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. 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 $\dfrac{17}{8}$ 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).

1

7. If in two triangles ABC and PQR, $\dfrac{AB}{QR} = \dfrac{BC}{PR} = \dfrac{CA}{PQ}$, 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
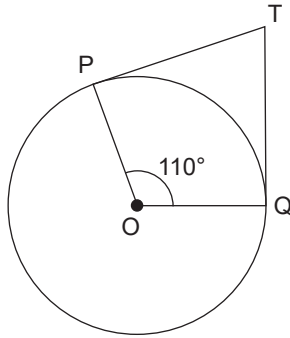
   (a) $60°$ (b) $70°$ (c) $80°$ (d) $90°$

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

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

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

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

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 $\dfrac{132}{7}$ cm².

    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) × 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**.*

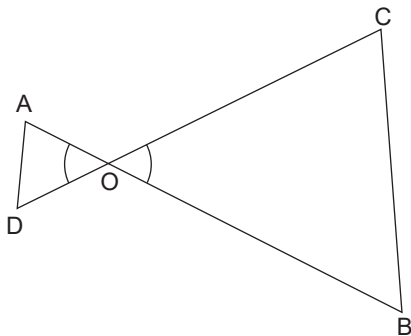21. For which value of p does the pair of equations given below has a unique solution?

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

22. E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that ΔABE ~ ΔCFB.

or

In the figure given below, OA × OB = OC × OD. Show that ∠A = ∠C and ∠B = ∠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 $\dfrac{5\sin A - 2\cos A}{\tan A}$.

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 $\pi = \dfrac{22}{7}$]
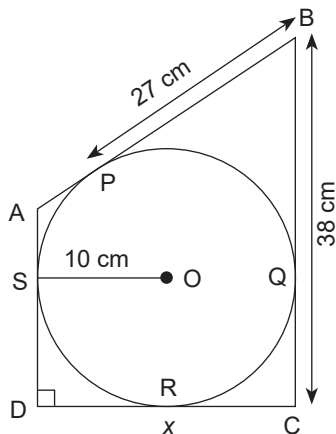
Section - C

*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.

4

30. Prove: $\sqrt{\dfrac{\sec A - 1}{\sec A + 1}} + \sqrt{\dfrac{\sec A + 1}{\sec A - 1}} = 2 \csc A$

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 m². 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.
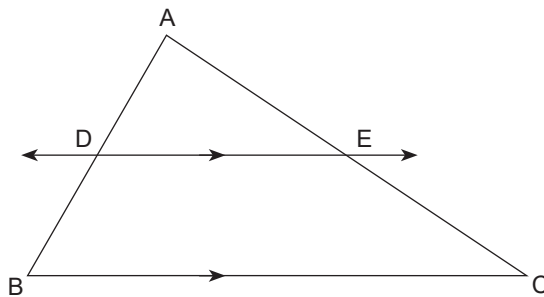
34. A solid cylinder of silver 9 cm high and 4 cm in diameter is melted and recast into a right-circular cone of diameter 6 cm. Find the height and the total surface area of the cone. Give your answer correct to one decimal place. (Take $\pi = 3.14$)

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 $\dfrac{32}{9}$ 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.
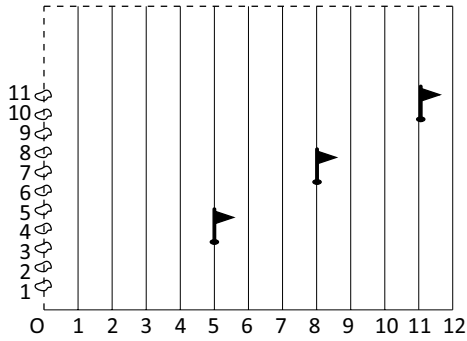

Based on the above information, answer the following questions:

(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.
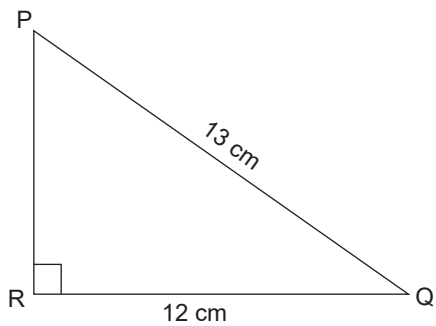
(*a*) If ∠PQR = θ, then find cos θ. 1 mark

(*b*) Find the value of sec θ. 1 mark

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

or

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