| **Grade 11**	**Third Term Test 2023(2024)**	32	E	I

Name :	**MATHEMATICS I**	**Time : 02 Hours**

- Answer all the question on this paper itself.
- Indicate the relevant steps and the correct units when answering the question.
- Mark are awarded as follows. In part A, 02 marks for each question and in part B, 10 marks for each question.

Part - A

01. A person deposits an amount of Rs. 40 000 at an annual simple interest rate of 8%. How much interest does he get for this amount at the end of two years?
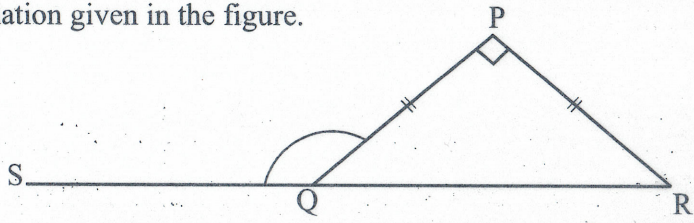
02. A Figure consisting of two sector shape iron wire frames. with radius of 7 cm. Find the minimum length of iron wire which is need to make this iron Frame.

7 cm
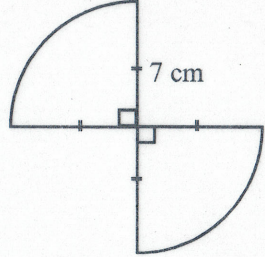
03. $\log_5 x = 2$
    i. Write down in index form
    ii. Find the value of 'x'
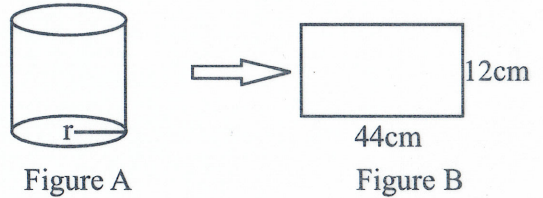
04. Simplify $\dfrac{1}{x^2} - \dfrac{2}{3x^2}$

05. Find the value of $P\hat{Q}S$ according to the information given in the figure.


06. Solve $\dfrac{1+x}{3} = 4$

07. Find the factors of,
$3x^2-5x-8$

08. When cut and stretched the given hollow cylinder in the figure **A**, then recieves a rectangular shape metal sheet as shown in the figure **B**. Find the radius of that cylinder.

Figure A   Figure B

09. **AB** and **CD** are two vertical buildings 50 m away from each other. The angle of elevation of **D** is 40^0, when observed from the top of the building **AB** and the angle of depression of **C** is 35^0 from **A**. Represent this information in the given figure.
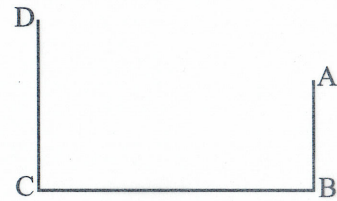
10. The following venn diagram has been drawn to represent the information of students who participated for a school trip. In the venn diagram shade the region that represent the girls who din't eat ice-cream

Students who ate ice-cream →   ← Boys
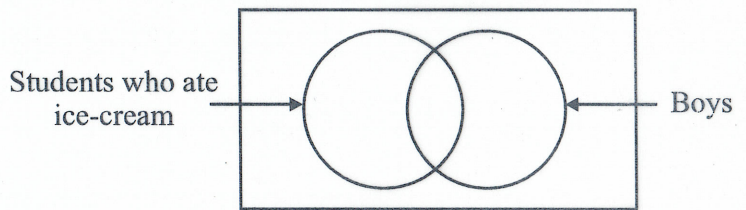
11. Solve.
$2x^2 - 98 = 0$

12. There are 20-30 number of identical colour cards and red colour cards in a same box. The probability of a card drawn at random from the box being red is $\frac{5}{9}$ .How many cards in total are there in the box?

13. If AB = BD and AE = BC, Write the pair of triangles that are congruent from the triangles given in the figure and write the relevant case of congruency.
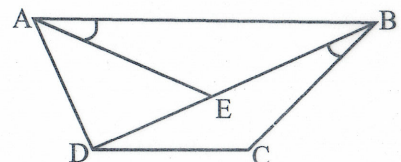
14. For the statements given below, mark a "✓" infront of the correct statements and a " ×" in front of the incorrect statements.
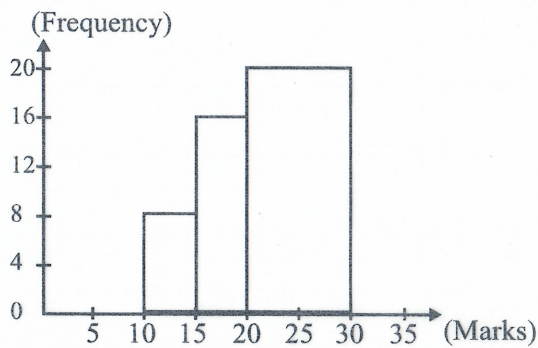
    i.   Diagonals are bisected as perpendicularly in a rhombus.

    ii. In a quadrilateral, if a pair of opposite sides is equal and parallel, it is a parallelogram

    iii. The opposite angles in a parallelogram are bisected by each diagonals

15. Find the least common multiple of terms of $3x, 4x^2y, xy$

16. By using the below histogram, draw the relevant frequency polygon.

17. Find the value of 'x' according to the information given in the figure.
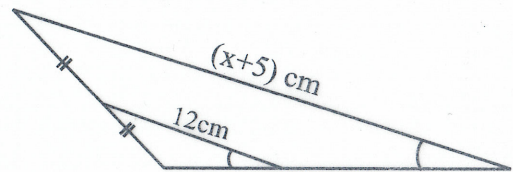
18. The circular cross section area of a cylindrical iron rod is $15.4cm^2$ and its length is **2m**. Find the volume of that iron rod.
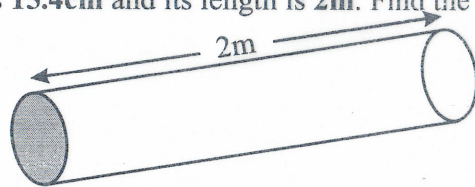
19. Solve the given inequality and represent the solutions on a number line.

    $2x-1 \leq 5$

20. A , B and C points are on the below circle with centre 'O'. If $A\hat{O}C = 78^0$, Find the value of $O\hat{C}B$
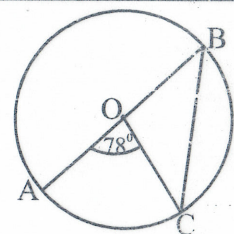
21. Below distance - time graph represents the motion of a certain vehical.
According to the given data, find the speed of **C** to **D**.

Distance(km)

240
200
160 ---------------------- D
120
80 -------- B   C
40
0
A   1   2   3   4   5   6   Time (h)
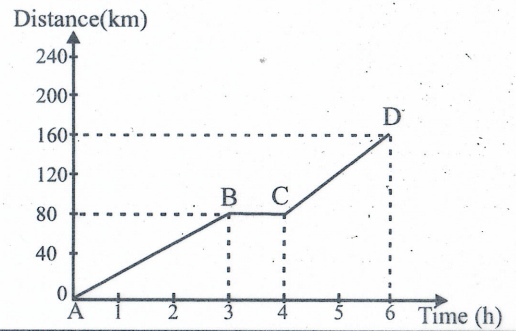
22. Find the value of 'x' according to the given data in the below figure.

A
50°
E
D
B
C
x°
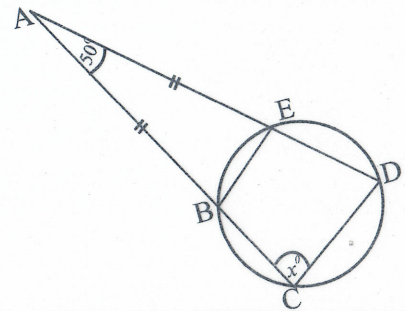
23. **PQ** is a locus moving 3m away from **OA** in the given figure. It is required to mark a point "**T**" on the above locus **PQ** as equidistant from **OA** and **OB**. Sketch the correct position of "**T**" in the below figure using the knowledge of loci.

B

P -------------------→ Q

↕ 3 m

O -------------------→ A

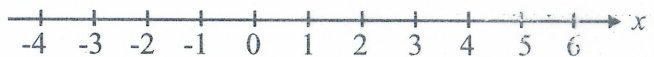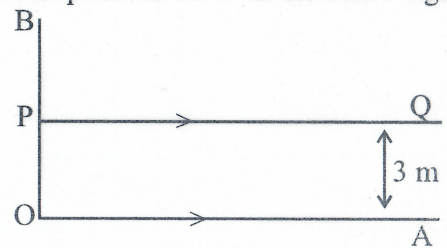24. **AB** is a straight line in the given figure.
    i.   Find the gradient of the straight line AB
    ii. Write an equation of the straight line AB

y

5 --------------- B

+1

A   0   1   2   x
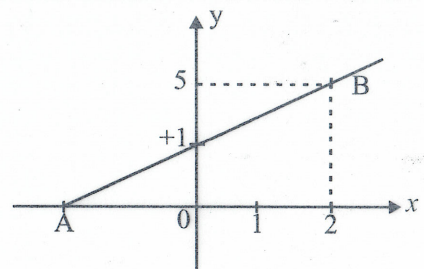
25. In the given figure, DC = 2 CP and $C\hat{R}Q = 130^0$.
    BR and DP are two straight lines
    i.   Find the length of AB
    ii. Find the value of $A\hat{D}C$

A ----→→---- B

D ----→→---- C   P

R (130°)   Q
7 cm
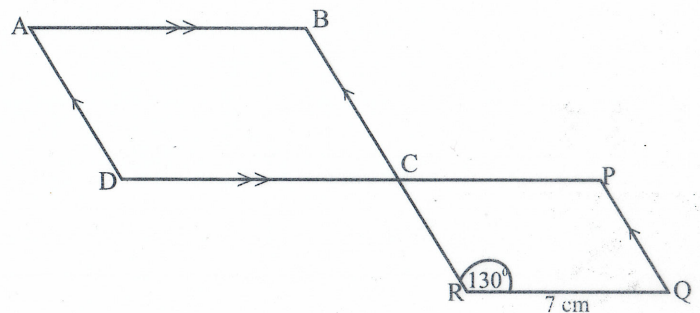
PART - B

(01) $\frac{1}{3}$ of a group of parents came to the school for sharamadana campaign, assigned to repair the play ground and $\frac{3}{5}$ of remaining parents participated to fix the school fence. And all the other remaining parents were divided in to two equal groups. Form the two groups, one group repaired the grade 01 class room and the other group prepared flower beds.

   i. What is the fraction of the total number of parents who did not give contribution to repair the school play ground?

   ii. What is the fraction of the total number of the parents who contributed to fix the school fence?

   iii. If there were 6 parents in the group of reparing grade 01 class room, find the total number of parents who paticipated for this shramadana campaign.

   iv. It was estimated that 30 mandays were needed to repair the play ground. Find the number of days it takes for the group of parents who repaired the play ground to complete it.

(02) Mr. Ranjith divided his rectangular shape land between his daughter and son as shown in the below figure. Daughter owned right angled triangluar shape part and son owned trapezium shape part.
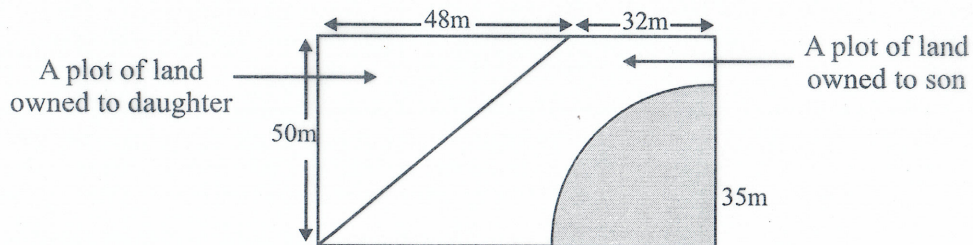
   i. Find the areas of the plots of land owned to daughter and son separately.

   ii. Write the ratio between the areas of plots of land owned to daughter and son in simplest form.

   iii. Vegetables are grown in the shaded part of sector with a radius of 35m as shown in the figure of the land owned to son. Find the perimeter of the shaded part.

iv. Both of daughter and son agreed to divide the plots of land owned to them again with the shape of two rectangles as the previous areas would not change. Draw the way of dividing the plots of land as rectangles in the above figure with the correct measurements.

(03)a. Mr. Ranjith owned 200 shares of company **A**. At the begining of the financial year he sold 60% of his shares at the market price of 50 rupees per share and Mr. Ranjith bought a certain number of shares of company **B** at 60 rupees per share by investing the amount he received by selling the shares of company **A**

i. Find how many number of shares Mr. Ranjith sold of company **A**.

ii. Find how many number of shares Mr. Ranjith bought from company **B** .

iii. At the end of the financial year, company 'A' paid 8 rupees per share and company 'B' paid 10 rupees per share as dividends. Find the total dividend income he recieved from the companies A and B at the end of a year.

b. Mr. Ranjith pays income tax for his annual income as follows.

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

If his annual income is Rs. 1 150 000, Find the amount of income tax Mr. Ranjith has to pay.

(04)a. An incomplete cumulative frequency distribution showing the information about the number of units of water recieved by 60 households in one day according to a certain water supply system.

Number of units of water used by a household	Class intervals with boundaries	Frequency (No. of households)	Cumulative Frequency
8-12	7.5 -	4	....
13-17	.... - 17.5	6	....
18-22	17.5 - 22.5	15	25
23-27	22.5 - 27.5	15	40
28-32	27.5 - 32.5	10	50
33-37	32.5 - 37.5	7	57
38-34	37.5 - 42.5	....	60

i. Fill in the blanks in the above table.
ii. Draw the cumulative frequency curve.
iii. Find the interquartile range using the cumulative curve.
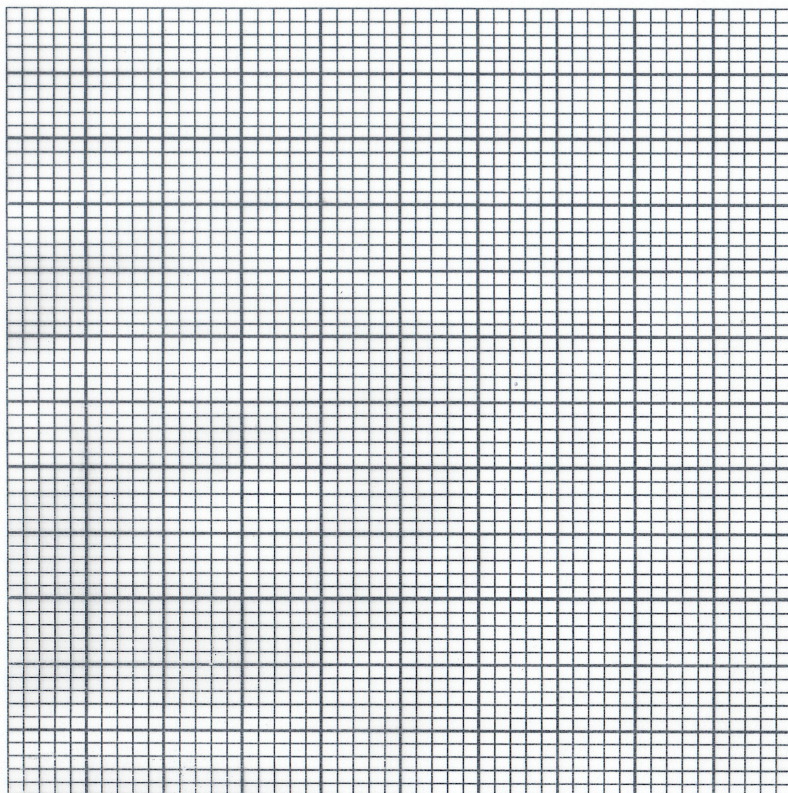
b. The pie chart given in the figure shows the usage of water units of these 60 households.
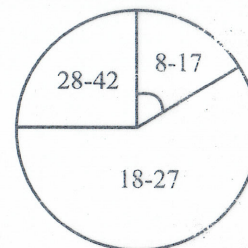
The 10 households are used 8-17 number of water units . Find the magnitude of the central angle of the sector that represent these 10 households.

(05)a. It was revealed that a certain type of soft drinks contains toxic chemicals that are harmful to human health. The probability of getting an accurate result from the machine used to test it is $\frac{15}{16}$. Below incomplete tree diagram is showing whether or not a sample of the soft drinks tested with this machine has given an accurate result.

i. Complete the tree diagram by indicating the relevant probabilities.

Getting an inaccurate result

Getting an accurate result
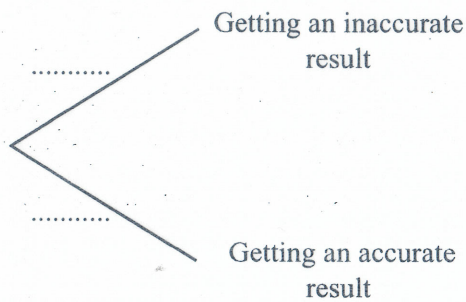
- When testing the sample of drinks from the above machine, If the machine gives an accurate result, it means that 80% of the sample contains the toxic chemical, and if the machine doesn't give an accurate result it is an equally likely whether the sample contains the toxic chemicals or not.

ii. Extend the above tree diagram to indicate the sample of that soft drinks with toxic chemicals or without toxic chemicals.

iii. By using the tree diagram find the probability of the randomly selected soft drink bottle from the above sample being a non-toxic one.

b. In a box containing 5 small bottles of the above type of soft drink, one of which is 100 ml. 4 small bottles contain toxic chemicals and the remaining bottle doesn't contain toxic chemicals.

An inspection officer will randomly take a bottle from this box and check whether it is toxic or non-toxic and without replacing it, again he randomly takes another bottle and check it. (Consider, P_1 , P_2 , P_3 , P_4 as bottles with the toxic chemicals and N_1 as a bottle without toxic chemicals)

i. Mark the sample space relevant to the above experiment in the given grid using the symbols.
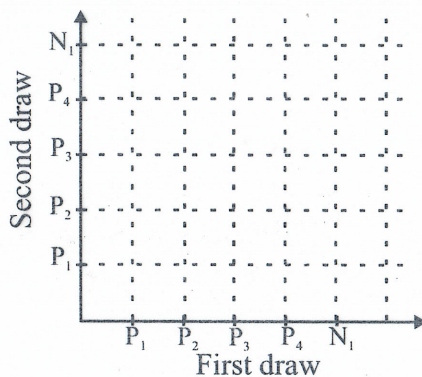
ii. In the grid encircle the event of getting both bottles with toxic chemicals and without toxic chemicals and find its probability.

Grade 11	Third Term Test 2023(2024)	32 E II

Name :	**MATHEMATICS II**	Time : 03 Hours Additional Reading Time : 10 minutes

Instructions :-

- Answer ten questions selecting five questions from part A and five questions from part B
- Write the relevant steps and the correct units in answering the questions.
- Each question carries 10 marks
- The volume of a right circular cylinder of base radius r and height h is $\pi r^2 h$
- The volume of a sphere of radius r is $\frac{4}{3}\pi r^3$
- Use additional reading time to go through the question paper, select the questions and decide on the questions that you give priority to in answering.

Part - A

(01) An incomplete table of y values corresponding to several values of the quadratic function $y = 3 - (x-1)^2$ is given below

X	-2	-1	0	1	2	3	4
Y	-6	-1	2	....	2	-1	-6

a. i. Find the value of y when x = 1

ii. Using the standard system of axes and a suitable scale, draw the graph of the given quadratic function on the provided graph paper, according to the above table.

b. Using the graph that you drew

i. Write the interval of values of x on which the function increases within the interval $-1 < y < 3$

ii. By writing the positive root of the equation $3 - (x-1)^2 = 0$, Find the value for $\sqrt{3}$ to the nearest first decimal place.

iii. For the graph that is obtained by translating the above graph downwards by one unit on the Co - ordinate plane without changing the shape of the graph, the quadratic function in the form $y = b - (x+a)^2$ is obtained. Find the value of a and b.

(02) A frequency distribution containing information on runs scored in 30 cricket matches, played by Suneth during the first few months of the year, is shown in the table below

[Here 0-15 means $0 \le x < 15$]

| Number of runs scored by a match [Class Interval]	Number of cricket matches
0-15	1
15-30	3
30-45	5
45-60	11
60-75	5
75-90	4
90-105	1

i. Suneth hopes to participate 35 cricket matches at the end of this year. Using the given data in the table and by taking a suitable assumed mean or otherwise, find the mean runs scored by Suneth to the nearest whole number. Hence calculate the total number of runs can be scored by Suneth at the end of the whole year.

ii. If Suneth has scored highest runs from each and every match that he has already participated, show that the total runs he has already scored is less than the number of runs scored at the end of the whole year by playing all the 35 matches.

(03)   If Mr. Jayasinghe takes a loan of 120 000 from a certain financial institute at a compound interest rate of 10% per year. Calculate the total interest required to pay the entire loan in two years.
Then Mr. Jayasinghe has bought a sofa set priced of Rs. 200 000 by using the entire loan and paying the rest in 20 equal monthly installment. If an annual interest rate of 15% is charged on the loan for the sofa set where the interest is calculated on the reducing balance, find the total interest that has to be paid for the sofa set and show that the sum of the interest paid for the sofa set and the interest for the loan taken from the financial institute for 2 years not exceeding Rs. 36 000/=

(04)   a. If $(2, -3)\begin{pmatrix} 3 & 0 \\ 1 & 2 \end{pmatrix} = (a, b)$, Find the value of a and b

b. Achala and Sanjana has a certain amount of money. If twice the amount of money that Sanjana has is added to the amount of money Achala has is Rs. 1150. If the twice the amount of money Achala has is added to the amount of money Sanajana has is Re. 1400.

i. Taking the amount of money Achala has as Rs. x and the amount of money Sanjana has as Rs .y construct a pair of simultaneous equation containing x and y .
By solving the pair of simultaneous equations, find the amount of money with Achala and Sanjana separately.

ii. If the total amount of money with both Achala and Sanjana is spent to by a pen and a book which is four times the value of a pen, find the price of the pen.

(05)   ABCD is a rectangular shaped metal lamina. A triangular shaped part where AB=BF = x units is removed from the lamina and the remaining portion is shaded as given in the figure. If the area of the remaining portion is 30 square units and FC=6 units then show that x satisfies the quadratic equation $x^2 + 12x - 60 = 0$
Using the method of completing the square or any other method, solve the above equation and show that $AB < \frac{1}{2} BC$ (Take $\sqrt{6} = 2.44$)
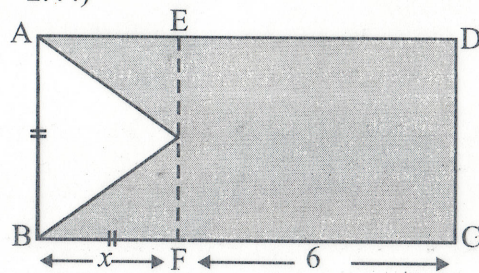
(06)   The diagram shows, a vertical tele-communication tower on the horizontal ground A and a transmission equipment of the company P is placed on the point B of the tower.
the angle of elevation of the point B where the transmission equipment of the company P is situated, as seen from the point C which is 24m from the point A is 42°.
(Neglect the height of the observer)

i. Copy the diagram on to your answer script and mark the above data.
ii. Using the trignometric table, calculate the height up to the place B where the transmission equipment of the company P is placed.
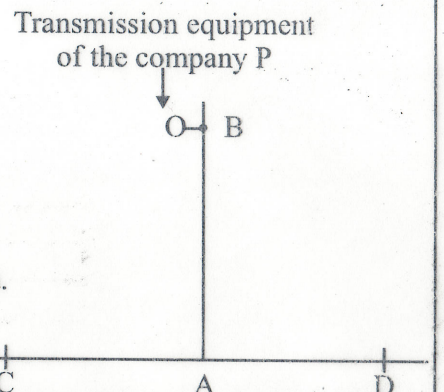
iii. A metal wire of length 30m is fixed to the certian point Q of the tower AB to keep it in a vertical position, and the other end is fixed to the point D which is 24m from the point A. Find the angel between the metal wire and the horizontal ground.

State with reason whether the transmission equipment of the company Q is located above or below the transmission equipment of the company P of the telecommunication tower.

Part - B

(07) The first three instances of a pattern constructed using the pieces of metal wires with equal lengths and iron nails are shown in the following diagram.
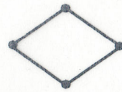
First pattern   Second pattern   Third pattern

i. Write down seperately the number of pieces of metal wires and number of iron nails which are used to construct first, second and third patterns respectively.

ii. If the first three terms of an arithmetic progression can be represented by using the number of pieces of metal wires, used to create first, second and third patterns above.
Write in terms of n, an expression for T_n, the number of pieces of metal wires used to create the nth pattern, and there by find the number of pieces of metal wires used to create the 8th pattern.

iii. Consider the number pattern which represents the number of nails used to create the above pattern and find the total number of nails that is required to create 8th patterns as give in the figures.

b. Find the sum of the first 8th terms of the geometric progression $\frac{3}{2}$, 3 , 6 , 12 , ...

(08) Use only a straight edge with a cm/mm scale and a pair of compasses for the following constructions show the construction lines clearly.

i. Construct the triangle ABC such that AB = 10cm, AC = 9cm and BAC = 75^0

ii. Construct the perpendicular bisector of AB and mark O as the point where the perpendicular bisector meets AB.

iii. Construct the angle bisector of BAC. Construct a circle, by taking the intersection point of the angle bisector and the perpendicular bisector drawn in (II) above, as the centre and touches the side AB at the point O.

iv. Name the point which it touches the above circle and the side AC as P. Give reasons why AO = AP

(09)a. Himali has 8 identical solid glass balls with equal size and shape. She needs to find the radius of a glass ball. These eight glass balls are completely immersed in the water of a container, of the shape of a cuboid with length, breadth and height 11 cm, 8 cm and h respectively, and the height of the water level is $\frac{2}{3}$ of it's total height. $r = \sqrt[3]{\frac{7h}{2}}$

If the water of the container reaches the spilling level after immersion of the eight glass balls, then show that the radius of the glass ball.

b. Taking that h = 12.5 cm and using logarithmic tables , find the value r to the nearest first decimal place.

(10) In the given figure ABXY and BCPQ are two rectangles. $AB = 2\,BC$, $XQ = PQ$ and $BX = 2BQ$
Copy the figure into your answer script and include the above information in it.
Prove that $PX^2 + CY^2 = 10\,BC^2 + 5\,QX^2$
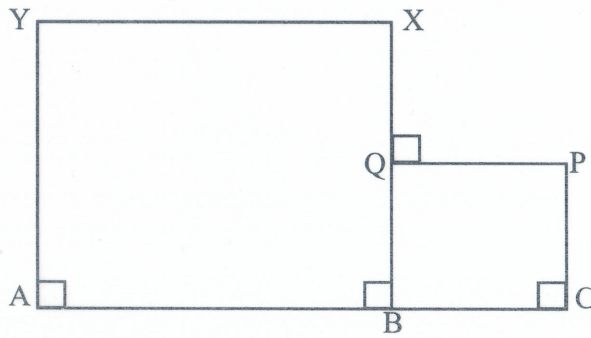
(11) In the given figure, The points A, B, C and D line on the circle with the centre O, such that DC//AB
The line DC produced and the tangent drawn to the circle at B, meets at E.
The lines AC and BD intereseat at M

   i. Show that $A\hat{D}B = B\hat{E}C$
   ii. Show that $\triangle AMB$ is an isosceles triangle
   iii. Prove that $\triangle ABD \equiv \triangle ABC$
   iv. Give reasons as to why $B\hat{C}E = B\hat{A}D$
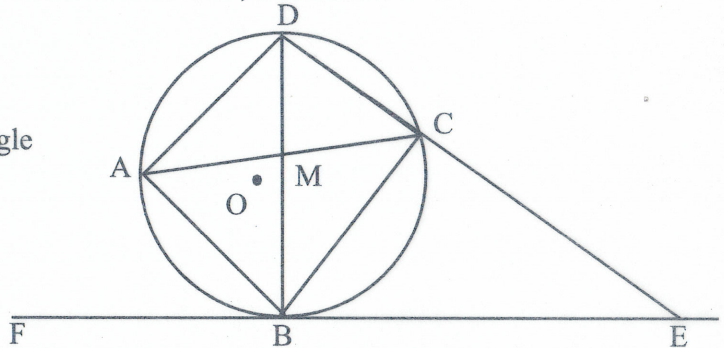
(12) An incomplete Venn diagram drawn to represent information of the survey to have students in a hostal is shown here.

Students who prefer to eat fish.

Students who prefer to eat eggs.

Students who prefer to eat meat.
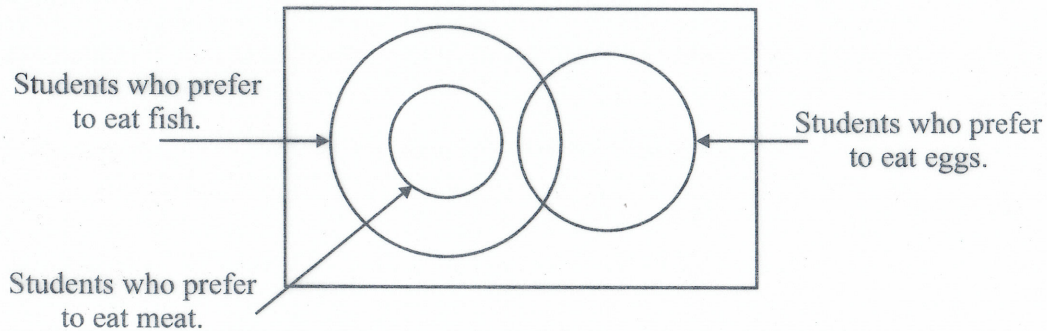
All the student who prefer to eat meat is also prefer to eat fish. Number of students who prefer to eat both fish and eggs is 6. Eight students do not prefer to eat either of the above item
   i. Copy the given Venn diagram in your answer script and include given information in it.
   ii. Shade the region which represent the students who prefer to eat only two types of food items.
   iii. If the students who prefer to eat egg is 15 and student who prefer to eat only one type of food item is 21, Calculate the number of students who do not prefer to eat meat.
   iv. If 15 students prefer to eat meat, calculate the percentage of the students who do not prefer to eat fish, out of the total number of students.
   v. Later reveal that, out of the 15 students who prefer to eat meat 04 students prefer to eat eggs. Accordingly draw a new venn diagram according to the changed data and indicate the relevent data on the diagram.
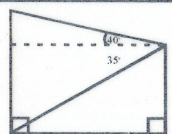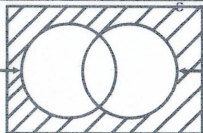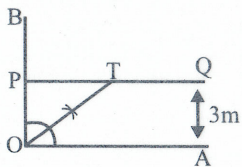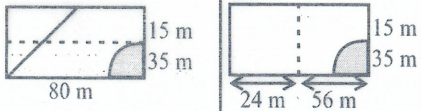
Third term test 2023(2024)
Mathematics
Answer sheet
Paper I -Part-A

Grade 11

Q.N	Answer	Marks	
01.	Interest for 2 years = Rs.6400 $\frac{50}{100}$ x 40000 x 2	01	02
02.	Minimum legth = 50 cm 2 x $\frac{22}{7}$ x 7 x $\frac{1}{4}$ or 11+11+28	01	02
03.	i. $5^2 = x$ ii. $25 = x$	01 01	02
04.	$\frac{1}{3x^2}$ $\frac{3-2}{3x^2}$	01	02
05.	$P\hat{Q}S = 135^0$ $P\hat{R}Q = 45^0$ or $P\hat{Q}R = 45^0$	01	02
6.	x = 11 for x+1 = 12	01	02
07.	$3x^2 - 8x + 3x - 8$ x (3x-2) + 1 (3x-8) (3x-8) (x+1)	01 01	02
08.	2 x $\frac{22}{7}$ x r = 44 r = 7cm	01 01	02
09.	 Mark 40^0 and 35^0 correctly Mark perpendicular and 50m	01 01	02
10.	 Students who ate ice cream Boys		02
11.	x = 7 or x= -7 $x^2 = 49$ or (x+7) (x-7)		02
12.	total number of cards = 27		02
13.	ABE Δ ≡ BDC Δ SAS	01 01	02
14.	i. ✓ ii. ✓ iii. ✗		02
15.	$12x^2y$		02

Q.N	Answer	Marks	
16.	To mark the top of the mid points of each columns To mark & join the mid points of the class intervals5-10 and 30-35 and darwing accurate frequency polygon	01 01	02
17.	x = 19 cm for x+ 5 = 24	01	02
18.	volume = 15.4 x 200 = 3080 cm³	01 01	02
19.	x ≤ 3 	01 01	02
20.	$O\hat{C}B = 34^0$ $O\hat{B}C = 34^0$	01	02
21.	40 kmh⁻¹ $\frac{160 - 80}{6 - 4}$	01	02
22.	$x = 65^0$ $A\hat{E}B = 65^0$ or $B\hat{E}D = 115^0$	01	02
23.	bisector of $A\hat{O}B$ to mark **T** 	01 01	02
24.	i. m = 2 ii. y = 2x+1	01 01	02
25.	i. AB = 14 cm ii. ADC = 130^0	01 01	02
	Part - B		
01.	Who did not give contribution = $1 - \frac{1}{3}$ to repair play ground $= \frac{2}{3}$ Who participated to fix school fence $= \frac{2}{3} \times \frac{3}{5}$ $= \frac{2}{5}$	01 01	01
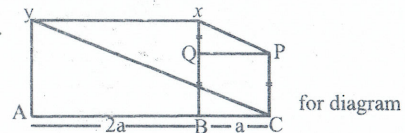
Q.N	Answer	Marks	
	Who participated to repair $= 1 - \left(\frac{1}{3} + \frac{1}{3}\right)$ Grade 1 class room	01	
	$= 1 - \left(\frac{5+6}{15}\right)$		
	$= 1 - \frac{11}{15}$	01	
	$= \frac{4}{15} \div 2$		
	$= \frac{4}{15} \times \frac{1}{2}$		
	$= \frac{2}{15}$	01	03
	Who participated to shramadana campaign $= \frac{2}{15} \to 6$		
	$= \frac{6}{2} \times 15$	01	
	$= 45$		
	$= 45 \times \frac{1}{3}$	01	
02	Who participated to repair play ground $= 15$	01	
	Number of days $= \frac{30}{15}$	01	02
	$= 2$		
			10

Q.N	Answer	Marks	
(02)	i. Land owned to daughter $= \frac{1}{2} \times 48 \times 50$	01	
	$= 1200 \ m^2$	01	
	Land owned to son $= \frac{1}{2} \times 50 \ (80+32)$	01	04
	$= 2800 \ m^2$	01	
	ii. Daughter : Son $= 1200:2800$		
	$3:7$		02
	iii. Perimeter $= 2 \times \frac{22}{7} \times 35 \times \frac{1}{4} + 70$		
	$= 55 + 70$	01	02
	$= 125m$		
	iv.	01	

Breadth of Daughter's Land $= \frac{1200}{80}$	$= \frac{1200}{50}$		
$= 15m$	$= 24m$	01	
Breadth of Son's Land $= \frac{2800}{80}$	$= \frac{2800}{50}$	01	02
$= 35m$ or	$= 56m$		
			10
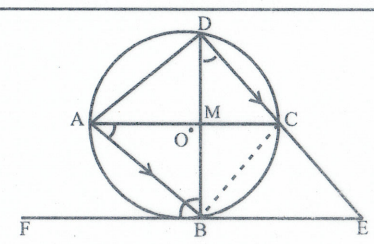
Q.N	Answer	Marks	
(03)a.	i. No.of Shares sold from $A = \frac{60}{100} \times 200$		01
	$= 120$	01	
	ii. No. of shares bought from **B** $= 120 \times 50$		
	$= \frac{120 \times 50}{60}$	01	
	$= 100$	01	02
	iii. Dividend income from A $= 200 - 120$	01	
	$=$ Rs. 80	01	
	$= 80 \times 8$		
	$=$ Rs. 640		
	iv. Dividend income from **B**		01
	$= 100 \times 10$		
	$= 1000$		
	Total Dividend income $= 1000 + 640$		
	$=$ Rs. 1640	01	04
b.	Tax for initial 500 000 $= \frac{4}{100} \times 500 \ 000$		
	$= 20000$	01	
	Tax for remaining 150 000 $= \frac{8}{100} \times 150 \ 000$		
	$= 12000$	01	
	Total income tax $= 20000 + 12000$		
	$=$ Rs. 32000	01	03
			10

Q.N	Answer	Marks	
(04)a.	i. Class Boundaries $-\ 7.5 - 12.5$		
	$-\ 12.5 - 17.5$	01	
	Frequency Column $-\ 3$		
	Cumulative Frequency $\Big\}$ $-\ 4$		
	$-\ 6$	01	02
	ii. To correct axes	01	
	To correct points	01	
	Smooth Curve	01	03
	iii. To getting Q1	01	
	To getting Q3	01	
	Interquartile range	01	03
	Central Angle $\frac{360^0}{60} \times 10$		01
	60^0	01	02
			10

Q.N	Answer	Marks
(05) a.		

(05) a.

i.

$\frac{80}{100}$ — getting an inaccurate results 02 02

$\frac{20}{100}$ — getting an accurate results 02 02

ii. First Experiment   Second Experiment

$\frac{4}{5}$ inaccurate results — $\frac{15}{16}$ Toxic 01

$\frac{1}{16}$ non-toxic 01

$\frac{1}{5}$ accurate results — $\frac{15}{16}$ Toxic 01

$\frac{1}{16}$ non-toxic 01

$\left(\frac{4}{5} \times \frac{1}{16}\right) + \left(\frac{1}{5} \times \frac{1}{16}\right)$ 01

$\frac{4}{80} + \frac{1}{80}$

$\frac{5}{80}$

$\frac{1}{16}$ 01 04

Marks: 01, 01, 01, 01, 01, 01, 01 04

b.

Second Draw

First Draw

Correct Cartesian plane   02
To encircle   01
To correct probability   01 04

10

Q.N	Answer	Marks
	Part A	

01. a.
i. 3   01 01
ii. correct x and y   01
Marking points accurately   01
smooth curve   01 03

b.
i. $-1 < x < 1$ 02 02
ii. Positive Root 2.7   01
$(x-1)^2 = \sqrt{3}$
$x - 1 = \sqrt{3}$
$2.7 - 1 = \sqrt{3}$
$1.7 = \sqrt{3}$ 01 02

iii. $a = -1$ 01
$b = +2$ 01 02

10

(02)

i.

Class intervals	Mid Value	d	f	fd
0-15	7.5	-45	1	-45 ⎫
15-30	22.5	-30	3	-90 ⎬ -210
30-45	37.5	-15	5	-75 ⎭
45-50	52.5	0	11	0
50-75	67.5	15	5	75 ⎫
75-90	82.5	30	4	120 ⎬ 240
90-105	97.5	45	1	45 ⎭

Correct mid value column   01
Correct Deviation column   01
Correct fd column   01

εfd 01

Mean $= A + \dfrac{\varepsilon fd}{\varepsilon d}$

$= 52.5 + \dfrac{30}{30}$ 01

$= 52.5 + 1$
$= 53.5$
$= 54$ 01

Total number of runs at the end of
the year $= 54 \times 35$
$= 1890$ 01 07

ii. $= (15 \times 1) + (30 \times 3) + (45 \times 5) + (60 \times 11)$
$+ (75 \times 5) + (90 \times 4) + (105 \times 1)$
$= 15+90+225+660+375+360+105$
$= 1830$ 01
$\underline{1830 < 1890}$ 01 03

10

(03)

Interest for the first years $= \dfrac{10}{100} \times 120000$

$= 12000$ 01

Amount for the second year $= 120000$

$\dfrac{12000}{132000}$ 01

Interest for the second year $= \dfrac{10}{100} \times 132000$

$= \underline{13200}$

Total interest $= 13200$
$= \dfrac{12000}{25200}$ 01

Loan $= 200000 - 120000$
$= 80000$ 01

Amount for a month
unit $= \dfrac{80000}{20} = 4000$ 01

Interest for a month unit $= \dfrac{15}{100} \times 4000 \times \dfrac{1}{12}$ 01

$= 50$

Q.N	Answer	Marks	

(03)

No. of month units $= \dfrac{20}{2} (20+1)$

$= 210$ — 01

Total interest $= 50 \times 210$
$= 10500$ — 01

Total interest $= 25200$
$\quad\quad\quad\quad\quad \underline{10500}$
$\quad\quad\quad\quad\quad 35700$ — 01

$\underline{35700 < 36000}$ — 01

10

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(04) a.

$a = 3$ — 01
$b = -6$ — 01 | 02

b.

i. Amount of money Achala has $= x$
Amount of money Sanjana has $= y$
$x + 2y = 1150$ —① — 01
$2x + y = 1400$ —② — 01
$4x + 2y = 2800$ —③ — 01

$\dfrac{3x}{3} = 1650$

$x = 550$ — 01

$x = 550$ from ①
$x + 2y = 1150$
$550 + 2y = 1150$ — 01
$2y = 1150 - 550$
$2y = 600$
$y = 300$ — 01 | 06

Amount of money Achala has $=$ Rs. 550
Amount of money Sanjana has $=$ Rs. 300

Price of a pen $= 550 + 300$
$= 850 \times \dfrac{1}{5}$ — 01

$=$ Rs. 170 — 01 | 02

10

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(05)

Area of the shaded portion $= $ Area of ABCD $-$ Area of ABT $\triangle$

$30 = x(x+6) - \dfrac{1}{2} \times x \times x$ — 01

$30 = x^2 + 6x - \dfrac{x^2}{2}$

$30 = \dfrac{2x^2 + 12x - x^2}{2}$ — 01

$60 = x^2 + 12x$

$0 = x^2 + 12x - 60$ — 01 | 03

$x^2 + 12x - 60 = 0$
$x^2 + 12x = 60$
$x^2 + 12x + 36 = 60 + 36$ — 01
$(x+6)^2 = 96$
$x + 6 = \pm\sqrt{96}$
$x + 6 = \pm 4\sqrt{6}$ — 01

$x + 6 = \pm 4 \times 2.44$
$x + 6 = \pm 9.76$

$x + 6 = 9.76$ or $x + 6 = -9.76$
$x = 9.76 - 6$ $\quad x = -9.76 - 6$
$x = 3.76$ $\quad\quad x = -15.76$ — 02

Grade 11 Mathematics(32) Answer sheet

Q.N	Answer	Marks	

negative value is not suitable for x

$\therefore$ BC $= x + 6$
$\quad\quad = 3.76 + 6$
$\dfrac{1}{2}$ BC $= \dfrac{9.76}{2}$ — 01

$\dfrac{1}{2}$ BC $= 4.88$

AB $= 3.76$
$\therefore \underline{\underline{AB < \dfrac{1}{2} BC}}$ — 01 | 07

10

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(06)

i.

90^0
42^0 — 01
To mark AC 24m — 01 | 02

ii. $\tan 42^0 = \dfrac{AB}{24}$ — 01

$0.9004 = \dfrac{AB}{24}$ — 01

$0.9004 \times 24 = AB$
$\underline{21.6 m} = AB$ — 01 | 03

iii. $\cos\theta = \dfrac{24}{30}$ — 01

$= 0.8000$ — 01
$\theta = \cos^{-1} 0.8000$
$\theta = 37^0 08'$ — 01

$37^0 08' < 42^0$ — 01
transmission equipment of the company Q is located below the transmission equipment of the company P — 01 | 05

10

	Part - B		

(07) a.

i. metal wires $4, 9, 14, ...$ — 01
Nails $4, 7, 10 ......$ — 01 | 02

ii. $T_n = a + (n-1) d$
$T_n = 4 + (n-1) 5$ — 01
$T_n = 4 + 5n - 5$
$T_n = 5n - 1$ — 01
No of nails used to create the 8th pattern
$= 5n - 1$
$= 5 \times 8 - 1$
$= 40 - 1$
$= 39$ — 01 | 03

iii. $S_n = \dfrac{n}{2}\{ 2a + (n-1)d \}$

$= \dfrac{8}{2}\{ 2 \times 4 + (8-1) 3 \}$ — 01

$= 4(8 + 7 \times 3)$
$= 4(8 + 21)$
$= 4 \times 29$
$= \underline{116}$ — 01 | 02

Q.N	Answer	Marks
(07) b.	$S_n = \dfrac{a\,(r^n-1)}{r-1}$	
	$= \dfrac{\frac{3}{2}(2^8-1)}{2-1}$	01
	$= \dfrac{3}{2}(256-1)$	01
	$= \dfrac{3}{2} \times 255$	
	$= 382\frac{1}{2}$	01 · 03 / 10

(08)	i. constructing $A\hat{B} = 10$ cm	01	
	constructing $B\hat{A}C = 75^0$	01	
	$AC = 9$ cm		
	constructing the triangle ABC	01	03
	ii. constructing the perpendicular bisector of AB. Marking O	01	03
	iii. constricting the angle bisector of $B\hat{A}C$	01	
	constructing the circle	01	02
	iv. Marking P	01	
	Tangents drawn from the same external point are equal in length	01	02 / 10

(09)a.	Volume of cuboid $= 11 \times 8 \times h$	01	
	volume of 8 glass balls $=\frac{4}{3}\times\frac{22}{7}\times r^3 \times 8$	01	
	$\frac{1}{3} \times 11 \times 8 \times h = \frac{4}{3}\times\frac{22}{7}\times r^3 \times 8$	01	
	$\dfrac{11\times8\times h\times3\times7}{3\times4\times22\times8} = r^3$		
	$\dfrac{7h}{8} = r^3$		
	$\dfrac{7h}{2} = r^3$		
	$r = \sqrt[3]{\dfrac{7 \times 12.5}{2}}$	01	04
	$r =\left(\frac{1}{3} \lg 7 + \frac{1}{3} \lg 12.5\right)- \lg 2$	01	
	$=\left(\frac{1}{3} \times 0.8451+ \frac{1}{3} \times 1.0969\right)-0.3010$	03	
	$= (0.2817 + 0.3656) - 0.3010$		
	$= 0.6473 - 0.3010$		
	$= 0.3463$		
	$=$ antilog 0.3463	01	
	$r = 2.22$	01	06 / 10

(10)	i.	for diagram	01

Data :- ABXY and BCP are two rectangles
XQ = PC and AB = 2 BC. — 01

to prove that :- $Px^2 + Cy^2 = 10BC^2 + 5Qx^2$

construction :- join Px and Cy

Q.N	Answer	Marks
	proof :-	
	PQx Δ Pythagoras Relation	
	$Px^2 = Qx^2 + PQ^2$	01
	PQ = BC (opposite sides of the rectangle BCPQ)	01
	$\therefore Px^2 = Qx^2 + BC^2$	
	$Qx = BQ$ (data)	01
	$\therefore Bx = 2Qx$	
	$Bx = Ay$ (opposite sides of the rectangle ABxy)	01
	$\therefore Ay = 2Qx$	
	AB = 2BC (data)	
	$\therefore AC = 3BC.$	01
	ACy Δ Pythagoras Relation	
	$Cy^2 = Ay^2 + AC^2$	01
	$yC^2 = (2 Qx)^2 + (3BC)^2$	01
	$yC^2 = 4Qx^2 + 9BC^2$	01
	$Px^2 + yC^2 = 5Qx^2 + 10BC^2$	/ 10

(11)		

data :- The points A,B,C, and D lie on the circle with the centre O. (DC//AB) the tangent drawn to the circle at the point B is FE. — 01 / 01

i. To prove that:- $A\hat{D}B = B\hat{E}C$
Proof :- $A\hat{D}B = A\hat{B}F$ (angles in the alternate segment) — 01
$B\hat{E}C = A\hat{B}F$ (AB//DC) — 01 / 02
$\therefore A\hat{D}B = B\hat{E}C$

ii. To prove that. :-AMB is an isosceles triangle

Proof :- $A\hat{B}M = B\hat{D}C$ (AB//DC) — 01
$B\hat{A}M = B\hat{D}C$ (angles in the same segment) — 01 / 02
$\therefore A\hat{B}M = B\hat{A}M$
$\therefore AM = BM$
$\therefore$ ABM is an isosceles triangle

iii. To prove that $A\hat{B}D\,\Delta \equiv ABC\Delta$
Proof :- $A\hat{B}D\,\Delta \equiv ABC\,\Delta$
$A\hat{B}D = B\hat{A}C$ (Proved) — 01
$A\hat{D}B = A\hat{C}B$ (angles in the same segment)
$AB = AB$ (Common) — 01
$\therefore ABD\Delta \equiv ABC\Delta$ (A.A.S) — 01 / 03

iv. In a cyclic quadrilateral exterior angle is equal to the interior opposite angle — 01 / 01
/ 10

Q.N	Answer	Marks	

(12) i.

Students who prefer to eat fish → 12 15 6 9 ← Students who prefer to eat eggs

Students who prefer to eat meat

Marking 6 and 8	02	02
ii. Shading the correct region	02	02
iii. Marking 9 and 12	01	
not eating meats = 12+8+6+9 = 35	01	02
iv. Total = 35+ 15 = 56	01	
Not eating fish = 9+8 = 17		
Percentage = $\dfrac{17}{50}$ x 100 = 34%	01	02

Fish → 12 11 4 6 9 ← Egg

Meat

Drawing the correct venn diagram	01	
Marking 11 and 4	01	02
		10