩} \end{aligned}$$

2. A sheet consists of a portion $ABCD$ in the shape of a trapezium and a semi-circular portion with diameter DC , as shown in the figure. (Take the value of π as $\frac{22}{7}$.)

- (i) It has been decided to attach small buttons along the edge of the semi-circular portion, starting from D and ending at C , such that the distance between every two adjacent buttons is 2 cm. How many buttons are required for this?

$$\begin{aligned} \text{Arc length of } CD &= \frac{1}{2} \times \frac{22}{7} \times 14 \quad \text{_____} \quad 1 \\ &= 22 \text{ cm} \quad \text{_____} \quad 1 \end{aligned}$$

$$\therefore \text{Numer of gaps} = \frac{22}{2} \quad \text{_____} \quad 1$$

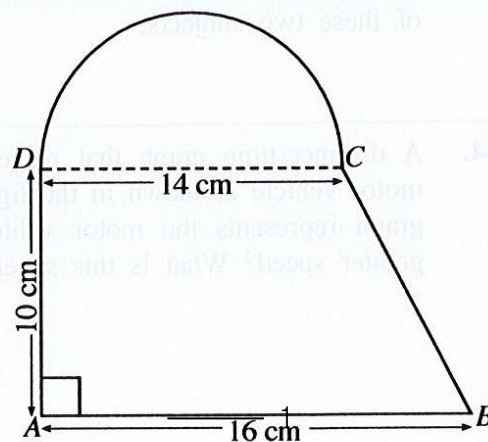
$$\text{Number of buttons} = 12 \quad \text{_____} \quad 1 \quad \text{④}$$

- (ii) Calculate the total area of the sheet.

$$\begin{aligned} \text{Total Area} &= \frac{1}{2} \times \frac{22}{7} \times 7 \times 7 + \frac{1}{2} (14 + 16) \times 10 \quad \text{_____} \quad 1 + 1 \\ &= 77 + 150 \quad \text{_____} \quad 1 \quad \text{(If at least one is correct)} & \text{④} \\ &= 227 \text{ cm}^2 \quad \text{_____} \quad 1 \end{aligned}$$

- (iii) If a rectangular sheet is made with its area equal to the area of the semi-circular portion and its length equal to the length of AD , then find its breadth.

$$\begin{aligned} \text{Breadth} &= \frac{77}{10} \quad \text{_____} \quad 1 \\ &= 7.7 \text{ cm} \quad \text{_____} \quad 1 & \text{②} \end{aligned}$$



3. Kumara runs a business within an urban council limits.

(a) The assessed annual value of his business place is 40 000 rupees. The urban council charges annual rates of 22%.

(i) Find the amount that has to be paid annually as rates.

$$\begin{aligned} \text{Rates} &= \text{Rs. } 40\,000 \times \frac{22}{100} \quad \text{----- } 1 && \textcircled{2} \\ &= \text{Rs. } 8\,800 \quad \text{----- } 1 \end{aligned}$$

(ii) How much does he have to pay as rates for a quarter?

$$\begin{aligned} \text{Rates for a quarter} &= \text{Rs. } \frac{8800}{4} \quad \text{----- } 1 \\ &= \text{Rs. } 2\,200 \quad \text{----- } 1 && \textcircled{2} \end{aligned}$$

(b)

	Annual income (rupees)	Income tax percentage
Initial	500 000	tax free
Next	500 000	4%
Next	500 000	8%

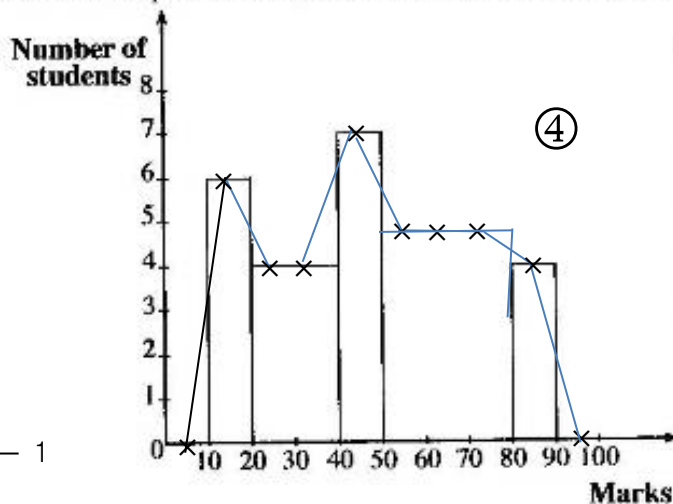
Kumara pays 12 000 rupees as income tax for a year, based on the above table. What is his annual income?

$$\begin{aligned} \text{Income on which tax is charged} &= \text{Rs. } \frac{12000 \times 100}{4} \quad \text{----- } 2 \\ &= \text{Rs. } 300\,000 \quad \text{----- } 1 && \textcircled{6} \end{aligned}$$

$$\begin{aligned} \text{Annual Income} &= \text{Rs. } 500\,000 + 300\,000 \quad \text{----- } 1 + 1 \\ &= \text{Rs. } 800\,000 \quad \text{----- } 1 && \textcircled{10} \end{aligned}$$

4. The following incomplete frequency distribution and corresponding incomplete histogram have been prepared using the marks obtained in a test by 40 students in a class. Here 10 – 20 denotes the marks interval "greater than 10 and less than or equal to 20", and the other intervals denote similarly.

Marks	Number of students
10 – 20	6
20 – 40	8
40 – 50	7
50 – 80	15
80 – 90	4
Total	40



For the column 50 - 80 ----- 1

(i) Complete the above frequency table and histogram.

(ii) Express the number of students who obtained more than 40 marks as a percentage of the total number of students. ----- 1

$$\begin{aligned} \frac{26}{40} \times 100\% &= 65\% \quad \text{----- } 1 && \textcircled{3} \\ & && \textcircled{3} \end{aligned}$$

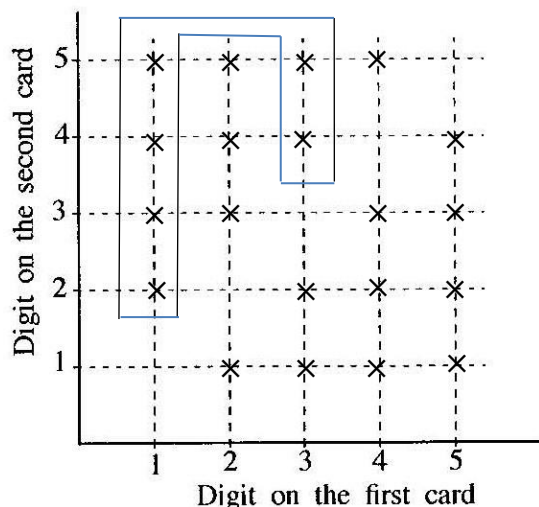
(iii) Draw the frequency polygon on the histogram. For the two end points 1 + 1

For the correct polygon ----- 1 ⑩

5. (a) It is given that the first two symbols of a certain password are two different digits from the digits 1, 2, 3, 4, 5. To choose the first digit of the password, a student randomly picks a card from five identical cards on each of which one of these digits is written. Then, **without replacing** it, he randomly picks another card to choose the second digit.

- (i) Using the symbol 'x', mark the sample space of the two digits on the cards that the student randomly picks, on the given grid.

For correctly marking x _____ ①

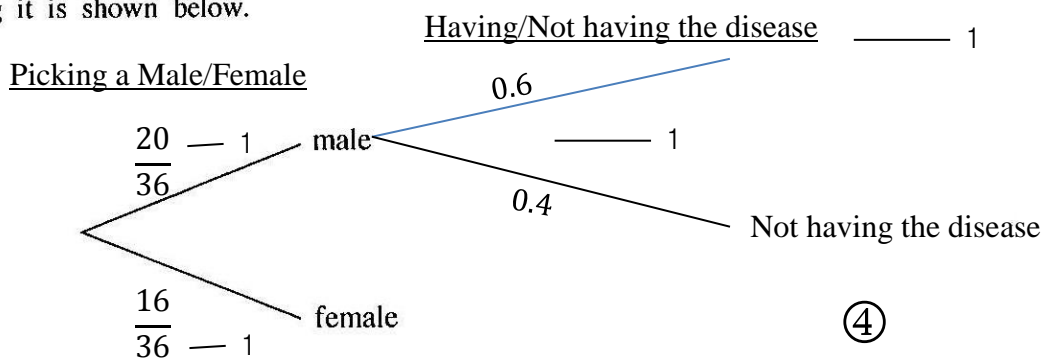


- (ii) It was later discovered that the first digit which was obtained for the password was odd and that this digit was less than the second digit that was obtained. Indicate the event that satisfies these conditions on the sample space and obtain its probability.

For indicating the event _____ 1
 $\frac{6}{20}$ or $\frac{3}{10}$ _____ 1 ②

- (b) During a period when a certain disease was spreading, 20 males and 16 females who displayed the symptoms of this disease arrived to obtain medication from a physician. Although all the females actually had the disease, the probability of a person picked at random from among the males actually having the disease was 0.6.

A portion of a tree diagram drawn to indicate the probabilities of a person picked at random from all these people, being a male or a female and being a person having the disease or not having it is shown below.



- (i) Complete the tree diagram by indicating all the relevant probabilities.
- (ii) Find the probability of a person picked at random being a person having the disease.

$\frac{20}{36} \times 0.6 + \frac{16}{36} \times 1$ _____ 1 + 1
 or $\frac{7}{9}$ _____ 1 ③

Part A

Answer five questions only.

I. The following notices have been published by Bank A and Company B.

Bank A	Company B
An interest of 9% per annum is paid for fixed deposits.	Price of a share is 25 rupees and dividends of 1.50 rupees per share is paid annually.

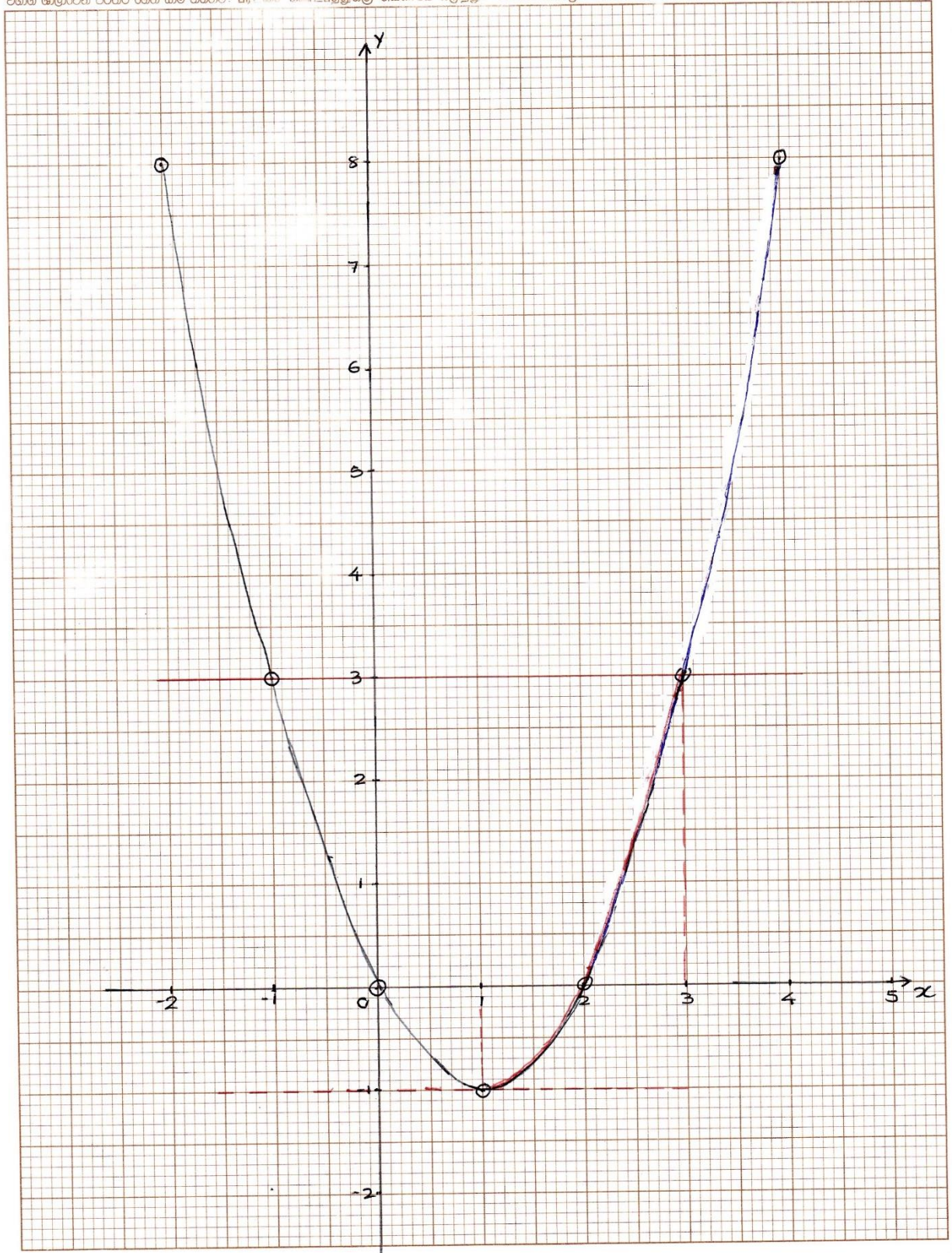
- (i) Kamal deposited exactly half of the amount of 100 000 rupees he had in a fixed deposit in Bank A and spent the remaining amount in buying shares in Company B. At the end of a year he obtains the dividends from Company B and sells all the shares at 26 rupees per share. Show giving reasons, from which investment he receives a greater income at the end of a year.
- (ii) Express the total income he receives at the end of a year as a percentage of the total amount invested.

Question No.	Marking Scheme	Marks	Other facts	
1	<p>(i) Interest from Bank A at the end of a year $= \text{Rs. } 50\,000 \times \frac{9}{100}$ $= \text{Rs. } 4\,500$</p> <p>Number of shares of Company B = $\frac{50\,000}{25}$ $= 2\,000$</p> <p>Dividend income = $2\,000 \times \text{Rs. } 1.50$ $= \text{Rs. } 3\,000$</p> <p>Capital gain = $\text{Rs. } 2\,000 \times 26 - \text{Rs. } 50\,000$ $= \text{Rs. } 2\,000$</p> <p>Total income from Company B $= \text{Rs. } 3\,000 + \text{Rs. } 2\,000$ $= \text{Rs. } 5\,000$</p> <p>Since $\text{Rs. } 5\,000 > \text{Rs. } 4\,500$ a greater income is obtained from the investment in Company B.</p> <p>(ii) Total income obtained at the end of a year $= \text{Rs. } 4\,500 + \text{Rs. } 5\,000$ $= \text{Rs. } 9\,500$</p> <p>Total income as a percentage of the amount invested $= \frac{9\,500}{100\,000} \times 100\%$ $= 9.5\%$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>7</p> <p>3</p> <p>10</p> <p>10</p>	<p>Capital gain $= 2\,000 \times (\text{Rs. } 26 - \text{Rs. } 25)$ or $2\,000 \times \text{Rs. } 1$</p>

ශ්‍රී ලංකා විභාග දෙපාර්තමේන්තුව
இலங்கைப் பரீட்சைத் திணைக்களம்
Department Of Examinations, Sri Lanka

විභාගය / பரீட்சை / Exam		විෂයය / பாடம் / Subject	
ප්‍රශ්න අංකය / வினா இலக்கம் / Question No.		විභාග අංකය / சுட்டுடன் / index No.	

විභාග ශාලාවේ පිටතට ගෙන යාම තහනම්. පරීட்சා මහලයට පත්වීමට වෙනුවෙන් භාවිතයට නොමැතිව පැමිණි පිටපත් භාවිතයට නොමැත. Not to be removed from the Examination Hall.



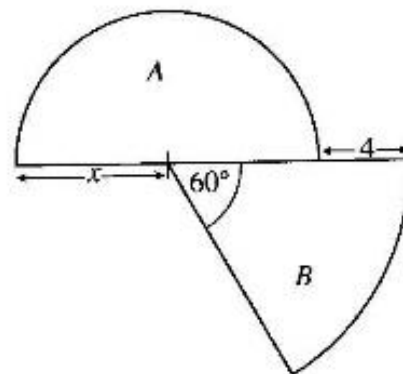
2. An incomplete table showing the y -values corresponding to several x -values of the quadratic function $y = x^2 - 2x$, within the interval $-2 \leq x \leq 4$, is given below.

x	-2	-1	0	1	2	3	4
y	8	3	0	-1	0	...	8

- (i) Find the value of y when $x = 3$.
- (ii) Using the standard system of axes and a suitable scale, draw the graph of the given quadratic function on a graph paper, according to the above table of values.
- (iii) Write the coordinates of the turning point of the graph.
- (iv) Express the given quadratic function in the form $y = (x-a)^2 + b$. Here, a and b are two numbers.
- (v) Write the interval of values of x on which the function increases within the interval $-1 < y \leq 3$.

Question No.	Marking Scheme	Marks	Other facts
2	(i) $y = 3$ when $x = 3$	1	
	(ii) Correct axes Marking at least 6 points correctly Smooth curve	1 1 1	
	(iii) (1, -1)	2	
	(iv) $y = (x - 1)^2 - 1$	1+1	For obtaining both $a = 1$ and $b = -1$ 1 mark
	(v) $1 < x \leq 3$ or greater than 1 and less than or equal to 3	2	$1 < x$ or $x \leq 3$ or 1 and 3 1 mark
			△ 10
			□ 10

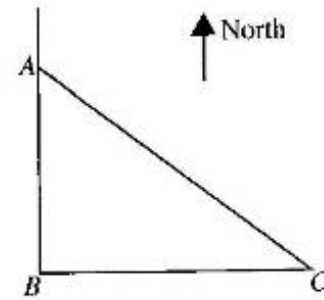
4. A lamina consisting of a semi-circle A of radius x units and a sector B with angle at the centre 60° , which is concentric with the semi-circle, is shown in the figure. If the area of A and the area of B are equal, show that x satisfies the quadratic equation $x^2 - 4x - 8 = 0$ and show with reasons that x can take exactly one value.



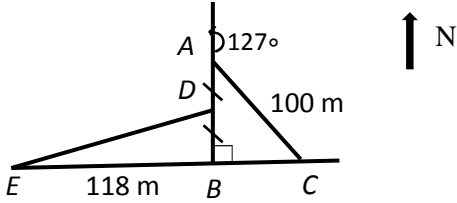
By using 1.73 for the value of $\sqrt{3}$, find an approximate value for the radius of the sector B , to the first decimal place.

Question No.	Marking Scheme	Marks	Other facts
4	<p>Area of the semicircular lamina $A = \frac{1}{2} \pi (x)^2$</p> <p>Area of the lamina B in the shape of a sector $= \frac{1}{6} \pi (x + 4)^2$</p> <p>$\frac{1}{6} \pi (x + 4)^2 = \frac{1}{2} \pi (x)^2$</p> <p>$x^2 + 8x + 16 = 3x^2$ $2x^2 - 8x - 16 = 0$ $x^2 - 4x - 8 = 0$</p> <p>$(x - 2)^2 = 8 + 4$</p> <p>$x - 2 = \pm 2\sqrt{3}$ $x = 2 + 2\sqrt{3}$ or $2 - 2\sqrt{3}$</p> <p>$2 - 2\sqrt{3} < 0$ x can take only one value. It is $x = 2 + 2\sqrt{3}$</p> <p>$x = 2 + 2(1.73)$ $= 5.46$ units</p> <p>Radius of the sector $= 4 + 5.46$ $= 9.5$ units</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>$x = \frac{4 \pm \sqrt{16 - 4 \times 1 \times 8}}{2}$</p> <p>$x = 2 \pm 2\sqrt{3}$</p> <p>10</p> <p>10</p> <p>10</p>

5. A man standing at point A of a level ground observes a mango tree at point C , a distance of 100 metres away from him on a bearing of 127° . He also observes a coconut tree at point B which is to the south of point A and to the west of point C . A rough sketch of the locations of the points A , B and C is given in the figure.

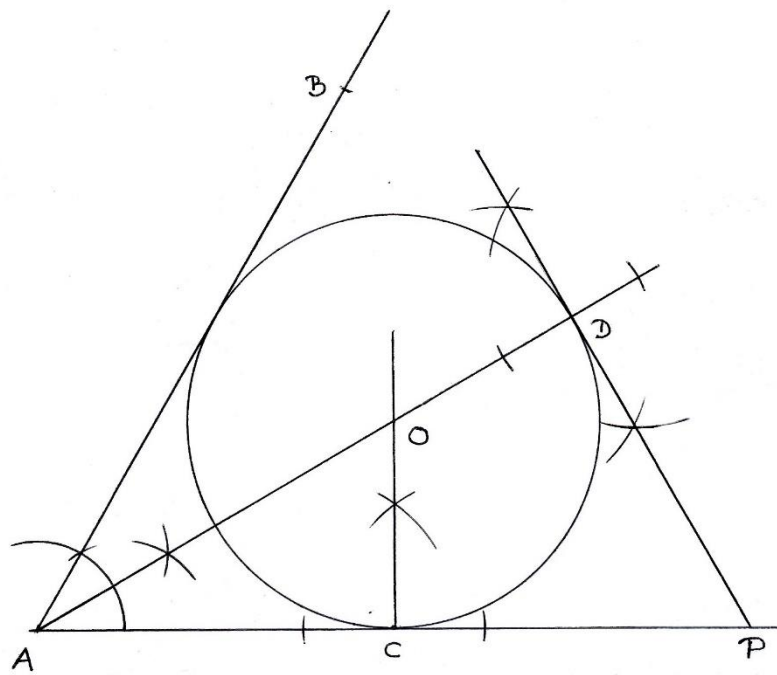


- (i) Copy the given figure onto your answer script and indicate the above information in it.
- (ii) Using the trigonometric tables, find the distance AB between the man and the coconut tree, to the nearest metre.
- (iii) On the copied figure, mark the point D which is exactly halfway between the man and the coconut tree, and the point E which is 118 metres to the west of the coconut tree at point B . Using the approximate value obtained in part (ii) above for the distance AB , and the trigonometric tables, find the magnitude of \hat{BDE} .

Question No.	Marking Scheme	Marks	Other facts
5	<p>(i) </p> <p>Marking 90° Marking 127° or 100 m</p>	1 1	2
	<p>(ii) $\cos 53^\circ = \frac{AB}{AC}$ $AB = 100 \times 0.6018$ $AB = 60.18$ $AB \approx 60$ m</p>	1 1 1 1	4
	<p>(iii) Marking D and E correctly $\tan \hat{EDB} = \frac{118}{30}$ $\tan \hat{EDB} = 3.933$ $\hat{EDB} = 75^\circ 44'$</p>	1 1 1 1	4 10 10

7. Sunitha who hopes to participate in a sports event trains by jogging daily. She spends 105 minutes in the first week and 119 minutes in the second week for this. The time she spends training each week when taken consecutively, lie in an arithmetic progression.
- (i) Find the common difference of this arithmetic progression.
 - (ii) Find in minutes, the time she spends training in the 7th week.
 - (iii) In which week does the time she spends training during a week first exceed 221 minutes?
 - (iv) (a) Find the total time she spends jogging during the first 10 weeks of training.
 - (b) If the average speed at which she jogs is 6 km h^{-1} , find the total distance she jogs during that time.

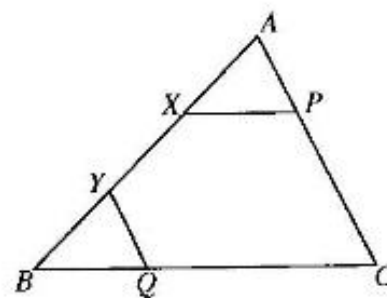
Question No.	Marking Scheme		Marks	Other facts
7	(i) Common Difference = $119 - 105 = 14$	1	1	
	(ii) $a = 105, d = 14, n = 7$ $T_n = a + (n - 1)d$ $T_7 = 105 + (7 - 1)14$ $= 105 + 6 \times 14$ $= 105 + 84$ $= 189 \text{ minutes}$	1	2	
	(iii) $T_n = a + (n - 1)d$ $221 < 105 + (n - 1)14$ $\frac{116}{14} < n - 1$ $n > 9.28$ In the 10th week .	1	3	
	(iv) (a) $a = 105, n = 10, d = 14$ $S_n = \frac{n}{2} \{2a + (n - 1)d\}$ $= \frac{10}{2} \{2 \times 105 + (10 - 1)14\}$ $= 5 \{210 + 126\}$ $= 5 \times 336$ $= 1680 \text{ minutes}$	1	4	
	(b) Distance jogged = $\frac{6}{60} \times 1680$ $= 168 \text{ km}$	1	10	10



8. Use only a straight edge with a cm/mm scale and a pair of compasses for the following constructions. The construction lines should be drawn clearly.
- (i) Construct a straight line segment AC of length 6 cm and construct the line AB such that $\hat{CAB} = 60^\circ$.
 - (ii) Construct the angle bisector of \hat{CAB} .
 - (iii) Construct the circle that has its centre O on the above constructed angle bisector and touches AC at C . Produce the line AO such that it meets the circle at D .
 - (iv) Construct the tangent to the circle at D and mark the point of intersection of this tangent and AC produced as P .
 - (v) Give reasons why $\hat{DPC} = \hat{AOC}$.

Question No.	Marking Scheme	Marks	Other facts
8	(i) The straight line segment $AC = 6$ cm $\hat{CAB} = 60^\circ$	1 1	2
	(ii) Angle bisector of \hat{CAB}	2	2
	(iii) Obtaining the centre Constructing the circle Obtaining D	1 1 1	3
	(iv) Constructing the tangent at D	1	1
	(v) $\hat{OCP} = \hat{ODP} = 90^\circ$ $OCPD$ is a cyclic quadrilateral. $\hat{DPC} = \hat{AOC}$ (The exterior angle of a cyclic quadrilateral is equal to the interior opposite angle)	1 1	2
			10
			10

9. In the given figure, ABC is a triangle. X and Y are two points on AB such that $AX = BY$. Moreover, P is a point on AC such that $XP \parallel BC$ and Q is a point on BC such that $YQ \parallel AC$. Copy the given figure onto your answer script and indicate the above information in it.

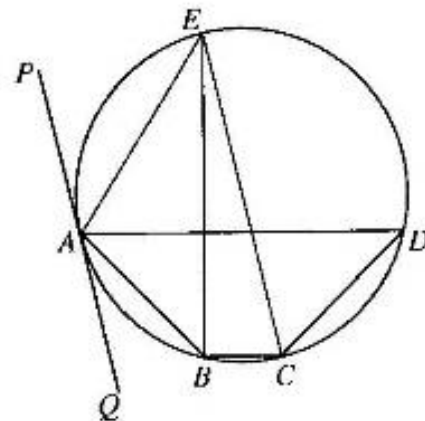


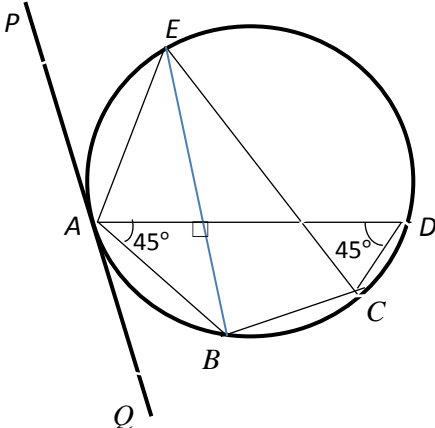
- (i) Show that $\Delta AXP \equiv \Delta BYQ$.
- (ii) Draw the straight line PQ and show that $PQ \parallel AB$.
- (iii) The lines PX and QY produced meet at D . If $DX = XP$, show that $XY = \frac{1}{2}PQ$.

Question No.	Marking Scheme	Marks	Other facts
9		2	$AX = BY \dots 1$ $AP \parallel YQ$ $XP \parallel BC \} 1$
(i)	<p>In the triangles AXP and BYQ $AX = BY$ (Given) $\hat{XAP} = \hat{YBQ}$ (Corresponding \sphericalangles) $\hat{APX} = \hat{BQY}$ (Corresponding \sphericalangles) $\Delta AXP \equiv \Delta BYQ$ (A.A.S)</p>	1	
(ii)	<p>$XP = BQ$ (Corresponding sides of congruent Δs) $XP \parallel BQ$ (Given) $\therefore XPQB$ is a parallelogram. $\therefore PQ \parallel AB$.</p>	1	
(iii)	<p>Applying the converse of the midpoint theorem to ΔDPQ, $DY = YQ$ $XY = \frac{1}{2}PQ$ (Applying the midpoint theorem to ΔDPQ)</p>	1	
		2	
		3	
		3	
		2	10
			10

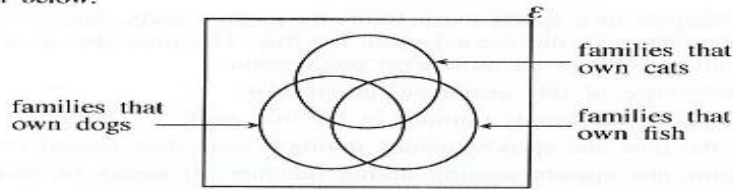
10. In the cyclic quadrilateral $ABCD$ shown in the figure, $\hat{DAB} = \hat{ADC} = 45^\circ$. The straight line drawn from B perpendicular to AD meets the circle at E . The line PAQ is the tangent drawn to the circle at A .

Prove that CE is a diameter of the circle and that it is parallel to the tangent PAQ .



Question No.	Marking Scheme	Marks	Other facts
<p style="text-align: center;">10</p>	 <p> $\hat{ABE} = 90^\circ - 45^\circ$ $= 45^\circ$ (Sum of the interior angles of a Δ.) </p> <p> $\hat{ABC} + \hat{ADC} = 180^\circ$ (Opposite angles of the cyclic quadrilateral $ABCD$ are supplementary.) $\hat{ABC} = 135^\circ$ </p> <p> $\hat{ABC} = \hat{ABE} + \hat{EBC}$ $135^\circ = 45^\circ + \hat{EBC}$ $\hat{EBC} = 90^\circ$ </p> <p> $\therefore CE$ is a diameter. (Angle in a semicircle is 90°.) </p> <p> $\hat{ABC} + \hat{AEC} = 180^\circ$ (Opposite angles of the cyclic quadrilateral $ABCE$ are supplementary.) $\hat{AEC} = 45^\circ$ </p> <p> $\therefore \hat{PAE} = 45^\circ$ (Angles in the same segment) $\therefore \hat{PAE} = \hat{AEC} = 45^\circ$ $\therefore PQ \parallel EC$ (Since alternate angles are equal) </p>	<p style="text-align: center;">1</p> <p style="text-align: center;">1+1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1+1</p> <p style="text-align: center;">1</p>	<p style="text-align: center;">10</p> <p style="text-align: center;">10</p>

11. A survey was conducted on 115 families that own pets. Information on the families that own dogs, cats and fish as pets from these families and an incomplete Venn diagram drawn corresponding to it are given below.

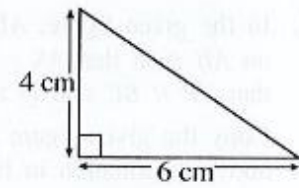


- 4 families own all the above three types of pets.
- The number of families that own only dogs is 19.
- 24 families own both dogs and cats while 21 families own both dogs and fish.
- 11 families do not own any of the above three types of pets.

- (i) Copy the given Venn diagram onto your answer script and include the above information in it.
- (ii) The number of families that own dogs is twice the number of families that own fish. Find the number of families that own fish but **do not** own dogs.
- (iii) How many families own only cats?
- (iv) The number of families that own only fish is twice the number of families that own cats and fish but **not** dogs. Find the probability of a family selected at random from those surveyed being a family that owns only fish.

Question No.	Marking Scheme	Marks	Other facts
<p>11</p>	<p>(i)</p> <p>Marking at least two of 4, 19, 11, 115 in the correct regions Obtaining 20 Obtaining 17</p> <p>(ii) Number of families that own dogs = $24 + 17 + 19 = 60$ \therefore Number of families that own fish but not dogs = $30 - 21 = 9$</p> <p>(iii) Number of families that own only cats = $115 - (60 + 9 + 11) = 35$</p> <p>(iv) Number of families that own only fish = $9 \times \frac{2}{3} = 6$ Probability of being a family that owns only fish = $\frac{6}{115}$</p>	<p>2 1 1 1 1 1 1 1 1</p> <p>4 3 1 2</p> <p>10 10</p>	<p>Marking in two regions correctly - 2 Marking in one region correctly - 1</p>

12. A hemispherical container of radius r is completely filled with water. This water is poured into a glass container in the shape of a prism, having a triangular cross section with the measurements shown in the figure, such that no water spills out. Then the water fills this glass container to a height of 10 cm. Show that the radius r of the hemispherical container is obtained by $r = \sqrt[3]{\frac{180}{\pi}}$ cm, and taking the value of π as 3.14, find the value of r in centimetres to the first decimal place.



Question No.	Marking Scheme	Marks	Other facts
12	<p>Volume of water in the hemispherical container $= \frac{1}{2} \left(\frac{4}{3} \pi r^3 \right)$</p> <p>Volume of water in the prism shaped container $= \frac{1}{2} \times 4 \times 6 \times 10$</p> <p>$\therefore \frac{1}{2} \times \frac{4}{3} \times \pi \times r^3 = \frac{1}{2} \times 4 \times 6 \times 10$</p> <p>$r^3 = \frac{1}{2} \times \frac{4 \times 6 \times 10 \times 2 \times 3}{4 \times \pi}$</p> <p>$r^3 = \frac{180}{\pi}$</p> <p>$\therefore r = \sqrt[3]{\frac{180}{\pi}} \text{ cm}$</p> <p>$\log r = \frac{1}{3} [\log 180 - \log \pi]$</p> <p>$= \frac{1}{3} [2.2553 - 0.4969]$</p> <p>$= \frac{1}{3} [1.7584]$</p> <p>$= 0.5861$</p> <p>$r = \text{antilog}(0.5861)$</p> <p>$r = 3.855$</p> <p>$r = 3.9 \text{ cm}$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1+1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p></p> <p style="text-align: center;">10</p> <p style="text-align: center;">10</p>