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Your JEE Guide

CBSE Class X · Mathematics Standard (041)

Sample Question Paper 1 · Session 2026-27

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

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General instructions:

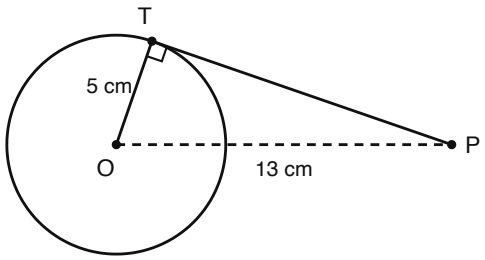
1. This question paper contains 38 questions. All questions are compulsory.
2. This question paper is divided into five Sections: A, B, C, D and E.
3. In Section A, Questions 1 to 18 are multiple choice questions (MCQs) and Questions 19 and 20 are Assertion–Reason based questions of 1 mark each.
4. In 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.	The HCF of 96 and 404 is: (A) 8 (B) 4 (C) 2 (D) 12	1
2.	The LCM of $2^3 \times 3^2$ and $2^2 \times 3^3$ is: (A) 108 (B) 36 (C) 72 (D) 216	1
3.	The sum of the zeroes of the polynomial $x^2 - 2x - 8$ is: (A) –2 (B) –8 (C) 2 (D) 8	1
4.	The pair of equations $2x + 3y = 7$ and $4x + 6y = 14$ has: (A) infinitely many solutions (B) a unique solution (C) exactly two solutions (D) no solution	1

5.	The positive value of k for which $x^2 + kx + 16 = 0$ has equal roots is: (A) 4 (B) 8 (C) 2 (D) 16	1
6.	The quadratic equation $2x^2 - 3x + 5 = 0$ has: (A) two distinct real roots (B) more than two real roots (C) no real roots (D) two equal real roots	1
7.	The 11th term of the AP 5, 9, 13, … is: (A) 45 (B) 41 (C) 49 (D) 44	1
8.	The sum of the first 10 terms of the AP 2, 6, 10, … is: (A) 190 (B) 220 (C) 180 (D) 200	1
9.	The distance between the points (2, 3) and (–4, 11) is: (A) 8 units (B) 10 units (C) 6 units (D) 14 units	1
10.	The point dividing the line segment joining (–1, 7) and (4, –3) in the ratio 2 : 3 is: (A) (2, 1) (B) (3, 1) (C) (1, 3) (D) (1, 2)	1
11.	If $\sin A = \frac{3}{5}$ and A is acute, then $\tan A$ is: (A) 4/5 (B) 5/3 (C) 4/3 (D) 3/4	1
12.	$(1 + \tan^2 A)\cos^2 A$ is equal to: (A) 1 (B) $\sec^2 A$ (C) 0 (D) $\tan^2 A$	1
13.	When the length of the shadow of a vertical pole equals its height, the angle of elevation of the Sun is: (A) 90° (B) 45° (C) 60° (D) 30°	1
14.	If $\triangle ABC \sim \triangle DEF$ and $AB : DE = 2 : 3$, the ratio of their perimeters is: (A) 3 : 2 (B) 8 : 27 (C) 2 : 3 (D) 4 : 9	1

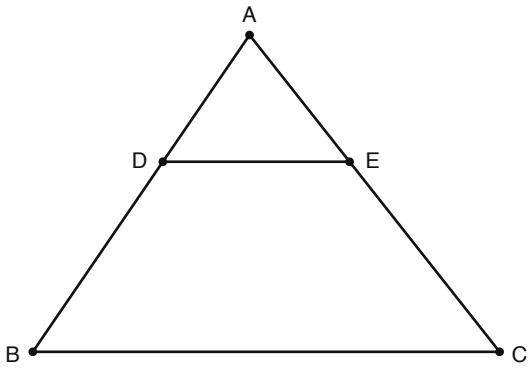
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15.	A point P is 13 cm from the centre of a circle of radius 5 cm. The length of the tangent from P is:  (A) 18 cm (B) 8 cm (C) 10 cm (D) 12 cm	1
16.	The area of a sector of a circle of radius 14 cm with central angle 90° is: (use $\pi = \frac{22}{7}$) (A) 154 cm² (B) 77 cm² (C) 308 cm² (D) 616 cm²	1
17.	The curved surface area of a cylinder of radius 7 cm and height 10 cm is: (use $\pi = \frac{22}{7}$) (A) 1540 cm² (B) 440 cm² (C) 220 cm² (D) 880 cm²	1
18.	A die is thrown once. The probability of getting a prime number is: (A) 1/6 (B) 2/3 (C) 1/2 (D) 1/3	1
19.	**Assertion (A):** The HCF of any two consecutive natural numbers is 1. **Reason (R):** Two consecutive natural numbers are always co-prime. (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 point (0, 4) lies on the y-axis. **Reason (R):** The x-coordinate of every point on the y-axis is zero. (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 a quadratic polynomial whose zeroes have sum –3 and product 2.	2

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22.	Solve: $2x + y = 5$ and $x - y = 1$. **OR** For what value(s) of k will the pair $kx + 2y = 5$ and $3x + y = 1$ have a unique solution?	2
23.	In $\triangle ABC$, $DE \parallel BC$ with D on AB and E on AC. If AD = 2 cm, DB = 3 cm and AE = 4 cm, find EC.  	2
24.	Evaluate: $2\tan^2 45^\circ + \cos^2 30^\circ - \sin^2 60^\circ$. **OR** If $\sin(A + B) = 1$ and $\cos(A - B) = 1$, $0^\circ \le A + B \le 90^\circ$, $A \ge B$, find A and B.	2
25.	Find the length of the arc of a circle of radius 21 cm that subtends an angle of 60° at the centre. (use $\pi = \frac{22}{7}$)	2

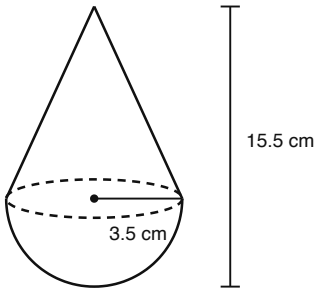
Section C

26.	Prove that $\sqrt{5}$ is irrational.	3
27.	Find the zeroes of $x^2 - 3x - 10$ and verify the relationship between the zeroes and the coefficients.	3
28.	The sum of the digits of a two-digit number is 9. Nine times the number is twice the number obtained by reversing its digits. Find the number. **OR** The ratio of incomes of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each saves ₹2000 per month, find their monthly incomes.	3
29.	Prove that the lengths of the tangents drawn from an external point to a circle are equal.	3

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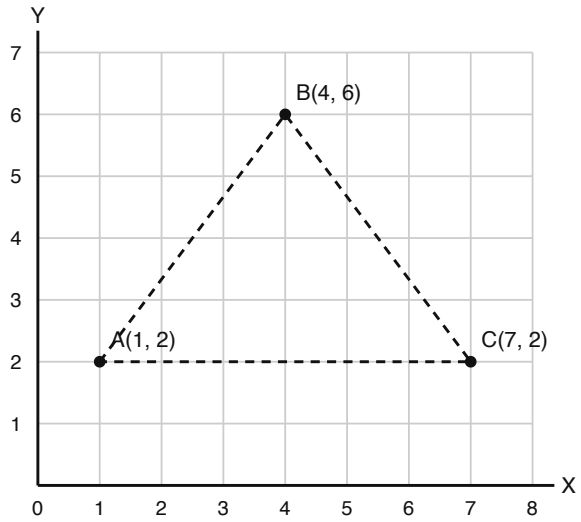
30.	Prove that $\dfrac{\tan A}{1-\cot A}+\dfrac{\cot A}{1-\tan A}=1+\sec A\,\operatorname{cosec} A.$ **OR** Prove that $\dfrac{\sin A-2\sin^3 A}{2\cos^3 A-\cos A}=\tan A.$	3
31.	Find the mean of the following data: Class: 0–10 | 10–20 | 20–30 | 30–40 | 40–50 Frequency: 5 | 8 | 15 | 12 | 10	3

Section D

32.	A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train. **OR** The sum of the reciprocals of Rehman's ages (in years) 3 years ago and 5 years from now is $\frac{1}{3}$. Find his present age.	5
33.	State and prove the Basic Proportionality Theorem (Thales theorem).	5
34.	From the top of a 75 m high lighthouse, the angles of depression of two ships on the same side of it are 30° and 45°. Find the distance between the ships. (use $\sqrt{3}=1.73$)	5
35.	A toy is a cone mounted on a hemisphere of the same radius 3.5 cm. The total height of the toy is 15.5 cm. Find its total surface area. (use $\pi=\frac{22}{7}$)  **OR** A solid is a cylinder with a hemisphere at each end. Its total length is 19 cm and diameter 7 cm. Find its volume. (use $\pi=\frac{22}{7}$)	5

Section E

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36.	**Case study 1.** A school auditorium has 30 rows of seats. The first row has 20 seats and each row after it has 2 more seats than the row in front. (i) How many seats are there in the 10th row? *[1]* (ii) How many seats are there in the first 10 rows together? *[1]* (iii) Find the total number of seats in the auditorium. *[2]* **OR** (iii) Which row has 60 seats? *[2]*	4
37.	**Case study 2.** In a school garden, three plants are at A(1, 2), B(4, 6) and C(7, 2) on a coordinate grid (units in metres).  (i) Find the distance AB. *[1]* (ii) Find the midpoint of AC. *[1]* (iii) Show that triangle ABC is isosceles. *[2]* **OR** (iii) Find the point on AC that divides it in the ratio 1 : 2. *[2]*	4
38.	**Case study 3.** A bag contains 5 red, 8 green and 7 white balls. A ball is drawn at random. (i) Find the probability that the ball is red. *[1]* (ii) Find the probability that the ball is not green. *[1]* (iii) Find the probability that the ball is red or white. *[2]* **OR** (iii) If 5 more green balls are added, find the probability of drawing a green ball. *[2]*	4

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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)** 4. *Working:* $96 = 2^5 \times 3$, $404 = 2^2 \times 101$. HCF $= 2^2 = 4$.

2. **(D)** 216. *Working:* Take the highest powers: $2^3 \times 3^3 = 216$.

3. **(C)** 2. *Working:* Sum $= -b/a = 2$. (Zeroes are 4 and –2.)

4. **(A)** infinitely many solutions. *Working:* $\frac{2}{4} = \frac{3}{6} = \frac{7}{14}$: the lines coincide.

5. **(B)** 8. *Working:* $k^2 - 64 = 0 \Rightarrow k = 8$.

6. **(C)** no real roots. *Working:* $D = 9 - 40 = -31 < 0$.

7. **(A)** 45. *Working:* $a_{11} = 5 + 10 \times 4 = 45$.

8. **(D)** 200. *Working:* $S_{10} = 5(2 \times 2 + 9 \times 4) = 5 \times 40 = 200$.

9. **(B)** 10 units. *Working:* $\sqrt{6^2 + 8^2} = 10$.

10. **(C)** (1, 3). *Working:* $x = \frac{2(4)+3(-1)}{5} = 1$, $y = \frac{2(-3)+3(7)}{5} = 3$.

11. **(D)** 3/4. *Working:* $\cos A = \frac{4}{5}$, so $\tan A = \frac{3}{4}$.

12. **(A)** 1. *Working:* $\sec^2 A \cos^2 A = 1$.

13. **(B)** 45°. *Working:* $\tan\theta = 1 \Rightarrow \theta = 45^\circ$.

14. **(C)** 2 : 3. *Working:* Perimeters of similar triangles are in the ratio of corresponding sides.

15. **(D)** 12 cm. *Working:* Radius $\perp$ tangent: $\sqrt{13^2 - 5^2} = 12$ cm.

16. **(A)** 154 cm². *Working:* $\frac{90}{360} \times \frac{22}{7} \times 14^2 = 154$ cm².

17. **(B)** 440 cm². *Working:* $2\pi r h = 2 \times \frac{22}{7} \times 7 \times 10 = 440$ cm².

18. **(C)** 1/2. *Working:* Primes 2, 3, 5: $3/6 = 1/2$.

19. **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A.
Working: Both true; consecutive numbers share no factor other than 1, which is why the HCF is 1.

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

Section B

21. $x^2 - (\text{sum})x + \text{product} = x^2 + 3x + 2$. (1 + 1)

22. Adding: $3x = 6$, so $x = 2$ (1); then $y = 1$ (1).

OR Unique solution when $\frac{k}{3} \neq \frac{2}{1}$ (1), i.e. $k \neq 6$ (1).

23. By the Basic Proportionality Theorem, $\frac{AD}{DB} = \frac{AE}{EC}$ (1), so $\frac{2}{3} = \frac{4}{EC}$, EC = 6 cm (1).

24. $2(1) + \frac{3}{4} - \frac{3}{4}$ (1) $= 2$ (1).

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OR $A + B = 90^\circ$, $A - B = 0^\circ$ (1) $\Rightarrow A = B = 45^\circ$ (1).

25. $\frac{60}{360} \times 2 \times \frac{22}{7} \times 21$ (1) $= 22$ cm (1).

Section C

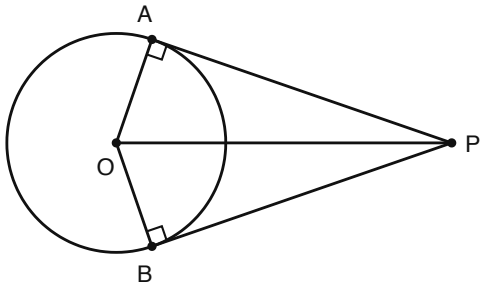
26. Assume $\sqrt{5} = \frac{a}{b}$ in lowest terms (½). Then $5b^2 = a^2$, so 5 divides a; write a = 5c (1). Then $b^2 = 5c^2$, so 5 divides b (1). This contradicts a, b being co-prime, so $\sqrt{5}$ is irrational (½).

27. $x^2 - 3x - 10 = (x - 5)(x + 2)$: zeroes 5 and –2 (1). Sum $= 3 = -\frac{-3}{1}$ (1). Product $= -10 = \frac{-10}{1}$ (1).

28. Let the number be 10a + b with a + b = 9 (½). $9(10a + b) = 2(10b + a) \Rightarrow 88a = 11b \Rightarrow b = 8a$ (1). With a + b = 9: a = 1, b = 8 (1). Number = 18 (½).

OR Incomes 9x, 7x; expenditures 4y, 3y (½). $9x - 4y = 2000$, $7x - 3y = 2000$ (1). Solving: x = 2000, y = 4000 (1). Incomes ₹18 000 and ₹14 000 (½).

29. Let PA, PB be tangents from P to a circle with centre O (figure, ½). OA ⊥ PA and OB ⊥ PB (½). In right triangles OAP and OBP, OA = OB (radii) and OP is common (1). So the triangles are congruent (RHS) and PA = PB (1).



30. Write in terms of t = tan A: $\frac{t^2}{t-1} - \frac{1}{t(t-1)} = \frac{t^3-1}{t(t-1)}$ (1) $= \frac{t^2+t+1}{t} = t + 1 + \frac{1}{t}$ (1). Since $\tan A + \cot A = \sec A \operatorname{cosec} A$, the expression equals $1 + \sec A \operatorname{cosec} A$ (1).

OR Numerator $= \sin A(1 - 2\sin^2 A)$, denominator $= \cos A(2\cos^2 A - 1)$ (1). Since $1 - 2\sin^2 A = 2\cos^2 A - 1$ (1), the ratio is $\frac{\sin A}{\cos A} = \tan A$ (1).

31. Class marks 5, 15, 25, 35, 45; $\sum f = 50$ (1); $\sum fx = 25 + 120 + 375 + 420 + 450 = 1390$ (1); mean $= 1390/50 = 27.8$ (1).

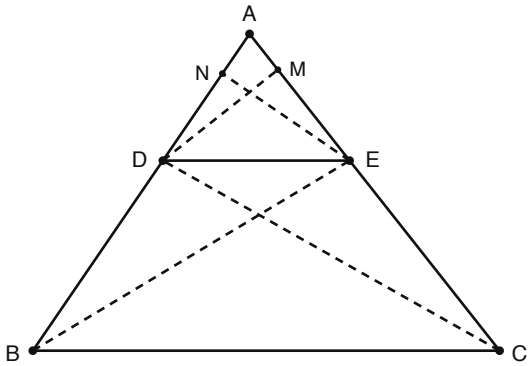
Section D

32. Let speed = x km/h (½). $\frac{360}{x} - \frac{360}{x+5} = 1$ (1). $1800 = x^2 + 5x \Rightarrow x^2 + 5x - 1800 = 0$ (1). $(x + 45)(x - 40) = 0$ (1). Speed cannot be negative, so x = 40 km/h (1½).

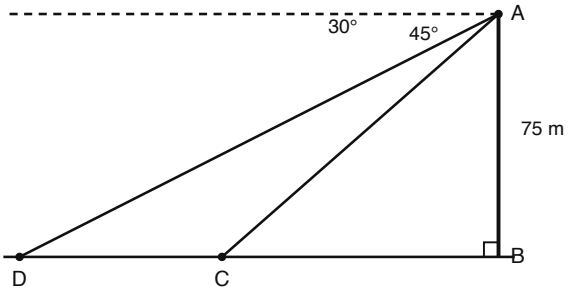
OR Let present age = x (½). $\frac{1}{x-3} + \frac{1}{x+5} = \frac{1}{3}$ (1). $3(2x + 2) = (x - 3)(x + 5) \Rightarrow x^2 - 4x - 21 = 0$ (1½). $(x - 7)(x + 3) = 0$ (1). Age = 7 years (1).

33. Statement (1). Figure, given, to prove (1). Construction: join BE and CD; draw EN ⊥ AB, DM ⊥ AC (½). $\frac{ar(ADE)}{ar(BDE)} = \frac{AD}{DB}$ and $\frac{ar(ADE)}{ar(DEC)} = \frac{AE}{EC}$ (1). Triangles BDE and DEC have the same base DE and lie between the same parallels, so their areas are equal (1). Hence $\frac{AD}{DB} = \frac{AE}{EC}$ (½).

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34. Figure (1). Nearer ship: $\tan 45^\circ = \frac{75}{x} \Rightarrow x = 75$ m (1). Farther ship: $\tan 30^\circ = \frac{75}{y} \Rightarrow y = 75\sqrt{3}$ m (1). Distance $= 75(\sqrt{3} - 1)$ (1) $= 75 \times 0.73 = 54.75$ m (1).



35. Cone height = 15.5 – 3.5 = 12 cm (½); slant height $l = \sqrt{12^2 + 3.5^2} = 12.5$ cm (1). CSA of hemisphere $= 2\pi r^2 = 77$ cm² (1). CSA of cone $= \pi r l = \frac{22}{7} \times 3.5 \times 12.5 = 137.5$ cm² (1). Total = 214.5 cm² (1½).

OR r = 3.5 cm; cylinder height = 19 – 7 = 12 cm (1). Cylinder volume $= \pi r^2 h = 462$ cm³ (1½). Two hemispheres = one sphere: $\frac{4}{3}\pi r^3 = 179.67$ cm³ (1½). Total ≈ 641.67 cm³ (1).

Section E

36. (i) $a_{10} = 20 + 9 \times 2 = 38$.
(ii) $S_{10} = 5(40 + 18) = 290$.
(iii) $S_{30} = 15(40 + 29 \times 2) = 15 \times 98 = 1470$. **OR** $20 + 2(n-1) = 60 \Rightarrow n = 21$.

37. (i) $\sqrt{3^2 + 4^2} = 5$ m.
(ii) $(4, 2)$.
(iii) AB = 5, BC = $\sqrt{3^2 + 4^2} = 5$, AC = 6, so AB = BC. **OR** $\left(\frac{1(7)+2(1)}{3}, \frac{1(2)+2(2)}{3}\right) = (3, 2)$.

38. (i) $5/20 = 1/4$.
(ii) $12/20 = 3/5$.
(iii) $(5 + 7)/20 = 3/5$. **OR** $13/25$.

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