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 $\pi = \frac{22}{7}$ wherever required if not stated.

Section - A

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

1. For some integer p, every odd integer is of the form

   (*a*) $2p + 1$ (*b*) $2p$ (*c*) $p + 1$ (*d*) p

2. If the mode of some data is 7 and their mean is also 7, then their median is

   (*a*) 10 (*b*) 9 (*c*) 7 (*d*) 8

3. If $p(x)$ is a polynomial of degree one and $p(a) = 0$, then a is said to be

   (*a*) value of $p(x)$. (*b*) zero of $p(x)$.

   (*c*) constant of $p(x)$. (*d*) none of these.

4. The pair of equations $x = a$ and $y = b$ graphically represents lines which are

   (*a*) parallel. (*b*) intersecting at (b, a).

   (*c*) coincident. (*d*) intersecting at (a, b).

5. The decimal expansion of the number $\frac{17}{8}$ will terminate after how many places of decimals?

   (*a*) 4 (*b*) 3 (*c*) 2 (*d*) Will not terminate

6. The mid-point of a line segment joining two points A(2, 4) and B(–2, –4) is

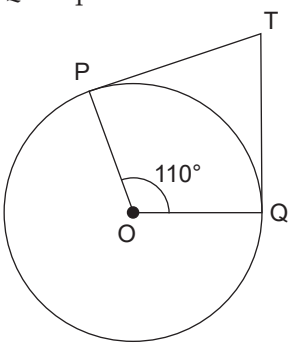
   (*a*) (–2, 4). (*b*) (2, –4). (*c*) (0, 0). (*d*) (–2, –4).

7. If in two triangles ABC and PQR, $\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ}$, then

(*a*) $\Delta PQR \sim \Delta CAB$. (*b*) $\Delta PQR \sim \Delta ABC$.

(*c*) $\Delta CBA \sim \Delta PQR$. (*d*) $\Delta BCA \sim \Delta PQR$.

8. If TP and TQ are the two tangents to a circle with centre O so that $\angle POQ = 110°$, then $\angle PTQ$ is equal to



(*a*) 60° (*b*) 70° (*c*) 80° (*d*) 90°

9. The value of (sin 45° + cos 45°) is

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

10. If ΔABC is right-angled at C, then the value of cos(A + B) is

(*a*) $\frac{\sqrt{3}}{2}$ (*b*) 1 (*c*) $\frac{1}{2}$ (*d*) 0

11. Tangents from an external point to a circle are

(*a*) equal. (*b*) not equal.

(*c*) parallel. (*d*) perpendicular.

12. The distance between the points (0, 5) and (–5, 0) is

(*a*) 5 units. (*b*) $5\sqrt{2}$ units. (*c*) $2\sqrt{5}$ units. (*d*) 10 units.

13. The area of the square that can be inscribed in a circle of radius 8 cm is

(*a*) 256 cm^2 (*b*) 128 cm^2 (*c*) 642 cm^2 (*d*) 64 cm^2

14. If $x \tan 45° \sin 30° = \cos 30° \tan 30°$, then x is equal to

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

15. Two identical solid cubes of side a are joined end to end. Then the total surface area of the resulting cuboid is

(*a*) 12 a^2 (*b*) 8 a^2 (*c*) 10 a^2 (*d*) 11 a^2

16. If arithmetic mean of a, $a + 3$, $a + 6$, $a + 9$ and $a + 12$ is 10, then a is equal to

(*a*) 1 (*b*) 2 (*c*) 3 (*d*) 4

17. Consider the following frequency distribution:

Class	0 – 5	6 – 11	12 – 17	18 – 23	24 – 29
Frequency	13	10	115	8	11

The upper limit of the median class is

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

18. The probability that a non-leap year selected at random will contain 53 Sundays is

(*a*) $\frac{1}{7}$ (*b*) $\frac{2}{7}$ (*c*) $\frac{3}{7}$ (*d*) $\frac{5}{7}$

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. **Assertion (A):** In a circle of radius 6 cm, the angle of a sector is 60°. Then the area of the sector is $\frac{132}{7}$ cm^2.

Reason (R): Area of the circle with radius r is πr^2.

(*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. **Assertion:** For any two positive integers p and q,
HCF $(p, q) \times$ LCM $(p, q) = p \times q$.

Reason: If the HCF of two numbers is 5 and their product is 150, then their LCM is 40.

(*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****.*

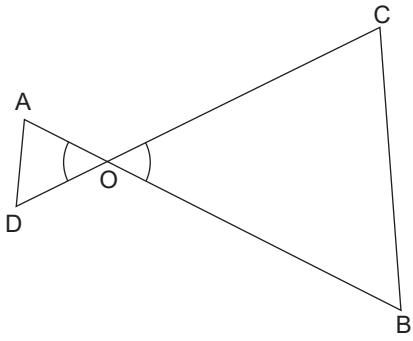
21. For which value of p does the pair of equations given below has a unique solution?

$$4x + py + 8 = 0$$
$$2x + 2y + 2 = 0$$

22. E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\Delta ABE \sim \Delta CFB$.

or

In the figure given below, OA × OB = OC × OD. Show that $\angle A = \angle C$ and $\angle B = \angle D$.



23. Calculate the length of the chord which is at a distance of 6 cm from the centre of a circle of diameter 20 cm.
24. Given A is an acute angle and 13 sin A = 5, evaluate $\frac{5\sin A - 2\cos A}{\tan A}$.
25. The circumference of a circle is 22 cm. Calculate the area of its quadrant (in cm^2).

or

Area of a sector of a circle of radius 14 cm is 154 cm^2. Find the length of the corresponding arc of the sector. [Use $\pi = \frac{22}{7}$]

Section - C

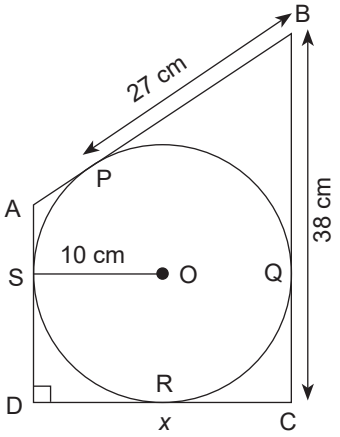
Section C consists of 6 questions of ***3 marks each****.*

26. Prove that $\sqrt{3} + \sqrt{5}$ is an irrational number.
27. Find the roots of the equation $x^2 + x - (a + 2)(a + 1) = 0$.
28. The ratio of income of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each of them manages to save ₹ 2000 per month, find their monthly incomes.

or

The sum of the digits of a two-digit number is 5. The digit obtained by increasing the digit at ten's place by unity is one-eighth of the number. Find the number.

29. In the given figure, quadrilateral ABCD is circumscribed and AD ⊥ DC. Find x if radius of incircle is 10 cm.



30. Prove: $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A$

or

If $\tan^4 \theta + \tan^2 \theta = 1$, prove that $\cos^4 \theta + \cos^2 \theta = 1$.

31. A bag contains 5 black, 7 red and 3 white balls. A ball is drawn at random from the bag. Find the probability that the ball drawn is

(*a*) red.

(*b*) black or white.

(*c*) not black.

Section - D

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

32. The sum of the areas of two squares is 640 m^2. If the difference in their perimeters is 64 m, find the sides of the two squares.

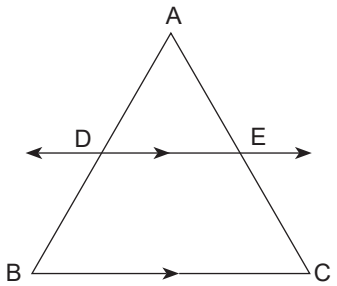
or

Sonal can row a boat at a speed of 5 km/h. If it takes her 1 hour more to row the boat 5.25 km upstream than to return downstream, find the speed of the stream.

33. In the given figure, DE || BC.

(*a*) If AD = x, DB = $x - 2$, AE = $x + 2$ and EC = $x - 1$, find the value of x.

(*b*) If DB = $x - 3$, AB = $2x$, EC = $x - 2$ and AC = $2x + 3$, find the value of x.



34. A solid cylinder of silver 9 cm high and 4 cm in diameter is melted and recast into a right-circular cone of diameter 6 cm. Find the height and the total surface area of the cone. Give your answer correct to one decimal place. (Take $\pi = 3.14$)

or

A sphere of diameter 12 cm is dropped in a right-circular cylindrical vessel, partly filled with water. If the sphere is completely submerged in water, the water level in the cylindrical vessel rises by $\frac{32}{9}$ cm. Find the diameter of the cylindrical vessel.

35. A study of yield of 150 tomato plants resulted in the following records:

Tomatoes per plant	1 – 5	6 – 10	11 – 15	16 – 20	21 – 25
Number of plants	20	50	46	22	12

Calculate the mean of the number of tomatoes per plant.

Section - E

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

36. India is a competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in the 6th year and 22600 in the 9th year.

Based on the above information, answer the following questions:

(*a*) Find the production during first year. 1 mark

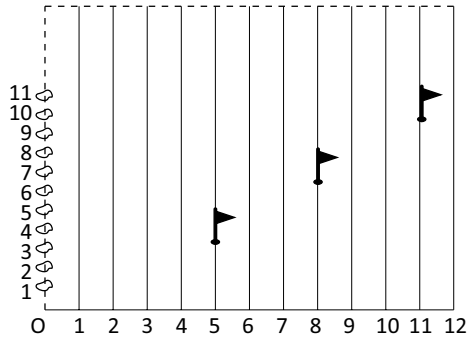
(*b*) Find the production during 8th year. 1 mark

(*c*) Find the production during first 3 years. 2 marks

or

In which year, the production is 29,200 sets.

37. Students of class X are having their Sports Day on a rectangular shaped playground. 12 lines are drawn along the length and along the breadth of the rectangular shaped playground, 200 potatoes are kept at a distance of 1 m from each other. A student, Raju has been told to post a yellow flag on 5th line at distance of $\frac{1}{10}$ th of the breadth of the playground. Sanju has posted a blue flag on the 11th line at a distance of $\frac{1}{8}$ th of the breadth. At last, Anushka has posted her green flag exactly halfway between the line segment joining two flags.



Based on the given situation, answer the following questions.

(*a*) What are the coordinates of the spot where Raju has posted his yellow flag? 1 mark

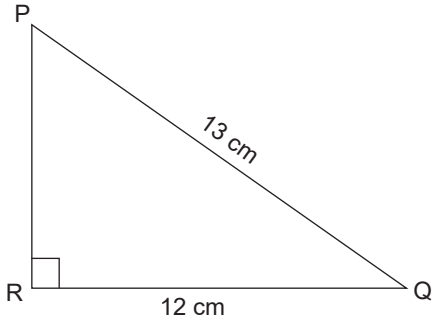
(*b*) Where has the green flag been posted? 1 mark

(*c*) Find the distance between blue flag and yellow flag? 2 marks

or

What is the distance between yellow flag and green flag?

38. Anita, a student of class 10th, has to make a project on 'Introduction to Trigonometry'. She decides to make a birdhouse which is triangular in shape. She uses cardboard to make the birdhouse as shown in the figure. Considering the front side of birdhouse as right triangle PQR, right-angled at R, answer the following questions.



(*a*) If $\angle PQR = \theta$, then find $\cos \theta$. 1 mark

(*b*) Find the value of $\sec \theta$. 1 mark

(*c*) Find the value of $\frac{\tan \theta}{1 + \tan^2 \theta}$. 2 marks

or

Find the value of $\cot^2 \theta - \text{cosec}^2 \theta$.