CBSE Class 10 Mathematics: Sample Paper 2

Based on NCERT · the board's 2024 to 2026 pattern | Time: 3 hours · **Maximum marks: 80**

1. All questions are compulsory. Internal choice is given in some questions; attempt one of the alternatives.
2. Section A has 20 objective questions of 1 mark each: multiple-choice and assertion-reason.
3. Section B has very short answer questions of 2 marks; Section C short answer questions of 3 marks; Section D long answer questions of 5 marks; Section E case-based questions of 4 marks.
4. Wherever necessary, draw neat, labelled diagrams. Calculators are not allowed.
5. For the assertion-reason questions, choose: (a) Both A and R are true, and R is the correct explanation of A. (b) Both A and R are true, but R is not the correct explanation of A. (c) A is true, but R is false. (d) A is false, but R is true.

Section A (20 × 1 mark)

1. In ΔXYZ, right-angled at Y, XY = 7 cm, YZ = 24 cm and XZ = 25 cm. The value of tan Z is [1]

(a) $\frac{24}{7}$ (b) $\frac{7}{25}$

(c) $\frac{7}{24}$ (d) $\frac{24}{25}$

2. The weights of 36 sacks of rice at a godown in Raipur are grouped below. The modal class is [1]

Weight (kg)	Number of sacks
45-50	5
50-55	9
55-60	12
60-65	7
65-70	3

(a) 50-55 (b) 55-60

(c) 60-65 (d) 45-50

3. The distance between the points A(1, −2) and B(7, 6) is [1]

(a) 10 units (b) 14 units

(c) $4\sqrt{5}$ units (d) 2 units

4. A cone has base radius 6 cm and height 8 cm. Take $\pi = 3.14$. Its curved surface area is [1]

(a) 188.4 cm^2 (b) 150.72 cm^2

(c) 301.44 cm^2 (d) 113.04 cm^2

5. $\Delta ABC \sim \Delta DEF$ and $\Delta DEF \sim \Delta PQR$. Which of these must be true? [1]

(a) $\Delta ABC \cong \Delta PQR$ (b) $\Delta ABC \sim \Delta PQR$

(c) $\Delta ABC \sim \Delta QPR$ (d) ΔABC and ΔPQR are similar only if they are congruent

6. A box at a sweet shop in Mathura holds 40 laddoos, of which 15 are kesar laddoos and the rest are plain. One laddoo is taken out at random. The probability that it is a kesar laddoo is [1]

(a) $\frac{5}{8}$ (b) $\frac{3}{8}$

(c) $\frac{3}{5}$ (d) $\frac{1}{4}$

7. The lines $x = 4$ and $y = -1$ meet at [1]

(a) (0, 0)
(b) (−1, 4)
(c) (4, −1)
(d) no point, as they are parallel

8. The sum of the first 20 terms of the AP 3, 7, 11, . . . is [1]

(a) 820
(b) 780
(c) 860
(d) 410

9. Assertion (A): The values of a scooter that loses 10% of its value every year, recorded at the end of each year, form an AP. Reason (R): In an AP each term after the first is obtained by adding a fixed number to the preceding term. [1]

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

10. Assertion (A): From a point 17 cm from the centre of a circle of radius 8 cm, each of the two tangents is 15 cm long. Reason (R): A circle has infinitely many tangents. [1]

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

11. The length of the tangent from a point 17 cm from the centre of a circle of radius 8 cm is [1]

(a) 15 cm
(b) 9 cm
(c) 25 cm
(d) $\sqrt{353}$ cm

12. Which of the following is a quadratic equation? [1]

(a) $2x + 3 = 0$
(b) $x^3 + 2x = 1$
(c) $3x^2 = 0$
(d) $(x + 1)^2 = x^2 + 4$

13. Which of the following lists is an AP? [1]

(a) 2, 6, 18, 54
(b) 5, 9, 14, 20
(c) 1, 4, 9, 16
(d) −7, −2, 3, 8

14. Which of the following statements is true? [1]

(a) A circle has exactly two tangents.
(b) A circle has infinitely many tangents, but only two of them pass through a given point outside it.
(c) From a point inside a circle exactly one tangent can be drawn.
(d) A circle has infinitely many tangents, and infinitely many pass through a given point outside it.

15. A polynomial $p(x)$ has degree 5. The greatest number of points at which the graph of $y = p(x)$ can meet the x-axis is [1]

(a) infinitely many
(b) 4
(c) 6
(d) 5

16. In the step deviation method, the assumed mean is 55 and the class size is 10. For the class with class mark 75, u_i is [1]

(a) 2
(b) 20
(c) −2
(d) 7.5

17. The value of $2 \sin 30° + \sqrt{3} \cos 30°$ is [1]

(a) $\frac{3}{2}$ (b) $\frac{5}{2}$

(c) 2 (d) $1 + \sqrt{3}$

18. The prime factorisation of 180 is [1]

(a) $2^2 \times 3 \times 15$ (b) $4 \times 9 \times 5$

(c) $2^2 \times 3^2 \times 5$ (d) $2^3 \times 3^2 \times 5$

19. The part of a circular region enclosed between a chord and the arc it cuts off is called [1]

(a) a sector (b) a quadrant

(c) a segment (d) an arc

20. From the top of a cliff, the angle of depression of a boat at sea is 30°. The angle of elevation of the top of the cliff, seen from the boat, is [1]

(a) 60° (b) 30°

(c) 90° (d) 45°

Section B (5 × 2 marks)

21. The area of a circle is 616 cm^2 and a sector of it has area 154 cm^2. Find the angle of the sector and the length of its arc. Take $\pi = 22/7$. [2]

Or *The circumference of a circle is 264 cm and an arc of it is 88 cm long. Find the angle the arc subtends at the centre and the area of the corresponding sector. Take $\pi = 22/7$.*

22. Explain why equal corresponding angles are enough to show that two triangles are similar, but not enough for two quadrilaterals. Give an example for quadrilaterals. [2]

23. The zeroes of $x^2 + (k - 4)x - 9$ are negatives of each other. Find k and the zeroes. [2]

24. A bag has 10 tokens marked with a star and some plain tokens. A token is drawn at random, and the probability that it is plain is $\frac{1}{3}$. Find the number of plain tokens. [2]

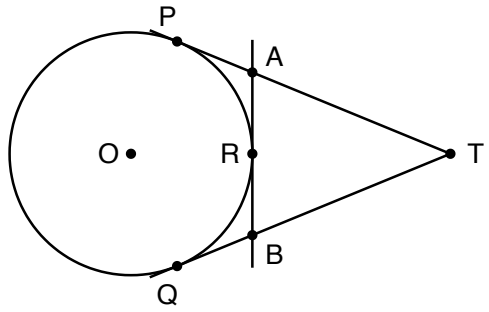
25. A boy whose eyes are 1.35 m above the ground sees the top of a 21.35 m tall flag-mast at an angle of elevation of 45°. How far from the mast is he standing? [2]

Section C (6 × 3 marks)

26. The total rainfall in July (in mm) at 50 weather stations in Assam is given below. Find the mean rainfall by the step deviation method. [3]

Rainfall (mm)	Number of stations
100-150	4
150-200	9
200-250	16
250-300	13
300-350	8

27. TP and TQ are tangents from T to a circle. A third tangent touches the circle at R on the minor arc PQ and meets TP at A and TQ at B, as in the figure. Prove that the perimeter of ΔTAB equals 2TP. Find the perimeter when TP = 12 cm. [3]



28. If $5 \tan\theta = 12$, where θ is acute, find the value of $\frac{2\sin\theta - \cos\theta}{\sin\theta + 3\cos\theta}$. [3]

29. Solve $3x + 2y = 12$ and $5x - 3y = 1$ by elimination, and hence find m for which $y = mx - 1$. [3]

30. Find the values of k for which $(k+1)x^2 - 2(k-1)x + 1 = 0$ has two equal roots. Find the roots for the positive value of k. [3]

Or *Find the value of k for which $x^2 - 2(k+1)x + k^2 = 0$ has two equal roots, and find those roots.*

31. A cylindrical flower vase has inner radius 2.1 cm and height 14 cm, but its base rises inside it as a hemisphere of radius 2.1 cm. Take π = 22/7. Find how much water the vase holds when full, and what percentage of its apparent capacity is lost to the raised base. [3]

Section D (4 × 5 marks)

32. Ankit's mother is 24 years older than Ankit. Five years from now, the product of their ages (in years) will be 432. (a) Form a quadratic equation in Ankit's present age x. (b) Find the present ages of Ankit and his mother. [5]

Or *The sum of the present ages of two sisters, Riya and Tara, is 22 years. Three years ago, the product of their ages (in years) was 63. (a) Form a quadratic equation in Riya's present age x. (b) Find their present ages.*

33. (a) State and prove the Basic Proportionality Theorem. (b) In ΔLMN, P lies on LM and Q on LN with PQ ∥ MN. If LP = 3.5 cm, PM = 6.5 cm and LQ = 4.2 cm, find LN. [5]

Or *(a) Prove that if in two triangles the corresponding angles are equal, then their corresponding sides are in the same ratio. (b) In ΔABC and ΔDEF, ∠A = ∠D and ∠B = ∠E. AB = 5 cm, BC = 7 cm, DE = 7.5 cm and DF = 9 cm. Find EF and AC.*

34. A straight level road runs away from the foot of a 120 m tall watchtower. A guard at the top sees a bus moving away along the road at uniform speed. Its angle of depression is 60° at first and 45° two minutes later. (a) Find the bus's distances from the foot at the two sightings. (b) Find its speed. (c) How many more minutes will it take for the angle of depression to become 30°? (Use √3 ≈ 1.73.) [5]

Or *A hot-air balloon rises vertically at a uniform speed from a point O on level ground. Rohan stands at P, 60 m from O. Eight seconds after it leaves O, he sees the balloon at an angle of elevation of 30°. (a) Find the balloon's speed. (b) After how many seconds from the start is its angle of elevation 45°? (c) After how many seconds is it 60°? (Use √3 ≈ 1.73.)*

35. A toy shop in Chennai has a box of 40 balls, some red and the rest yellow. For a ball taken out at random, P(red) = $\frac{3}{8}$. (a) Find the number of red balls. (b) Find P(yellow). (c) If 10 more red balls are put into the original box, find the new P(red). (d) Starting again from the original box, how many yellow balls must be taken out so that P(red) becomes $\frac{3}{5}$? [5]

Or *A stationery shop in Bengaluru has a box of 36 pens, some blue and the rest black. For a pen taken out at random, P(blue) = $\frac{5}{12}$. (a) Find the number of blue pens. (b) Find P(black). (c) If 9 more blue pens are put into the original box, find the new P(blue). (d) Starting again from the original box, how many black pens must be taken out so that P(blue) becomes $\frac{3}{4}$?*

Section E (3 × 4 marks)

36. Read the passage and answer the questions that follow. [4]

Kavya, a Class 10 student in Kochi, made a table of the sine and cosine of some standard angles for her revision notes. She wants to use it to find the other ratios, since tan A = sin A ÷ cos A, and to see how the values change as the angle grows from 0° to 90°.

A	0°	30°	45°	60°	90°
sin A	0	1/2	1/√2	√3/2	1
cos A	1	√3/2	1/√2	1/2	0

(a) As A increases from 0° to 90°, the table shows that [1]

(a) sin A and cos A both increase
(b) sin A increases and cos A decreases
(c) sin A decreases and cos A increases
(d) sin A and cos A both decrease

(b) Using the table, the value of tan 60° is [1]

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

(c) Kavya tries to find tan 90° from her table. Explain why tan 90° is not defined, and name one other ratio that is not defined at 90°. [2]

Or *Kavya tries to find cot 0° from her table. Explain why cot 0° is not defined, and name one other ratio that is not defined at 0°.*

37. Read the passage and answer the questions that follow. [4]

A caterer at a wedding hall in Indore stacks identical plastic cups one inside another. A single cup stands 11 cm tall, and each cup added to the stack raises its height by 1.5 cm, so stacks of 1, 2, 3, . . . cups are 11 cm, 12.5 cm, 14 cm, . . . tall. The cups are stored on shelves, and the caterer wants to know how tall different stacks will be and how many cups fit in a given height.

(a) The height of a stack of 20 cups is [1]

(a) 39.5 cm (b) 41 cm
(c) 30 cm (d) 38 cm

(b) The number of cups in a stack 50 cm tall is [1]

(a) 27 (b) 26
(c) 33 (d) 28

(c) A shelf has 80 cm of clear height. Find the largest number of cups that can stand in one stack on it, and the height of that stack. [2]

Or *A second kind of cup stands 9 cm tall alone, and each added cup raises its stack by 2 cm. For what number of cups are the two kinds of stack equally tall, and what is that height?*

38. Read the passage and answer the questions that follow. [4]

A park in Jaipur has a circular flower bed with centre O and radius 28 m. From the park gate G, two straight paths GA and GB are laid so that each just touches the edge of the bed, at A and at B, as in the figure. The gate is 53 m from the centre of the bed. The gardener wants to know the lengths of the paths and the angles they make, so that he can order the paving stones and edge the paths with a hedge.

(a) The angle between the radius OA and the path GA is [1]

(a) 45° (b) 60°
(c) 90° (d) 180°

(b) The length of the path GA is [1]

(a) 25 m (b) 45 m
(c) 53 m (d) 81 m

(c) If $\angle AOB$ is four times $\angle AGB$, find $\angle AGB$ and $\angle AOB$. [2]

Or *Find the total length of hedge needed along both paths and the two radii OA and OB, that is, the perimeter of OAGB.*