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General Certificate of Education (Ordinary Level Examination), 2023 (2024) – Practice Test

Mathematics - I

32 – E I

Two hours

Name/ Index Number

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 Signature of Invigilator

Important:

- ❖ This question paper consists of **8** pages.
- ❖ Answer **all** questions **on this paper itself**.
- ❖ Use the space provided under each question for working and writing the answer.
- ❖ Indicate the relevant steps and the correct units when answering the questions.
- ❖ Marks will be awarded as follows:
 02 marks each for questions in part A.
 10 marks each for questions in part B.

For Marking Examiner’s use only.

Question number		Marks
A	1 – 25	
B	1	
	2	
	3	
	4	
	5	
Total		

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Marked by

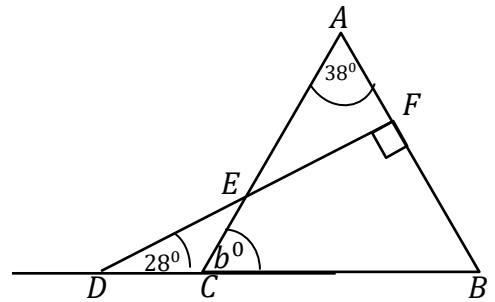
Mathematics I – Part A

Answer all the questions on this paper itself.

1. The charges for the amount of water units used in a house in a particular month is Rs. 1200. A value added tax (VAT) of 18% is also added for that. Find the amount of water bill payable for that month.

2. Solve : $\frac{5}{3x} - 2 = 3$

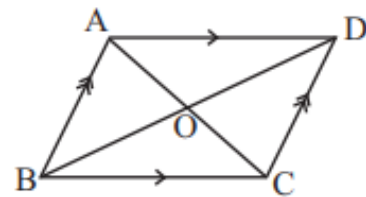
3. If $\widehat{CAB} = 38^\circ$, $\widehat{EDC} = 28^\circ$ in the given figure, find the value of b° .



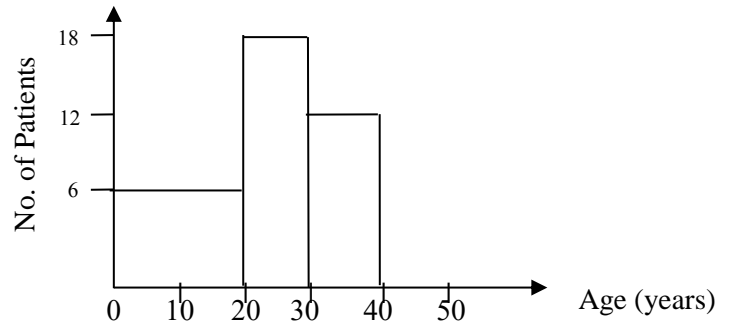
4. A sector with angle at the centre is 90° has been cut out from a circular lamina with radius 21 cm. Find the perimeter of that sector. (Take $\pi = \frac{22}{7}$)

5. $ABCD$ is a parallelogram. For each statement given below, if it is correct, mark a “✓” and if it is incorrect, mark a “X” in the box in front of it.

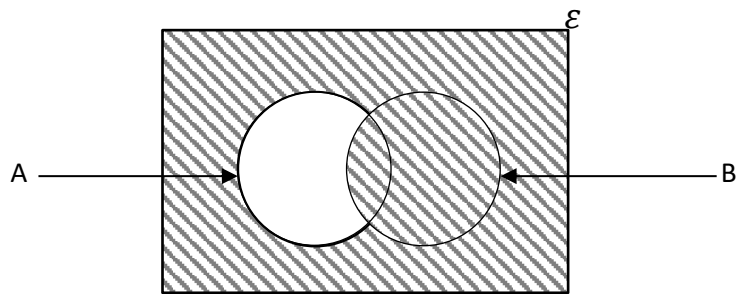
i.	$AC = BD$	
ii.	$AB = CD, AD = BC$	
iii.	Area of $ABD \Delta =$ Area of $BCD \Delta$	



6. The following histogram shows the age and the number of patients who visited a medical clinic on a given day. What is the number of patients aged 30 or below 30 who came on that day?
(The class interval 20-30 means more than 20 but less than or equal 30.)

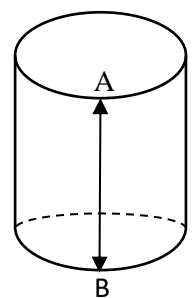


7. Write the shaded region in Venn diagram, in set notation.



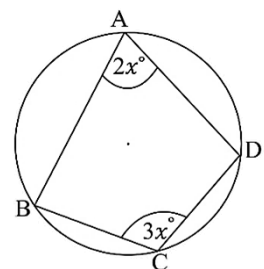
8. It takes 3 hours a vehicle with the uniform speed 40 kmh^{-1} to cover a certain distance. If the same journey is travelled at a uniform speed of 20 kmh^{-1} , how many times the time taken to travel at a speed of 40 kmh^{-1} will be?

9. The circumference of the base and the height of a right circular cylinder made by the paper are 44cm and 20 cm respectively. Draw the lamina obtained by cutting and unfolding surface along the line AB (Generator) as shown in the figure with measurements.



10. In the given figure the points A, B, C and D lie on the circle.

$\hat{BAD} = 2x^\circ, \hat{BCD} = 3x^\circ$. Find the value of x° .



11. Underline the correct answer of the first approximation of $\sqrt{6}$.

i. 2.2

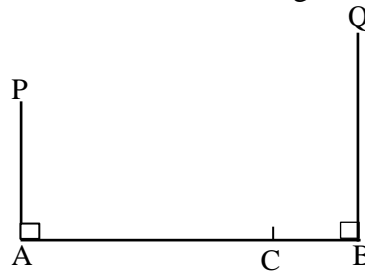
ii. 2.3

iii. 2.4

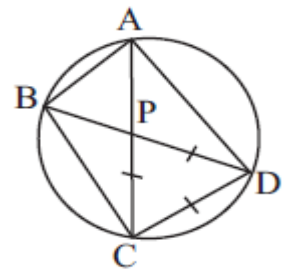
iv. 2.5

12. Simplify : $\frac{a^2}{2b^3} \div \frac{a}{6b^2}$

13. There are two vertical pillars AP and BQ located at A and B on a horizontal ground. A person at C sees Q, the top of tower BQ, at an angle of elevation of 60° . A bird on top of tower AP sees point C at an angle of depression of 40° . Represent this information in the given figure.



14. In the given figure $PC = CD = PD$, $\hat{BAC} = 2x^\circ - 10^\circ$. Find the value of x° .



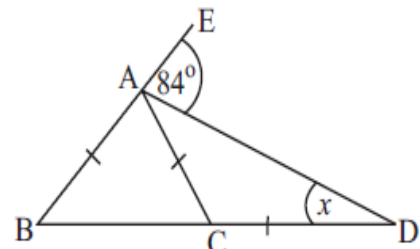
15. The first term of a geometric progression is 2 and the fourth term is 54. Find its common ratio.

16. Find the least common multiples of the following algebraic expressions.

$$8x^2y, 4y^2, 3x$$

17. The cross sectional area of a right triangular prism is 24 cm^2 and the height is 20 cm. Find the volume of it.

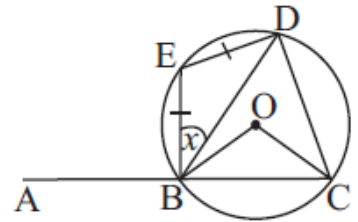
18. In the given figure $AB = AC = CD$, $\hat{ADC} = x^\circ$, $\hat{DAE} = 84^\circ$. Find the value of x° .



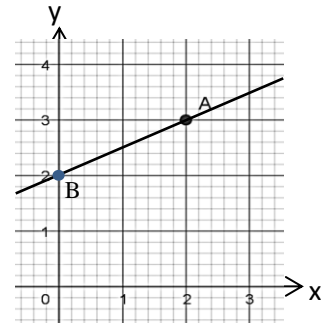
19. Factorize : $2x^2 + 5x - 3$

20. A student randomly answers two multiple-choice questions consisting of three answers. Find the probability that the answers to both questions are correct.

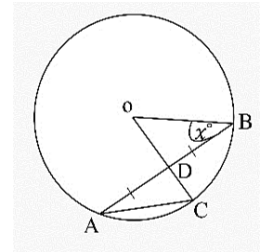
21. The centre of the given circle is O and $\widehat{BOC} = 80^\circ$, $\widehat{ABE} = 70^\circ$, $BE = ED$. Find the value of x° .



22. Write the equation of the straight line which passes through the points A and B in the given Cartesian plane.

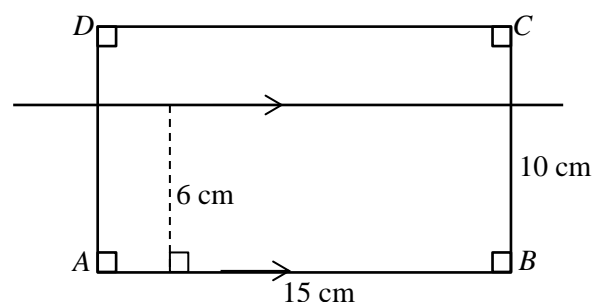


23. The centre of the given circle is O and $\widehat{DAC} = 24^\circ$, $\widehat{OBD} = x^\circ$, $AD = DB$. Find the value of x° .



24. Solve : $(x + 2)(x - 3) = 0$

25. $ABCD$ is a rectangle. A point P is to be marked equidistant to the two points A and B , and 6 cm distance from the line AB . Mark that point P using the knowledge of loci.

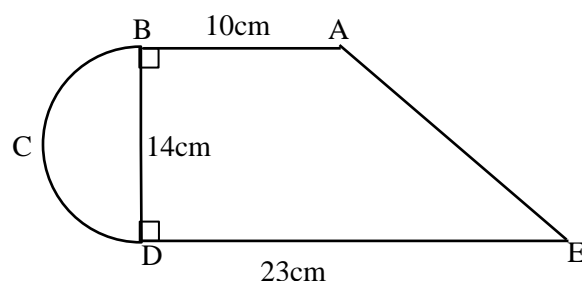


Part B

Answer all the questions on this paper itself.

1. Palitha reserved $\frac{1}{5}$ of this land to build a house and the rest for cultivations.
 - i. What fraction of the total land is allocated for cultivation?
 - ii. He allocated $\frac{1}{3}$ of the portion allocated for cultivation to vegetable cultivation. What fraction of the total land is allocated for growing vegetables?
 - iii. After allocating for house building and growing vegetables, the rest of the land is used for other crops. Express that portion as a fraction of the total land.
 - iv. If the plot allocated for other crops is 200 m^2 more than the plot allocated for building the house, how many square meters is the plot allocated for building the house?

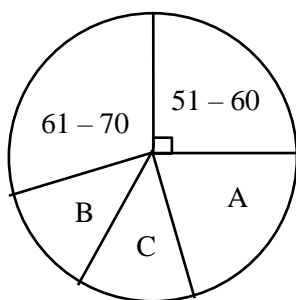
2. To make a wall decoration, use metal wire and make the following template and cover it with thick piece of white cloth. Here BCD is a semicircle with BD as its diameter and ABDE is a trapezium.



- i. Find the arc length BCD.
- ii. Find the minimum length of a piece of colored tape of cloth needed to stitch, from A to E along the edge ABCDE .
- iii. Find the area of the semicircle BCD.
- iv. Find the ratio between the area of the semicircle BCD and the area of the trapezium ABDE.
- v. The area of the whole decoration, divided by BF into two equal parts, is required to be colored black and blue. Mark with measurements the position of F on the edge DE.

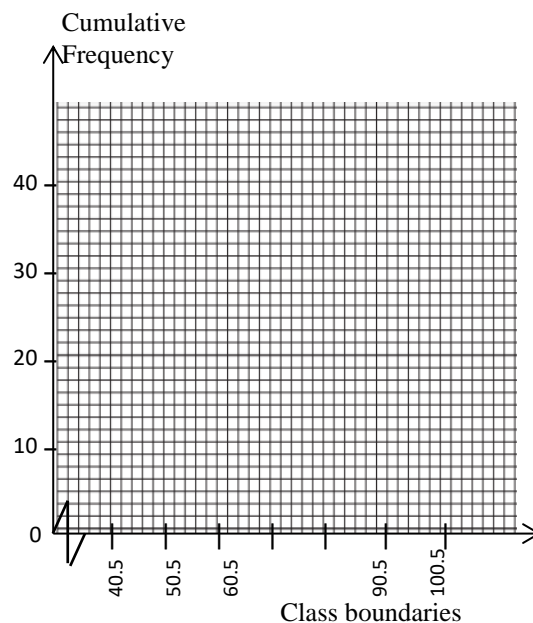
3. (a) Upul invests Rs. 96 000 to buy shares of a company when the market price of a share is Rs. 40. The company pays a dividend of Rs. 4 per share.
- Find the number of shares that Upul can buy.
 - Find the annual dividend income he receives.
 - After receiving the annual dividend income, Upul sells all his shares and obtains a capital gain of Rs. 36 000. Find the selling price of a share.
- (b)i. Upul has to pay Rs. 1400 rates per quarter for his business building located within a municipal area. Find the assessed value of the building if the rate of annual assessed tax levied by the municipal council is 8 %.
- ii. The municipal council will deduct 10 % of total assessed tax for the year if paid in total before 31st of January of that year. If Upul pays the above tax in total before 31st of January find the amount of assessed tax he will pay.

4. The following is an incomplete pie chart and a frequency distribution of the scores obtained by 10 students of a Grade 11 class in a certain school in Mathematics.

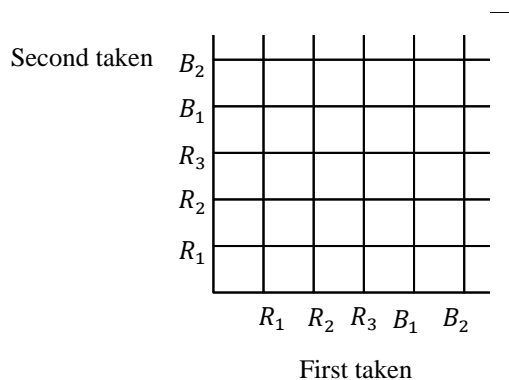


Class Intervals	Class Boundaries	No. of Students	Cumulative Frequency
41 - 50	40.5 - 50.5	.....	.....
51 - 60	50.5 - 60.5	.....	.....
61 - 70	60.5 - 70.5	12	.....
71 - 80	.....	8	35
81 - 90	80.5 - 90.5	.....	40

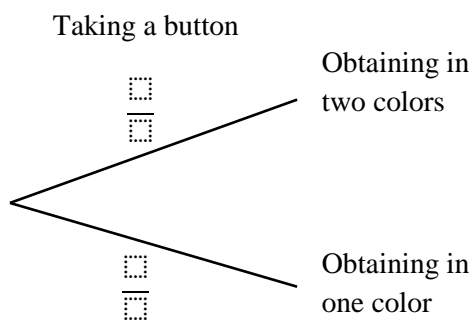
- Complete the table if the angle at the centre of sectors B and C are equal.
- Find the angle at the centre of the sector which belongs to the class interval 61-70.
- Using the completed table, complete the horizontal axis of the given coordinate plane and draw the cumulative frequency curve.
- Find the number of students who obtained marks more than 75 and express it as a percentage of total students, using the cumulative frequency curve.



5. A box contains identical buttons with 03 red buttons (R) and 02 blue buttons (B). First, one button was is taken from the box and it is not returned to the box, then another button is taken from the box and noted the color.
- i. Mark the sample space of this random experiment with “x” on the given grid.



- ii. Encircle the event of taking two buttons being different colors in the grid and find the probability.
- iii. Complete the incomplete tree diagram given using the probabilities you obtained in ii above.



- ii. When both taken buttons are of the same colors, they are fixing to a dress and if the buttons are different colors the probability of fixing to a dress is 0.2. Extend the above tree diagram for the case of a buttons are fixing to a dress by including the relevant probabilities.
- iii. Find the probabilities that the taken buttons are fixed to the dress.

Additional Reading Time – 10 minutes

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.

Instructions :

- Answer **ten questions** selecting **five questions** from **Part A** and **five questions** from **Part B**.
- Each question carries 10 marks.
- The volume of a right circular cone of base radius r and height h is $\frac{1}{3}\pi r^2 h$.
- The volume of a right circular cylinder of base radius r is $\pi r^2 h$.

Part A

Answer only five questions.

01. Maheshi borrows Rs. 120 000 to be paid in 24 monthly instalments under the reducing balance method at 24% annual interest rate. Fathima borrows a loan of Rs. 120 000 to be repaid in two years at 12% annual compound interest. Find the total amount paid by both separately and explain who has made the better deal considering the total amount.
02. An incomplete table of y values corresponding to several x values of the function $y = x(x - 4) - 2$ is given below.

x	-1	0	1	2	3	4	5
y	3	-2	-5	.....	-5	-2	3

- (a)
- i. Find the value of y when $x = 2$.
 - ii. Using the standard system of axes and a suitable scale, draw the graph of the quadratic function on a graph paper according to the above table of values.
- (b) Using the graph,
- iii. Write the coordinates of the turning point.
 - iv. Write the range of x which the function increasing and $y \leq 0$.
 - v. Express the function in the form $y = (x - a)^2 - b$ and using it find the approximate value for $\sqrt{6}$ to the nearest first decimal place. Here a and b are two constants.
03. (a) Janupa and Minuka are two customers using telephone connections belonging to the same telephone company. The following table shows the time they spent on phone calls, the number of text messages they sent and the total amount they spent on those services on that day.

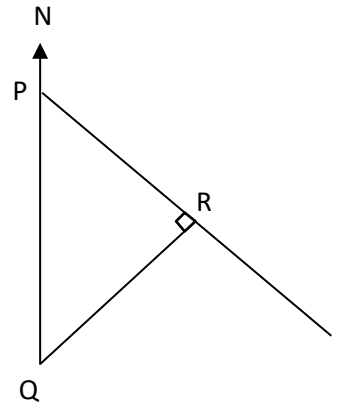
Name	The time spent on phone calls (minutes)	No. of text messages	Total amount spent (Rupees)
Janaka	$10\frac{1}{2}$	20	31
Minuka	30	10	65

- i. Considering that the company charges Rs. x per minute for phone calls and Rs. y for text messages, construct a pair of simultaneous equations based on the information given in the above table.
- ii. By solving the above pair of simultaneous equations, find the charges for per minute phone calls and the amount charged for a text messages separately.

(b) Simplify : $\frac{x+1}{x^2+5x+6} - \frac{x}{x+3}$

04. Fishing port Q is located 20 km south of fishing port P . A fishing boat is sails in a bearing of 138° from the port P .

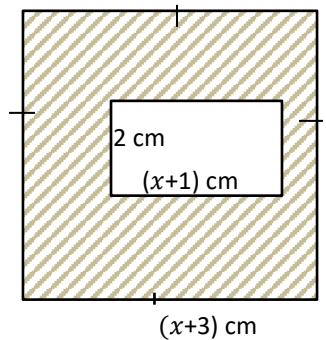
- i. Copy the given diagram in your answer sheet and include the above information.



Use trigonometric tables for calculations in part (ii) and (iii) below.

- ii. If R is the shortest distance between the fishing boat sailing in the above direction and the port Q , find the distance QR to the nearest whole number.
- iii. From the position R , the boat travels 10 km ahead on the same route and arrives at a position S , anchors and engages in fishing activities. Find the magnitude of \hat{RSQ} to the nearest degree.
- iv. The fishing boat sails forward along S from R , a distance equal to QR and arrives to the position T , find the bearing of Q from T .

5. A rectangle of length $(x + 1)$ cm and breadth 2 cm is cut out from a square of length of a side $(x + 3)$ cm. The area of the shaded region is 15 cm^2 . Construct a quadratic equation of x using the given information and find the value of x to the nearest first decimal place by solving it. Find the length of a side of the square. (Take $\sqrt{3}=1.73$)



6. The following frequency distribution shows the number of words, a student writes on each page of his notebook.

Class Interval (No. of words in a page)	21-30	31-40	41-50	51-60	61-70	71-80
Frequency (no. of pages)	8	10	13	33	11	5

- i. What is the modal class?
- ii. By taking the mid value of the modal class as the assumed mean or other method, find the mean number of words written on a page of this notebook.
- iii. Nehara says that a book of 60 pages would sufficient if the above amount of short notes were written with 60 words on each page. Show that her statement is not true.

Part B
Answer five questions only.

7. In a theatre, the rows of seats are arranged in a semi-circular way. The number of seats in each row is arranged in an arithmetic progression. The number of seats in the second, third and fourth rows are 17, 21, 25 respectively.

- i. Find the number of seats in first row.
- ii. Show that the number of seats in n^{th} row is $4n+9$.
- iii. In which row are there 45 seats?
- iv. The total number tickets sold for a drama show is 1060. As the pre-arranged seats in the hall were not enough, the organizing committee added equal number of seats to each row. If the total number of rows of seats in the theatre were 20, how many new seats should be added per row?

8. Use only a straight edge with a cm/mm scale and a pair of compasses for the following geometric constructions. The construction lines should be drawn clearly.

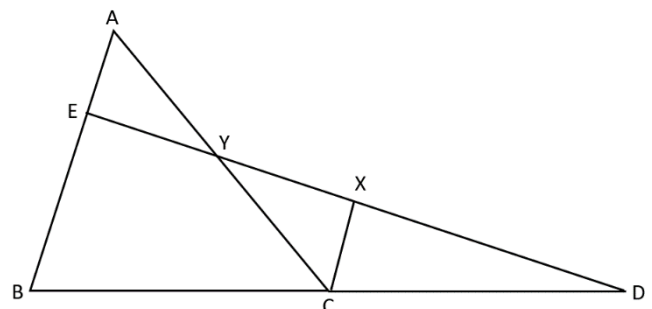
- i. Construct the triangle PQR such that $PQ = 8 \text{ cm}$, $PR = 7 \text{ cm}$, $QR = 5 \text{ cm}$.
- ii. Construct a parallel line through R parallel to PQ .
- iii. Construct the angle bisector of $\hat{R}PQ$.
- iv. Complete the triangle NQR by marking the point N equidistant to PQ and PR and such that the area of the triangle PQR is equal to the area of the triangle PQN .
- v. Construct the circum-circle of the triangle NQR .

9. A hollow conical vessel of radius 6 cm and height 8 cm is completely filled with water. When the water is poured into a right circular cylinder with radius r cm and height h cm by without wasting any amount of water, if the level of water is 4 cm below the exhaust level of the cylinder, show that

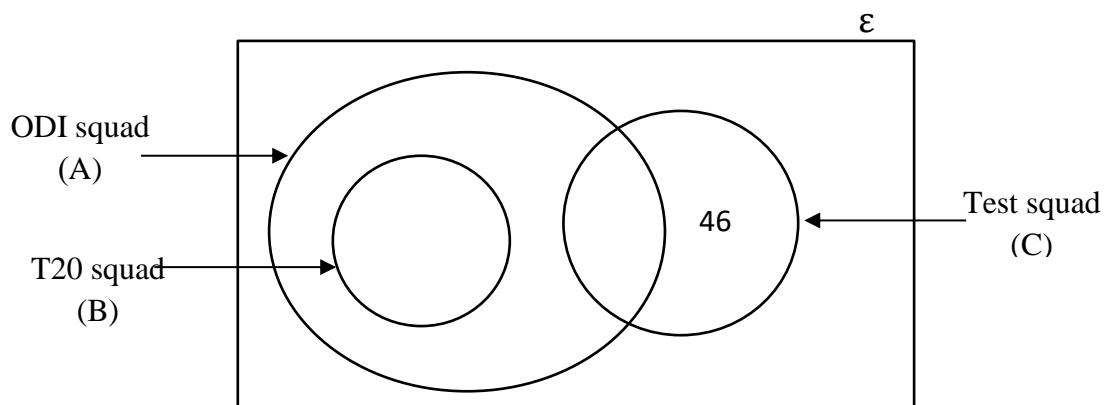
$r = 4 \sqrt{\frac{6}{h-4}}$ and when $h = 4.5168$ cm find the value of r to the nearest whole number using the logarithmic tables.

10. In the triangle ABC the side BC is produced up to D such that $BC = CD$. The point E is on AB such that $3AE = AB$. The mid-point of DE is X . ED and AC are intersect at the point Y . Copy the given figure to your answer sheet and include the given information. Prove the following by giving reasons.

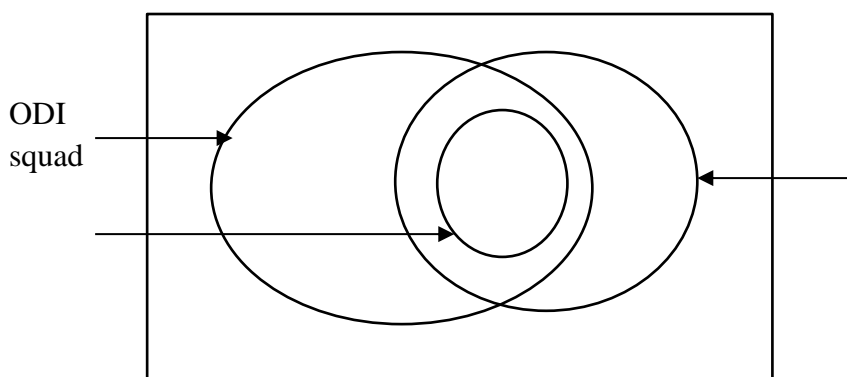
- i. $EB = 2AE$
- ii. $CX = EA$
- iii. Y is the mid point of AC .



11. 150 cricketers are training at the Newsland Cricket Academy. A part of these players have been directed to three special squads and arrangements have been made to provide additional training. The three special squads are One Day International squad (ODI), Twenty-Twenty squad (T20) and Test squad (Test). Below is an incomplete Venn diagram with information on how players have been selected for these squads.



- i. If the total number of players in the Test cricket squad is 60, what is the number of players included in both the Test and ODI squads?
- ii. 66 players have been selected for the ODI squad. How many players are not selected for any of the above squads?
- iii. If the number of players selected for only one squad is 76, how many players are selected for the T20 squad?
- iv. Write in set notation and describe in words the subset that has the number of players as 46.
- v. If it is decided to include all the players in the T20 squad in the Test squad for future cricket matches, a more convenient and incomplete Venn diagram is given below to include the information. Copy it and complete it.



12. The centre of the circle is O . The tangent drawn to the circle at A is PQ . Produced BC and produced BD meet PQ at the points F and E respectively. $\widehat{ABD} = x$ is given.

- i. Copy the given figure and include the given information.
- ii. Show that $CDEF$ is a cyclic quadrilateral.

