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Your JEE Guide

CBSE Class X · Mathematics Standard (041)

Sample Question Paper 2 · Session 2026-27

Time allowed: 3 hours **Maximum marks: 80**

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General instructions:

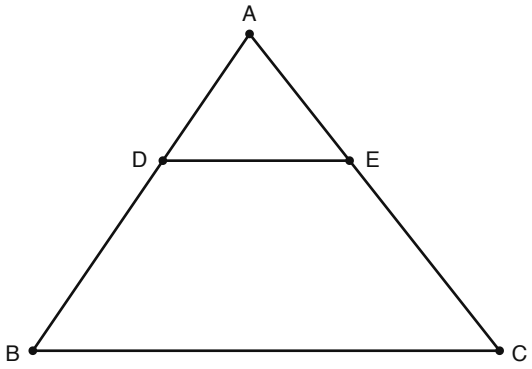
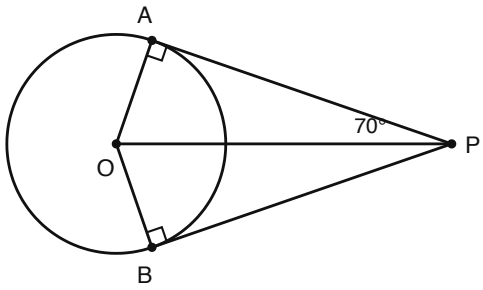
1. This question paper contains 38 questions. All questions are compulsory.
2. This question paper is divided into five Sections: A, B, C, D and E.
3. In Section A, Questions 1 to 18 are multiple choice questions (MCQs) and Questions 19 and 20 are Assertion–Reason based questions of 1 mark each.
4. In Section B, Questions 21 to 25 are very short answer (VSA) type questions carrying 2 marks each.
5. In Section C, Questions 26 to 31 are short answer (SA) type questions carrying 3 marks each.
6. In Section D, Questions 32 to 35 are long answer (LA) type questions carrying 5 marks each.
7. In Section E, Questions 36 to 38 are case study based questions carrying 4 marks each.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D, and in the 2-mark sub-parts of Section E.
9. Draw neat figures wherever required. Take π = 22/7 wherever required, if not stated.
10. Use of calculators is not allowed.

Section A

1.	Given that HCF(26, 91) = 13, the LCM of 26 and 91 is: (A) 2366 (B) 91 (C) 182 (D) 364	1
2.	Which of the following is irrational? (A) 0.375 (B) $3+\sqrt{2}$ (C) $\frac{\sqrt{12}}{\sqrt{3}}$ (D) $\sqrt{49}$	1
3.	If 2 is a zero of the polynomial x^2-5x+k, the value of k is: (A) 6 (B) 14 (C) –6 (D) 10	1
4.	A quadratic polynomial whose zeroes are –3 and 4 is: (A) $x^2-7x+12$ (B) x^2+x-12 (C) $x^2+7x-12$ (D) x^2-x-12	1

5.	The value of k for which $3x + ky = 9$ and $6x + 4y = 18$ have infinitely many solutions is: (A) 4 (B) –2 (C) 2 (D) 6	1
6.	The roots of $x^2 - 5x + 6 = 0$ are: (A) 2 and 3 (B) –1 and 6 (C) –2 and –3 (D) 1 and 6	1
7.	The common difference of the AP $\frac{3}{2}, \frac{1}{2}, -\frac{1}{2}, \ldots$ is: (A) $-\frac{1}{2}$ (B) –1 (C) 1 (D) $\frac{1}{2}$	1
8.	The number of two-digit numbers divisible by 7 is: (A) 14 (B) 12 (C) 15 (D) 13	1
9.	The distance of the point (–6, 8) from the origin is: (A) 6 units (B) 8 units (C) 14 units (D) 10 units	1
10.	The midpoint of the line segment joining (–2, 5) and (6, –1) is: (A) (2, 3) (B) (4, 2) (C) (2, 2) (D) (4, 4)	1
11.	The value of $\sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$ is: (A) 1 (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{1}{2}$ (D) 0	1
12.	If $\cos A = \frac{12}{13}$ and A is acute, then $\operatorname{cosec} A$ is: (A) $\frac{5}{12}$ (B) $\frac{13}{5}$ (C) $\frac{12}{5}$ (D) $\frac{13}{12}$	1
13.	A ladder 10 m long leans against a vertical wall and makes an angle of 60° with the ground. The height it reaches on the wall is: (A) $10\sqrt{3}$ m (B) $\frac{5}{\sqrt{3}}$ m (C) $5\sqrt{3}$ m (D) 5 m	1

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14.	In $\triangle ABC$, $DE \parallel BC$ with D on AB and E on AC. If AD = 3 cm, DB = 6 cm and AE = 2 cm, then AC is:  (A) 4 cm (B) 8 cm (C) 9 cm (D) 6 cm	1
15.	PA and PB are tangents from an external point P to a circle with centre O. If $\angle APB = 70^\circ$, then $\angle AOB$ is:  (A) 140° (B) 110° (C) 70° (D) 90°	1
16.	The perimeter of a semicircular protractor of diameter 14 cm is: (use $\pi = \frac{22}{7}$) (A) 36 cm (B) 50 cm (C) 44 cm (D) 22 cm	1
17.	The volume of a sphere of radius 3 cm is: (A) 12π cm³ (B) 36π cm³ (C) 108π cm³ (D) 27π cm³	1
18.	The empirical relationship between the three measures of central tendency is: (A) Mode = 3 Mean – 2 Median (B) Mode = Median – Mean (C) Mode = 3 Median – 2 Mean (D) Mode = 2 Median – 3 Mean	1

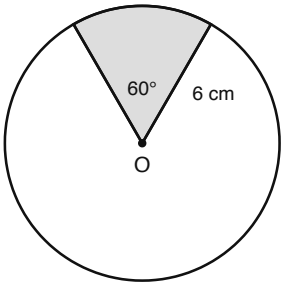
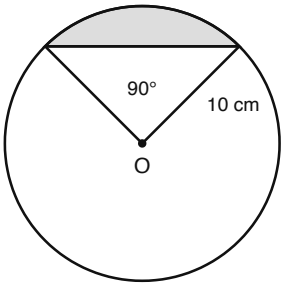
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19.	**Assertion (A):** The sum of the first n odd natural numbers is n^2. **Reason (R):** The odd natural numbers form an AP with common difference 1. (A) Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. (B) Both A 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.	1
20.	**Assertion (A):** The probability of an event cannot be 1.2. **Reason (R):** For any event E, $0 \le P(E) \le 1$. (A) Both Assertion (A) and Reason (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.	1

Section B

21.	Explain why $7 \times 11 \times 13 + 13$ is a composite number.	2
22.	Solve by elimination: $x + y = 14$ and $x - y = 4$.	2
23.	Find the ratio in which the y-axis divides the line segment joining (5, –6) and (–1, –4). Also find the point of division.	2
24.	If $2\sin 2A = \sqrt{3}$ and 2A is acute, find A. **OR** Evaluate: $\dfrac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$.	2

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25.	Find the area of the sector of a circle of radius 6 cm whose angle is 60°. (use $\pi = \frac{22}{7}$)  **OR** A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the minor segment. (use $\pi = 3.14$)  	2

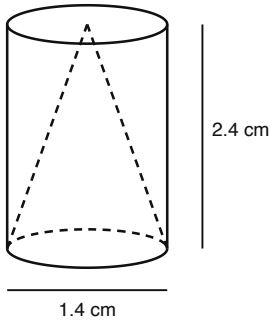
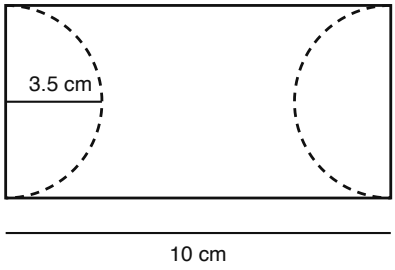
Section C

26.	Given that $\sqrt{5}$ is irrational, prove that $3 + 2\sqrt{5}$ is irrational.	3
27.	Find the zeroes of $6x^2 - 7x - 3$ and verify the relationship between the zeroes and the coefficients.	3
28.	A fraction becomes $\frac{9}{11}$ if 2 is added to both its numerator and denominator. If 3 is added to both, it becomes $\frac{5}{6}$. Find the fraction.	3
29.	Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact. **OR** Two concentric circles have radii 5 cm and 3 cm. Find the length of the chord of the larger circle that touches the smaller circle.	3
30.	Prove that $\dfrac{1 + \sec A}{\sec A} = \dfrac{\sin^2 A}{1 - \cos A}$. **OR** Prove that $\sqrt{\dfrac{1 + \sin A}{1 - \sin A}} = \sec A + \tan A$.	3

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31.	Two dice are thrown at the same time. Find the probability that (i) the sum is 8, (ii) a doublet appears, (iii) the sum is a prime number.	3

Section D

32.	The difference of the squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers.	5
33.	The sum of the first 7 terms of an AP is 49 and the sum of its first 17 terms is 289. Find the sum of its first n terms and its 20th term.	5
34.	The angle of elevation of the top of a tower from a point on the ground is 30°. After walking 20 m towards the tower, the angle of elevation becomes 60°. Find the height of the tower and the distance of the second point from the tower. (use $\sqrt{3} = 1.73$) **OR** From a point on a bridge across a river, the angles of depression of the banks on opposite sides are 30° and 45°. If the bridge is 3 m above the water, find the width of the river. (use $\sqrt{3} = 1.73$)	5
35.	From a solid cylinder of height 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm². (use $\pi = \frac{22}{7}$)  **OR** A wooden article is made by scooping out a hemisphere from each end of a solid cylinder of height 10 cm and base radius 3.5 cm. Find its total surface area. (use $\pi = \frac{22}{7}$)  	5

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Section E

36. (4)

Case study 1. A rectangular park has an area of 180 m². Its length is 3 m more than its breadth.

(i) Taking the breadth as x m, write the quadratic equation that x satisfies. *[1]*

(ii) Find the discriminant of this equation. *[1]*

(iii) Find the length and breadth of the park. *[2]*

OR

(iii) Find the cost of fencing the park at ₹50 per metre. *[2]*

37. (4)

Case study 2. The daily wages of 50 workers in a factory are given below.

Wages (₹)	100–120	120–140	140–160	160–180	180–200
Workers	12	14	8	6	10

(i) Write the modal class. *[1]*

(ii) Write the median class. *[1]*

(iii) Find the median wage. *[2]*

OR

(iii) Find the modal wage. *[2]*

38. (4)

Case study 3. A card is drawn at random from a well-shuffled deck of 52 playing cards.

(i) Find the probability that it is a red king. *[1]*

(ii) Find the probability that it is a face card. *[1]*

(iii) Find the probability that it is neither a heart nor a king. *[2]*

OR

(iii) All the face cards are removed and a card is drawn from the remaining 40. Find the probability that it is a red card numbered below 5 (ace counts as 1). *[2]*

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Answers and Marking Scheme

Marks for each step are shown in brackets. Any correct alternative method gets full credit.

Section A

1. **(C)** 182. *Working:* LCM $= \frac{26 \times 91}{13} = 182$.

2. **(B)** $3 + \sqrt{2}$. *Working:* $\sqrt{49} = 7$, 0.375 is terminating and $\frac{\sqrt{12}}{\sqrt{3}} = 2$; only $3 + \sqrt{2}$ is irrational.

3. **(A)** 6. *Working:* $4 - 10 + k = 0 \Rightarrow k = 6$.

4. **(D)** $x^2 - x - 12$. *Working:* Sum = 1, product = –12: $x^2 - x - 12$.

5. **(C)** 2. *Working:* $\frac{3}{6} = \frac{k}{4} = \frac{9}{18}$ gives $k = 2$.

6. **(A)** 2 and 3. *Working:* $(x - 2)(x - 3) = 0$.

7. **(B)** –1. *Working:* $\frac{1}{2} - \frac{3}{2} = -1$.

8. **(D)** 13. *Working:* 14, 21, …, 98: $98 = 14 + (n - 1)7 \Rightarrow n = 13$.

9. **(D)** 10 units. *Working:* $\sqrt{36 + 64} = 10$.

10. **(C)** (2, 2). *Working:* $\left(\frac{-2+6}{2}, \frac{5-1}{2}\right) = (2, 2)$.

11. **(A)** 1. *Working:* $\frac{3}{4} + \frac{1}{4} = 1$.

12. **(B)** $\frac{13}{5}$. *Working:* $\sin A = \frac{5}{13}$, so $\operatorname{cosec} A = \frac{13}{5}$.

13. **(C)** $5\sqrt{3}$ m. *Working:* Height $= 10 \sin 60^\circ = 5\sqrt{3}$ m.

14. **(D)** 6 cm. *Working:* $\frac{AD}{DB} = \frac{AE}{EC}$: $\frac{3}{6} = \frac{2}{EC}$, EC = 4 cm, so AC = 6 cm.

15. **(B)** 110°. *Working:* In quadrilateral OAPB the angles at A and B are 90°, so $\angle AOB = 180^\circ - 70^\circ = 110^\circ$.

16. **(A)** 36 cm. *Working:* $\pi r + 2r = 22 + 14 = 36$ cm.

17. **(B)** 36π cm³. *Working:* $\frac{4}{3}\pi(27) = 36\pi$ cm³.

18. **(C)** Mode = 3 Median – 2 Mean. *Working:* 3 Median = Mode + 2 Mean.

19. **(C)** A is true but R is false. *Working:* A is true: $S_n = \frac{n}{2}[2 + 2(n - 1)] = n^2$. R is false: the common difference is 2.

20. **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* Both true; A follows directly from R.

Section B

21. $7 \times 11 \times 13 + 13 = 13(77 + 1) = 13 \times 78$ (1). It has factors other than 1 and itself, so it is composite (1).

22. Adding: $2x = 18$, so $x = 9$ (1); then $y = 5$ (1).

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23. Let the ratio be k : 1. On the y-axis x = 0: $\frac{-k+5}{k+1} = 0 \Rightarrow k = 5$, ratio 5 : 1 (1). $y = \frac{5(-4)+(-6)}{6} = -\frac{13}{3}$; point $\left(0, -\frac{13}{3}\right)$ (1).

24. $\sin 2A = \frac{\sqrt{3}}{2}$ (1), so $2A = 60^\circ$ and $A = 30^\circ$ (1).

OR Numerator $= \frac{5}{4} + \frac{16}{3} - 1 = \frac{67}{12}$ (1). Denominator = 1, so the value is $\frac{67}{12}$ (1).

25. Area $= \frac{60}{360} \times \frac{22}{7} \times 36$ (1) $= \frac{132}{7} \approx 18.86$ cm² (1).

OR Sector $= \frac{1}{4} \times 3.14 \times 100 = 78.5$ cm²; triangle $= \frac{1}{2} \times 10 \times 10 = 50$ cm² (1). Segment = 28.5 cm² (1).

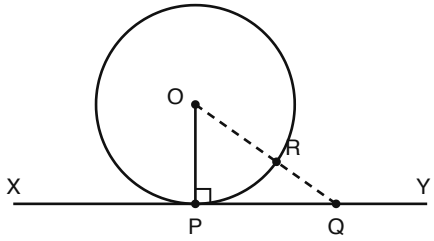
Section C

26. Suppose $3 + 2\sqrt{5} = \frac{a}{b}$ with integers a, b, b ≠ 0 (1). Then $\sqrt{5} = \frac{a-3b}{2b}$, which is rational (1). This contradicts the fact that $\sqrt{5}$ is irrational, so $3 + 2\sqrt{5}$ is irrational (1).

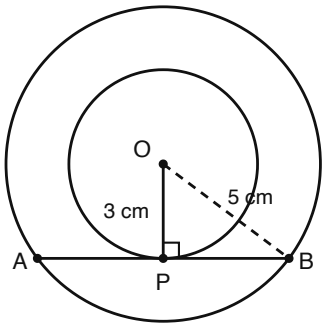
27. $6x^2 - 9x + 2x - 3 = (2x - 3)(3x + 1)$: zeroes $\frac{3}{2}$ and $-\frac{1}{3}$ (1). Sum $= \frac{7}{6} = -\frac{-7}{6}$ (1). Product $= -\frac{1}{2} = \frac{-3}{6}$ (1).

28. Let the fraction be $\frac{x}{y}$. $11x - 9y = -4$ and $6x - 5y = -3$ (1). Multiplying by 5 and 9 and subtracting: x = 7 (1), then y = 9. The fraction is $\frac{7}{9}$ (1).

29. Let XY be the tangent at P to a circle with centre O (figure, ½). Take any point Q ≠ P on XY; Q lies outside the circle, so OQ meets the circle at R and OQ > OR = OP (1). So OP is the shortest distance from O to XY (1), and the shortest segment from a point to a line is perpendicular to it: OP ⊥ XY (½).



OR The chord AB touches the smaller circle at P, so OP ⊥ AB and P is the midpoint of AB (1). $AP = \sqrt{5^2 - 3^2} = 4$ cm (1). AB = 8 cm (1).



30. LHS $= \left(1 + \frac{1}{\cos A}\right)\cos A = 1 + \cos A$ (1). RHS $= \frac{1-\cos^2 A}{1-\cos A} = \frac{(1-\cos A)(1+\cos A)}{1-\cos A}$ (1) $=$ $1 + \cos A$ = LHS (1).

OR Multiply inside by $\frac{1+\sin A}{1+\sin A}$: $\sqrt{\frac{(1+\sin A)^2}{1-\sin^2 A}}$ (1) $= \frac{1+\sin A}{\cos A}$ (1) $= \sec A + \tan A$ (1).

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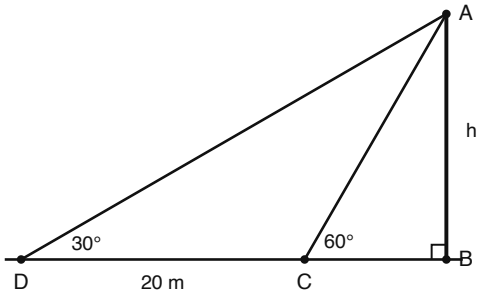
31. 36 outcomes. (i) (2,6), (3,5), (4,4), (5,3), (6,2): $\frac{5}{36}$ (1). (ii) 6 doublets: $\frac{1}{6}$ (1). (iii) Sums 2, 3, 5, 7, 11 occur 1 + 2 + 4 + 6 + 2 = 15 times: $\frac{15}{36} = \frac{5}{12}$ (1).

Section D

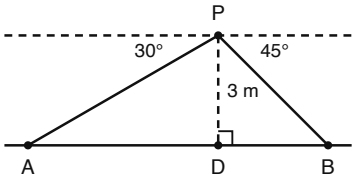
32. Let the larger be y and the smaller x: $x^2 = 8y$, $y^2 - x^2 = 180$ (1). So $y^2 - 8y - 180 = 0$ (1), $(y - 18)(y + 10) = 0$ (1). y = –10 gives $x^2 = -80$, impossible, so y = 18 (1). $x^2 = 144$, x = ±12. The numbers are 18 and 12 (or 18 and –12) (1).

33. $\frac{7}{2}(2a + 6d) = 49 \Rightarrow a + 3d = 7$ (1). $\frac{17}{2}(2a + 16d) = 289 \Rightarrow a + 8d = 17$ (1). So d = 2, a = 1 (1). $S_n = \frac{n}{2}[2 + 2(n - 1)] = n^2$ (1). $a_{20} = 1 + 19 \times 2 = 39$ (1).

34. Figure (1). Let CB = x and the height AB = h. $\tan 60^\circ = \frac{h}{x} \Rightarrow h = \sqrt{3}x$ (1). $\tan 30^\circ = \frac{h}{x+20} \Rightarrow h = \frac{x+20}{\sqrt{3}}$ (1). So 3x = x + 20, x = 10 m (1), and $h = 10\sqrt{3} = 17.3$ m (1).



OR Figure (1). With PD = 3 m: $AD = 3\cot 30^\circ = 3\sqrt{3}$ m (1½) and $DB = 3\cot 45^\circ = 3$ m (1½). Width $= 3(\sqrt{3} + 1) = 3 \times 2.73 = 8.19$ m (1).



35. r = 0.7 cm, h = 2.4 cm. Slant height $l = \sqrt{2.4^2 + 0.7^2} = 2.5$ cm (1). CSA of cylinder $= 2\pi rh = 10.56$ cm² (1). Top area $= \pi r^2 = 1.54$ cm² (1). Inner surface of cone $= \pi rl = 5.5$ cm² (1). Total = 17.6 cm² ≈ 18 cm² (1).

OR CSA of cylinder $= 2\pi rh = 2 \times \frac{22}{7} \times 3.5 \times 10 = 220$ cm² (2). Two hemispherical hollows $= 2 \times 2\pi r^2 = 154$ cm² (2). Total = 374 cm² (1).

Section E

36. (i) $x(x + 3) = 180$, i.e. $x^2 + 3x - 180 = 0$.
(ii) $D = 9 + 720 = 729$ (positive, so two distinct real roots).
(iii) $x = \frac{-3+27}{2} = 12$ (the other root is negative). Breadth 12 m, length 15 m. **OR** Perimeter $= 2(15 + 12) = 54$ m; cost = ₹2700.

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37. (i) 120–140 (highest frequency, 14).
(ii) N/2 = 25; cumulative frequencies 12, 26, …, so the median class is 120–140.
(iii) $120 + \frac{25-12}{14} \times 20 = 120 + 18.57 = ₹138.57$. **OR** $120 + \frac{14-12}{2(14)-12-8} \times 20 = 120 + 5 = ₹125$.

38. (i) $\frac{2}{52} = \frac{1}{26}$.
(ii) $\frac{12}{52} = \frac{3}{13}$.
(iii) Hearts or kings: 13 + 3 = 16 cards, so $\frac{52-16}{52} = \frac{9}{13}$. **OR** Two red suits × 4 cards = 8, so $\frac{8}{40} = \frac{1}{5}$.

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