

D.P.S R.K. PURAM
PRE-BOARD - I.

S-2
PRE BOARD 2024-25

Mathematics SET2

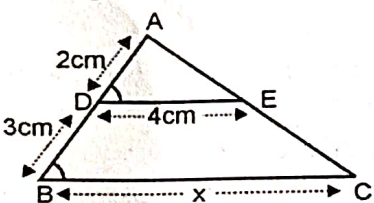
Time Allowed: 3 Hrs.

Maximum Marks : 80

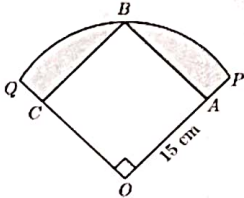
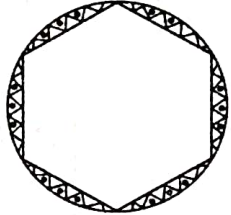
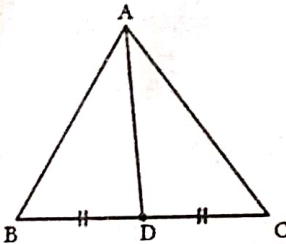
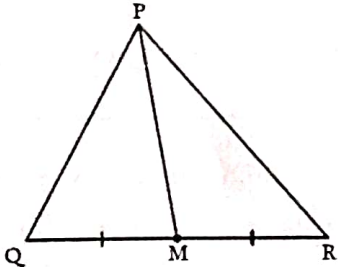
General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 mark questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

S.NO	SECTION A												
1	Which of these is the polynomial whose zeroes are $2\sqrt{2}$ and $-3\sqrt{2}$? a) $x^2 - \sqrt{2}x - 12$ b) $x^2 - 2\sqrt{2}$ c) $x^2 + \sqrt{2}x - 12$ d) $x^2 - 2\sqrt{2}x + 6$												
2	The pair of equations $x = a$ and $y = b$ graphically represents the lines which are ___ a) parallel b) intersecting at (a, b) c) coincident d) intersecting at (b, a)												
3	If the quadratic equation $x^2 + 4x + k = 0$ has real and equal roots then ___ a) K is less than 4 b) K is equal to 4 c) K is greater than 4 d) K is greater than equal to 4												
4	For the following distribution find the upper limit of the modal class <table border="1"><thead><tr><th>Class</th><th>0-5</th><th>5-10</th><th>10-15</th><th>15-20</th><th>20-25</th></tr></thead><tbody><tr><td>Frequency</td><td>10</td><td>15</td><td>12</td><td>20</td><td>9</td></tr></tbody></table> a) 10 b) 15 c) 20 d) 25	Class	0-5	5-10	10-15	15-20	20-25	Frequency	10	15	12	20	9
Class	0-5	5-10	10-15	15-20	20-25								
Frequency	10	15	12	20	9								

5	$\sin^2 60^\circ - 2 \tan 45^\circ - \cos^2 30^\circ = \underline{\hspace{2cm}}$ a) 2 b) -2 c) 1 d) -1
6	The zeroes of polynomial $p(x) = ax^2 + bx + c$ are reciprocal of each other if ____ (a) $b = 2a$ (b) $c = b$ (c) $b = a$ (d) $c = a$
7	The distance of the point $(6, -2)$ from the x -axis is ____ units. a) 2 b) -2 c) 6 d) -6
8	$\sqrt{3} \cos^2 A + \sqrt{3} \sin^2 A$ is equal to ____ a) 1 b) $\frac{1}{\sqrt{3}}$ c) $\sqrt{3}$ d) 0
9	In the given figure, if $DE \parallel BC$, then x equals ____  a) 6 cm b) 10 cm c) 8 cm d) 12.5 cm
10	A girl calculates her probability of winning the first prize in a lottery is 0.08. If 6000 tickets were sold, how many tickets had she bought? a) 40 b) 240 c) 480 d) 750
11	In an arithmetic progression, the 4th term is 11 and the 10th term is 23. What is the common difference? a) 2 b) 3 c) 4 d) 5
12	The total surface area of a solid hemisphere of radius 7 cm is ____ a) 447π sq. cm c) 174π sq. cm b) 239π sq. cm d) 147π sq. cm
13	A card is selected at random from a well shuffled deck of 52 cards. The probability of it being a red face card is ____ a) $\frac{3}{26}$ b) $\frac{3}{13}$ c) $\frac{2}{13}$ d) $\frac{1}{2}$
14	The mean weight of 45 students is 42 kg. Find the mean weight, if each gains 1.5 kg after one year. a) 45 kg b) 43 kg c) 40 kg d) 43.5 kg
15	The maximum number of common tangents that can be drawn to two intersecting circles at two distinct points will be ____ a) 1 b) 2 c) 3 d) 4

16	The ratio of the lateral surface area to the total surface area of a cylinder with base diameter 1.6 m and height 20 cm is ____ a) 1:7 b) 1:5 c) 7:1 d) 5:1
17	The distance between the points $(10 \cos 30^\circ, 0)$ and $(0, 10 \cos 60^\circ)$ is ____ a) 10 units b) 100 units c) 5 units d) 20 units
18	If PA and PB are tangents to the circle with center O such that $\angle APB = 50^\circ$, then $\angle OAB$ will be ____ a) 25° b) 130° c) 40° d) 50°
	DIRECTION: In 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
19	Statement A (Assertion): HCF of two consecutive natural numbers is 1 Statement R (Reason): HCF of two coprimes is always 1
20	Statement A (Assertion): Avikant bought a pair of glasses with wiper blades of length 3 cm and the angle swept in one swipe is 30° . The area of each wiper is $\frac{3\pi}{4} \text{ cm}^2$. Statement R (Reason): Area of sector with radius 'r' and central angle ' θ ' is described as $\frac{\theta}{720^\circ} 2\pi r^2$.
SECTION B	
21	The points, $A(-3,2)$, $B(-1, -4)$ and $C(5,2)$ are the vertices of a triangle. The points P and Q are the mid-points of AB and AC respectively. Show that the length of PQ is half of the length of BC.
22	Prove that $\frac{2+3\sqrt{5}}{7}$ is an irrational number when it is given that $\sqrt{5}$ is an irrational number. OR If $\text{HCF}(a, b) = p$ and $\text{LCM}(a, b) = q$, where 'a' is the smallest prime number and 'b' is the greatest one-digit composite number. What is the sum of p and q?

23	If the point $P(6,2)$ divides the line segment joining $A(6,5)$ and $B(y,4)$ in the ratio $3 : 1$, then find the value of y .
24	Cards are marked with numbers $4, 5, 6, 7, \dots, 39$. What is the probability that the number on the cards is a multiple of 3 or 7 ? OR A coin is tossed two times. Find the probability of getting at most one head.
25	If $\sin \theta + \sin^2 \theta = 1$, then find the value of $\cos^2 \theta + \cos^4 \theta$
SECTION C	
26	<p>In the given figure, a square $OACB$ is inscribed in a quadrant $OPBQ$. If $OA = 15\text{cm}$, find the area of the shaded region. (Use $\pi = 3.14$).</p> <div style="text-align: right;">  </div> <p style="text-align: center;">OR</p> <p>A round table cover has six equal designs as shown in the figure. If the radius of the cover is 28 cm, find the cost of making the designs at the rate of $\text{₹}0.35$ per cm^2, [use $\sqrt{3} = 1.7$]</p> <div style="text-align: right;">  </div>
27	<p>State and prove the Basic Proportionality Theorem. OR Sides AB and AC and median AD of a triangle ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that $\triangle ABC \sim \triangle PQR$.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>
28	Prove that $\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \frac{1 + \sin \theta}{\cos \theta}$

29	The HCF of 2472, 1284 and a third number N is 12. If their LCM is $2^3 \times 3^2 \times 5 \times 103 \times 107$, then find the smallest such number N.
30	Find the zeroes of the following polynomial $y^2 + \frac{3}{2}\sqrt{5}y - 5$ and verify the relation between the zeroes and the coefficients of the polynomials.
31	Find the values of k for which the equation $(3k + 1)x^2 + 2(k + 1)x + 1$ has equal roots. Also find the roots.

SECTION D

32 The angle of elevation of an aeroplane from a point A on the ground is 60° . After a flight of 30 seconds, the angle of elevation changes to 30° . If the plane is flying at a constant height of $3600\sqrt{3}$ metres, find the speed of the aeroplane.

33 If the median of the following distribution is 32. Find the value of x and y.

C.I.	0-10	10-20	20-30	30-40	40-50	50-60	Total
f	10	x	25	30	y	10	100

OR

A car assembly unit assembles a limited number of cars daily, depending on the prevailing demand. The following table presents an analysis of the number of cars assembled by the unit over three consecutive months :

Cars assembled per day	0-4	4-8	8-12	12-16	16-20
No of days	33	18	21	11	7

If the demand of the cars is doubled, estimate how many cars on an average should be assembled per day such that the increased demand is met ?

34 Check graphically whether the pair of linear equations $4x - y - 8 = 0$ and $2x - 3y + 6 = 0$ is consistent. Also, find the vertices of the triangle formed by these lines with the x-axis.

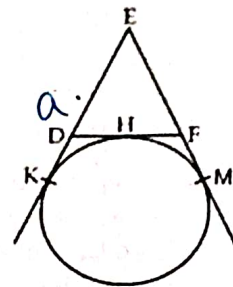
OR

A shopkeeper buys a number of books for ₹1800. If he had bought 15 more books for the same amount, then each book would have cost him ₹20 less. Find how many books he bought initially.

35

Prove that the tangents drawn from an external point to a circle are equal in length.

In the given figure, a circle touches the side DF of $\triangle DEF$ at H and touches ED and EF produced at K and M respectively. If $EK = 9\text{ cm}$, then calculate the perimeter of $\triangle EDF$.



SECTION E

36

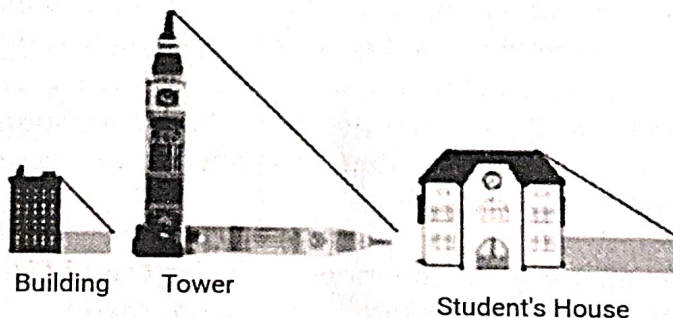
The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16,000 sets in 6th year and 22,600 in the 9th year. Based on the above information, answer the following:



- What is the fixed number by which the production increases every year? (1)
 - Find the production of TV sets in the first year. (1)
 - Find the total number of TV sets produced in the first five years. (2)
- Or
- In which year production was 29,200? (2)

37

A student is trying to find the height of a tower near his house. The height of the building is 20 m when it casts a shadow 10 m long on the ground. At the same time, the tower casts a shadow 50 m long on the ground. At the same time, his house casts a 20 m shadow on the ground.



Based on the above information, solve the following questions:

- What is the height of the tower? (1)

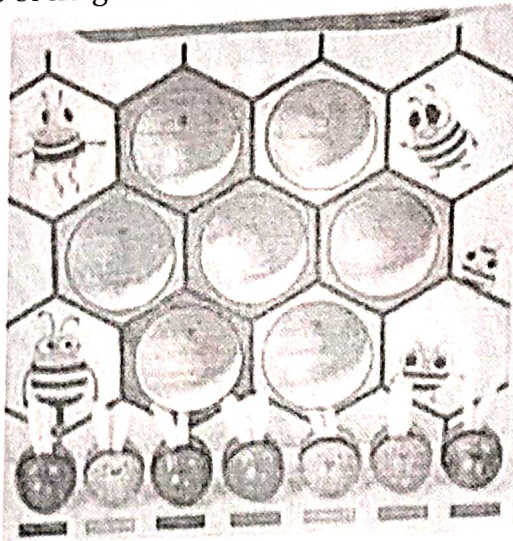
- b) What is the height of the student's house? (1)
- c) What will be the length of the shadow of the tower when the building casts a shadow of 12 m at the same time? (2)

OR

- c) When the tower casts a shadow of 40 m, at that time what will be the length of the shadow of the Student's house? (2)

38

A wooden toy is shown in the picture. This is a cuboidal wooden block of dimensions 14 cm x 17cm x 4 cm. On its top there are seven cylindrical hollows for bees to fit in. Each cylindrical hollow is of height 3 cm and radius 2 cm.



Based on the above information, solve the following questions:

- a) Find the volume of wood carved out to make one cylindrical hollow. (1)
- b) Find the lateral surface area of the cuboid to paint it with green colour. (1)
- c) Find the volume of wood in the remaining cuboid after carving out seven cylindrical hollows. (2)
- OR
- ✓ c) Find the surface area of the top surface of the cuboid to be painted yellow. (2)