APEEJAY COMMON PREBOARD EXAMINATION (2024-2025)

SUBJECT – MATHEMATICS
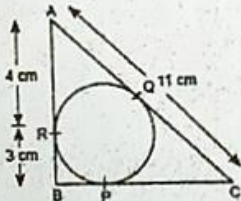
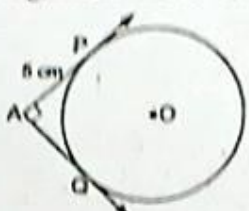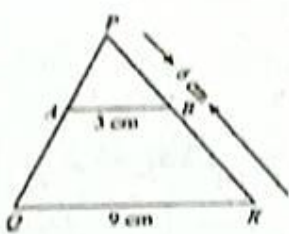## CLASS – X

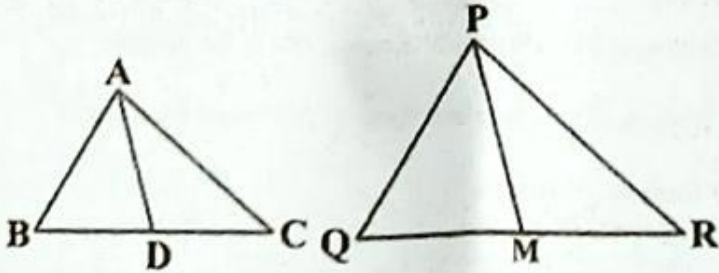**DURATION: 3 HOURS**　　　　　　　　　　　　　　　　**M.M. 80**

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and 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 value of 1, 1 and 2 marks each respectively.

7. All Questions are compulsory. However, an internal choice in 2 Questions of 2 marks, 2 Questions of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.

8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

9. The question paper consists of 7 printed pages.

SECTION A

Section A consists of 20 questions of 1 mark each.

Q.NO.		Marks
1	The value of k for which the pair of linear equations $x - 2y = 3$ and $3x + k y = 1$ has a unique solution is (a) $k = -6$　　　(b) $k \neq -6$　　　(c) $k = 0$　　　(d) $k \neq -\frac{3}{2}$	1
2	If one of the zeroes of the quadratic polynomial $p(x) = (k-1) x^2 + k x + 1$ is -3, then the value of k is (a) $-\frac{4}{3}$　　　(b) $\frac{4}{3}$　　　(c) $-\frac{2}{3}$　　　(d) $\frac{2}{3}$	1
3	In the figure given below, if $\triangle ABC$ circumscribes a circle, then length of BC is (a) 8 cm　　　(b) 11cm　　　(c) 12 cm　　　(d) 10 cm	1
4	If $\triangle ABC$ is right angled at C, then the value of $\operatorname{cosec} (A+B)$ is	1

1

	(a) 0	(b) 1	(c) $\frac{1}{2}$	(d) $\frac{\sqrt{3}}{2}$	

5	The mean and mode of a frequency distribution are 28 and 16 respectively. The median of the frequency distribution is	1

(a) 22   (b) 23.5   (c) 24   (d) 24.5

6	In the figure given below, the pair of tangents AP and AQ drawn from an external point A to a circle with centre O are perpendicular to each other and length of each tangent is 5 cm. The radius of the circle is	1

(a) 10 cm   (b) 7.5 cm   (c) 5 cm   (d) 2.5 cm

7	A sphere of diameter 18 cm is dropped into a cylindrical vessel of diameter 36 cm, partly filled with water. If the sphere is completely submerged, then the water level rises (in cm) by	1

(a) 3   (b) 4   (c) 5   (d) 6

8	The point which lies on the perpendicular bisector of the line segment joining the points A $(-2, -5)$ and B $(2,5)$ is	1

(a) $(0, 0)$ (b) $(0, 2)$ (c) $(2, 0)$ (d) $(-2, 0)$

9	In the figure given below, if AB∥ QR, then the length of PB is	1

(a) 2cm   (b) 3cm   (c) 6cm   (d) 9cm

10	Two dice are thrown at the same time and the product of numbers appearing on them is noted. The probability that the product is a prime number is	1

(a) $\frac{1}{3}$ (b) $\frac{1}{6}$ (c) $\frac{1}{5}$ (d) $\frac{5}{6}$

11	The product of the zeroes of the quadratic polynomial $bx^2 + c x + a$ is	1

(a) $\frac{a}{b}$ (b) $\frac{b}{c}$ (c) $\frac{b}{a}$ (d) $\frac{a}{c}$

12	A solid is in the shape of a cone mounted on a hemisphere of same base radius. If the curved surface areas of the hemispherical part and the conical part are equal, then find the ratio of the radius and the height of the conical part.	1

(a) $1 : 3$ (b) $1 : \sqrt{3}$ (c) $\sqrt{3} : 1$ (d) $3 : 1$

13	If the distance between the points (4, p) and (1,0) is 5, then the value of p is	1
	(a) 4 (b) ± 4 (c) − 4 (d) 0	
14	If $y = 1$ is a common root of the equations $ay^2 + ay + 3 = 0$ and $y^2 + y + b = 0$, then ab is	1
	(a) 3 (b) 6 (c) − 3 (d) $\frac{-7}{2}$	
15	The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is	1
	(a) 7 (b) 14 (c) 21 (d) 28	
16	If $\frac{1}{x+2}, \frac{1}{x+3}, \frac{1}{x+5}$ are in A.P, then the value of x is	1
	(a) 5 (b) 3 (c) 1 (d) 2	

17 — Consider the following data:

Class	65-85	85-105	105-125	125-145	145-165	165-185
Frequency	4	5	13	20	14	7

The difference of the upper limit of the median class and the lower limit of the modal class is

(a) 0   (b) 19   (c) 20   (d) 38 | 1

18	$(\sec^2\theta - 1)(1 - \csc^2\theta)$ is equal to:	1
	(a) −1 (b) 1 (c) 0 (d) 2	

19	**Assertion (A):** The length of the minute hand of a clock is 7 cm. The area swept by the minute hand in 5 minutes is $\frac{77}{6}$ cm².	1
	Reason (R): The length of an arc of a sector of a circle subtending angle q at centre and radius r is given by $\frac{q}{360} \times 2\pi r$.	
	(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 but 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.	

20	**Assertion (A):** $3 \times 5 \times 7 + 7$ is a composite number.	1
	Reason (R): A composite number is a natural number or a positive integer which has more than two factors.	
	(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 but 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.	

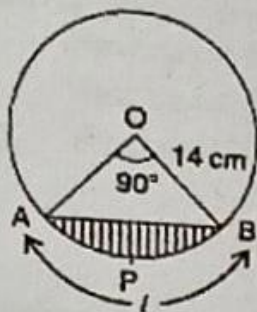|			
	SECTION B		
	Section B consists of 5 questions of 2 marks each.		
21	(a) Find the least positive integer divisible by first five natural numbers. OR (b)The H.C.F of 85 and 238 is expressible in the form 85m -238. Find the value of m.	2	
22	A (5,1), B (1,5) and C (-3, -1) are the vertices of △ABC. Find the length of the median AD.	2	
23	The centre of a circle is (2a-1,7) and it passes through the point (-3, -1). If the diameter of the circle is 20 units, then find the value of a.	2	

24	(a) Cards numbered 1 to 30 are put in a bag. A card is drawn at random from this bag.
	Find the probability that the number on the card drawn from bag is
	   (i) not divisible by 3.
	   (ii) a prime number greater than 7.
	
	OR
	
	(b) A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is thrice that of a red ball, find the number of blue balls in the bag.
		2	

25	Evaluate the following $$\dfrac{4\cot^2 60° + \sec^2 30° - 2\sin^2 45°}{\sin^2 60° + \cos^2 45°}$$	2	
	SECTION C Section C consists of 6 questions of 3 marks each.		
26	(a) Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of triangle PQR. Show that △ABC~△PQR. OR (b) A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds.	3	
27	The altitude of a right triangle is 7cm less than its base. If the hypotenuse is 13cm, find the other two sides.	3	

8.	Prove that: $$\frac{\tan A + \sec A - 1}{\tan A - \sec A + 1} = \frac{1 + \sin A}{\cos A}$$	3
9.	If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of the polynomial $2x^2 - 5x - 3$, then find the values of p and q.	3
30.	(a) Find the area of the segment of a circle and the length of the corresponding arc APB if the radius of the circle is 14 cm. OR (b) An arc of a circle has length 5π cm and the area of the corresponding sector is 20π cm². Find the radius of the circle.	3
31.	Prove that $5 - 2\sqrt{3}$ is an irrational number given that $\sqrt{3}$ is an irrational number.	3

SECTION D
Section D consists of 4 questions of 5 marks each.

32	(a) Draw the graph of the pair of linear equations $2x + y = 4$ and $2x - y = 4$. Write the vertices of the triangle formed by these lines and the y-axis. Also find the area of this triangle. OR (b) Seven times a two-digit number is equal to four times the number obtained by reversing the order of the digits. If the difference between the digits is 3, find the number.	5
33.	(a) The distribution below gives the marks of 100 students of a class. If the median marks are 24, find the frequencies p and q.	5

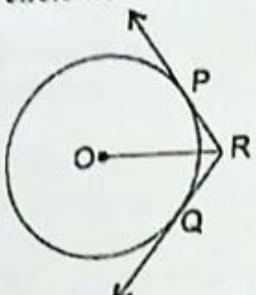| Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
No. of students	4	6	10	p	25	q	18	5

OR

(b)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
No. of workers	10	15	20	22	18	12	13

Compute the mean daily wages of the workers.

34.	A bird is sitting on the top of a 80 m high tree. From a point on the ground, the angle of elevation of the bird is $45°$. The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is $30°$. Find the speed of flying of the bird.	5
35.	(i) Prove that lengths of tangents drawn from an external point to a circle are equal. (ii) In the figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If $\angle PRQ = 120°$, then prove that OR $=2$ PR 	2+3

SECTION E
Section E consists of 3 Case Based study questions of 4 marks each.

36.	Vijay is trying to find the average height of a tower near his house. He is using the properties of similar triangles. The height of Vijay's house is 20m and it casts a shadow 10m long on the ground at a particular time. At the same time, the tower casts a shadow 50m long on the ground and the house of Ajay casts 20m shadow on the ground. VIJAY'HOUSE TOWER AJAY's HOUSE Based on the above information, answer the following questions: (i) What is the height of the tower? (ii) What is the height of Ajay's house? (iii) If the tower casts a shadow of 40m at a particular time, then what will be the length of the shadow of Ajay's house at that time? OR When the tower casts a shadow of 40m, same time what will be the length of the shadow of Vijay's house?	1 1 2
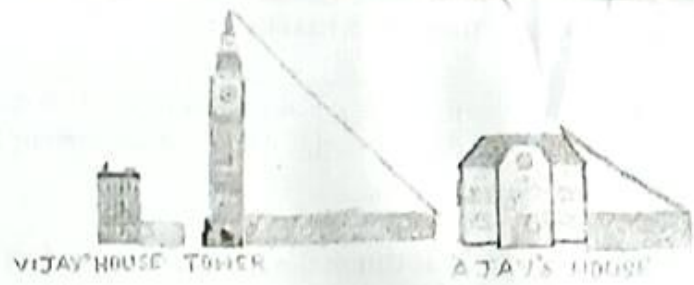
37.	Manpreet Kaur is the national record holder for women in the short put discipline. Her throw of 18.86 m at the Asian Grand Prix in 2017 is the biggest distance for an Indian female athlete.	
	Keeping her as a role model, Sanjhitha is determined to earn gold in Olympics one day. Initially her throw reached 7.56 m only. Being an athlete in school, she regularly practiced both in the mornings and in the evenings and was able to improve the distance by 9 cm every week. During the special camp for 15 days, she started with 40 throws and every day kept increasing the number of throws by 12 to achieve this remarkable progress.	
	Based on the above information, answer the following questions:	
	(i) How many throws Sanjitha practiced on 11th day of the camp?	1
	(ii) How many throws did she do during the entire camp of 15 days?	1
	(iii) What would be Sanjitha's throw distance at the end of 6 months?	2
	OR	
	When will she be able to achieve a throw of 11.16 m?	
38.	For a school Trophy: A school decides to give a trophy of the best student in the class, which is the form of cylinder mounted on a solid hemisphere with the same radius and is made from some metal. Suppose the diameter of the hemisphere is 24 cm and total height of trophy is 28cm.	
	(i) Find the curve surface area of the cylinder.	1
	(ii) Find the volume of the cylinder.	1
	(iii) Find the curved surface area of the trophy.	2
	OR	
	Find the weight of the metal used in making the trophy, if the weight of 1cm³ of metal is 1.5gm.	