

Class- X Session- 2024-25

Subject- Mathematics (Standard)

SP2

Time Allowed: 3 Hrs.

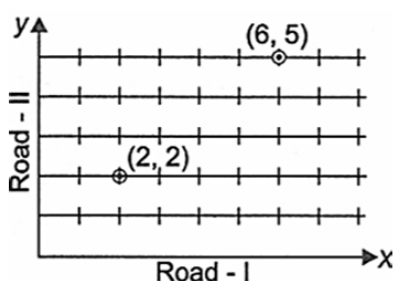
Maximum Marks : 80

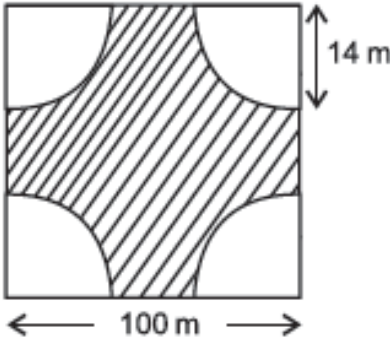
General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 markseach.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D have been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take $\pi = 22/7$ wherever required if not stated.
11. Use of calculators is not allowed.

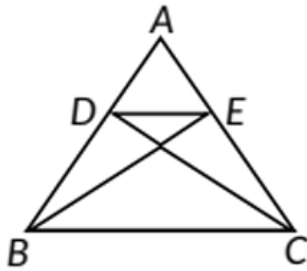
SECTION A		
Section A consists of 20 questions of 1 mark each.		
S.NO		MARKS
1	If tangents PA and PB from a point P to a circle with centre O are inclined to each other at an angle of 80° then $\angle POA =$ a) 50° b) 60° c) 70° d) 80°	1
2	Which of the following statements is not true? a) A number of secants can be drawn at any point on the circle. b) Only one tangent can be drawn at any point on a circle. c) A chord is a line segment joining two points on the circle d) From a point inside a circle only two tangents can be drawn.	1
3	A solid sphere is cut into two hemispheres. The ratio of the surface areas of sphere to that of two hemispheres taken together, is : a) 1 : 1 b) 1 : 4 c) 2 : 3 d) 3 : 2	1
4	For some data x_1, x_2, \dots, x_n with respective frequencies f_1, f_2, \dots, f_n the value of $\sum_{i=1}^n f_i(x_i - \bar{x})$ is equal to : a) $n\bar{x}$ b) 1 c) $\sum f_i$ d) 0	1
5	AD is a median of $\triangle ABC$ with vertices $A(5, -6)$, $B(6, 4)$ and $C(0, 0)$. Length AD is equal to a) $\sqrt{68}$ units b) $2\sqrt{15}$ units c) $\sqrt{101}$ units d) 10 units	1

6	The roots of the quadratic equation $x^2 + x - 1 = 0$ are a) Irrational and distinct b) not real c) rational and distinct d) real and equal	1
7	If one of the zeroes of the quadratic polynomial $(k - 1)x^2 + kx + 1$ is (-3) , then the value of k is a) $\frac{4}{3}$ b) $-\frac{4}{3}$ c) $\frac{2}{3}$ d) $-\frac{2}{3}$	
8	If $\sin \theta = \frac{3}{5}$, then the value of $\frac{\operatorname{cosec} \theta - \cot \theta}{2 \cot \theta}$ is a) $\frac{1}{2}$ b) $\frac{1}{3}$ c) $\frac{1}{8}$ d) $\frac{1}{5}$	1
9	The pair of equations $3^{x+y} = 81$, $81^{x-y} = 3$ has (a) no solution (b) $x = 2$, $y = 2$ (c) infinitely many solutions (d) $x = 2\frac{1}{8}$, $y = 1\frac{7}{8}$	1
10	A tank is made of the shape of a cylinder with a spherical depression at one end. The height of the cylinder is 1.45m and radius is 30 cm. The total surface area of the tank is a) $30m^2$ b) $3.3m^2$ c) $30.3m^2$ d) $3300m^2$	1
11	If the common difference of an A.P. is 5, then $a_{18} - a_{13}$ is a) 5 b) 20 c) 25 d) 30	1
12	If $\sqrt{3}\tan 2\theta = 3$, $0^\circ < 2\theta < 90^\circ$, then the value of $\sin \theta + \sqrt{3}\cos \theta$ is a) 2 b) $\sqrt{3}$ c) $\frac{\sqrt{3}+1}{\sqrt{2}}$ d) 1	1
13	A box has 10 equal sized cards. Of the 10 cards, 4 are blue, 3 are green, 2 are yellow and 1 is red. If a card is randomly drawn from the box, which is the colour that the card is most likely to have? a) Red b) Blue c) Green d) Yellow	1
14	The graph of a quadratic polynomial $p(x)$ passes through the points $(-6, 0)$, $(0, -30)$, $(4, -20)$ and $(6, 0)$. The zeroes of the polynomial are a) $-6, 0$ b) $4, 6$ c) $-30, -20$ d) $-6, 6$	1
15	A well-planned locality has two straight roads perpendicular to each other. There are 5 lanes parallel to Road - I. Each lane has 8 houses as seen in figure. Chaitanya lives in the 6th house of the 5th lane and Hamida lives in the 2nd house of the 2nd lane. What will be the shortest distance between their houses?  a) 12 units b) 5 units c) 6 units d) 10 units	1
16	If $\Delta ABC \sim \Delta EDF$ and ΔABC is not similar to ΔDEF , then which of the following is not	1

	$(-3, 4)$.	
22	<p>A box contains cards numbered 11 to 123. A card is drawn at random from the box. Find the probability that the number on the drawn card is a square number</p> <p style="text-align: center;">OR</p> <p>In a pack of 52 playing cards one card is lost. From the remaining cards, a card is drawn at random. Find the probability that the drawn card is queen of heart, if the lost card is a black card.</p>	2
23	<p>The LCM of two numbers is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280, then find the other number.</p> <p style="text-align: center;">OR</p> <p>If the HCF of 450 and 216 is expressible in the form $23m - 51$, then find the value of m</p>	2
24	Find the points on the x -axis which are at a distance of $2\sqrt{5}$ from the point $(7, -4)$.	2
25	If $4\cot^2 45^\circ - \sec^2 60^\circ + \sin^2 60^\circ + p = \frac{3}{4}$, then find the value of p .	2
	<p>SECTION C</p> <p>Section C consists of 6 questions of 3 marks each.</p>	
26	<p>Prove that</p> $\frac{\sin \theta}{\cot \theta + \operatorname{cosec} \theta} = 2 + \frac{\sin \theta}{\cot \theta - \operatorname{cosec} \theta}$	3
27	Prove that $\sqrt{5}$ is an irrational number	3
28	<p>Find the area of the minor segment of a circle of radius 14 cm, when its central angle is 60° (Take $\sqrt{3} = 1.73$).</p> <p style="text-align: center;">OR</p> <p>A square park has each side of 100 m. At each corner of the park, there is a flower bed in the form of a quadrant of radius 14 m as shown in the given figure. Find the area of the remaining part of the park. [Take $\pi = 22/7$]</p> <div style="text-align: center;">  <p>The diagram shows a square with side length 100 m. At each of the four corners, there is a quadrant of a circle with radius 14 m. The area of the square that is not covered by these four quadrants is shaded with diagonal lines. The radius of each quadrant is labeled as 14 m, and the side length of the square is labeled as 100 m.</p> </div>	3
29	If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of $2x^2 - 5x - 3$, find the value of p and q	3
30	The sum of the reciprocals of Rehman's ages in years 3 years ago and 5 years from now	

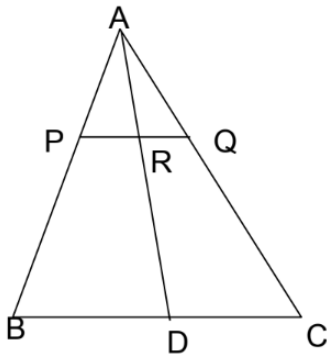
is $\frac{1}{3}$. Find out his present age.

31 In the figure, if $\triangle BEA \cong \triangle CDA$, then prove that $\triangle DEA \sim \triangle BCA$.



OR

In $\triangle ABC$, P and Q are points on AB and AC respectively such that PQ is parallel to BC. Prove that the median AD drawn from A on BC bisects PQ.



SECTION D

Section D consists of 4 questions of 5 marks each

32 Solve the following system of linear equations graphically:

$$3x + y - 12 = 0; x - 3y + 6 = 0$$

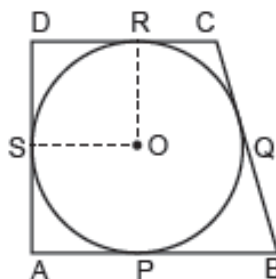
Shade the region bounded by the lines and x -axis.

OR

Place A and B are 160 km apart on a highway. One car starts from A and another from B at the same time. If they travel in the same direction, they meet in 8 hours. But, if they travel towards each other, they meet in 2 hours. Find the speed of each car.

33 Prove that the lengths of tangents drawn from an external point to a circle are equal.

A quadrilateral ABCD is drawn so that $\angle D = 90^\circ$, $BC = 38$ cm and $CD = 25$ cm. A circle is inscribed in the quadrilateral and it touches the side AB, BC, CD and DA at P, Q, R and S respectively. If $BP = 27$ cm, find the radius of the inscribed circle.



34 The median of the following frequency distribution is 50. Find the value of p , also find mean and mode.

3

5

5

5

Class	Frequency
0 – 20	17
20 – 40	p
40 – 60	32
60 – 80	24
80 – 100	19

OR

The median of the following data is 52.5. Find the values of x and y , if the total frequency is 100.

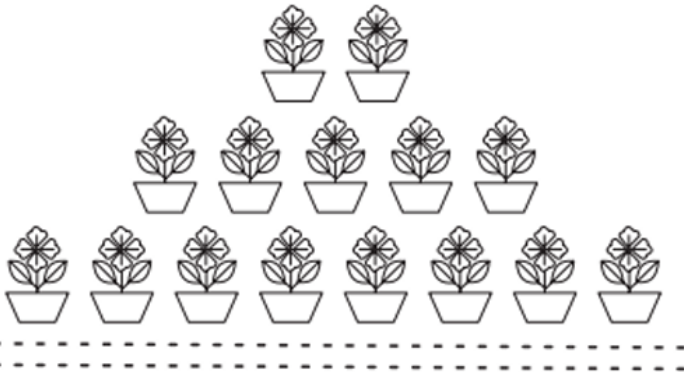
C.I.	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
Frequency	2	5	x	12	17	20	y	9	7	4

- 35 The angle of elevation of a jet fighter from a point A on the ground is 60° . After a flight of 15 seconds, the angle of elevation changes to 30° . If the jet is flying at a speed of 720 km/hr, find the constant height. ($\sqrt{3} = 1.732$).

5

SECTION E
Case study based questions are compulsory.

- 36 Aahana, being a plant lover, decides to convert her balcony into a beautiful garden full of plants. She bought a few plants with pots for her balcony. She placed the pots in such a way that the number of pots in the top row is 2. In the next row there are 5 pots. In the 3rd row from the top there are 8 pots and so on.



On the basis of the above situation answer the following questions.

- (i) Write an A.P whose terms represent the number of pots in different rows starting from the top . Also, find the common difference.
- (ii) Is it possible to arrange 34 pots in a row if this pattern is continued? Justify your answer.
- (iii) (A) If there are 'n' number of rows of pots , then find the expression for finding the total number of pots in terms of n. Hence find S_8 .

1

1

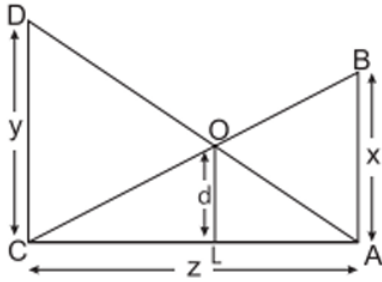
OR

- (iii) (B) The shopkeeper added 3 pots in each row. How many pots are there in the 11th row from the top?

2

37

Anika is studying in class X. She observed two poles DC and BA. The heights of these poles are x metre and y metre respectively as shown in figure:



These poles are z m apart and O is the point of intersection of the lines joining the top of each pole to the foot of the opposite pole and the distance between point O and L is d .

Based on the above information, answer the following questions:

(i) Is $\triangle CAB$ and CLO ? Justify

1

(ii) If $x = y$, prove that $BC : DA = 1 : 1$.

1

(iii)(A) If $CL = a$, then find a in terms of x , z and d .

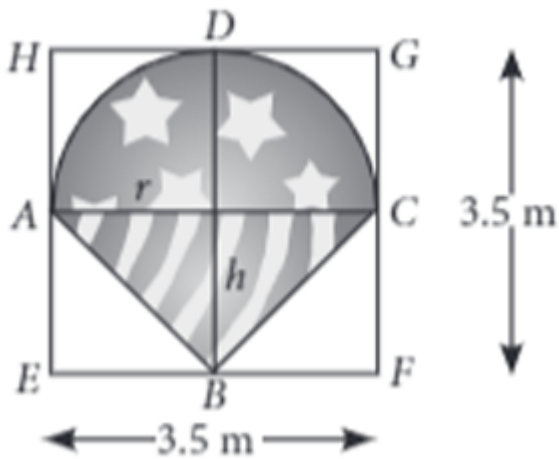
2

OR

(iii)(B) If $AL = b$, then find b in terms of y , z and d .

38

Emily purchased a spinner from a shop, which is of the shape as shown in the figure, in which the right circular cone and hemisphere lie on opposite sides of a common base of length 3.5 m. Cylindrical box circumscribing them in this position. Now, answer the following questions.



1

2

1

Based on the above information, answer the following questions:

(i) Find the volume of the conical part

(ii) Find the volume of the cylinder that circumscribes the cone and hemisphere.

(iii)(A) Find the additional space enclosed by the cylinder.

OR

(iii)(B) Find the ratio of the curved surface areas of the cone and hemisphere.