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Your JEE Guide

CBSE Class X · Mathematics Standard (041)

Sample Question Paper 6 · Session 2026-27

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

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General instructions:

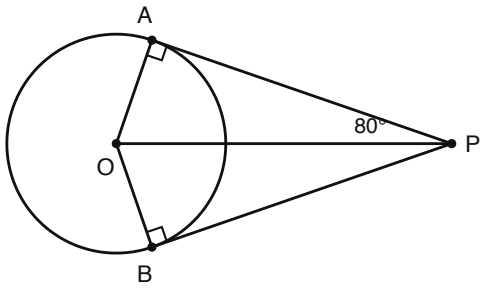
1. This question paper contains 38 questions. All questions are compulsory.
2. This question paper is divided into five Sections: A, B, C, D and E.
3. In Section A, Questions 1 to 18 are multiple choice questions (MCQs) and Questions 19 and 20 are Assertion–Reason based questions of 1 mark each.
4. In 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.	If $a = 2^3 \times 3$ and $b = 2 \times 3 \times 5$, then HCF(a, b) is: (A) 120 (B) 6 (C) 3 (D) 2	1
2.	The LCM of the co-prime numbers 9 and 16 is: (A) 144 (B) 1 (C) 25 (D) 72	1
3.	If the zeroes of $x^2 + px + q$ are 2 and –3, then: (A) p = –1, q = 6 (B) p = 1, q = 6 (C) p = –1, q = –6 (D) p = 1, q = –6	1
4.	If α and β are the zeroes of $x^2 - 4x + 3$, then $\alpha\beta(\alpha + \beta)$ is: (A) 7 (B) 1 (C) 12 (D) –12	1

5.	The lines x = 2 and y = 3: (A) intersect at (2, 3) (B) intersect at (3, 2) (C) coincide (D) are parallel	1
6.	The equation $x^2 - 4x + k = 0$ has two distinct real roots when: (A) k $\geq$ 4 (B) k < 4 (C) k = 4 (D) k > 4	1
7.	The 10th term from the end of the AP 4, 9, 14, …, 254 is: (A) 204 (B) 49 (C) 214 (D) 209	1
8.	If the sum of the first n terms of an AP is $3n^2 + n$, its first term is: (A) 1 (B) 3 (C) 4 (D) 6	1
9.	The point (–3, 0) lies: (A) at the origin (B) on the x-axis (C) in the second quadrant (D) on the y-axis	1
10.	P(1, 2), Q(4, 6) and R(5, 9) are three vertices of parallelogram PQRS. The fourth vertex S is: (A) (2, 5) (B) (8, 13) (C) (3, 4) (D) (0, –1)	1
11.	$\sin 2A = 2\sin A$ is true when A is: (A) 60° (B) 30° (C) 45° (D) 0°	1
12.	If $\cot\theta = \frac{7}{8}$, then $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$ is: (A) $\frac{8}{7}$ (B) $\frac{7}{8}$ (C) $\frac{49}{64}$ (D) $\frac{64}{49}$	1
13.	A straight ramp 6 m long makes an angle of 30° with the ground. The height of its top above the ground is: (A) 3 m (B) $2\sqrt{3}$ m (C) $3\sqrt{3}$ m (D) $6\sqrt{3}$ m	1
14.	In triangles ABC and DEF, $\frac{AB}{DE} = \frac{BC}{FD}$. The triangles are similar when: (A) $\angle A = \angle D$ (B) $\angle B = \angle E$ (C) $\angle A = \angle F$ (D) $\angle B = \angle D$	1

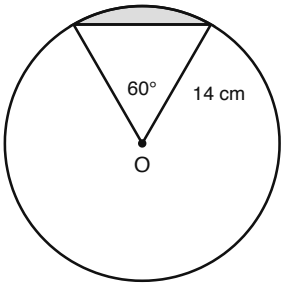
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15.	PA and PB are tangents from P to a circle with centre O. If $\angle APB = 80°$, then $\angle POA$ is:  (A) 70° (B) 60° (C) 50° (D) 40°	1
16.	The area of the ring between two concentric circles of radii 5 cm and 3 cm is: (A) 4π cm² (B) 16π cm² (C) 34π cm² (D) 8π cm²	1
17.	A cylindrical pencil sharpened at one end is a combination of: (A) a hemisphere and a cylinder (B) two cylinders (C) a cone and a cylinder (D) a sphere and a cone	1
18.	The probability that a non-leap year chosen at random has 53 Sundays is: (A) $\frac{52}{365}$ (B) $\frac{1}{7}$ (C) $\frac{2}{7}$ (D) $\frac{1}{365}$	1
19.	**Assertion (A):** For 12 and 18, HCF × LCM = 216. **Reason (R):** For any two positive integers a and b, HCF(a, b) × LCM(a, b) = a × b. (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 perimeter of a sector of radius r and angle θ is $\frac{\theta}{360} \times 2\pi r + 2r$. **Reason (R):** The area of a sector of radius r and angle θ is $\frac{\theta}{360} \times \pi r^2$. (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.	Find the smallest number which leaves a remainder of 3 when divided by 12, 16 or 24.	2

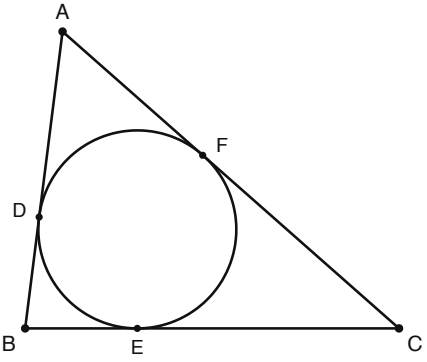
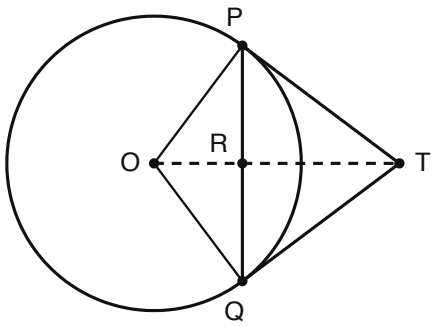
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22.	Find the value of k for which the roots of $kx^2 + 6x + 1 = 0$ are equal. **OR** Solve: $\frac{x}{2} + \frac{2y}{3} = -1$ and $x - \frac{y}{3} = 3$.	2
23.	Find the point on the y-axis that is equidistant from A(6, 5) and B(–4, 3).	2
24.	If $\sin A = \frac{3}{4}$ and A is acute, find $\cos A$ and $\tan A$. **OR** Prove that $\dfrac{1 + \tan^2 A}{1 + \cot^2 A} = \tan^2 A$.	2
25.	Find the area of the minor segment of a circle of radius 14 cm when the angle of the sector is 60°. (use $\pi = \frac{22}{7}$, $\sqrt{3} = 1.73$) 	2

Section C

26.	Given that $\sqrt{3}$ is irrational, prove that $5 - 2\sqrt{3}$ is irrational.	3
27.	Find the zeroes of $t^2 - 15$ and verify the relationship between the zeroes and the coefficients.	3
28.	Two angles are complementary. The larger angle exceeds the smaller by 18°. Find the angles. **OR** A lending library charges a fixed amount for the first three days and an extra charge for each day after that. Saritha paid ₹27 for a book kept 7 days, and Susy paid ₹21 for a book kept 5 days. Find the fixed charge and the charge for each extra day.	3

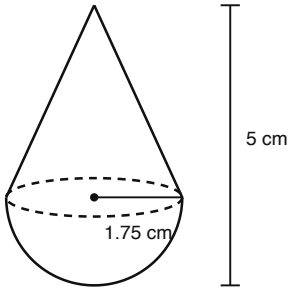
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29.	A circle is inscribed in triangle ABC, touching AB at D, BC at E and CA at F. If AB = 8 cm, BC = 10 cm and CA = 12 cm, find AD, BE and CF.  **OR** PQ is a chord of length 8 cm of a circle of radius 5 cm with centre O. The tangents at P and Q meet at T. Find the length TP.  	3
30.	Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$.	3
31.	A die is thrown twice. Find the probability that (i) 5 does not come up either time, (ii) 5 comes up at least once, (iii) the product of the two numbers is 6.	3

Section D

32.	A train travels 54 km at a uniform speed and then 63 km at a speed 6 km/h more than before. The whole journey takes 3 hours. Find the first speed of the train. **OR** Shefali's marks in Mathematics and English add up to 30. Had she got 2 more marks in Mathematics and 3 fewer in English, the product of her marks would have been 210. Find her marks in the two subjects.	5
33.	The first and last terms of an AP are 17 and 350, and its common difference is 9. Find the number of terms, their sum, and the two middle terms.	5

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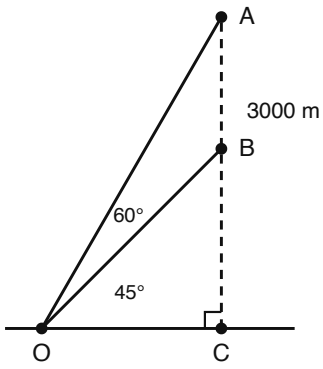
34.	A statue 1.6 m tall stands on a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and that of the top of the pedestal is 45°. Find the height of the pedestal. (use $\sqrt{3} = 1.73$) **OR** From a point P on the ground, the angle of elevation of the top of a 10 m tall building is 30°. A flagstaff on top of the building has its top at an angle of elevation of 45° from P. Find the length of the flagstaff and the distance of the building from P. (use $\sqrt{3} = 1.732$)	5
35.	A playing top is a cone surmounted by a hemisphere. The whole top is 5 cm high and its diameter is 3.5 cm. Find the area to be coloured. (use $\pi = \frac{22}{7}$, and take the slant height as 3.7 cm) 	5

Section E

36.	**Case study 1.** A company made 600 TV sets in its 3rd year and 700 in its 7th year. Production increases by the same number every year. (i) How many sets did it make in the 1st year? *[1]* (ii) How many sets did it make in the 10th year? *[1]* (iii) Find the total production in the first 7 years. *[2]* **OR** (iii) In which year will production reach 1000 sets? *[2]*	4

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37. **Case study 2.** An aeroplane A flying 3000 m above the ground passes vertically above another plane B. At that instant, the angles of elevation of A and B from a point O on the ground are 60° and 45°. (use $\sqrt{3} = 1.732$) — 4



(i) Find the horizontal distance OC of O from the vertical line through the planes. *[1]*

(ii) Find the height of plane B. *[1]*

(iii) Find the vertical distance between the two planes. *[2]*

OR

(iii) If the angle of elevation of A had been 30°, how far would O be from C? *[2]*

38. **Case study 3.** The marks of 30 students in a test are given below. — 4

Marks	10–25	25–40	40–55	55–70	70–85	85–100
Students	2	3	7	6	6	6

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

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

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

OR

(iii) Find the modal marks. *[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. **(B)** 6. *Working:* Common primes with the lower powers: $2 \times 3 = 6$.

2. **(A)** 144. *Working:* For co-prime numbers, LCM = product = 144.

3. **(D)** p = 1, q = –6. *Working:* $(x-2)(x+3) = x^2 + x - 6$.

4. **(C)** 12. *Working:* α + β = 4, αβ = 3: product 12.

5. **(A)** intersect at (2, 3). *Working:* x = 2 is vertical and y = 3 is horizontal; they meet at (2, 3).

6. **(B)** k < 4. *Working:* $D = 16 - 4k > 0 \Rightarrow k < 4$.

7. **(D)** 209. *Working:* From the end the AP is 254, 249, …: $254 - 9 \times 5 = 209$.

8. **(C)** 4. *Working:* $a_1 = S_1 = 3 + 1 = 4$.

9. **(B)** on the x-axis. *Working:* Its y-coordinate is 0.

10. **(A)** (2, 5). *Working:* Diagonals bisect each other: S = P + R – Q = (2, 5).

11. **(D)** 0°. *Working:* At A = 0° both sides are 0; for the other angles $\sin 2A \neq 2 \sin A$.

12. **(C)** $\frac{49}{64}$. *Working:* $\frac{\cos^2\theta}{\sin^2\theta} = \cot^2\theta = \frac{49}{64}$.

13. **(A)** 3 m. *Working:* $6 \sin 30^\circ = 3$ m.

14. **(D)** $\angle B = \angle D$. *Working:* SAS similarity needs the angle included between the proportional sides: $\angle B$ and $\angle D$.

15. **(C)** 50°. *Working:* OP bisects $\angle APB$: $\angle APO = 40^\circ$, and $\angle OAP = 90^\circ$, so $\angle POA = 50^\circ$.

16. **(B)** 16π cm². *Working:* $\pi(25 - 9) = 16\pi$ cm².

17. **(C)** a cone and a cylinder. *Working:* The sharpened end is a cone on the cylindrical body.

18. **(B)** $\frac{1}{7}$. *Working:* 365 days = 52 weeks + 1 day; that extra day is a Sunday with probability $\frac{1}{7}$.

19. **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* 6 × 36 = 216 = 12 × 18, which is exactly what R states.

20. **(B)** Both A and R are true but R is not the correct explanation of A. *Working:* Both are true, but the area formula does not explain the perimeter.

Section B

21. $12 = 2^2 \times 3$, $16 = 2^4$, $24 = 2^3 \times 3$; LCM $= 2^4 \times 3 = 48$ (1). The number is 48 + 3 = 51 (1).

22. $D = 36 - 4k = 0$ (1), so k = 9 (1).

OR Clearing fractions: 3x + 4y = –6 and 3x – y = 9 (1). Subtracting: 5y = –15, y = –3, x = 2 (1).

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23. Let it be (0, y): $36 + (y-5)^2 = 16 + (y-3)^2$ (1). $61 - 10y = 25 - 6y$, y = 9: the point is (0, 9) (1).

24. $\cos A = \sqrt{1 - \frac{9}{16}} = \frac{\sqrt{7}}{4}$ (1). $\tan A = \frac{3}{\sqrt{7}}$ (1).

OR $\frac{\sec^2 A}{\operatorname{cosec}^2 A}$ (1) $= \frac{\sin^2 A}{\cos^2 A} = \tan^2 A$ (1).

25. Sector $= \frac{60}{360} \times \frac{22}{7} \times 196 \approx 102.67$ cm²; equilateral triangle $= \frac{\sqrt{3}}{4} \times 196 = 84.77$ cm² (1). Segment ≈ 17.90 cm² (1).

Section C

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

27. $t^2 = 15$: zeroes $\sqrt{15}$ and $-\sqrt{15}$ (1). Sum $= 0 = -\frac{0}{1}$ (1). Product $= -15 = \frac{-15}{1}$ (1).

28. x + y = 90 and x – y = 18 (1). Adding: 2x = 108 (1). The angles are 54° and 36° (1).

OR x + 4y = 27 and x + 2y = 21 (1). Subtracting: 2y = 6, y = 3 (1). Fixed charge ₹15; ₹3 per extra day (1).

29. Tangents from a point are equal: let AD = AF = x, BD = BE = y, CE = CF = z (1). x + y = 8, y + z = 10, z + x = 12, so x + y + z = 15 (1). AD = 5 cm, BE = 3 cm, CF = 7 cm (1).

OR OT ⊥ PQ at its midpoint R, so PR = 4 and OR = 3 (1). Let TR = y: $TP^2 = y^2 + 16$ and $TP^2 = (y+3)^2 - 25$ (1). So 6y = 32, $y = \frac{16}{3}$, and $TP^2 = \frac{256}{9} + 16 = \frac{400}{9}$: TP $= \frac{20}{3}$ cm (1).

30. Divide the numerator and denominator by $\cos A$ (1): $\frac{\frac{1}{\sin A} - 1}{\frac{1}{\sin A} + 1}$ (1) $= \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$ (1).

31. 36 outcomes. (i) $5 \times 5 = 25$: $\frac{25}{36}$ (1). (ii) $1 - \frac{25}{36} = \frac{11}{36}$ (1). (iii) (1, 6), (6, 1), (2, 3), (3, 2): $\frac{4}{36} = \frac{1}{9}$ (1).

Section D

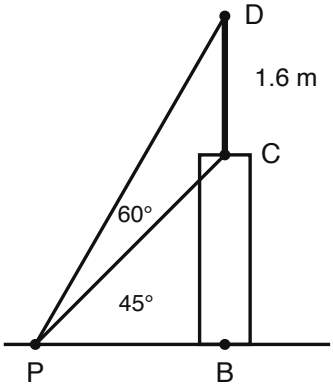
32. Let the first speed be x km/h (½). $\frac{54}{x} + \frac{63}{x+6} = 3$ (1). $3x^2 - 99x - 324 = 0$, i.e. $x^2 - 33x - 108 = 0$ (1½). $(x-36)(x+3) = 0$ (1). The first speed is 36 km/h (1).

OR Let Mathematics = x, English = 30 – x (½). $(x+2)(27-x) = 210$ (1). $x^2 - 25x + 156 = 0$ (1½). $(x-12)(x-13) = 0$ (1). Maths 12, English 18; or Maths 13, English 17 (1).

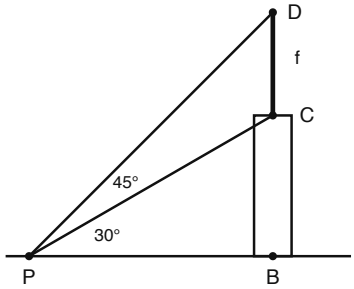
33. $350 = 17 + 9(n-1)$ (1), so n = 38 (1). $S_{38} = 19(17 + 350) = 6973$ (1+1). Middle terms: $a_{19} = 17 + 162 = 179$ and $a_{20} = 188$ (1).

34. Figure (1). Let the pedestal BC = h and PB = x. $\tan 45^\circ = \frac{h}{x} \Rightarrow x = h$ (1). $\tan 60^\circ = \frac{h+1.6}{x} \Rightarrow h + 1.6 = \sqrt{3}h$ (1). $h = \frac{1.6}{\sqrt{3}-1} = 0.8(\sqrt{3}+1)$ (1) $= 0.8 \times 2.73 \approx 2.18$ m (1).

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OR Figure (1). Let PB = x. $\tan 30^\circ = \frac{10}{x} \Rightarrow x = 10\sqrt{3} = 17.32$ m (1½). $\tan 45^\circ = \frac{10+f}{x} \Rightarrow 10 + f = 17.32$ (1½). The flagstaff is 7.32 m long, and the building is 17.32 m from P (1).



35. r = 1.75 cm (½). Hemisphere CSA $= 2\pi r^2 = 2 \times \frac{22}{7} \times 3.0625 = 19.25$ cm² (1½). Cone height = 5 – 1.75 = 3.25 cm, slant ≈ 3.7 cm (1). Cone CSA $= \pi r l = \frac{22}{7} \times 1.75 \times 3.7 = 20.35$ cm² (1). Total ≈ 39.6 cm² (1).

Section E

36. (i) a + 2d = 600 and a + 6d = 700 give d = 25 and a = 550.
(ii) $550 + 9 \times 25 = 775$.
(iii) $S_7 = \frac{7}{2}(1100 + 6 \times 25) = \frac{7}{2} \times 1250 = 4375$. **OR** $550 + 25(n-1) = 1000 \Rightarrow n = 19$: the 19th year.

37. (i) $OC = \frac{3000}{\tan 60^\circ} = 1000\sqrt{3} \approx 1732$ m.
(ii) $BC = OC \tan 45^\circ = 1000\sqrt{3} \approx 1732$ m.
(iii) $3000 - 1732 = 1268$ m. **OR** $\frac{3000}{\tan 30^\circ} = 3000\sqrt{3} \approx 5196$ m.

38. (i) 40–55.
(ii) N/2 = 15; cumulative frequencies 2, 5, 12, 18, so 55–70.
(iii) $55 + \frac{15-12}{6} \times 15 = 62.5$. **OR** $40 + \frac{7-3}{14-3-6} \times 15 = 40 + 12 = 52$.

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