Time : 3 Hours
Maximum Marks : 80

MATHEMATICS (Standard)

CBSE
Sample Question Papers

Self Assessment Paper 1

General 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- I and 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. *Section III, Question No 21 to 26 are Very short answer Type questions of 2 marks each,*
2. *Section IV, Question No 27 to 33 are Short Answer Type questions of 3 marks each*
3. *Section V, 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

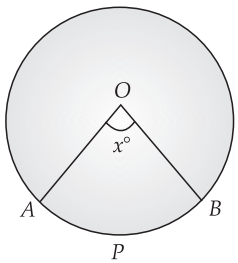
Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.

1. Write the value of $\cot^2\theta - \dfrac{1}{\sin^2\theta}$

OR

AI If $k + 1 = \sec^2\theta\,(1 + \sin\theta)\,(1 - \sin\theta)$, then find the value of k.

2. In given fig., O is the centre of a circle. If the area of the sector $OAPB$ is $\dfrac{5}{36}$ times the area of the circle, then find the value of x.



3. If the areas of three adjacent faces of a cuboid are X, Y, and Z respectively, then find the volume of cuboid in terms of X,Y and Z.

4. From the following frequency distribution, find the median class :

Cost of living index	1400 – 1550	1550 – 1700	1700 – 1850	1850 – 2000
Number of weeks	8	15	21	8

5. Out of 200 bulbs in a box, 12 bulbs are defective. One bulb is taken out at random from the box. What is the probability that the drawn bulb is not defective ?

6. Find the smallest positive rational number by which $\frac{1}{7}$ should be multiplied so that its decimal expansion terminates after 2 places of decimal.

OR

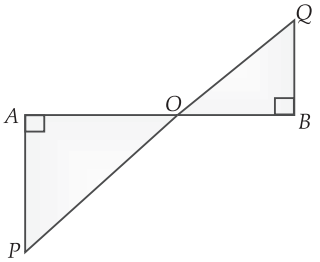
Write one rational and one irrational number lying between 0.25 and 0.32.

AI 7. Find the coordinates of the point on y-axis which is nearest to the point (– 2, 5).

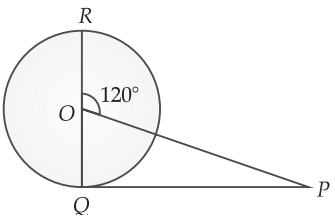
8. In triangles ABC and DEF, $\angle B = \angle E$, $\angle F = \angle C$ and $AB = 3DE$. Then, what can you say about the similarity and congruency of these triangles.

OR

AI In the given figure, if $\angle A = 90°$, $\angle B = 90°$, $OB = 4.5$ cm, $OA = 6$ cm and $AP = 4$ cm, then QB ..... .



9. PQ is a tangent drawn from an external point P to a circle with centre O and QOR is the diameter of the circle. If $\angle POR = 120°$, the measure of $\angle OPQ$.



10. a and b are two positive integers such that the least prime factor of a is 3 and the least prime factor of b is 5, then find the least prime factor of $(a + b)$.

OR

Find the smallest natural number by which 1200 should be multiplied, so that the square root of the product is a rational number.

11. Find the zeroes of the quadratic polynomial $x^2 + 99x + 127$.

OR

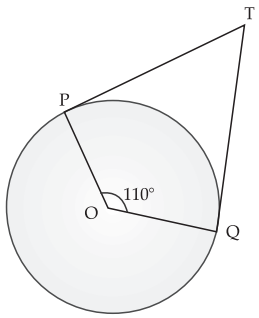
AI For what value of k, the roots of the equation $x^2 + 4x + k = 0$ are real ?

12. The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ have no solution. Justify

13. If the n^{th} term of an A.P. –1, 4, 9, 14.... is 129. Find the value of n.

14. If the distance between the points $(4, p)$ and $(1, 0)$ is 5, then the value of p.

15. In the given figure, if TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 110°$, then find $\angle PTQ$.



16. Find the volume of a right circular cylinder with base radius 7 cm and height 10 cm. $\left(\text{use } \pi = \frac{22}{7}\right)$

Section-II

Case study based questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark

AI 17. Case Study based-1 :

Jaspal takes a loan from a bank for his car.

Jaspal Singh repays his total loan of ₹ 118000 by paying every month starting with the first instalment of ₹ 1000. If he increases the instalement by ₹ 100 every month.

(a) If the given problem is based on AP, then what is the first term and common difference?
(i) 1000, 100 (ii) 100, 1000
(iii) 100, 100 (iv) 1000,1000

(b) In how many months the loan will be cleared?
(i) 20 (ii) 30 (iii) 40 (iv) 50

(c) The amount paid by him in 30th installment is
(i) 3900 (ii) 3500 (iii) 3000 (iv) 3600

(d) The amount paid by him in 30 installments is
(i) 37000 (ii) 73500 (iii) 75300 (iv) 53700

(e) What amount does he still have to pay after 30th installment?
(i) 45500 (ii) 44000 (iii) 54500 (iv) 44500

AI 18. Case Study based-2 :

John and Jivanti are playing with the marbles. They together have 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they now have is 124.

(a) If John had x number of marbles, then number of marbles Jivanti had :
(i) $x - 45$ (ii) $45 - x$ (iii) $45x$ (iv) $x - 5$

(b) Number of marbles left with Jivanti, when she lost 5 marbles:
(i) $x - 45$ (ii) $40 - x$ (iii) $45 - x$ (iv) $x - 40$

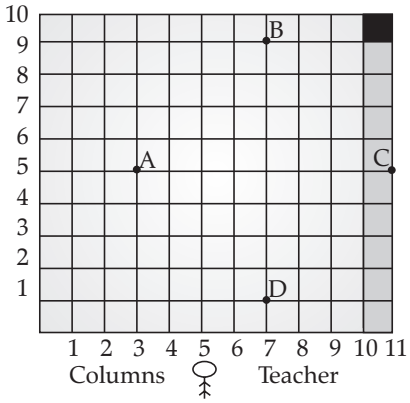
(c) The quadratic equation related to the given problem is:
(i) $x^2 - 45x + 324 = 0$ (ii) $x^2 + 45x + 324 = 0$
(iii) $x^2 - 45x - 324 = 0$ (iv) $-x^2 - 45x + 324 = 0$

(d) Number of marbles John had had :
(i) 10 (ii) 9 (iii) 35 (iv) 30

(e) If John had 36 marbles, then number of marbles Jivanti had :
(i) 10 (ii) 9 (iii) 36 (iv) 35

AI 19. Case Study based-3 :

Students of a school are standing in rows and columns in their playground for a drill practice. A, B, C and D are the positions of four students as shown in figure.



(a) What are the Co-ordinate positions of A and B?
(i) (3, 5) and (7, 9) (ii) (3, 5) and (7, 1)
(iii) (7, 9) and (3, 5) (iv) (7, 1) and (9, 4)

(b) B and D are apart at a distance :
(i) 9 (ii) 8 (iii) 7 (iv) 6

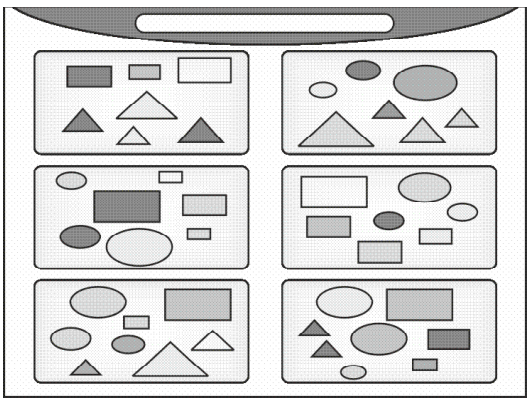
(c) What is the mid-point of AD?
(i) (5, 4) (ii) (7, 5) (iii) (3, 5) (iv) (5, 3)

(d) Distance between C and D is :
(i) 4 (ii) $4\sqrt{2}$ (iii) 8 (iv) $\sqrt{2}$

(e) How sides of quadrilateral ABCD are equal:
(i) 2 (ii) 3 (iii) all (iv) None of these

AI 20. Case Study based-4 :

A child's game has 8 triangles of which 3 are blue and rest are red, and 10 squares of which 6 are blue and rest are red. One piece is lost at random.



(a) How many triangles are of red colour and how many squares are of blue colour?
(i) 5, 4 (ii) 4, 5 (iii) 5, 5 (iv) 8, 6

(b) Find the probability that lost piece is triangle.
(i) $\frac{4}{9}$ (ii) $\frac{5}{9}$ (iii) $\frac{1}{3}$ (iv) $\frac{5}{18}$

(c) Find the probability that lost piece is square.
(i) $\frac{4}{9}$ (ii) $\frac{5}{9}$ (iii) $\frac{1}{3}$ (iv) $\frac{5}{18}$

(d) Find the probability that lost piece is square of blue color.
(i) $\frac{4}{9}$ (ii) $\frac{5}{9}$ (iii) $\frac{1}{3}$ (iv) $\frac{5}{18}$

(e) Find the probability that lost piece is triangle of red color.
(i) $\frac{4}{9}$ (ii) $\frac{5}{9}$ (iii) $\frac{1}{3}$ (iv) $\frac{5}{18}$

PART-B

Section-III

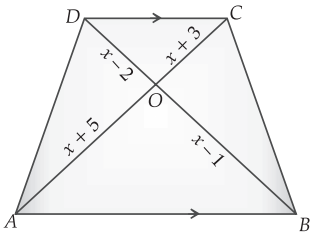
All questions are compulsory. In case of internal choices, attempt any one.

21. Three sets of English, Hindi and Sociology books dealing with cleanliness have to be stacked in such a way that all the books are stored topicwise and the height of each stack is the same. The number of English books is 96, the number of Hindi books is 240 and the number of sociology books is 336.

(i) Assuming that the books are of the same thickness, determine the number of stacks of English, Hindi and Sociology books.

(ii) Which mathematical concept is used in the problem?

22. In the given figure, if $AB \parallel DC$, find the value of x.



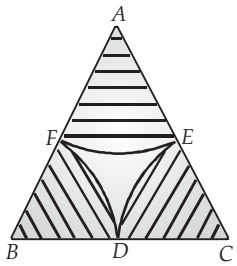
23. Prove that : $(\sin\theta + \text{cosec}\,\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$

24. Manu is 1.7 m tall, he wants to see the light tower near his house and measure its height. The distance of tower from his house is $20\sqrt{3}$ m . So he used the concept of trigonometry. The angle of elevation from the eye of Manu to the top of tower is 30°. Find the height of the tower.

OR

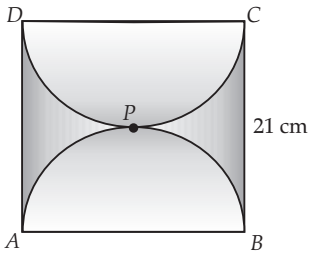
The tops of two towers of height x and y, standing on the ground, subtend the angles of 30° and 60° respectively at the centre of the line joining their feet, then find $x : y$.

AI **25.** In fig., arcs are drawn by taking vertices A, B and C of an equilateral triangle of side 10 cm, to intersect the sides BC, CA and AB at their respective mid-points D, E and F. Find the area of the shaded region. (Use $\pi = 3.14$).



OR

Find the perimeter of the shaded region if *ABCD* is a square of side 21 cm and *APB* and *CPD* are semicircles. $\left(\text{use } \pi = \frac{22}{7}\right)$



26. **(i)** Find the mean of children per family from the data given blow :

Number of children	0	1	2	3	4	5
Number of families	5	11	25	12	5	2

(ii) Which mathematical concept is used in this problem ?

Section-IV

All questions are compulsory. In case of internal choices, attempt any one.

27. If α, β and γ are zeroes of the polynomial $6x^3 + 3x^2 - 5x + 1$, then find the value of $\alpha^{-1} + \beta^{-1} + \gamma^{-1}$.

OR

Quadratic polynomial $2x^2 - 3x + 1$ has zeroes as α and β. Now form a quadratic polynomial whose zeroes are 3α and 3β.

28. Find c if the system of equations $cx + 3y + (3 - c) = 0$; $12x + cy - c = 0$ has infinitely many solutions ?

OR

Find the value(s) of k so that the pair of equations $x + 2y = 5$ and $3x + ky + 15 = 0$ has a unique solution.

29. If the sum of first four terms of an AP is 40 and that of first 14 terms is 280. Find the sum of its first n terms.

30. If P and Q are the points on side CA and CB respectively of ΔABC, right angled at C. Prove that $(AQ^2 + BP^2) = (AB^2 + PQ^2)$

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

32. Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

33. Peter throws two different dice together and finds the product of the two numbers obtained. Rina throws a die and squares the number obtained. Who has the better chance to get the numbers 25.

Section-V

All questions are compulsory. In case of internal choices, attempt any one.

AI **34.** Solve the following system of equations :

$$\frac{21}{x}+\frac{47}{y} = 110$$

$$\frac{27}{x}+\frac{21}{y} = 162,\ x, y \neq 0.$$

OR

If the roots of the quadratic equation $(c^2 - ab)x^2 - 2(a^2 - bc)x + b^2 - ac = 0$ in x are equal, then show that either $a = 0$ or $a^3 + b^3 + c^3 = 3abc$

35. Find the ratio in which the line segment joining the points $A(3, -3)$ and $B(-2, 7)$ is divided by x-axis. Also find the co-ordinates of point of division.

36. The angle of elevation of the top B of a tower AB from a point X on the ground is 60°. At a point Y, 40 m vertically above X, the angle of elevation of the top is 45°. Find the height of the tower AB and the distance XB.

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