Class : X   **Max. Marks : 80**

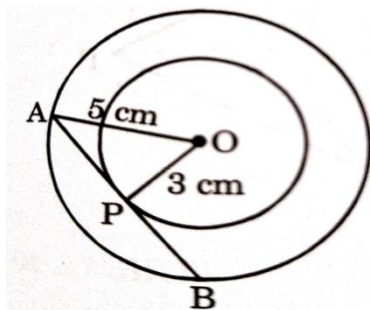**Subject : Mathematics (Standard) (041)**   **Max. Time : 3 Hours**
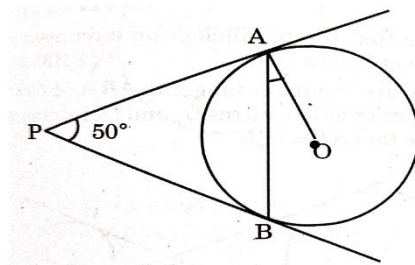
General Instructions:

1. This question paper has five sections A, B, C, D and E
2. **Section A** has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
3. **Section B** has 5 Short Answer- I (SA-I) type questions carrying 2 marks each.
4. **Section C** has 6 Short Answer - II (SA -II) type questions carrying 3 marks each.
5. **Section D** has 4 long Answer (LA) type questions carrying 5 marks each.
6. **Section E** has 3 source based/ case based/passage based/ integrated units of assessment (4 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 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 $\pi = 22/7$ wherever required if not stated.

Section - A

1. If the sum of zeros of the polynomial $p(x) = 3x^2 - 2k\sqrt{2}\,x + 1$ is $4\sqrt{2}$, then the value of k is:
    (a) $3\sqrt{2}$ (b) 6   (c) $2\sqrt{2}$ (d) $\frac{1}{6}$

2. The pair of equations $21x - 12y = 12$ and $7x - 4y - 4 = 0$ has
    (a) A unique solution (b) exactly two solutions   (c) no solution   (d) infinitely many solutions

3. If the angle between two tangents drawn from an external point P to a circle of radius 'r' and centre O is 60^0, then the length of OP is:
    (a) 3r   (b) 2r   (c) $\sqrt{2}$ r   (d) $\sqrt{3}$ r

4. The graph of a quadratic polynomial passes through $(4, 0), (0, -10), (-6, 4)$ and $(-4, 0)$, then the zeros of polynomial are:
    (a) $-10, 0$ (b) $4, 6$ (c) $4, -4$ (d) $-6, -10$

5. Two cones have their heights in the ratio 1 : 3 and radii in the ratio 3 : 1, then ratio of their volume is:
    (a) 1 : 3   (b) 2 : 3   (c) 1 : 1   (d) 3 : 1
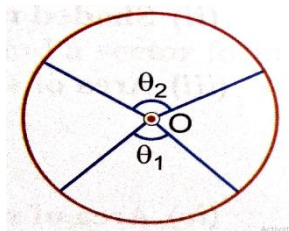
6. In the given figure, the length of PB = …….. cm

    (a) 6   (b) 7   (c) 8   (d) 9

7. In the given figure, PA and PB are tangents to the circle with centre O such that $\angle APB = 50^0$, then, the measure of $\angle OAB$ is:

(a) 25^0 (b) 35^0 (c) 40^0 (d) 45^0

8. If for an A.P. $a_{12} - a_8 = -12$, then its common difference is;

(a) 4   (b) 3   (c) -4 (d) -3

9. Distance between the points $(cos\theta, -sin\theta)$ and $(sin\theta, cos\theta)$ is :

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

10. If two solid hemispheres of same base diameter 'd' are together joined along their bases, then surface area of this new solid is :

(a) $\frac{4}{3}\pi d^3$ (b) πd^2 (c) $4\pi d^2$ (d) $\frac{2}{3}\pi d^3$

11. The centre of a circle whose diameter's end points are $(-6, 3)$ and $(6, 7)$ is:

(a) $(5, 0)$ (b) $(0, 5)$ (c) $(-5, 0)$ (d) $(0, -5)$

12. If $sin\theta = x$ and $sec\theta = y$ then the value of $tan\theta$ is:

(a) xy (b) $\frac{1}{xy}$ (c) $\frac{x}{y}$ (d) $\frac{y}{x}$

13. The value of $(sin30^0 + cos30^0) - (sin60^0 + cos60^0)$ is :

(a) 0   (b) 1   (c) -1 (d) 2

14. If the mode of some observation is 10, Mean is x and Median is $25 - x$, then the Median is:

(a) 13   (b) 11   (c) 12   (d) 14

15. In a group of 25 people, 5 can't swim. If one person is selected at random, then the probability that he/she can swim is:

(a) $\frac{1}{5}$ (b) $\frac{3}{4}$ (c) $\frac{2}{3}$ (d) $\frac{4}{5}$

16. Two coins are tossed simultaneously, the probability of getting atleast one head is:

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{3}{4}$ (d) $\frac{1}{4}$

17. The upper limit of the median class in the given frequency distribution table is:

Class	$0 - 5$	6 - 11	$12 - 17$	$18 - 23$	$24 - 29$
Frequency	13	10	15	8	11

(a) 17   (b) 17.5   (c) 18   (d) 18.5

18. The nature of roots of quadratic equation $2x^2 - 3x - 5$ is:

(a) 2 equal real roots (b) 2 distinct real roots (c) No real roots   (d) More than 2 real roots

DIRECTION : In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R) has the following four choices (a), (b), (c) and (d), only one of which is the correct answer. Mark the correct choice.

(a) Assertion (A) and Reason (R) are True; Assertion (A) is a correct explanation for Reason (R).

(b) Assertion (A) and Reason (R) are True; Assertion (A) is not a correct explanation for Reason (R)

(c) Assertion (A) is True, Reason (R) is False.

(d) Assertion (A) is False, Reason (R)is True.

19. **Assertion (A)** : The ratio of areas of minor sectors as shown in the figure is $\frac{\theta_1}{\theta_2}$.

    Reason (R) : Ratio of areas of sectors of two circles only depends on angles of sectors.

20. **Assertion (A) :** If product of two numbers is 5400 and their HCF is 30, then their LCM is 180
    Reason (R) : HCF is always a factor of LCM.

Section – B

21. Find the smallest number which is divisible by both 72 and 120.

OR

Prove that 18^n can not end with digit 0 for any natural number n.

22. From a pack of 52 playing cards, jacks, Queens and Kings of red colour are removed. From the remaining cards, a card is drawn at random. Find the probability that card drawn is :
    (i) a black king   (ii) a card of red colour

OR

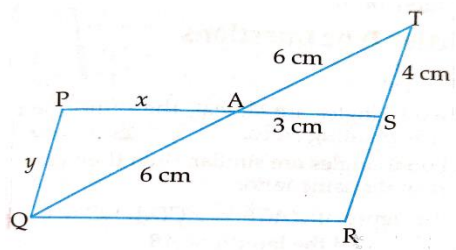An integer is chosen between 1 to 100. Find the probability that it is:
    (i) Divisible by 8   (ii) Not divisible by 8

23. Find the point on y-axis which is at a distance of 13 unit from the point $(-5, 7)$.

24. Point $(3, 1)$ divides the line segment joining the points $(3, k)$ and $(3, -5)$ in the ratio 1 : 3 internally. Find the value of k

25. If $cosA = \frac{2}{5}$, find the value of $4 + 4tan^2A$.

Section – C

26. Find the zeros of the quadratic polynomial $p(x) = 4\sqrt{3}x^2 - 5x - 2\sqrt{3}$ and verify the relations between the zeros and its coefficients.

27. Sum of areas of two squares is 544 m². If the difference of their perimeters is 32 m. Find the sides of two squares.

28. Prove that in a triangle if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio.

OR

In the given figure, PQRS is a parallelogram. If AT = AQ = 6 cm, AS = 3 cm and TS = 4 cm, then find $x \; and \; y$

29. Prove that $\sqrt{3}$ is an irrational number.

30. Evaluate : $\dfrac{\cos 45^0}{sec30^0 + cosec30^0}$

OR

If $tan\theta + sin\theta = m$ and $tan\theta - sin\theta = n$, show that $m^2 - n^2 = 4\sqrt{mn}$

31. A piece of wire 22 cm long is bent into the form of an arc of a circle subtending an angle of 60^0at its centre. Find the radius of the circle and area of sector formed.
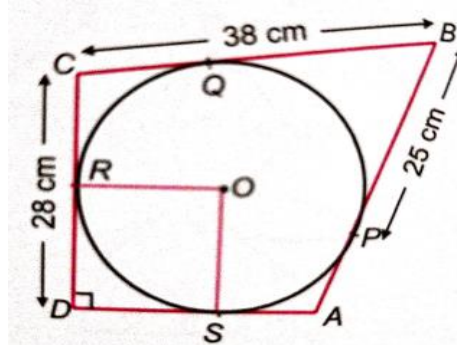
Section – D

32. Solve the following system of equations graphically : $3x - y = 3 \; ; x - 2y = -4$. Shade the area of region bounded by lines and y-axis . Also find the area of this shaded region.

OR

The sum of a 2 – digit number and the number formed by interchanging the digits is 132. If 12 is added to the number, the new number becomes 5 times the sum of digits. Find the number.

33. Prove that the lengths of tangents drawn from an external point to a circle are equal.
Using this concept, find the radius of the circle with centre O in the given figure, if ABCD is a quadrilateral in which $\angle ADC = 90^0$, BC = 38 cm, CD = 28 cm and BP = 25 cm.

34. The angle of elevation of a jet plane from a point P on a ground is 60^0. After a flight of 15 seconds, the angle of elevation changes to 30^0. If the jet plane is flying at a constant height $1500\sqrt{3}$ m, find the speed of plane in km/hour.

35. Find x and y if mean of the following distribution is 62.8.

Class Interval	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120	Total
Frequency	5	x	10	y	7	8	50

OR

The following table shows the marks obtained by 100 students of class X in a school during a particular academic session. Find the median mark of this distribution.

Marks	No. of students
Less than 10	7
Less than 20	21
Less than 30	34
Less than 40	46
Less than 50	66
Less than 60	77
Less than 70	92
Less than 80	100

Section – E

36. **Case Study-1**
Read the following passage and answer the questions that follow:
An interior designer Rajeev Sethi hired two painters, Salim and Karim to make paintings for his buildings. Both painters were asked to make 50 different paintings each. The prices quoted by both the painters are given below:
Salim asked for Rs 6000 for first painting and an increment of Rs 200 for each following painting.
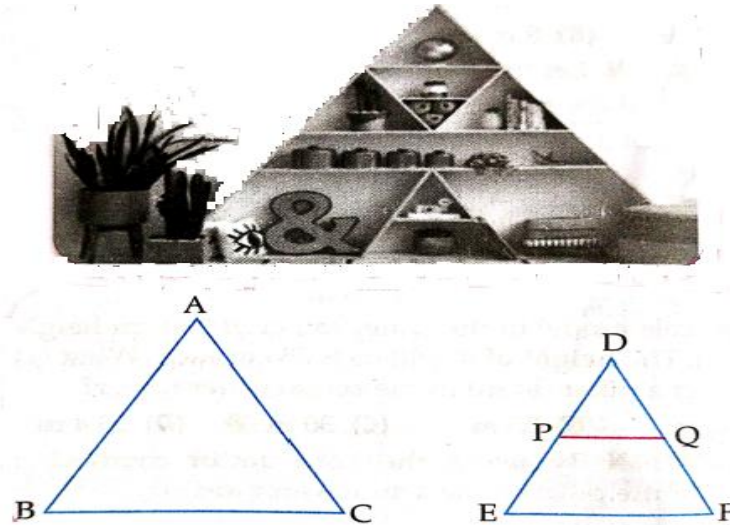Karim asked Rs 4000 for the first painting and an increment of Rs 400 for each following painting.

(a) How much money did Salim get for his 25th painting?
(b) For which painting Karim gets Rs15600?
(d) How much money did Salim get in all?

<div align="center">OR</div>

If both Salim and Karim make paintings at the same pace, find the first painting for which Karim will get more money than Salim.

37**. Case Study- 2**

Read the following passage and answer the questions that follow:

Triangle is a very popular shape used in different design in the market. The picture given above shows a cabinet designed by a designer. Here the largest triangle is represented by ΔABC and the smallest one with the self is represented by ΔDEF. PQ is parallel to EF.

(a) Show that $\Delta DPQ \sim \Delta DEF$.
(b) If DP = 50 cm, DE = 70 cm, DQ = 60 cm, find DF.
(c) If 2AB = 3DE , $\Delta ABC \sim \Delta DEF$ and Perimeter of ΔDEF = 30 cm, find the perimeter of ΔABC.

<div align="center">OR</div>

If 2AB = 3DE and $\Delta ABC \sim \Delta DEF$, then show that $\dfrac{\text{Perimeter of } \Delta ABC}{\text{Perimeter of } \Delta DEF}$ = constant

38. **Case Study – 3**

Read the following passage and answer the questions that follow:

Reema's father bought an ice-cream brick, empty cones and scoop to pour the ice-cream into the cones for all family members. Dimensions of the ice-cream brick are 30 cm, 25 cm, 10 cm and the radius of hemispherical scoop is 3.5 cm. Also radius and height of cone are 3.5 cm and 12 cm respectively.

(a). Find the slant height of ice-cream cone.
(b). What is the volume of hemispherical scoop?
(c). What is the minimum number of scoops required to fill the cone upto brim?

<div align="center">OR</div>

What is the quantity of ice-cream in the brick (in litres)?