Mathematics   10

Sample Question Paper
Basic (Code 241)

Time Allowed: 3 hours   Maximum Marks: 80

General Instructions:

1. This Question Paper has 5 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 Case 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 $\pi = \dfrac{22}{7}$ wherever required if not stated.

Section - A

*Section A consists of 20 questions of **1 mark each**.*

1. $2\sqrt{3}$ is
   (*a*) an integer
   (*b*) a natural number
   (*c*) a rational number
   (*d*) an irrational number

2. For quadratic polynomial $f(x) = 2x^2 + 3x + 5$, if the discriminant is equal to 0, its graph will touch x-axis at
   (*a*) one point
   (*b*) two points
   (*c*) three points
   (*d*) four points

3. The points at which the graph lines of the equations $ax + by = 0$ and $ax - by = 0$ intersect is
   (*a*) $(a, 0)$ (*b*) $(b, 0)$ (*c*) $(0, 0)$ (*d*) (a, b)

4. If the graph of the equations $3x + 4y = 12$ and $(m + n)x + 2(m - n)y = (5m - 1)$ is a coincident line, then
   (*a*) $m = -1, n = -5$
   (*b*) $m = 1, n = 5$
   (*c*) $m = 5, n = 1$
   (*d*) $m = -5, n = -1$

5. If $x = 2$ and $x = 3$ are the roots of the equation $3x^2 - 2ax + 2b = 0$, then the value of a and b are

1

(a) 9, $\dfrac{15}{2}$ (b) $\dfrac{15}{2}$, 9   (c) $\dfrac{9}{2}$, 15   (d) $\dfrac{2}{15}$, $\dfrac{1}{9}$

6. If angles of a triangle are in A.P., then one angle is

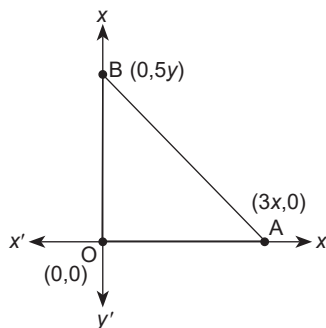(a) 70°   (b) 40°   (c) 60°   (d) 50°

7. If the circumferences of two circles are in the ratio 4 : 9, then the ratio of their area is

(a) 9 : 4   (b) 4 : 9   (c) 2 : 3   (d) 16 : 81

8. Coordinates of the point equidistant from three vertices of ΔABC as shown in the given figure, is

(a) $\dfrac{3}{2}x$, $\dfrac{5}{2}y$ (b) $\dfrac{x}{3}$, $\dfrac{2}{3}y$

(c) x, y   (d) $\dfrac{2y}{3}$, $\dfrac{x}{3}$

9. Distance of (0, 2) from the mid-point of a line joining (4, 10) and (2, 2) is

(a) 6 units   (b) 4 units

(c) 5 units   (d) 12 units

10. If cosec θ = 2, cot θ = $\dfrac{\sqrt{3}}{p}$, then p is equal to

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

11. In a triangle ABC, right-angled at C, if tan A = 1, then 2 sin A cos A is equal to
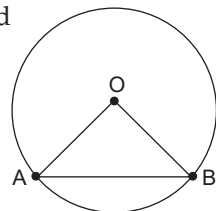
(a) 1   (b) $\dfrac{1}{2}$ (c) 2   (d) $\dfrac{\sqrt{3}}{2}$

12. A pole of height 10 m is broken from some height and its top touches the ground making an angle of 60° with the ground. The height from the ground at which the pole broke is

(a) 4.8 m   (b) 4.6 m   (c) 4.9 m   (d) 5.2 m

13. AB is a chord of length $5\sqrt{3}$ cm of a circle with centre O and radius OA = 5 cm. Then the area of the sector OAB is

(a) $\dfrac{3}{8}\pi$ cm^2 (b) $\dfrac{8}{3}\pi$ cm^2

(c) 25 cm^2 (d) $\dfrac{25}{3}\pi$ cm^2

14. The area of the sector of a circle bounded by an arc of 5π cm is equal to 20π cm^2. Radius of the circle is

(a) 12 cm   (b) 16 cm   (c) 10 cm   (d) 8 cm

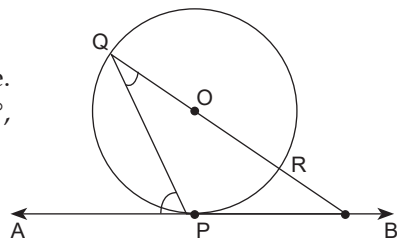15. If areas of three adjacent faces of a cuboid are a, b and c, the volume of the cuboid is

(a) $a^2b^2c^2$ (b) abc   (c) $\sqrt{abc}$ (d) $a^3b^3c^3$

2

16. If $U_i = \dfrac{x_i - 13}{10}$, $\sum f_i U_i = 70$ and $\sum f_i = 100$, then the value of $\bar{x}$ is

   (*a*) 20 (*b*) 21

   (*c*) 22 (*d*) 23

17. In the given figure, O is centre of the circle. AB is a tangent to circle at P. If $\angle APQ = 58°$, then $\angle PQB$ is

   (*a*) 58° (*b*) 32°

   (*c*) 122° (*d*) 132°

18. In a single throw of two dice, the probability of getting a doublet of even numbers is

   (*a*) $\dfrac{1}{12}$ (*b*) $\dfrac{5}{36}$ (*c*) $\dfrac{7}{36}$ (*d*) $\dfrac{11}{36}$

Direction for Questions 19 and 20: In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

19. **Statement A (Assertion):** From an external point P, two tangents are drawn to a circle at points Q and R. Then PQ = $\dfrac{1}{2}$ PR.

   Statement R (Reason): Lengths of two tangents drawn from an external point to a circle are equal.

   (*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. **Statement A (Assertion):** A card is drawn from a pack of 52 cards, probability that it would be a heart is $\dfrac{1}{4}$.

   Statement R (Reason): Each card has a probability of $\dfrac{1}{52}$ to be drawn.

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

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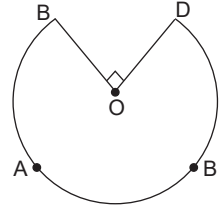22. If $\tan (A - B) = \dfrac{1}{\sqrt{3}}$ and $\sin (A + B) = \dfrac{\sqrt{3}}{2}$, find A and B.

or

If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$, show that $\cos \theta - \sin \theta = \sqrt{2} \sin \theta$.

23. The wheel of a bicycle has a diameter 70 cm. How many revolutions must the wheel make every 10 seconds to keep a speed of 19.8 km/h?

or

The shape of the given tabletop is of the sector of a circle with centre O and angle $\angle BOD = 90°$. If OB = OD = 60 cm, find the perimeter of tabletop.

24. Diagonals of a rhombus are 50 cm and 120 cm. Find each side of the rhombus.

25. If two tangents are drawn to a circle from an external point, then prove that they are equally inclined to the line joining the centre to that point.

Section - C

*Section C consists of 6 questions of **3 marks each**.*

26. Let x, y, z and p be rational numbers such that p is not a perfect cube.
    If $x + y\, p^{1/3}\, zp^{2/3} = 0$, prove that $x = y = z = 0$.

27. Find a quadratic polynomial, the sum of whose zeroes is -1 and their product is -6.

28. 8 men and 12 women can finish a work in 10 days, while 6 men and 8 women can finish it in 14 days. Find the time taken by 1 man alone to finish the work. Also, find time taken by 1 woman alone to finish the work.

or

If $\dfrac{x}{3} + \dfrac{y}{4} = 6$ and $\dfrac{x}{6} + \dfrac{y}{2} = 6$, find the value of $3y - 2x$ and $\dfrac{x}{y} + \dfrac{1}{2}$.
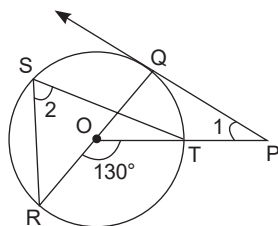
29. Find the length of each diagonal of the given rhombus.
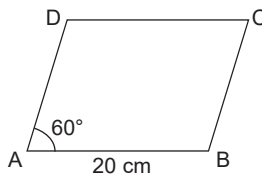
30. Calculate the median for the following data:

Mid value	15	25	35	45	55	65
Frequency	4	28	15	20	17	16

31. In the given figure, PQ is a tangent from an external point P to a circle with centre O and OP cuts the circle at T and QOR is the diameter. If $\angle POR = 130°$ and S is a point on the circle, find $\angle 1 + \angle 2$.

4

or

If *s* is the semi-perimeter of triangle ΔABC in which a circle touches the sides BC, AC, AB at D, E and F, respectively, prove that BD = *s* − AC.

Section - D

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

32. Out of a total number of birds, one-fourth are moving about in the lotus plant, one-ninth coupled (along) with one-fourth as well as 7 times the square root of number moves on a hill. 56 birds remain on trees. What is the total number of birds?

or

Prove that both the roots of equation

$(x - a)(x - b) + (x - b)(x - c) + (x - c)(x - a) = 0$ are real but they are equal only when $a = b = c$.

33. Prove that three times the sum of the squares of the sides of a triangle is equal to four times the sum of the squares of the median of a triangle.

34. A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank, which is 10 m in diameter and 2 m deep. If water flows through the pipe at a rate of 6 km/h, in how much time will the tank be filled?

or

A sector of a circle of radius 15 cm has angle 120°. It is rolled up so that two bounding radii are joined together to form a cone. Find the volume of the cone.

35. A survey regarding the heights of 50 girls in a school was conducted.

Find the mean, median and mode of given data.

Height (cm)	120 – 130	130 – 140	140 – 150	150 – 160	160 – 170
Number of Girls	2	8	12	20	8

Section - E

*Case study based questions are **compulsory**.*

36. The smartphone industry is getting very competitive these days. Many new models are launched every year. A company sold 10,000 smartphones of certain model in the third year and 14,000 smartphones in the fifth year. The selling of smartphones increases uniformly every year. Based on the information, answer the following:
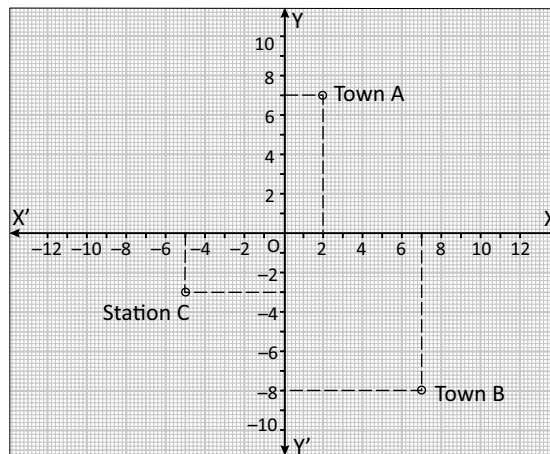
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(a) What was the sale in the second year? (1 mark)

(b) What was the total sale in the first five years? (2 marks)

or

In which year the sale would be 22000?

(c) After how many years, the sale of smartphones would be 66000? (1 mark)

37. Jay and Dev are working in a marketing company at station C in Gurugram. They are assigned to visit customers at places A and B as shown in the graph.


(a) Who travelled a longer distance if Jay had to visit A and Dev to B? (1 mark)

(b) During the return journey, they planned to meet at a place which is exactly halfway from their customers. What are the coordinates of that place? (2 marks)

or

Find the area of the triangle formed by points A, B and C.

(c) What would be the distance between places A and B? (1 mark)

38. A tree of height 10 m is situated in open field. From top of the tree, a tower can be seen clearly. If viewed from the top of the tree, the angles of elevation and depression of the top and base of the tower are observed to be 45° and 30°, respectively.
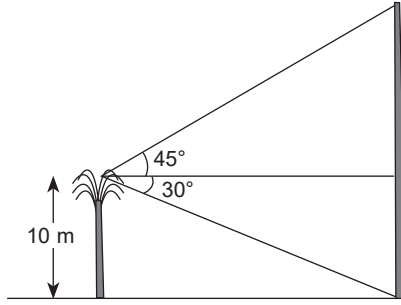
(*a*) How far is the tower from the tree? (1 mark)

(*b*) What will be the area of the trapezium formed? (2 marks)

or

What will be the perimeter of the trapezium formed?

(*c*) What will be the height of the tower? (1 mark)