

Sample Question Paper - 2



Time : 3 Hours

Maximum Marks : 80

MATHEMATICS (Standard)

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. What is the product of a non-zero rational and an irrational number?

OR

If two positive integers a and b are written as $a = x^4 y^3$ and $b = x^2 y$;
where x, y are prime numbers, then HCF of a and b .

2. If one of the zeroes of the cubic polynomial $x^3 + px^2 + qx + r$ is 1,
then the product of the other two zeroes.

OR

Is equation $x^2 + 5x - 2 = 0$ has two distinct real roots? Justify

Sample Question Paper - 2



3. AOBC is a rectangle whose three vertices are vertices A (1, 3), O (0, 0) and B (2, -4).
What is the length of the diagonal?
4. From a point P(outside circle) which is at a distance of 13 cm from the centre O of a circle of radius 5 cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR.
5. What is the diameter of a circle whose area is equal to the sum of the areas of the two circles of radii 8 cm and 18 cm is
6. It is given that triangles $ABC \sim DFE$, $\angle A = 30^\circ$, $\angle C = 50^\circ$, $AB = 5$ cm, $AC = 8$ cm and $DF = 7.5$ cm. Then, $DE = 12$ cm, $\angle F = 100^\circ$ is true or not, justify.
7. If three solid hemispheres of same base radius '2' are joined together along their bases, then curved surface area of this new solid.
8. What is the coordinates of the point which lies on the perpendicular bisector of the line segment joining the points A(3, -7) and B(-3,7).
9. If all the zeroes of a cubic polynomial are positive, then what are the signs of all the coefficients and the constant term of the polynomial?
10. If the common difference of an A.P. is -3, then find the value of $a_{12} - a_9$.
11. Find the solution of pair of equations $x = 2$ and $x = -7$
12. If the lines given by $3x - ky = 3$ and $4x + 5y + 1 = 0$ are parallel, then the value of k ?
13. From an external point P, tangents PA and PB are drawn to a circle with centre O.
If $\angle PAB = 50^\circ$, then find $\angle AOB$.
14. If $\tan (3x + 30^\circ) = 0$, then find the value of x.
15. Find the median of the data, using an empirical relation between mean, median and mode when it is given that Mode = 10.5 and Mean = 14.
16. If the circumferences of two concentric circles forming a ring are 44 cm and 22 cm respectively. Find the width of the ring.

OR

Volume and surface area of a solid sphere are numerically equal.
What is the diameter of sphere?

Sample Question Paper - 2



Section-II

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

17. Case study based - 1:

In a potato race, a bucket is placed at the starting point, which is 5m from the first potato, and the other potatoes are placed 3m apart in a straight line. There are ten potatoes in the line (see figure below).



A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in, and she continues in the same way until all the potatoes are in the bucket.

(a) What is the distance travelled by competitor to pick 1st potato?

- (i) 10 (ii) 16 (iii) 22 (iv) 48

(b) What is the distance travelled by competitor to pick 2nd potato?

- (i) 10 (ii) 16 (iii) 22 (iv) 48

(c) What is the distance travelled by competitor to pick 3rd potato?

- (i) 10 (ii) 16 (iii) 22 (iv) 48

(d) The given problem is based on which concept?

- (i) AP (ii) GP (iii) HP (iv) None of these

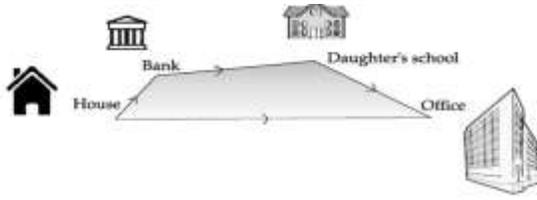
(e) Find the total distance travelled by the competitor?

- (i) 300 (ii) 370 (iii) 730 (iv) 700

18. Case Study based - 2 :

Ayush Starts walking from his house to office. Instead of going to the office directly, he goes to a bank first, from there to his daughter's school and then reaches the office. (Assume that all distances covered are in straight lines). If the house is situated at (3,5), bank at (6, 9), school at (10, 14) and office at (10, 20) and coordinates are in km.

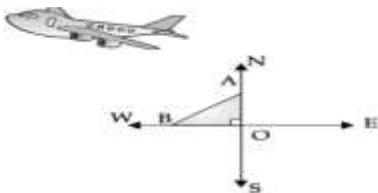
Sample Question Paper - 2



- (a) What is the distance between house and bank?
(i) 5 (ii) 10 (iii) 12 (iv) 27
- (b) What is the distance between Daughter's School and bank?
(i) 7.8 (ii) 10 (iii) 9.8 (iv) 27
- (c) What is the distance between house and office?
(i) 16.5 (ii) 17 (iii) 24 (iv) 26
- (d) What is the total distance travelled by Ayush to reach the office?
(i) 5 (ii) 10.8 (iii) 18.8 (iv) 20
- (e) What is the extra distance travelled by Ayush?
(i) 2 (ii) 2.3 (iii) 2.4 (iv) none of these

19. Case Study based - 3 :

An aeroplane leaves an airport and flies due north at a speed of 1,500 km per hour. At the same time, another aeroplane leaves the same airport and flies due west at a speed of 1,200 km per hour.



- (a) What is the distance travelled by aeroplane towards north after $1\frac{1}{2}$ hours.
(i) 1000 (ii) 2000 (iii) 1500 (iv) 2250
- (b) What is the distance travelled by aeroplane towards west after $1\frac{1}{2}$ hours?
(i) 1000 (ii) 1200 (iii) 1500 (iv) 1800
- (c) ΔAOB is
(i) 90° (ii) 45° (iii) 30° (iv) 60°
- (d) How far apart will be the two planes after $\frac{3}{2}$ hours
(i) $\sqrt{22,50,000}$ (ii) $\sqrt{32,40,000}$ (iii) $\sqrt{54,90,0000}$ (iv) None of these

Sample Question Paper - 2



- (e) The given problem is based on which concept?
- (i) Triangles (ii) Co-ordinate geometry
(iii) Height and Distance (iv) None of these

20. Case Study based - 4 :

A horse is tied to a peg at one corner of a square shaped grass field of sides 10m by means of a 5 m long rope (see the given figure).



- (a) What is the area of the grass field?
- (i) 225 sq m (ii) 100 sq m (iii) 255 sq m (iv) 15sq m
- (b) The area of that part of the field in which the horse can graze.
- (i) 19.625 sq m (ii) 19.265 sq m (iii) 19 sq m (iv) 78.5 sq m
- (c) The grazing area if the rope were 10 m long instead of 5 m.
- (i) 7.85 sq m (ii) 785 sq m (iii) 225 sq m (iv) 78.5 sq m
- (d) The increase in the grazing area if the rope were 10 m long instead of 5 m.
- (i) 58.758 sq m (ii) 58.875 sq m (iii) 58 sq m (iv) 78.5sq m
- (e) The given problem is based on which concept?
- (i) Coordinate geometry (ii) Area related to circles
(iii) Circle (iv) None of these

PART-B

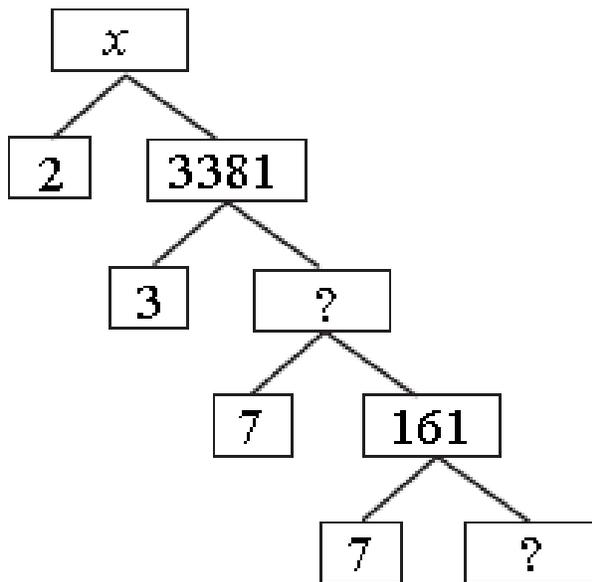
Section-III

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

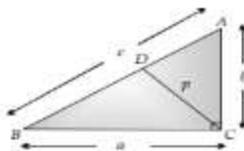
Sample Question Paper - 2



21. Complete the following factor tree and find the composite number x.



22. ABC is a right triangle, right angled at C. Let BC = a, CA = b, AB = c and p be the length of perpendicular from C to AB. Prove that $cp = ab$.



OR

In the figure, PQRS is a trapezium in which $PQ \parallel RS$, on PQ and RS, there are points E and F respectively such that EF intersects SQ at G. Prove that $EQ \cdot GS = GQ \cdot FS$.



23. Find cosec 30 and cos 60 geometrically.

OR

Prove that:
$$\frac{(\sin^4\theta + \cos^4\theta)}{1 - 2 \sin^2\theta \cos^2\theta} = 1$$

Sample Question Paper - 2



24. From the top of light house, 50m above the water, the angle of depression of a small boat is 30° . Find how far the boat is from the basement of the light house.

25. Find the area of the square that can be inscribed in a circle of radius 12 cm.

26. The mean and median of 100 observations are 52 and 56 respectively. The value of the largest observation is 100. It was later found that it is 120 not 100. Find the true mean and median.

Section-IV

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

27. Sum of the ages of a father and the son is 44 years. If father's age is three times that of his son, then find their respective ages.

OR

A part of monthly hostel charge is fixed and the remaining depends on the number of days one has taken food in the mess. When Swati takes food for 10 days, she has to pay Rs 3,000 as hostel charges whereas Mansi who takes food for 155 days has to pay Rs 3,500 as hostel charges. Find the fixed charges and the cost of food per day.

28. The ninth term of an A.P. is equal to five times the second term and twelfth term exceeds seventh times the third term by 2. Find the first term and the common difference.

OR

The sum of first n terms of three arithmetic progressions are S_1 , S_2 and S_3 respectively. The first term of each A.P. is 1 and common differences are 1, 2 and 3 respectively. Prove that $S_1 + S_3 = 2S_2$. 29. A 1.5 m tall boy spots a balloon moving with the wind in a horizontal line at a height of 80.5 m from the ground. The angle of elevation of the balloon from the eyes of the boy at any instant is 60° . After sometime, the angle of elevation reduces to 30° .

(i) Find the distance travelled by the balloon during the interval.

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

30. If $(x^2 + y^2)(a^2 + b^2) = (ax + by)^2$. Prove that $\frac{x}{a} + \frac{y}{b}$

Sample Question Paper - 2

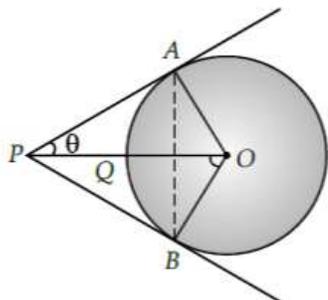


31. A bag contains 36 balls out of which x balls are red.

(i) If one ball is drawn at random from the bag, what is the probability that it is not red ?

(ii) If 2 more red balls are put in the bag, the probability of drawing a red ball will be times the probability of drawing a red ball in the first case. Find the value of x .

32. In the given figure, OP is equal to the diameter of a circle with centre O and PA and PB are tangents. Prove that ABP is an equilateral triangle.



33. If $b \cos \theta = a$, then prove that $\operatorname{cosec} \theta + \cot \theta = \sqrt{\frac{b+a}{b-a}}$

Section-V

34. Two points A and B are on the same side of a tower and in the same straight line with its base. The angle of depression of these points from the top of the tower are 60° and 45° respectively. If the height of the tower is 20 m, then find the distance between these points.

OR

Man on a cliff observes a boat at an angle of depression of 30° which is approaching the shore to the point immediately beneath the observer with a uniform speed. Six minutes later, the angle of depression of the boat is found to be 45° . Find the Time taken by boat to reach the shore.

35. If $P(9k + 3, -p)$ divides the line segment joining $A(3k + 1, -3)$ and $B(8k, 5)$ in the ratio 3 : 1.

Find the values of k and p .

36. If roots of the quadratic equation $x^2 + 2px + mn = 0$ are real and equal, show that the roots of the quadratic equations $x^2 - 2(m + n)x + (m^2 + n^2 + 2p^2) = 0$ are also equal.