

**APEEJAY SCHOOL, FARIDABAD**

**PRE BOARD-II, 2023-24**

**CLASS-X**

**SUBJECT-MATHEMATICS**

**TIME ALLOWED- 3HRS.**

**GENERAL INSTRUCTIONS:**

**MAX.MARKS-80**

- All questions are compulsory.
- This question paper contains 38 questions divided into five Sections A, B, C, D and E.
- Section A has 20 MCQs carrying 1 mark each.
- Section B has 5 questions carrying 2 marks each.
- Section C has 6 questions carrying 3 marks each.
- Section D has 4 questions carrying 5 marks each.
- Section E has 3 case based question (04 marks each) with sub-parts of the values of 1,1,2 marks each respectively.

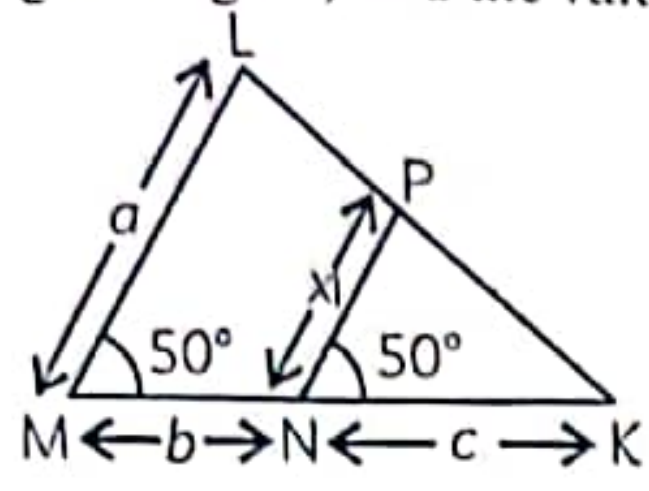
**SECTION – A**

Q1.	The pair of linear equations $2x + 3y = 5$ and $4x + 6y = 10$ is (a) inconsistent (b) consistent (c) dependent consistent (d) dependent inconsistent	1
Q2.	Points A(3, 1), B(5, 1), C(a, b) and D(4, 3) are vertices of a parallelogram ABCD. The values of a and b are respectively (a) a = 6, b = 3 (b) a = 2, b = 1 (c) a = 4, b = 2 (d) a = -4, b = 2	1
Q3.	When 2120 is expressed as the product of its prime factors we get (a) $2 \times 5^3 \times 53$ (b) $2^3 \times 5 \times 53$ (c) $5 \times 7^2 \times 31$ (d) $5^2 \times 7 \times 33$	1
Q4.	The number of revolutions made by a circular wheel of radius 0.7 m in rolling a distance of 176 m is (a) 22 (b) 24 (c) 75 (d) 40	1
Q5.	In $\Delta ABC$ , right angled at B, $AB = 5$ cm and $\sin C = 1/2$ . Determine the length of side AC. (a) 10 cm (b) 15 cm (c) 20 cm (d) 5cm	1
Q6.	In the $\Delta ABC$ , D and E are points on side AB and AC respectively such that $DE \parallel BC$ . If $AE = 2$ cm, $AD = 3$ cm and $BD = 4.5$ cm, then CE equals (a) 1 cm (b) 2 cm (c) 3 cm (d) 4 cm	1
Q7.	The ratio of the total surface area to the lateral surface area of a cylinder with base radius 80 cm and height 20 cm is (a) 1 : 2 (b) 2 : 1 (c) 3 : 1 (d) 5 : 1	1
Q8.	If $4 \tan \theta = 3$ , then the value of $\frac{4 \sin \theta - \cos \theta}{4 \sin \theta + \cos \theta}$ is (a) 1/2 (b) 1/3 (c) 1/4 (d) 1/5	1
Q9.	Two different dice are thrown together. The probability of getting the sum of the two numbers less than 7 is: (a) 5/12 (b) 7/12 (c) 12/5 (d) 3/11	1
Q10.	If $\beta, \alpha$ are zeroes of the polynomial $x^2 - 1$ , then value of $\beta + \alpha$ is: (a) 1 (b) 2 (c) -1 (d) 0	1

Q11	The value of k for which the equations $(3k + 1)x + 3y = 2$ ; $(k^2 + 1)x + (k - 2)y = 5$ has no solution, then k is equal to (a) 3 (b) 2 (c) -1 (d) -2	1														
Q12	The median class of the following data is: <table border="1" style="margin-left: 20px;"> <tr> <td>Marks</td> <td>0 - 10</td> <td>10 - 20</td> <td>20 - 30</td> <td>30 - 40</td> <td>40 - 50</td> <td>50 - 60</td> </tr> <tr> <td>No. of students</td> <td>8</td> <td>10</td> <td>12</td> <td>30</td> <td>22</td> <td>30</td> </tr> </table> (a) 20 - 30 (b) 30 - 40 (c) 40 - 50 (d) 50 - 60	Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	No. of students	8	10	12	30	22	30	1
Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60										
No. of students	8	10	12	30	22	30										
Q13	The next term of an A.P. $\sqrt{6}, \sqrt{24}, \sqrt{54}$ is..... (a) $\sqrt{60}$ (b) $\sqrt{96}$ (c) $\sqrt{72}$ (d) $\sqrt{216}$	1														
Q14	The quadratic equations whose roots are $2/3$ and $-1/2$ is (a) $3x^2 - 2x + 1 = 0$ (b) $6x^2 - 2x + 3 = 0$ (c) $3x^2 - x - 2 = 0$ (d) $6x^2 - x - 2 = 0$	1														
Q15	If $2x^2 - 3x - 2$ , $2x^2 + 5kx + 6$ and $2x^2 + 7x + 14$ are in A.P, then the value of k is - (a) $1/5$ (b) $2/5$ (c) $5/2$ (d) 0	1														
Q16	If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of $80^\circ$ , then $\angle POA$ is equal to- (a) $50^\circ$ (b) $60^\circ$ (c) $70^\circ$ (d) $80^\circ$	1														
Q17	If $\Delta ABC \sim \Delta EDF$ and $\Delta ABC$ is not similar to $\Delta DEF$ , then which of the following is not true? (a) $BC \cdot EF = AC \cdot FD$ (b) $AB \cdot EF = AC \cdot DE$ (c) $BC \cdot DE = AB \cdot EF$ (d) $BC \cdot DE = AB \cdot FD$	1														
Q18	The $(n - 1)^{th}$ term of an A.P. is given by 7, 12, 17, 22, ... is (a) $5n + 2$ (b) $5n + 3$ (c) $5n - 5$ (d) $5n - 3$	1														
Q19	<b>DIRECTION:</b> In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A) (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A) (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true. <b>Statement A (Assertion):</b> If the area of a sector of a circle having central angle as $100^\circ$ is $385 \text{ cm}^2$ , then area of the circle is $1386 \text{ cm}^2$ . <b>Statement R (Reason):</b> The area of the sector of a circle of radius 'r' and central angle 'θ' is given by $\frac{\theta}{360^\circ} \times \pi r^2$	1														
Q20	<b>Statement A (Assertion):</b> The ratio in which x-axis divide the line segment joining the points (1,5) and (-2,-7) is 5:7. <b>Statement R (Reason):</b> Given four points A, B, C and D will form a square if $AB = BC = CD = DA$	1														

**SECTION - B**

Q21.	Given that $\sqrt{3}$ is an irrational number. Prove that $2 + \sqrt{3}$ is an irrational number.	2
Q22.	If $\alpha$ and $\beta$ are the zeroes of the polynomial $x^2 + 3x - 4$ then, find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$	2

Q23.	If PQ is a tangent drawn from an external point P to a circle with centre O and QOR is a diameter where length of QOR is 8 cm such that $\angle POR = 120^\circ$ , then find OP and PQ.	2
Q24.	In the given figure, find the value of x in terms of a, b and c.  <p style="text-align: center;">OR</p> <p>PQR is a triangle right angled at P and M is a point on QR such that <math>PM \perp QR</math>. Show that <math>PM^2 = QM \times MR</math>.</p>	2
Q25.	Find A and B, if $\sin(A + 2B) = \sqrt{3}/2$ and $\cos(A + B) = 1/2$ . <p style="text-align: center;">OR</p> Prove that: $\frac{1 - \tan^2 \theta}{1 + \tan^2 \theta} = 1 - 2\sin^2 \theta$	2

**SECTION - C**

Q26.	Obtain graphically the solution of the pair of linear equations: $x + 2y = 8$ and $y - x = 1$ Find the coordinates of the point where the two lines meet. Also, determine the coordinates of the vertices of the triangle formed by these lines and the y-axis. <p style="text-align: center;">OR</p> Solve: $\frac{2}{\sqrt{x}} + \frac{3}{\sqrt{y}} = 2$ ; $\frac{4}{\sqrt{x}} - \frac{9}{\sqrt{y}} = -1, x, y > 0$	3
Q27.	A lead pencil consists of a cylinder of wood with a solid cylinder of graphite filled into it. The diameter of the pencil is 7 mm and the diameter of the graphite is 1mm. If the length of the pencil is 10cm, find the volume of the wood used in making this pencil. (use $\pi = 3.14$ ) <p style="text-align: center;">OR</p> Rasheed got a playing top (lattu) as his birthday present, which surprisingly had no colour on it. He wanted to colour it with his crayons. The top is shaped like a cone surmounted by a hemisphere. The entire top is 5 cm in height and the diameter of the top is 3.5 cm. Find the area he has to colour.	3
Q28.	A card is drawn at random from a well-shuffled deck of 52 playing cards. Find the probability that the card drawn is (i) either a heart or a queen. (ii) a black king. (iii) neither an ace nor a jack.	3
Q29.	Prove that: $\frac{(1 + \cot A + \tan A)(\sin A - \cos A)}{\sec^3 A - \operatorname{cosec}^3 A} = \sin^2 A \cdot \cos^2 A$	3

**Q30.** In Figure, XY and X' Y' are two parallel tangents to a circle with centre O and another tangent AB with the point of contact C intersecting XY at A and X' Y' at B. Prove that  $\angle AOB = 90^\circ$

**Q31.** National Art convention got registrations from students from all parts of the country, of which 60 are interested in music, 84 are interested in dance and 108 students are interested in handicrafts. For optimum cultural exchange, organisers wish to keep them in minimum number of groups such that each group consists of students interested in the same art form and the number of students in each group is the same. Find the number of students in each group. Find the number of groups in each art form. How many rooms are required if each group will be allotted a room?

**SECTION - D.**

**Q32.** A bird is sitting on the top of a tree, which is 80 m high. The angle of elevation of the bird, from a point on the ground is  $45^\circ$ . The bird flies away from the point of observation horizontally and remains at a constant height. After 2 seconds, the angle of elevation of the bird from the point of observation becomes  $30^\circ$ . Find the speed of flying of the bird.

OR

The angle of elevation of a cloud from a point 60 m above the surface of the water of a lake is  $30^\circ$  and the angle of depression of its shadow in water of lake is  $60^\circ$ . Find the height of the cloud from the surface of water.

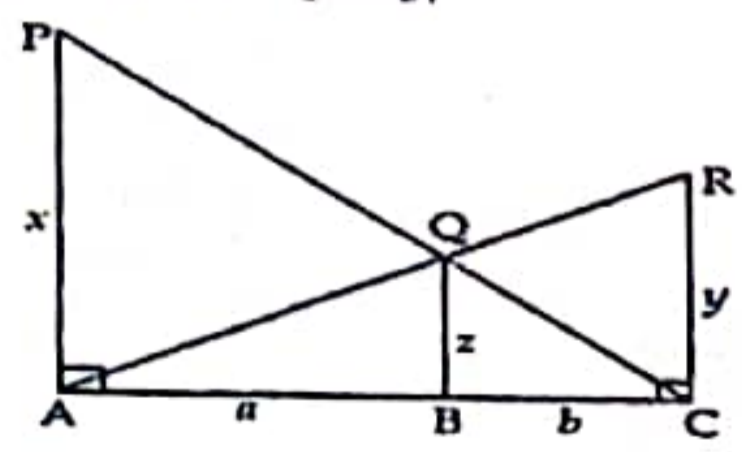
**Q33.** Daily wages of 110 workers, obtained in a survey, are tabulated below:

Daily Wages (in Rs. )	100-120	120-140	140-160	160-180	180-200	200-220	220-240
Number of Workers	10	15	20	22	18	12	13

Compute the mean daily wages and modal daily wages of these workers.

**Q34.** A train travels at a certain average speed for a distance of 63 km and then travels at a distance of 72 km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete total journey, what is the original average speed ?

**Q35.** In the given fig. PA, QB and RC each is perpendicular to AC such that  $PA = x$ ,  $RC = y$ ,  $QB = z$ ,  $AB = a$  and  $BC = b$ .

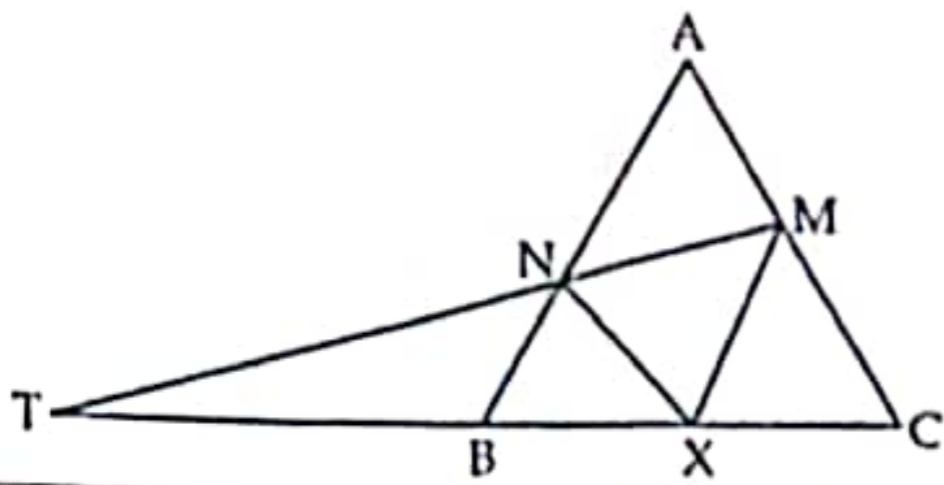


Prove that  $1/x + 1/y = 1/z$ .

**OR**

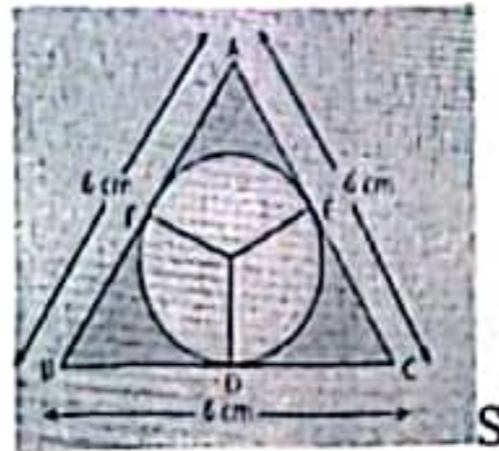
Any point X is taken on the side BC of a triangle ABC. XM & XN are drawn parallel to BA and CA meeting CA, BA in M and N respectively. MN meets BC produced in T.

Prove that:  $TX^2 = TB \times TC$ .



**SECTION - E**  
**CASE STUDY**

Q36. For the inauguration of Eco club of the school, badges were given to teachers. Sangeeta made these badges in the shape of an equilateral triangle of side 6 cm with a circle is inscribed in it as shown in the figure.



- (i) Find the area of an equilateral triangle.
- (ii) Find the radius of a circle and its area.
- (iii) Find the area of the shaded region. (use  $\sqrt{3}=1.732$ )

OR

Two circular pieces of equal radii and maximum area, touching each other are cut out from a rectangular card board of dimensions 14 cm  $\times$  7 cm. Find the area of the remaining card board. (use  $\pi = 22/7$ )

Q37. One day, Mohan visited his friend's apartment. From his balcony, he observed that there is flower bed on the ground which is in the shape of a parallelogram. Four red colour poles are there at the corners of the garden. He draws the sketch of the flower bed on a graph paper as shown in below

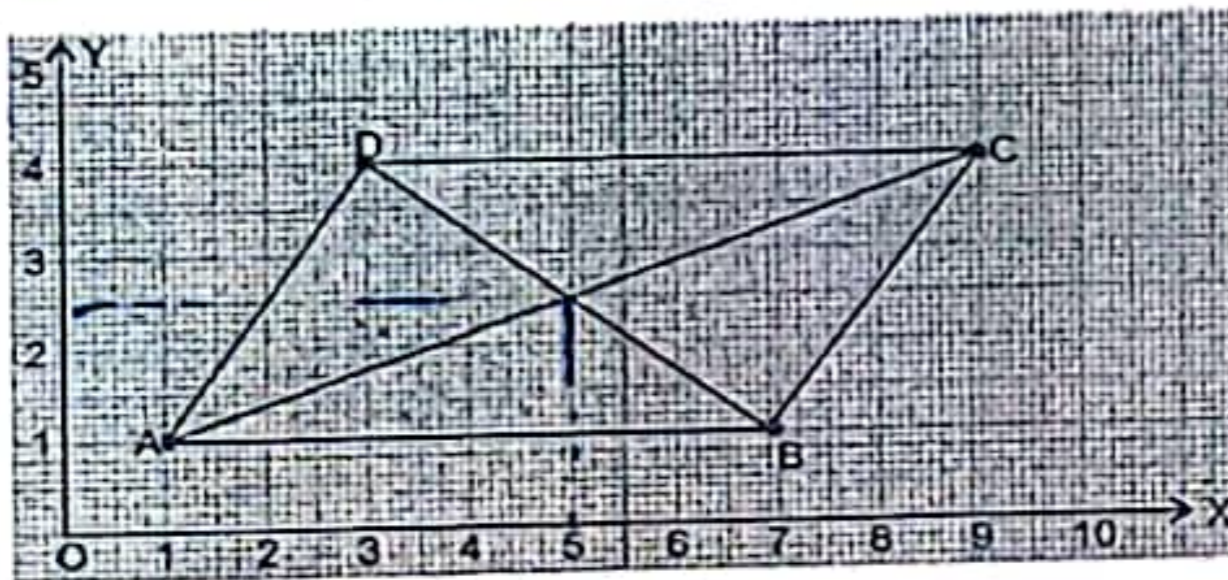


figure.

(i) Find the coordinates of the point of intersection of the diagonals.

(ii) Find the area of the parallelogram ABCD.

(iii) Find the ratio in which y-axis divides the line segment joining the points A(5, -6) and B(-1, -4). Also find the coordinates of the point of division.

1  
1  
2

1  
1  
2

	OR	
	Point A(- 1, y) and B(5, 7) lie on a circle with centre O(2, -3y). Find the values of y. Hence find the radius of the circle.	
Q38.	<p>Aditya is celebrating his birthday. He invited his friends. He bought a packet of toffees/candies which contains 120 candies. He arranges the candies such that in the first row there are 3 candies, in second there are 5 candies, in third there are 7 candies and so on.</p> <p>(i) Find the total number of rows of candies and how many candies are placed in a last row?</p> <p>(ii) Find the difference in number of candies placed in 7th and 3rd row.</p> <p>(iii) The first and last term of an AP are 5 and 45 respectively. If the sum of all its term is 400, find its common difference.</p>	1 1 2
	OR	
	If the 9 <sup>th</sup> term of an A.P. is zero, then show that its 29 <sup>th</sup> term is double of its 19 <sup>th</sup> term.	