Std X
Mathematics, Part - 1 and Part - 2
(English Medium)

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Revised Question Pattern Std. X (From 2019-20)

Mathematics Part I and Mathematics Part II

Que. No.	Nature of Questions	Marks	Marks with Option
Q. 1.	(A) 4 Multiple Choice Questions. (1 mark each) (B) Solve 4 out of 4 subquestions. (1 mark each)	4 4	4 4
Q. 2	(A) Complete 2 activities out of 3 (2 marks each) (B) Solve any 4 out of 5 sub questions (2 marks each)	4 8	6 10
Q. 3	(A) Complete any 1 activity out of 2 (3 marks each) (B) Solve any 2 out of 4 sub questions. (3 marks each)	3 6	6 12
Q. 4	Solve any 2 out of 3 sub questions. (4 marks each)	8	12
Q. 5	Solve any 1 out of 2 sub questions. (3 marks each)	3	6
	Total Marks	40	60

Note :

Q. 3(B) Part-II, one sub question should be asked as prove the given statement.

Q. 4 These questions should be out of the text books but based on prescribed syllabus and also challenging.

Q. 5 These questions should be creative.

Topicwise Weightage of Marks

Part I

Sr. No.	Topic	Marks With Option
1.	Linear Equations in Two Variables	12
2.	Quadratic Equations	12
3.	Arithmatic Progression	8
4.	Financial Planning	8
5.	Probability	8
6.	Statistics	12
	Total	**60**

Part II

Sr. No.	Topics	Marks With Option
1.	Similarity	10
2.	Pythagoras Theorem	7
3.	Circle	12
4.	Geometric Construction	7
5.	Co-ordinate Geometry	7
6.	Trignometry	7
7.	Mensuration	10
	Total	**60**

Note : In the topic wise weightage of marks given in the table, flexibility of maximum 2 marks is possible.

Each question paper should be of 40 marks and with option, of 60 marks.

1. Linear equations in two variables

Marks 35

Q 1 A Choose and write the correct alternative. **3**

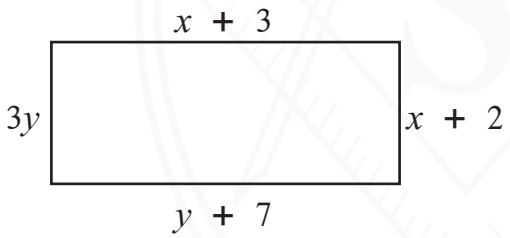
(1) Write the value of the determinant $\begin{vmatrix} 3 & -1 \\ 2 & 1 \end{vmatrix}$.

(A) 1 (B) 2 (C) 3 (D) 5

(2) For a simultaneous equation in x and y, $D_x = 25$, $D = 5$ and $D_y = 50$. Hence find the value of x.

(A) 25 (B) 50 (C) 10 (D) 5

(3)



In the adjacent figure, the lengths of sides of a rectangle are shown. Which of the equations is consistent with the given information ?

(A) $x - 3y = 2$ (B) $x - y = 4$

(C) $x + 3y = 2$ (D) $x + y = -4$

Q 1 B Solve. **2**

(1) To draw the graph of $x - y = 4$, Find y when $x = 5$.

(2) Form a two digit number whose unit's place is 'x' and ten's place is 'y'.

Q 2 A Complete the following activity. **2**

Complete the table to draw the graph of the equation $2x + y = 5$.

x	2	☐
y	☐	0
(x, y)	(2, ☐)	☐

Q 2 B Solve. **8**

(1) Identify and write the linear equations in two variables from the following.

$x^2 + 2x + y = 0$; $x + y + 5 = 0$; $2x - 3y = 5$;

$3y = 9x - 2$; $m^2 + mn + 2 = 0$; $3 = 3m + 2n$

(2) Write any four solutions of the equation $x + y = 2$.

(3) Find the values of Dx and D for the equations.

$2x + 3y = 4$; $7x - 5y = 2$

(4) Find the value of $x + y$, if $15x + 17y = 85$ and $17x + 15y = 75$.

Q 3 A Complete the given activity. **3**

Solve : $97x + 103y = 497$; $103x + 97y = 503$

Solution :

$103x + 97y = 503$ .... (I)

$+ \quad 97x + 103y = 497$ .... (II)

$200x + 200y =$ [ ] .... Adding (I) and (II)

Dividing by 200, we get

$\therefore x + y =$ [ ] ....(III)

$103x + 97y = 503$ .... (I)

$-97x \pm 103y = -497$ .... (II)

[ ] $- 6y = 6$ .... by subtracting (II) from (I)

Dividing the equation by 6, we get

$\therefore x - y =$ [ ].... (IV)

By solving equations (III) and (IV) we get,

$\therefore x =$ [ ] ; $y =$ [ ]

Q 3 B Solve. **6**

(1) $x + y$ [$x + 7$ / I am a rectangle / $y + 8$] $3x - 2y$ → Find my length and breadth from the given information.

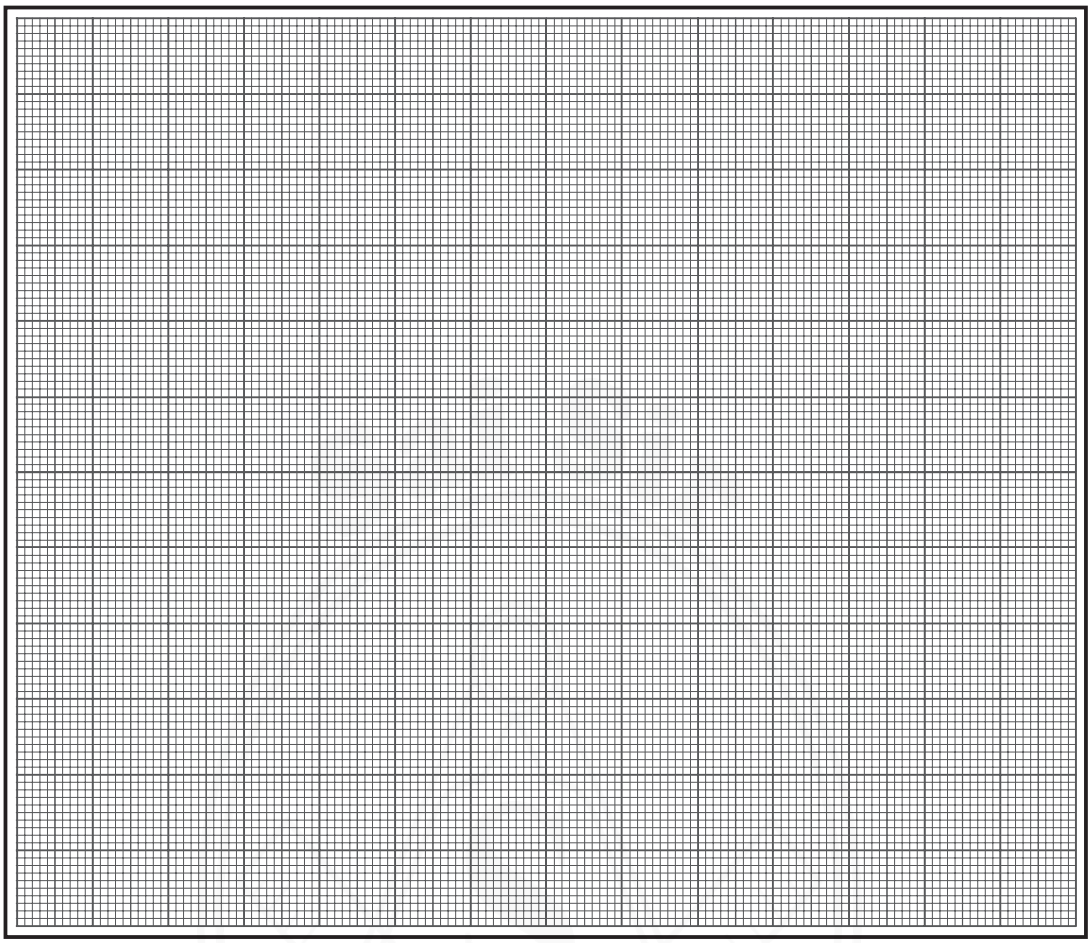
(2) Solve the following equations.

$3x - y = 7$; $x + 4y = 11$

Q 4 Solve. **8**

(1) Solve the following equations by graphical method

$x + y = 1$; $2x + 3y = 0$.



(2) The sum of two numbers is 25. If thrice the smaller number is subtracted from twice the larger number, the subtraction is also 25. Find the numbers.

Q 5 While solving the given simultaneous equations by Cramer's method, the determinants D, D_x and D_y were obtained as follows. **3**

$$D = \begin{vmatrix} 2 & 3 \\ 1 & 2 \end{vmatrix}; \qquad D_x = \begin{vmatrix} 4 & 3 \\ 5 & 2 \end{vmatrix}; \qquad D_y = \begin{vmatrix} 2 & 4 \\ 1 & 5 \end{vmatrix}$$

Find out the equations.

2. Quadratic equations

Marks 35

Q 1 A Choose and write the correct alternative. **3**

(1) The sum of the roots of one of the following equations is 3. Which one is the equation ?

(A) $x^2 - 3x + 2 = 0$ (B) $x^2 + 3x + 2 = 0$

(C) $3x^2 + 6x + 10 = 0$ (D) $x^2 + 3x - 2 = 0$

(2) Which one of the following is not a quadratic equation ?

(A) $x^2 = 6x$ (B) $x^2 - 6x = 30$

(C) $x^2 = 10$ (D) $x^2 + 6\sqrt{x} = 10$

(3) Find the discriminant of $x^2 + 5x - 6 = 0$

(A) 49 (B) 1 (C) 5 (D) 6

Q 1 B Solve. **2**

(1) Check whether $x = -3$ is a root of the quadratic equation $x^2 + 4 = 13$.

(2) In the general form of the quadratic equation $x^2 + 3x = 5$, what are the values of 'a' and 'c'.

Q 2 A Write the nature of roots from the given values of the discriminants and complete the activity. **2**

Value of the discriminant	Nature of roots
25	
– 23	
0	
10	

Q 2 B Solve. **8**

(1) Write the following equations in the form $ax^2 + bx + c = 0$.

(1) $2x^2 = 5x - 6$ (2) $x(x + 2) = 5$

(2) Decide whether $x = 2$ is a solution of $x^2 + 4x - 12 = 0$.

(3) Find the discriminant of $2x^2 + 10x + 21 = 0$.

(4) Write the sum and the product of the roots of $2x^2 + 10x - 5 = 0$.

Q 3 A Complete the following activity to solve the equation. **3**

Solve the quadratic equation $9x^2 + 6x = 4$ by using quadratic formula.

Solution : $9x^2 + 6x - 4 = 0$ ..... General form

$\therefore\ a = 9\ ;\ b = 6\ ;\ c = -4$ ..... comparing with general form

Quadratic Formula,

$x = \dfrac{-b \pm \sqrt{\square}}{2a}$ .... Formula

$\therefore\ x = \dfrac{-6 \pm \sqrt{\square}}{2 \times 9}$ .... putting the values of a, b, c

$\therefore\ x = \dfrac{-6 \pm \sqrt{\square}}{18}$ .... simplifying

$\therefore\ x = \dfrac{-6 \pm \square\sqrt{\square}}{18}$ .... simplifying further

$\therefore\ x = \dfrac{-1 \pm \sqrt{5}}{\square}$ .... by taking out common factor 6 and cancelling with denominator

Q 3 B Solve. **6**

(1) If $x = 4$ is a root of $x^2 - 9x + k = 0$, find the value of k and hence find the other root.

(2) One of the roots of a quadratic equation is $4 - \sqrt{7}$. Find the equation.

Q 4 Solve. **8**

(1) The sum of a number and its reciprocal is $\frac{13}{6}$. Find the number.

(2) Find the quadratic equation whose roots are the reciprocals of the roots of $x^2 + 4x - 10 = 0$.

Q 5 Find out any two values of m so that the roots of $x^2 + mx - 24 = 0$ are integers and write those equations. **3**

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3. Arithmetic Progression

Marks 35

Q 1 A Choose and write the correct alternative. **3**

(1) The first term of an A. P. is 3 and the common difference is also 3. Which of the following is that A. P. ?

(A) 3, 3, 3, 3 ..... (B) 3, 6, 9, 12, ...

(C) 3, 4, 5, 6, ... (D)3, 9, 27, 81...

(2) In an A. P., $a = 5$, $d = 0$; find t_5 .

(A) 25 (B) 9 (C) 0 (D) 5

(3) Write the value of x in the A. P. 3, 7, 11, x, 19 ... .

(A) 16 (B) 18 (C) 15 (D)17

Q 1 B Solve. **2**

(1) In the formula $t_n = a + (n\text{-}1)d$, what do a and d denote?

(2) Write the formula for the sum of first n natural numbers.

Q 2 A Sovle. **2**

In an A. P., $t_{10} = 43$ and $d = 5$. Complete the following activity to find the first term of the A. P.

$t_n = a + (n - 1)d$

$\therefore t_{10} = a + (\square - 1)\square$,

$\therefore \square = a + 45$

$\therefore a = \square$

Q 2 B Solve. **8**

(1) (i) Write first 5 terms of an A. P. having common difference 6.

(ii) Write first 5 terms of an A. P. having common difference -4.

(2) State, with reason, whether the sequence 12, 14, 16, 18, 22, 24, 26, 28, 32, 34, 36, 38, ... is an A. P.

(3) In an A. P. if $a = 1$, $d = 3$ then find t_{11}.

(4) In an A. P. if $a = 2$ and $t_5 = 12$, find t_2, t_3, t_4.

Q 3 A Complete the following activity. **3**

(1) If nineth term of an A.P. is zero then show that 29^{th} term is double the 19^{th} term.

Solution : $t_n = a + (n\text{-}1)d$ ..... Formula

$\therefore t_9 = a + (9\text{-}1)d$ ..... putting $n = 9$

$\therefore 0 = a + 8d$ ($\because t_9 = 0$ is given)

$\therefore a =$ [ ]

Now, $t_{29} =$ [ ]

$=$ a + [ ]

$=$ [ ] + [ ]

$=$ [ ] ....(I)

$t_{19} = a + (19\text{-}1)d$

$= a + 18d$

$= -8d + 18d$

$= 10d$ ....(II)

Form (I) and (II) it is proved that $t_{29} = 2 \times t_{19}$

Q 3 B Solve. **6**

(1) The first term of an A. P. is 1 and the sum of first 15 terms is 225, find the common difference.

(2) Consider the A. P. 4, 11, 18, 25, 32, ... The term t_n in this A. P. is 368. Find n.

Q 4 Solve. **8**

(1) In a district co-operative bank, Mr. Surendra invested Rs. 500 in 2001, Rs. 1500 in 2002, Rs. 2500 in 2003. If he keeps on investing in the bank upto 2020 in the same manner, how much investment will there be in his account at the end of 2020 ?

(2) Find the sum of all even numbers between 1 and 150.

Q 5 In the expression $3n - 10$, substitute values 1, 2, 3, 4, and 5 for n and write the values of the expression in order. State, with reason, whether the sequence obtained is an A. P. 3

■ ■ ■

4. Financial Planning

Marks 30

Q 1 A Choose and write the correct alternative. **2**

(1) The rate of GST on the spices is 5% which includes the rate of CGST ..... .

(A) 5% (B) 10% (C) 2.5% (D) 0.5%

(2) Philomina sold 45 shares at Rs. 120 market price. She invested the amount she got in shares at Rs. 75 market price. How many shares did she get ?

(A) 100 (B) 80 (C) 72 (D) 75

Q 1 B Solve. **2**

(1) In the tax invoice if the amount of CGST is ₹ 45 then what should be the amount of SGST ? why ?

(2) If the face value of a share is ₹ 10 and the share is at discount of ₹ 3, so the price of the share is ₹ 7.Which term is used for this price of the share ?

Q 2 A Solve by completing the activity. **2**

(1) Vanita invested Rs. 15,000 in shares of F. V. Rs. 100 at Rs. 50 premium. Complete the following activity to find how many shares she got.

Solution : MV = FV + ☐

= 100 + ☐ = ☐

$$\text{Number of shares} = \frac{\text{Total investment}}{\text{MV}} = \frac{15000}{150}$$

= ☐

Q 2 B Solve **8**

(1) The taxable cost of 1 kg of tea is Rs. 480. The rate of GST is 5%. Calculate how much a customer has to pay for 500 gm of tea.

(2) Rohit purchased 300 shares of face value Rs. 10 at Rs. 5 premium. He had to pay 0.5% brokerage. How much total amount did he spend ?

(3) The face value of a share is Rs. 100. Aakash purchased 25 shares when its market value was Rs 70. In the year, the company declared 20% dividend. Find the rate of return Aakash got on his investment.

(4) The market value of a mutual fund is Rs. 15 crore. The company has divided it into 60 lakh units. Find the NAV of each unit. If Sarala invests Rs. 12, 000 in the fund, how many units will she get ?

Q 3 A Complete the given activity. **3**

(1) Smt. Bhavika Sanghavi is a retail trader. She has paid GST of ₹ 6000 on purchase for the month of July 2019. She has collected GST of ₹ 8000 on sale for the said month. Find the GST payable for July 2019.

Solution : GST payable is the GST to be paid to central and state government.

(i) Output tax = ₹

(ii) Input tax = ₹

(iii) ∴ Input tax credit (ITC) = ₹

(iv) ∴ GST payable = Out put tax on sale - ITC (on purchase)

= ₹

(v) ∴ CGST payable = ₹ (vi) SGST payable = ₹

Q 3 B Solve. **6**

(1) Robert decided to purchase a washing maching. Its printed price was Rs. 27,000. The shopkeeper gave a discount of 5% on it. The rate of GST on washing machine is 28%. Calculate the CGST and SGST charged by the shopkeeper. Also, find the cost for which Robert got the machine.

(2) Mrunal purchased shares as follows -
Company A : 200 shares, FV = Rs. 10, MV = Rs. 25
Company B : 1250 shares, FV = Rs. 100, MV = Rs. 80
How much amount did she spend ?

Q 4 Solve. **4**

A wholesale dealer purchased spare parts of scooter with taxable price of Rs. 2,50,000. He sold the whole lot to a retailer at a taxable price of Rs. 2,80,000. After selling the lot the retailer got a taxable amount of Rs. 3,50,000. If the rate of GST is 28%, how much GST did the wholesaler pay ? How much GST did he charge to the retailer ? Find the GST payable by wholesaler ?

Q 5 Shares of FV Rs. 10 of two companies are available as follows.
Company A : MV Rs. 25, rate of dividend 24%
Company B : MV Rs. 20, rate of dividend 18%
State with reason, which shares you will prefer to purchase ? **3**

5. Probability

Marks 30

Q 1 A Choose and write the correct alternative. **2**

(1) If a dice is tossed, the probability of its upper face bearing an odd number is .....

(A) 3 (B) $\frac{3}{5}$ (C) $\frac{1}{2}$ (D) 6

(2) Find the probality of getting a queen from a well shuffled pack of 52 playing cards.

(A) $\frac{1}{13}$ (B) $\frac{1}{52}$ (C) $\frac{4}{13}$ (D) $\frac{12}{52}$

Q 1 B Solve. **2**

(1) If one die is rolled and event A is of getting even number on the upper face then write the favourable outcomes of event A and $n(A)$.

(2) For an event B if $P(B) = \frac{1}{2}$, $n(S) = 52$ then find $n(B)$.

Q 2 A Solve by completing the activity. **2**

An event is, 'getting at the most one tail when two coins are tossed'. Complete the activity to find the probability of the event.

S = {HH, ☐, ☐, TT} ∴ $n(S) = 4$

A : Getting at the most one tail.

$\therefore$ A = {HH, ☐, TH} $\therefore$ $n(A) = 3$

$P(A) = \dfrac{n(A)}{n(S)}$

$P(A) = \boxed{\dfrac{\quad}{\quad}}$

Q 2 B Solve. **8**

(1) Write the sample space (S) for the experiment of tossing two coins. Write $n(S)$ also.

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____

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(2) 'Write the sample space (S) and $n(S)$ for 'Form a two digit number using the digits 0, 1, 2, 3 ; without repetition'.

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____

(3) A committee of two is to be formed from two boys (B_1, B_2) and two girls (G_1, G_2). Write the sample space S and n(S).

____

____

____

____

(4) A bag contains 3 red and 3 green balls. Write the sample space S and $n(S)$ for the experiment of 'drawing two balls at random simultaneously from the bag'.

Q 3 A Complete the given activity. **3**

(1) Two dice are thrown, find the probability of the following event.

Event D : The sum of the numbers on upper faces is at least 10.

Solution : Sample space - S = {(1,1), (1,2), (1,3), (1,4), (1,5), (1,6), (2,1), (2,2), (2,3), (2,4), (2,5), (2,6), (3,1), (3,2), (3,3), (3,4), (3,5), (3,6), (4,1), (4,2), (4,3), (4,4), (4,5), (4,6), (5,1), (5,2), (5,3), (5,4), (5,5), (5,6), (6,1), (6,2), (6,3), (6,4), (6,5), (6,6)}

$\therefore$ $n(S)$ = [ ]

Event D : The sum of the numbers on upper faces is at least 10, means the sum should be 10, 11 or 12.

$\therefore$ D = { [ ] }

$\therefore$ $n(D)$ = [ ]

$\therefore P(D) = \frac{[\ ]}{[\ ]} = \frac{[\ ]}{[\ ]} = \frac{[\ ]}{[\ ]}$

Write the formula — Write the values — Write the answer in simplified form.

Q 3 B Solve. **6**

(1) A committee of three is to be formed from three boys and three girls. Find the probability of the following events.

(i) The committee consists of at least two girls.

(ii) The committee consists of at the most one girl.

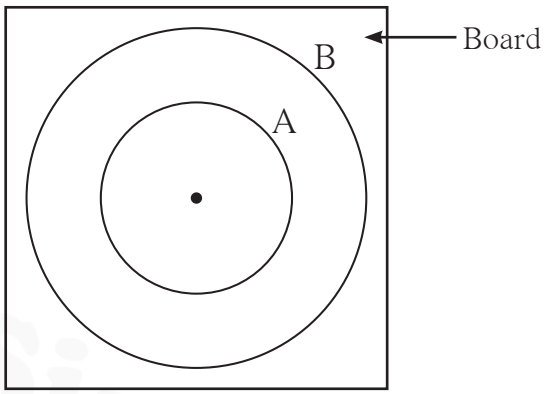
(2) Two digit numbers are to be made using the digits 3, 5, 6 and 8, without repetition of digits. Find the probability of the following events.
(i) The number is odd.
(ii) The number is divisible by 9.

Q 4 **Sovle.** **4**

A number is selected at random from first 100 whole numbers. Find the probability that the number is divisible by 8 or 12.

Q 5 **Solve.** **3**

There are two concentric circles A and B, of radius 5 and 10 cm respectively, on a board for a contest of archery. An arrow shot by Yajuvendra will certainly hit inside the larger circle.



Find the probability of the following events.

(1) The arrow will hit inside the circle A.

(2) The arrow will hit between the two circles A and B.

6. Statistics

Marks 35

Q 1 A Choose and write the correct alternative. **2**

(1) A survey revealed that 40% of the students like foot ball. To show this information by pie diagram, the degree measure of the sector should be ..... .

(A) 80° (B) 72° (C) 40° (D) 144°

(2) If $\Sigma f_i x_i = 20$ and $\Sigma f_i = 4$, what is the mean of the data.

(A) $\frac{1}{5}$ (B) 80 (C) 16 (D) 5

Q 1 B Solve. **2**

(1) Find the class mark for the class.

199.5 - 209.5

(2) In a pie chart if a sector for two wheelers shows 72% of the total vehicles, then find the measure of central angle for the sector showing two wheelers.

Q 2 A Complete the following table. **2**

Given Classes	Continuous Classes	Frequency	Cumulative frequency less than type
100 - 109	99.5 - 109.5	☐	6
110 - 119	109.5 - 119.5	18	☐
120 - 129	119.5 - 129.5	☐	40
130 - 139	129.5 - 139.5	☐	50
		50	

Q 2 B Solve. **6**

(1) The following table shows the frequency distribution of marks out of 100 obtained by the students in an examination. Prepare a 'greater than or equal to type' cumulative frequency table.

Marks	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Number of Students	3	21	25	40	11

(2) In step deviation method $\Sigma f_i u_i = -4$ and $\Sigma f_i = 40$. Find the value of $\bar{u}$.

(3) The following table shows specific quota of sugar for four ration-shops in a city. Find the central angles to draw a pie chart of the information.

Shop	A	B	C	D
Supply of sugar (Quintal)	25	12	8	15

Q 3 A Complete the given activity. **3**

Age of eye donors (yrs) Classes	Continuous Classes	Class Marks	No. of eye donors Frequency	Co-ordinates of points
15-19	14.5-19.5	17	0	(17, 0)
20-24	19.5-24.5	22	48	(22, 48)
25-29	.....	27	46	(27, 46)
30-34	29.5-34.5	32	45	(32, 45)
35-39	34.5-39.5	.....	34	.....
40-44	39.5-44.5	42	15	(42, 15)
45-49	44.5-49.5	47	12	(47, 12)
50-54	.....	.....	0	.....

Note : From the above data draw frequency polygon on a graph paper by taking suitable scale.

Q 3 B Solve. **9**

(1) The marks obtained by the students in an examination of 400 marks is given in the following frequency distribution table. Find the mean of the distribution.

Marks	200-240	240-280	280-320	320-360	360-400
Frequency	10	20	30	24	16

(2) The following table shows the utilisation of electricity for different appliances in a home. Present the information by a pie diagram.

Appliances	Lamps	Freeze	Geiser	Other
Utilisation of Electricity	35%	20%	15%	30%

(3) Show the following information by a histogram.

Daily wages (Rupees)	0-100	100-200	200-300	300-400	400-500	500-600
No. of workers	15	18	24	20	17	6

Q 4 Solve. **8**

(1) The following table shows the number of workers in a factory and their daily wages. Find the median of the daily wages.

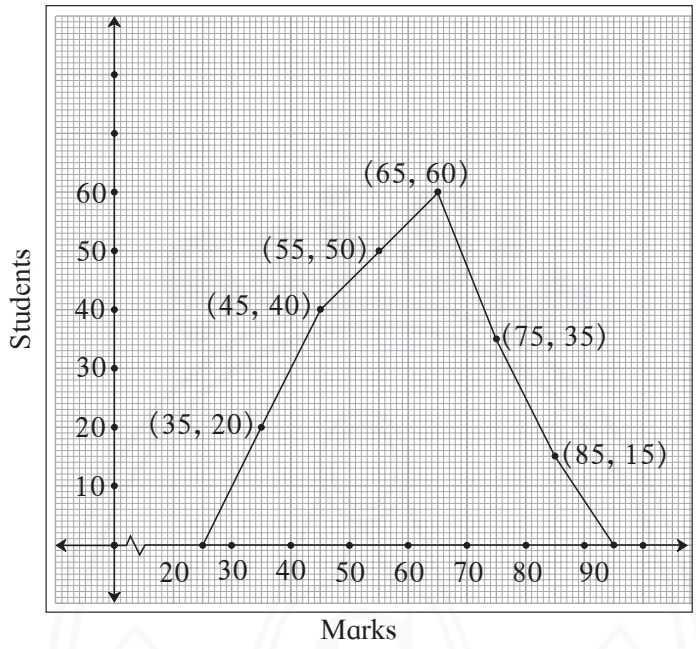
Daily wages (Rupees)	100-110	110-120	120-130	130-140	140-150	150-160
No. of workers	37	38	40	33	28	24

(2) The following table shows the number of employees in a company and their ages. Find the mode of the ages.

Age (Years)	35-40	40-45	45-50	50-55	55-60
No. of Employees	7	6	9	5	3

Q 5 Solve. **3**

(1) Observe the following frequency polygon and complete the frequency distribution table.



Class	30–40	40–50	50–60	60–70	70–80	80–90
Frequency						

■ ■ ■

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Swadhyay Pustika

(For Internal Evaluation of Private Candidates)

Std X

Subject : Mathematics Part -2

Name of the Student : _____

Exam Seat No. _____ Medium : _____ Year : _____

Centre No : _____ Name of Centre : _____

Sr. No.	Unit	Questionwise Marks					Total Marks Obtained	Total Marks for the Unit
		1	2	3	4	5		
1	Similarity							35
2	Pythagoras Theorem							20
3	Circle							40
4	Geometric Construction							25
5	Co-ordinate Geometry							30
6	Trigonometry							25
7	Mensuration							25
	Total							**200**

1. Similarity

Marks 35

Q 1 A Choose and write the correct alternative. **2**

(1) The base and height of *a* triangle is 9 and 5 respectively. The base and height of another triangle is 10 and 6 respectively. Find the ratio of the area of the first triangle to the area of the other triangle.

(A) 9 : 5 (B) 5 : 3 (C) 3 : 4 (D) 4 : 3

(2) Δ PQR ~ Δ ABC, PQ = 4 cm, QR = 6 cm and PR = 5 cm. If AB = 8 cm then find the perimeter of Δ ABC.

(A) 15 cm (B) 30 cm (C) 20 cm (D) 25 cm

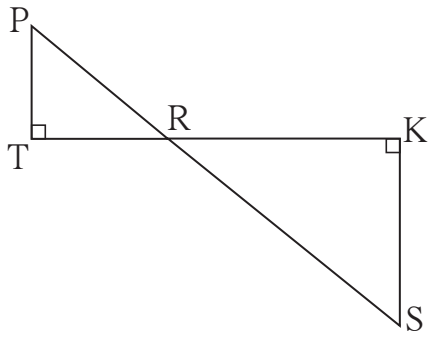
Q 1 B Solve. **2**

(1) Δ ABC ~ Δ PQR. A(Δ ABC) : A(Δ PQR) = 81:49, write the ratio AC:PR.

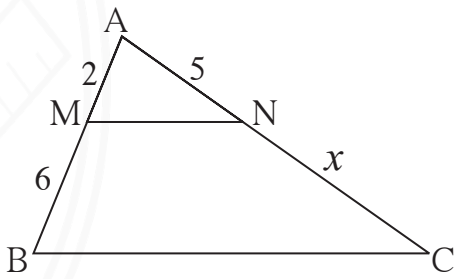
(2) The base and height of Δ LMN are 8 cm and 6 cm respectively. The base and height of Δ DEF are 10 cm and 4 cm respectively. Write the ratio A(Δ LMN) : A(Δ DEF).

Q 2 A Solve. **6**

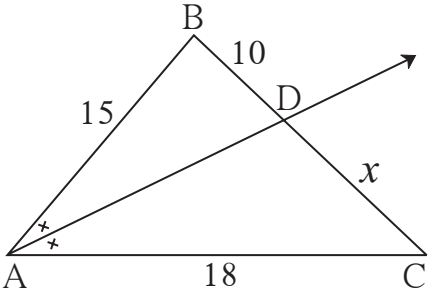
(1) In the figure, seg PS intersects seg TK in the point R. ∠ T and ∠ K are right angles. State whether Δ PTR and Δ SKR are similar. If yes, by which test ?



(2) In Δ ABC, seg MN || seg BC, If BM = 6, AN = 5, AM = 2, then find NC.



(3) In the adjoining figure, seg AD is the bisector of ∠ BAC. Find x from the other information shown in the figure.



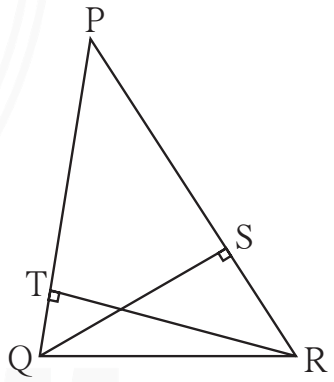
Q 2 B Δ ABC $\sim$ Δ PQR, A(Δ ABC) = 80, A(Δ PQR) = 245. Complete the activity to find $\frac{AB}{PQ}$. **2**

$$\frac{A(\Delta\ ABC)}{\square} = \frac{80}{245}$$

$$\frac{AB^2}{PQ^2} = \frac{\square}{\square} \qquad \therefore \frac{AB}{PQ} = \frac{4}{\square}$$

Q 3 A **Write the proof by completing the activity.** **3**

(1) In the adjacent figure, in Δ PQR, seg QS $\perp$ seg PR, seg RT $\perp$ seg PQ. Prove that : Δ PQS $\sim$ Δ PRT. Fill in the following boxes and complete the proof.



Proof : In Δ PQS and Δ PRT,

$\angle$ PSQ = $\square^\circ$ .... (I)

$\angle$ PTR = $\square^\circ$ .... (II)

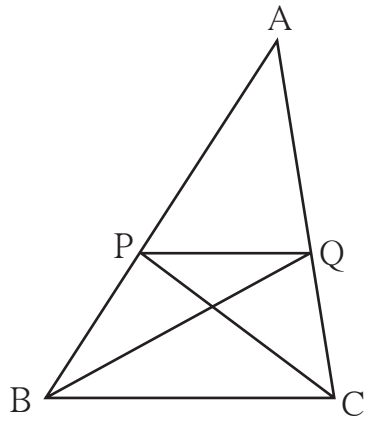
$\therefore$ $\angle$ PSQ $\cong$ $\square$ .... (I) and (II)

$\angle$ QPS $\cong$ $\square$ .... Common angle.

$\therefore$ $\square$ $\sim$ Δ PRT .... ($\because$ $\square$)

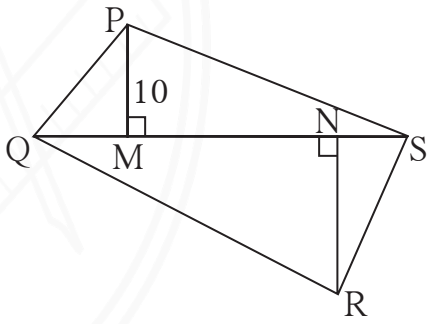
Q 3 B Solve. **9**

(1) In the given figure,
in Δ ABC, A-P-B and A-Q-C
seg PQ || seg BC.
seg PC and seg QB are drawn.
Prove that, $\frac{AP}{PB} = \frac{AQ}{QC}$
Write the proof.

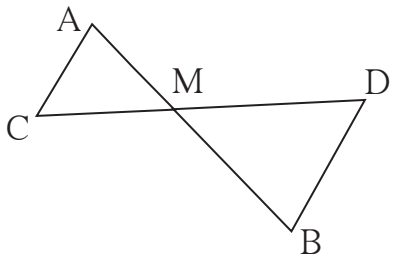


Proof :

(2) In the figure,
A(Δ PQS) = 100 cm^2
A(Δ QRS) = 150 cm^2
PM = 10 cm then, find NR.

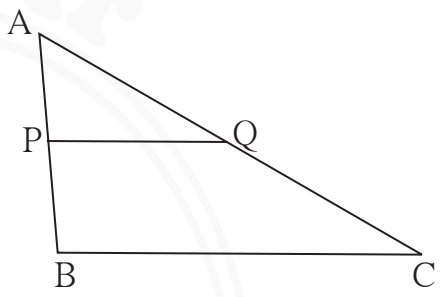


(3) seg AB and seg CD intersect each other at point M.
If AM × MD = CM × MB
then show that
∠ CAB ≅ ∠ DBA.

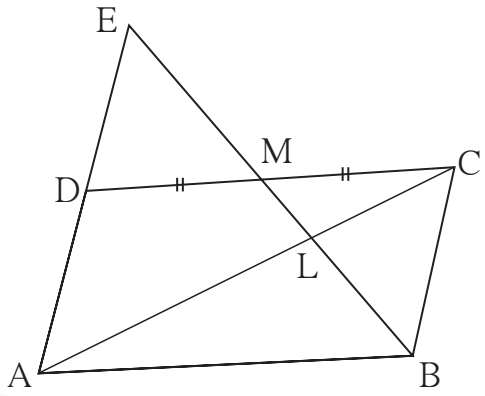


Q 4 Solve. **8**

(1) In the adjoining figure, seg PQ ‖ seg BC, AP : PB = 3 : 5 If A(□PQCB) = 160, then find A(Δ ABC).



(2) M is the midpoint of the side DC of a parallelogram ABCD. Line BM intersects seg AC at point L and line AD at point E.
Prove that, EL = 2BL



Q 5 Explain whether two similar triangles may be congruent as well. **3**

2. Pythagoras Theorem

Marks 20

Q 1 Choose and write the correct alternative. **2**

(1) Out of the following which is a Pythagorean triplet ?

(A) (10, 24, 27) (B) (3, 4, 5)

(C) (1, 2, 3) (D) (4, 9, 12)

(2) Length of a diagonal of a square is $15\sqrt{2}$ cm. Find its perimeter.

(A) 15 cm (B) 30 cm

(C) 45 cm (D) 60 cm

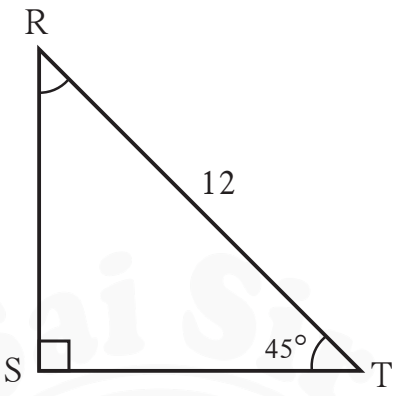
Q 2 A Solve. **4**

(1) Length of the hypotenuse of a right angled triangle is 61 cm. Its one side is 11 cm. Find the length of the other side.

(2) In ΔABC, $\angle BAC = 90°$, seg AD $\perp$ seg BC and B-D-C, BD = 3, DC = 12, then find AD.

Q 2 B Complete the following activity. **2**

(1) In Δ RST, $\angle$ S = 90°, $\angle$ T = 45°, RT = 12 cm. Find RS and ST.



In Δ RST, $\angle$ T = 45°, $\angle$ S = 90°,

$\therefore$ $\angle$ R =

According to 45°- 45°- 90° theorem

RS = $\frac{1}{\sqrt{2}}$ × ☐

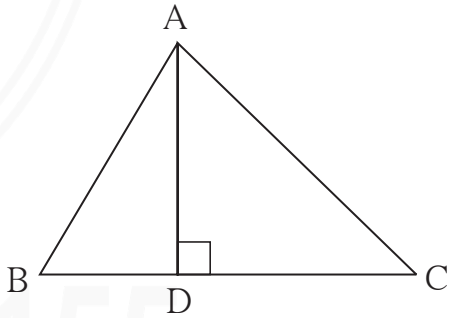
= ☐

ST = ☐/— × RT

= ☐

Q 3 A Complete the following activity. **3**

(1) In the adjoining figure
seg AD $\perp$ seg BC, B-D-C.
Show that
$AB^2 + CD^2 = AC^2 + BD^2$.



In Δ ABD, $AB^2 = AD^2 + BD^2$ ..... $\because$ Pythagoras Theorem

$\therefore$ $AD^2 = AB^2 - BD^2$ .... (I)

In Δ ACD, ☐ $= AD^2 + DC^2$ .... $\because$ ☐

$\therefore$ ☐ $= AC^2 -$ ☐ .... (II)

$\therefore$ $AB^2 -$ ☐ = ☐ $- DC^2$.... from (I) and (II)

$\therefore$ $AB^2 + CD^2 = AC^2 + BD^2$.

Q 3 B Seg AD is a median of Δ ABC. If AB = 12, AD = 10, AC = 16 then find BC. **3**

Q 4 **Solve.** **4**

Find the radius of the incircle of a triangle whose sides are 15, 20, 25.

Q 5 **Solve.** **2**

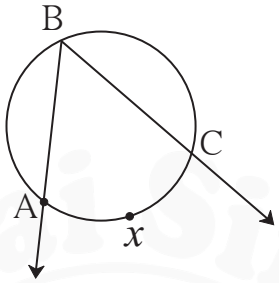
In Δ PQR, $\angle$ Q is an acute angle. Show that $PR^2 < PQ^2 + QR^2$

3. Circle

Marks 40

Q 1 A Choose and write the correct alternative. **5**

(1) In the given figure

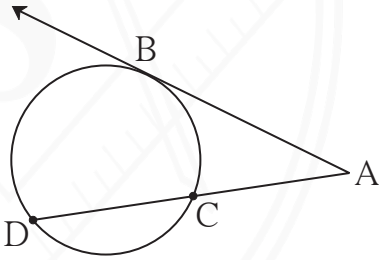


$m \angle ABC = 35°$, then m(arc AXC) = ...

(A) 100° (B) 140° (C) 70° (D) 17.5°

(2) In the given figure,

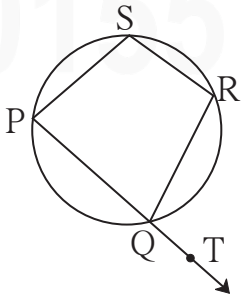
AC = 9, CD = 16, then AB = ?



(A) 16 (B) 15 (C) 17 (D) 12

(3) In the given figure, in □ PQRS,

if $\angle RSP = 80°$ then $\angle RQT$ = ...



(A) 100° (B) 80°

(C) 70° (D) 110°

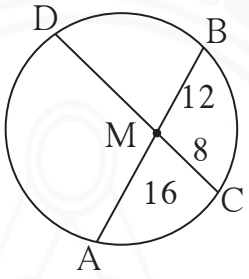
(4) Measure of angle inscribed in a semicircle is .....

(A) 90° (B) 120° (C) 100° (D) 60°

(5) In the given figure if MB = 12, MA = 16, MC = 8 then MD = ?

(A) 20 (B) 24

(C) 12 (D) 30



Q 1 B Solve 3

(1) Two circles with radii 16 and 4.8 touch each other externally. Find the distance between their centres.

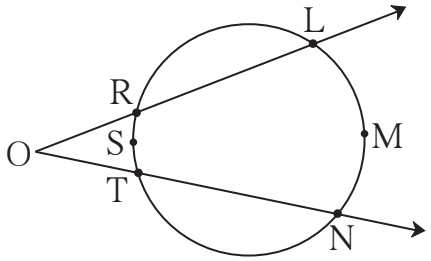
(2) State whether the following statement is true or not.

'If measures of arcs of two different circles are equal then the two arcs are congruent.'

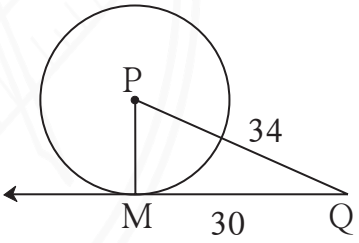
(3) What is the type of an angle inscribed in a major are of a circle ?

Q 2 **Solve.** **12**

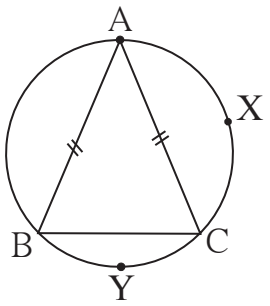
(1) In the figure if m(arc RST) = 32 and m(arc LMN) = 128 then $\angle$ LON = ?



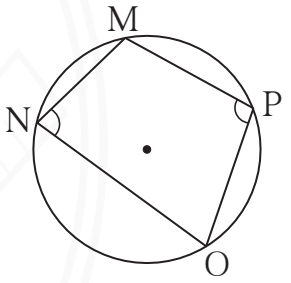
(2) P is the centre of the circle and seg QM is a tangent to the circle at point M.
If QM = 30, and PQ = 34, then find the radius of the circle.



(3) In the figure, in Δ ABC
chord AB $\cong$ chord AC
$\angle$ BAC = 40°
then (I) m(arc BYC) = ?
(II) m (arc AXC) = ?

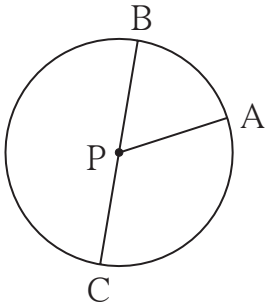


(4) In the given figure $\square$MNOP is a cyclic quadrilateral.
If $\angle$P = $4x$ + 12, and
$\angle$N = $3x$ + 28 then find the value of x.
Complete the following activity.

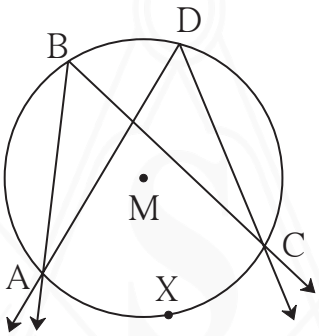


Opposite angles of a cyclic quadrilateral are $\square$
$\therefore$ $\angle$ P + $\square$ = 180°
$\therefore$ $(4x + 12)+(3x + 28) = \square$
$\therefore$ $7x + 40 = 180°$
$\therefore$ $7x = 140°$
$\therefore$ $x = \square$

(5) In the figure, P is the centre of the circle, BC is a diameter.
If $\angle$APB = 30°
then find (i) m(arc AC)
(ii) m(arc AB)
(iii) m(arc ACB)



(6) Complete the proof of the theorem 'Angles in the same arc are congruent' with the help of given figure.



Proof :

Arc intercepted by $\angle$ ABC = ☐

Arc intercepted by $\angle$ADC = ☐

☐ = $\frac{1}{2}$ m(arc AXC) ..... (I)

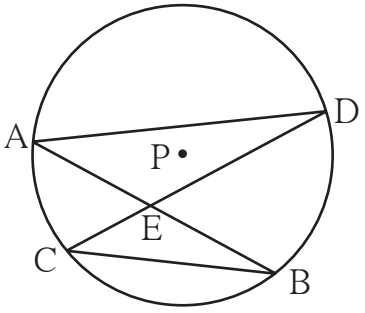
☐ = $\frac{1}{2}$ m(arc AXC) ..... (II)

From (I) and (II),

$\therefore$ $\angle$ ABC $\cong$ $\angle$ ADC

Q 3 A Solve **3**

(1) In the adjacent figure, chords AB and CD of a circle with centre P intersect each other at point E. Chords AD and CB are drawn.



Complete the following activity to prove that.

$AE \times EB = CE \times ED$.

Proof : In Δ CEB and Δ AED,

$\angle$ CEB $\cong$ $\angle$ AED ..... [ ]

$\angle$ BCE $\cong$ [ ] ..... Angles inscribed in the same arc.

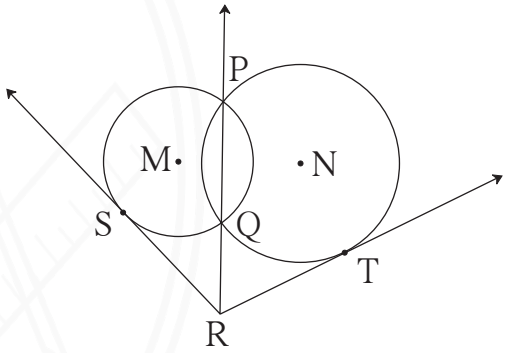
$\therefore$ [ ] $\sim \Delta$ AED ..... A-A test of similarity

$\therefore \frac{CE}{AE} = \frac{[\ ]}{ED}$ ..... [ ]

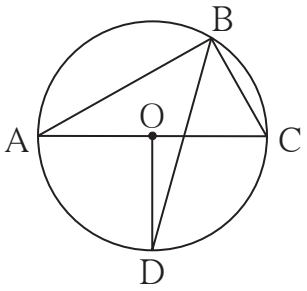
$\therefore$ AE $\times$ [ ] = CE $\times$ ED

Q 3 B Solve **6**

(1) Two circles with centres M and N intersect each other at P and Q. The tangents drawn from point R on the line PQ touch the circles at S and T.
Prove that, RS = RT.

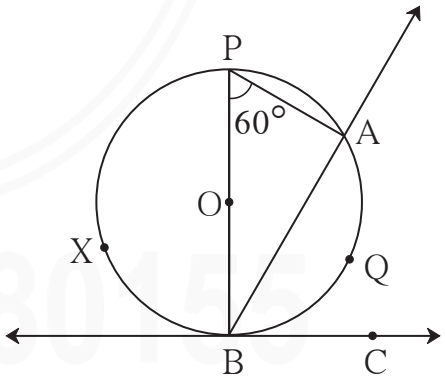


(2) In the figure, seg AC is a diameter of the circle with centre O. Bisector of ∠ ABC intersects the circle at D.
Prove that, seg OD ⊥ seg AC

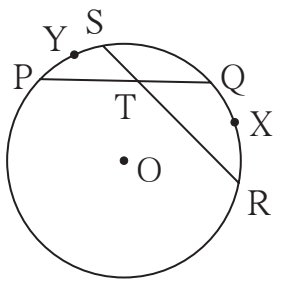


Q 4 Solve. **8**

(1) O is the centre and PB is a diameter of the circle. BC is the tangent of the circle with B as point of contact. If ∠APB = 60^{o} then (i) m(arc AQB) = ?
(ii) ∠ ABC = ?
(iii) ∠ PBA = ?
(iv) m(arc APB) = ?



(2) In the adjoining figure, chord PQ and chord RS intersect each other at point T.



Prove that -

$\angle$ PTS = $\frac{1}{2}$ [m(arc PYS) + m(arc QXR)]

Q 5 C is the centre and RS is a diameter of a circle. P is any point in the interior of the circle. Write the type of $\angle$ RPS and explain with a figure. **3**

4. Geometric Constructions

Marks 25

Q 1 Solve. **2**

(1) For a given circle, while constructing a tangent to it through a point on it, which property of a tangent is used if you make use of the centre of the circle ?

(2) State the property of parallel lines used to divide a given segment in the given number of equal parts.

Q 2 Solve. **8**

(1) Draw segment LM of length 3.7 cm. Draw its perpendicular bisector.

(2) Draw a circle with centre O and radius 2.5 cm. Take point P on the circle and draw a tangent to the circle at point P.

(3) Draw a segment of length 7.3 cm. Divide it into five equal parts.

(4) In Δ LMN, MN = 4.0 cm, LN = 3.5 cm, LM = 3.2 cm. In Δ STV, ST = 6.4 cm. Δ STV $\sim$ Δ LMN. Construct Δ STV.

Q 3 Draw a circle of radius 3 cm. Draw its two radii making an angle of 120° measure at the centre. Construct tangents to the circle passing through the outer ends of the radii. **3**

Q 4 Solve. **9**

(1) Draw a circle with centre P and radius 2.7 cm. Take a point Q at a distance of 5.8 cm from P. Draw tangents to the circle from point Q.

(2) Draw a circle with radius 3.3 cm. Draw a tangent to the circle through a point on it, without condsidering the centre of the circle.

(3) In Δ XYZ, $\angle$ X = 50^{o}, XY = 4.2 cm, XZ = 3.6 cm. Construct Δ XYZ. Also construct Δ XMN such that $\frac{XY}{XM} = \frac{4}{5}$ and Δ XYZ $\sim$ Δ XMN.

Q 5 Draw an angle of 45° measure. Construct a circle such that it touches both the arms of the angle. **3**

5. Co - ordinate Geometry

Marks 30

Q 1 A **Choose and write the correct alernative.** **2**

(1) Find the co-ordinates of the midpoint of a line segment joining P(5,7) and Q (–3, 3).

(A) (2, 4) (B) (1, 5) (C) (4, 2) (D) (2, 5)

(2) Find the distance of the point A(3, –4) from the origin.

(A) 7 (B) –1 (C) 1 (D) 5

Q 1 B **Solve.** **2**

(1) Find the distance between the points R(-3, 4) and S(5, 4).

(2) What is the slope of a line which makes an angle of 30° with the positive direction of X-axis ?

Q 2 **Solve.** **10**

(1) Find the distance between the points P(–5, –4) and Q(3, –7).

(2) If D(−7, 6), E(8, 5) and F(2, −2) are vertices of Δ DEF, find the co-ordinates of centroid of Δ DEF.

(3) Find the slope of the line AB if A(8, −9) and B(−5, 3).

(4) Find the value of k, if slope of line passing through P(k, 3) and Q(1, 2) is $-\frac{1}{3}$.

(5) **Complete the following activity.**

Find the ratio in which point T(−1, 6) divides the line segment joining the points S(−3, 10) and R(6, −8).

By section formula,

$$x = \frac{mx_2 + nx_1}{m+n}$$

$$\therefore -1 = \frac{m \times \square + n \times \square}{m+n}$$

$$\therefore -m - n = \square$$

$$\therefore -m - 6m = -3n + n$$

$$\therefore -7m = -2n$$

$$\frac{m}{n} = \frac{\square}{\square}$$

Q 3 A (1) Complete the following activity to decide whether the points D(0, 3), E(1, 1) and F(3, -1) are collinear or not. **3**

The slope of line DE = $\frac{y_2 - y_1}{x_2 - x_1}$ = $\frac{\square}{1-0}$ = $\square$

The slope of line EF = $\frac{y_2 - y_1}{x_2 - x_1}$ = $\frac{\square}{\square}$ = -1

$\therefore$ the slopes of line DE and line EF are $\square$

$\therefore$ the points D, E, F are $\square$

Q 3 B **Solve.** **6**

(1) Find the point on X axis which is equidistant from the points M(−5, −2) and N(3, 2).

(2) Find k if points A(1, 2), B($\frac{1}{2}$,3) and C(0, k) are collinear.

Q 4 Find the length of median BD of Δ ABC, if A(7, –3), B(5, 3) and C(3, 1). **4**

Q 5 Points D, E and F are the mid-points of sides of Δ ABC. Point G is the centroid of Δ ABC. Show that, the point G is the centroid of Δ DEF also. **3**

■ ■ ■

6. Trigonometry

Marks 25

Q 1 A Choose and write the correct alternative. **2**

(1) If $3\sin\theta = 4\cos\theta$ then $\cot\theta = ?$

(A) $\frac{4}{3}$ (B) $\frac{3}{5}$ (C) $\frac{3}{4}$ (D) $\frac{5}{4}$

(2) $4\sin^2\theta + 4\cos^2\theta =$ .....

(A) -4 (B) 3 (C) 16 (D) 4

Q 1 B **2**

(1) Write the value of $\cot 60°$.

(2) If $\cos 60 \times \sec\theta = 1$, write the value of θ.

Q 2 Solve. **6**

(1) If $\sin\theta = \frac{1}{2}$ then find the value of $\cos\theta$.

(2) If $5 \sin \theta - 12 \cos \theta = 0$ then find the value of $\sec \theta$.

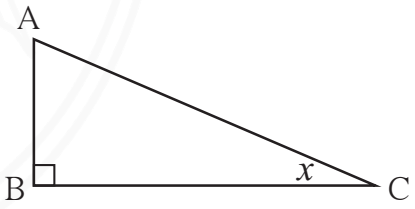
(3) Show that, $\sin^2 \theta (1 + \cot^2 \theta) = 1$

Q 3 A Complete the following activity with the help of adjoining figure. **2**

$\sin x = \square$, $\operatorname{cosec} x = \square$

$\sin x \times \operatorname{cosec} x = \square \times \square$

$= 1$



Q 3 B Complete the following activity to prove that

$\sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sec \theta - \tan \theta$. 3

L.H.S $= \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = \sqrt{\frac{(1-\sin\theta)\times(1-\sin\theta)}{(1+\sin\theta)\times\square}}$

$$= \sqrt{\square}$$

$$= \frac{\square}{\sqrt{\square}}$$

$$= \frac{1-\sin\theta}{\cos\theta} \quad .....(1)$$

R.H.S = sec θ - tan θ

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

$$= \frac{1-\sin\theta}{\cos\theta} \quad .....(2)$$

∴ from (1) and (2), L.H.S = R.H.S

Q 3 B Show that : $\sec^2\theta \times \operatorname{cosec}^2\theta = \sec^2\theta + \operatorname{cosec}^2\theta$ **3**

Q 4 **Solve.** **4**

The height of a light house is 85 m. An observer on it found the angle of depression to a boat to be 30°, which was sailing towards the light house. After 2 minutes, the angle of depression for the same boat was 60°. What was the speed of the boat in km/hr ? ($\sqrt{3}$ = 1.7)

Q 5 Solve. **3**

(1) 'If a trigonometric ratio of an angle is known, we can find all remaining ratios.' Explain whether this statement is true or false.

7. Mensuration

Marks 25

Q 1 A Choose and write the correct alternative. **2**

(1) What is the total surface area of a solid hemisphere having radius r?
(A) $4\pi r^2$ (B) πr^2 (C) $2\pi r^2$ (D) $3\pi r^3$

(2) The measure of an arc of a circle is 90° and its length is 11 cm. What is the diameter of the circle ?
(A) 21 cm (B) 7 cm (C) 14 cm (D) 28 cm

Q 1 B Solve. **2**

(1) The radius of a sphere is R. Find the ratio of its surface area to the area of a circle of the same radius.

(2) The area of a minor segment of a circle is 120, If the area of its corresponding major segment is 194, find the area of the circle.

Q 2 A Solve. **6**

(1) Find the height of a cone whose radius of base is 40 and curved surface area is 1640 π.

(2) The measure of an arc of a circle is 60° and its radius is 15 cm. Find the length of the arc. (π = 3.14)

(3) The ratio of the radii of two circles is 2:3. Find the ratio of their areas. If the area of the bigger circle is 3123 sq. cm, find the area of the smaller circle.

Q 2 B Volume of a cube is 3375 cm^3. Complete the following activity to find the total surface area of the cube. **2**

Volume of cube = l^3

$\therefore$ 3375 = l^3

$\therefore$ ☐ = l

Total surface area of cube = ☐

= ☐

= ☐

Q 3 A The length, breadth and height of a metalic parallelopiped is 16 cm, 11 cm and 10 cm respectively. It was melted and cast into discs. The diameter and thickness of each disc was 4 cm and 0.2 cm respectively. What was the number of discs formed ? $\left(\pi = \frac{22}{7}\right)$ **3**

Complete the following activity and find the answer.

Activity :

Let the number of discs formed be N and the thickness of each disc be T.

Volume of the [ ] = Volume of one disc × Number of discs

The shape of each disc is [ ]

$\therefore$ L × B × H = πR^2 × [ ] × N

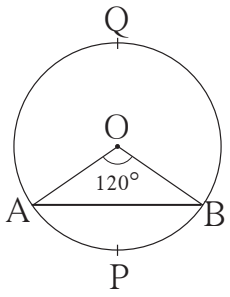
[ ] = [ ] × $(2)^2$ × 0.2 × N ($\because$ diameter of disc is 4 cm)

$\therefore \frac{16 \times 11 \times 10 \times 7 \times 10}{22 \times 4 \times 2}$ = N

$\therefore$ [ ] = N

Q 3 B Radii of the circular faces of a frustum of a cone are 14 cm and 8 cm. If slant height of the frustum is 10 cm then find the curved surface area of the frustum. (π = 3.14) **3**

Q 4 A chord AB of a circle with centre O subtends an angle of 120° at the centre. If the radius of the circle is 30 cm, find the area of the minor segment APB. ($\sqrt{3}$ = 1.7, π = 3.14) **4**



Q 5 The volumes and the heights of a cylinder and a cone are equal. Find the ratio of the radii of their bases. **3**

Notes :

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