DAV PUBLIC SCHOOL, MCL, KALINGA AREA
PRACTICE TEST
CLASS - X
MATHEMATICS

Time : **3 hrs** Max. Marks : **80**

Instructions

1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.

PART-A

1. It consists two sections- Section I and Section II.
2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 4 questions on case study. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

PART-B

1. Question No. 21 to 26 are Very Short Answer Type questions of 2 marks each.
2. Question No. 27 to 33 are Short Answer Type questions of 3 marks each.
3. Question No. 34 to 36 are Long Answer Type questions of 5 marks each.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

PART A

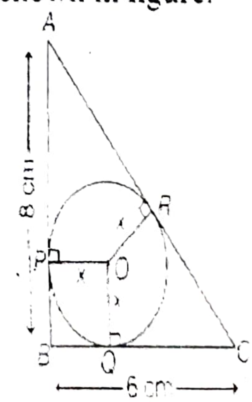
Section - I

Directions (Q.Nos. 1-16) *Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.*

1. ΔABC and ΔDEF are similar such that $2AB = DE$ and $BC = 8$ cm, then find the value of EF.

2. 12 spheres of the same size are made from melting a solid cylinder of 16 cm diameter and 2 cm height. Find the diameter of each sphere.

3. ABC is a right-angled triangle with $BC = 6$ cm and $AB = 8$ cm. A circle with centre O and radius x cm has been inscribed in ΔABC as shown in figure.



Then, find the value of x.

4. If the circumference of a circle exceeds it diameter by 30, then find the radius of the circle.

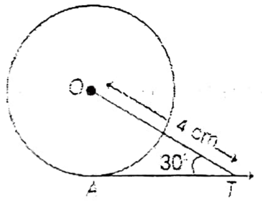
5. To divide a line segment AB in the ratio $6:7$, a ray AX is drawn first such that $\angle BAX$ is an acute angle and then points $A_1, A_2, \ldots$ are located equal distances on the ray AX. Find the point on the ray AX, which point B is join.

6. If the first term of an AP is 2 and common difference is 4, then find the sum of its 40 terms.

Or What is the common difference of an AP in which $T_{18} - T_{14} = 32$?

7. If $P(-1, 1)$ is the mid-point of the line segment joining $A(-3, b)$ and $B(1, b+4)$, then find the value of b.

8. In the given figure, AT is a tangent to the circle with centre O such that $OT = 4$ cm and $\angle OTA = 30°$.



Then, find the value of AT.

Or Find the length of a tangent drawn to a circle, with radius 5 cm, from a point 13 cm away from the centre of the circle.

9. In a lottery ticket, there are 10 prizes and 25 blanks, find the probability of not getting a prize.

10. If the graph of a quadratic polynomial does not intersect the X-axis, then find the number of zero(s).

11. If the mean of first n natural numbers is $\frac{5n}{9}$, then find the value of n.

12. Find the centroid of ΔPQR whose vertices are $P(-8, 0)$, $Q(5, 5)$ and $R(-3, -2)$.

13. The material of a cone is converted into the shape of a cylinder of equal radius. If height of the cylinder is 6 cm, then find the height of the cone.

14. What is the value of $2\tan^2\theta + \cos^2\theta - 2$, If θ is an acute angle and $\sin\theta = \cos\theta$.

Or In a rectangle $ABCD$, $AB = 40$ cm, $\angle BAC = 30°$, then find the side of BC.

15. If α and β are the zeroes of polynomial $3x^2 + 4x + 2$, then find $\alpha\beta^2 + \beta\alpha^2$.

Or If α and β are the zeroes of the polynomial $f(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1$, then find the value of $4k$.

16. Find the HCF of 96 and 404 by prime factorisation method.

Or If $\frac{17}{125}$ is a rational number, find the decimal expansion of it.

Section - II

Directions (Q.Nos. 17-20) *Case study based questions are compulsory. Attempt any four sub parts of each question. Each sub part carries 1 mark.*

17. Case Study I

Pollution

Sulpher dioxide (SO_2) can cause respiratory problems such as branchitis and can irritate your nose, throat and lungs. It may cause cough, whearing, phlegm and asthma attacks. The effects are worse when you are exercising. SO_2 has been linked to cardiovascular disease.

To find out the concentration of SO_2 in the air (in parts per million, i.e. ppm).

A student collects the data for 30 localities in a certain city and is presented below

Concentration of SO_2 (in ppm)	Frequency
0.00-0.04	4
0.04-0.08	9
0.08-0.12	9
0.12-0.16	2
0.16-0.20	4
0.20-0.24	2

(a) Suppose mean of n observations is $\bar{x}$. If we multiply each observation by 5, then new mean will be

(i) x (ii) $\frac{\bar{x}}{5}$

(iii) $\bar{x}+5$ (iv) $\bar{x}-5$

(b) The class with the maximum frequency is said to be

(i) Median (ii) Mode

(iii) Mean (iv) None of these

(c) Find the mean concentration of SO_2 in the air.

(i) 0.0750 ppm (ii) 0.085 ppm

(iii) 0.0999 ppm (iv) 0.087 ppm

(d) Find the median class of the given data.

(i) 0.04-0.08 (ii) 0.08-0.12

(iii) 0.12-0.16 (iv) None of these

(e) Find the number of localities, which have more than 0.12 ppm.

(i) 7 (ii) 8 (iii) 6 (iv) 5

18. Case Study II

Sattelite Towers in Himalayas

The sattellite image of Himalaya Mountain is shown below. In this image there are many signal towers are standing.

The angle of elevation of the top of a hill from the foot of a tower is 60° and the angle of elevation of the top of the tower with height 50 m from the foot of the hill is 30°.

(a) Find the horizontal distance between hill and tower.

(i) 50 m (ii) $50\sqrt{3}$ m

(iii) $40\sqrt{3}$ m (iv) $45\sqrt{3}$ m

(b) Find the height of the hill.

(i) 150 m (ii) 145 m

(iii) 155 m (iv) 160 m

(c) Find the distance from foot of tower to the top of the hill.

(i) $100\sqrt{3}$ m (ii) $150\sqrt{3}$ m

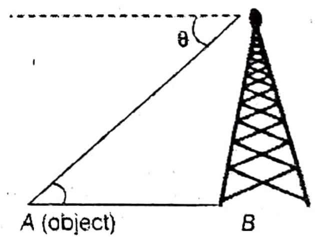
(iii) 120 m (iv) 100 m

(d) Find the distance from foot of the hill to the top of the tower.

(i) $100\sqrt{3}$ m (ii) 100 m

(iii) 120 m (iv) 140 m

(e) Suppose a person is sitting on the top of the tower and see the object on the ground at point A. And the angle of depression make by person to the object is θ.



If the object is move away from the tower then the angle of depression make by person is

(i) increasing

(ii) decreasing

(iii) increasing or decreasing

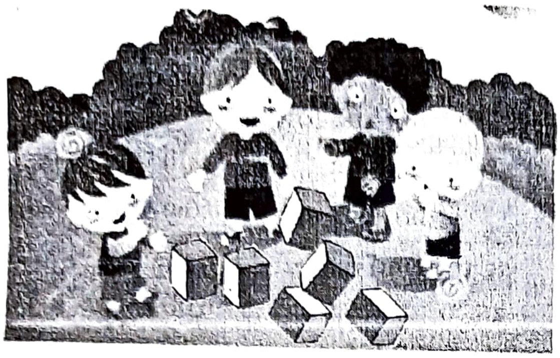
(iv) None of the above

19. Case Study III

Fun Game

One day children invite some friends in their house and they want to play some fun game.

So, they consider block in the shape of a cube with one letter/number written on each face as shown below



While through the cube, they want to know the change of getting some particular number or alphabet.

2	3	5	7	A	B

(a) Find the probability of getting an alphabet.

(i) 1 (ii) $\frac{1}{3}$

(iii) $\frac{2}{3}$ (iv) $\frac{5}{7}$

(b) Find the probability of getting a prime number.

(i) $\frac{2}{3}$ (ii) $\frac{1}{3}$

(iii) 1 (iv) None of these

(c) Find the probability of getting a consonant.

(i) $\frac{1}{3}$ (ii) $\frac{1}{6}$

(iii) $\frac{5}{6}$ (iv) $\frac{2}{3}$

(d) When we have no reason to believe that one is more likely to occur than the other, then it is said to be

(i) simple event

(ii) compound event

(iii) equally likely outcomes

(iv) None of the above

(e) If the probability of any event is one, then in percentage we can say that it is

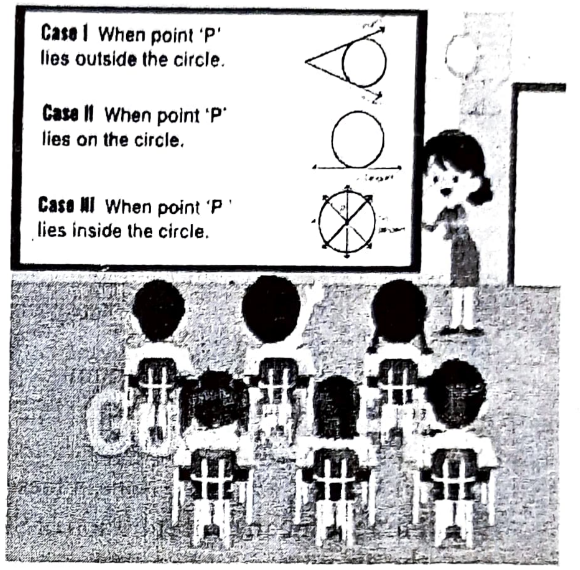
(i) 0% (ii) 20%

(iii) 50% (iv) 100%

20. Case Study IV

Number of Tangents on a Circle

The number of tangents drawn from a point on a circle depends upon the position of the point with respect to the circle.



Suppose O is the centre of a circle of radius 5 cm. T is a point such that $OT = 13$ cm and OT intersects the circle at E and AB is the tangent to the circle at E.

(a) Find the length of the tangent at point T.

(i) 12 cm (ii) 13 cm

(ii) 14 cm (iv) 15 cm

(b) Find the length of the tangent AB.

(i) $\frac{20}{7}$ cm (ii) $\frac{20}{3}$ cm

(iii) $\frac{10}{3}$ cm (iv) None of these

(c) How many tangents can be drawn from point O.

(i) 0 (ii) 1 (iii) 2 (iv) 3

(d) Find the area of triangle ABT

(i) $\frac{80}{7}$ cm^2 (ii) $\frac{80}{3}$ cm^2

(iii) $\frac{80}{11}$ cm^2 (iv) None of these

(e) If two tangents are drawn to a circle from an external point, then they subtend equal angles at

(i) inside the circle (ii) chord

(iii) centre (iv) None of these

PART B

Directions (Q.Nos. 21-26) *These are Very Short Answer Type questions of 2 marks each.*

21. In a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance and complete steps?

22. One root of the quadratic equation $2x^2 - 8x - k = 0$ is 5/2. Find the other root and the value of k.

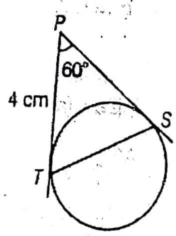
Or

Using quadratic formula, solve for x.

$$9x^2 - 3(a+b)x + ab = 0$$

23. Find the ratio in which the point (11, 15) divides the line segment joining the points (15, 5) and (9, 20).

24. In the given figure, PT and PS are tangents to a circle from a point P, such that $PT = 4$ cm and $\angle TPS = 60°$. Find the length of chord TS. How many lines of same length TS can be drawn in the circle?



Or AB is a diameter and AC is a chord of a circle such that $\angle BAC = 30°$. If the tangent at C intersects AB produced in D, prove that $BC = BD$.

25. If $\theta = 30°$, verify that

$$\cos 3\theta = 4\cos^3\theta - 3\cos\theta$$

26. In a two-digit number, the ten's digit is three times the unit's digit. When the number is decreased by 54, the digits are reversed. Find the number.

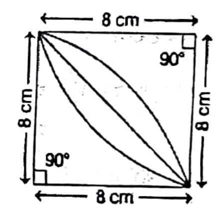
Directions (Q.Nos. 27-33) *These are Short Answer Type questions of 3 marks each.*

27. If the p th, q th and r th terms of an AP are a, b and c respectively, then show that $a(q-r) + b(r-p) + c(p-q) = 0$.

28. A ladder reaches a window which is 12 m above the ground on one side of the street. Keeping its foot of the same point, the ladder is turned to the other side of the street to reach a window 9 m high. Find the width of street, if the length of the ladder is 15 m.

Or In ΔABC, if AD is the median, then show that $(AB)^2 + (AC)^2 = 2(AD^2 + BD^2)$.

29. Calculate the area of the designed region, in the given figure, common between the two quadrants of circles of radius 8 cm each.



30. Prove that $\sqrt{7}$ is an irrational number.

31. If the point $R(x, y)$ is equidistant from the points $P(a+b, a-b)$ and $Q(b-a, a+b)$, then find distance of P from origin, mid-point of PQ and also prove that $xa = yb$.

32. Prove that $\sin\theta(1+\tan\theta) + \cos\theta(1+\cot\theta) = \sec\theta + \text{cosec}\,\theta$.

Or In ΔABC, right angled at B, if $\tan A = \sqrt{3}$, then find the value of

$$\sin A \cos C + \cos A \sin C.$$

33. A toy is in the form of a cone mounted on a hemisphere of radius 3.5 cm. The total height of the toy is 15.5 cm. Find the total surface area and volume of the toy.

Directions (Q.Nos. 34-36) *These are Long Answer Type questions of 5 marks each.*

34. Solve the following quadratic equation by factorisation method.

$$\frac{1}{a+b+x}=\frac{1}{a}+\frac{1}{b}+\frac{1}{x},\ a+b\neq 0.$$

35. Draw a right angled ΔABC in which $AB=6$ cm, $BC=8$ cm and $\angle B=90°$. Draw BD perpendicular from B on AC and draw a circle passing through the points B, C and D. Construct tangents from A to this circle.

36. Find a quadratic polynomial whose zeroes are reciprocals of the zeroes of the polynomial $f(x)=ax^2+bx+c,\ a\neq 0,\ c\neq 0.$

Or If α, β are the zeroes of the polynomial $p(x)=2x^2+5x+k$ satisfying the relation $\alpha^2+\beta^2+\alpha\beta=\frac{21}{4}$, then find the value of k for this to be possible.

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