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Your JEE Guide

CBSE Class X · Mathematics Standard (041)

Sample Question Paper 5 · Session 2026-27

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

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This is an original practice paper written to the official CBSE 2026-27 design; it is not issued by CBSE.

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 exponent of 2 in the prime factorisation of 144 is: (A) 6 (B) 2 (C) 3 (D) 4	1
2.	The HCF of the smallest prime number and the smallest composite number is: (A) 8 (B) 2 (C) 4 (D) 1	1
3.	If $\frac{1}{2}$ is a zero of $2x^2 + 3x + k$, then k is: (A) –1 (B) 1 (C) –2 (D) 2	1
4.	A quadratic polynomial whose zeroes have sum 0 and product –1 is: (A) $x^2 - 1$ (B) $x^2 + x - 1$ (C) $x^2 + 1$ (D) $x^2 - x$	1

5.	If x = a, y = b is the solution of $x + y = 5$ and $x - y = 1$, then: (A) a = 3, b = 2 (B) a = 2, b = 3 (C) a = 1, b = 4 (D) a = 4, b = 1	1
6.	The roots of $2x^2 - x - 6 = 0$ are: (A) –2 and $\frac{3}{2}$ (B) 3 and –2 (C) 1 and –3 (D) 2 and $-\frac{3}{2}$	1
7.	The first term of an AP is –5 and its common difference is 2. The sum of its first 6 terms is: (A) 15 (B) 5 (C) 0 (D) 6	1
8.	Which term of the AP 21, 18, 15, … is –81? (A) 36th (B) 35th (C) 33rd (D) 34th	1
9.	The perimeter of the triangle with vertices (0, 4), (0, 0) and (3, 0) is: (A) 5 units (B) 7 units (C) 10 units (D) 12 units	1
10.	If $\left(\frac{a}{3}, 4\right)$ is the midpoint of the segment joining (–6, 5) and (–2, 3), then a is: (A) –4 (B) 12 (C) –12 (D) –6	1
11.	If $\sec\theta = 2$ and θ is acute, then θ is: (A) 90° (B) 60° (C) 30° (D) 45°	1
12.	The value of $\dfrac{1 - \tan^2 45^\circ}{1 + \tan^2 45^\circ}$ is: (A) 0 (B) $\frac{1}{2}$ (C) 2 (D) 1	1
13.	From a point 20 m from the foot of a tower, the angle of elevation of its top is 30°. The height of the tower is: (A) $10\sqrt{3}$ m (B) $\frac{20}{\sqrt{3}}$ m (C) $20\sqrt{3}$ m (D) 10 m	1
14.	In $\triangle ABC$, $DE \parallel BC$ with D on AB and E on AC. If $\frac{AD}{DB} = \frac{3}{5}$ and AE = 4.5 cm, then EC is: (A) 12 cm (B) 4.5 cm (C) 2.7 cm (D) 7.5 cm	1

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15.	The angle between two radii of a circle is 130°. The angle between the tangents at the ends of these radii is: (A) 90° (B) 130° (C) 50° (D) 40°	1
16.	The area of a sector of a circle of radius 7 cm with central angle 45° is: (use $\pi = \frac{22}{7}$) (A) 19.25 cm² (B) 77 cm² (C) 9.625 cm² (D) 38.5 cm²	1
17.	If the radius of a sphere is doubled, its volume becomes: (A) 2 times (B) 8 times (C) 6 times (D) 4 times	1
18.	A bag contains 3 red and 5 black balls. A ball is drawn at random. The probability that it is not red is: (A) $\frac{1}{8}$ (B) $\frac{3}{5}$ (C) $\frac{5}{8}$ (D) $\frac{3}{8}$	1
19.	**Assertion (A):** The pair of equations $2x + 3y = 9$ and $4x + 6y = 18$ has infinitely many solutions. **Reason (R):** If $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, the lines coincide. (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):** 5^n ends with the digit 0 for some natural number n. **Reason (R):** A number ending with 0 has both 2 and 5 as prime factors. (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 HCF and LCM of 6, 72 and 120 using prime factorisation.	2
22.	Find the values of k for which $2x^2 + kx + 3 = 0$ has two equal roots. **OR** Find the roots of $x^2 + 4x - 21 = 0$ by factorisation.	2
23.	Find the ratio in which P(4, m) divides the line segment joining A(2, 3) and B(6, –3). Hence find m.	2

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24.	The minute hand of a clock is 14 cm long. Find the area swept by it in 5 minutes. (use $\pi = \frac{22}{7}$) **OR** A pendulum swings through an angle of 60° and describes an arc 8.8 cm long. Find the length of the pendulum. (use $\pi = \frac{22}{7}$)	2
25.	If $3\cot A = 4$, check whether $\frac{1-\tan^2 A}{1+\tan^2 A} = \cos^2 A - \sin^2 A$.	2

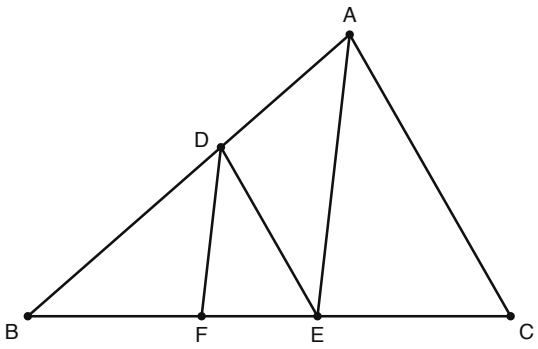
Section C

26.	Find the largest number that divides 245 and 1029 leaving a remainder of 5 in each case.	3
27.	Find a quadratic polynomial the sum and product of whose zeroes are $\frac{7}{2}$ and $\frac{3}{2}$ respectively. Also find its zeroes.	3
28.	5 pencils and 7 pens together cost ₹50, while 7 pencils and 5 pens together cost ₹46. Find the cost of one pencil and one pen. **OR** A taxi charges a fixed amount plus a rate per km. A 10 km journey costs ₹105 and a 15 km journey costs ₹155. Find the fixed charge and the rate per km. How much does a 25 km journey cost?	3
29.	Prove that the tangents drawn at the ends of a diameter of a circle are parallel. **OR** A circle with centre O touches all four sides of a quadrilateral ABCD. Prove that $\angle AOB + \angle COD = 180^\circ$.	3
30.	Prove that $\frac{\cos A}{1+\sin A} + \frac{1+\sin A}{\cos A} = 2\sec A$.	3
31.	The mean of the following distribution is 18. Find the missing frequency f.	3

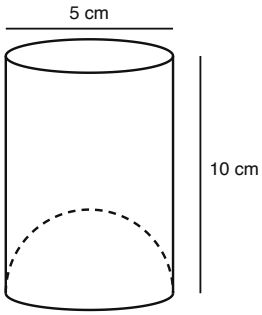
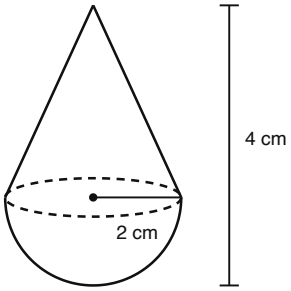
Class	11–13	13–15	15–17	17–19	19–21	21–23	23–25
Frequency	7	6	9	13	f	5	4

Section D

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32.	A cottage industry makes a certain number of toys in a day. The cost of making each toy (in ₹) is 55 minus the number of toys made that day. On one day the total cost was ₹750. Find the number of toys made that day. **OR** The hypotenuse of a right triangle is $3\sqrt{10}$ cm. If the smaller side is tripled and the larger side doubled, the new hypotenuse is $9\sqrt{5}$ cm. Find the sides of the triangle.	5
33.	A ladder has rungs 25 cm apart. The rungs decrease uniformly in length from 45 cm at the bottom to 25 cm at the top. The top and bottom rungs are 2.5 m apart. Find (i) the number of rungs, (ii) the length of the 6th rung from the bottom, and (iii) the total length of wood needed for the rungs.	5
34.	In the figure, DE ∥ AC and DF ∥ AE. (i) Prove that $\frac{BF}{FE} = \frac{BE}{EC}$. (ii) Using the Basic Proportionality Theorem, prove that a line drawn through the midpoint of one side of a triangle parallel to another side bisects the third side.  	5

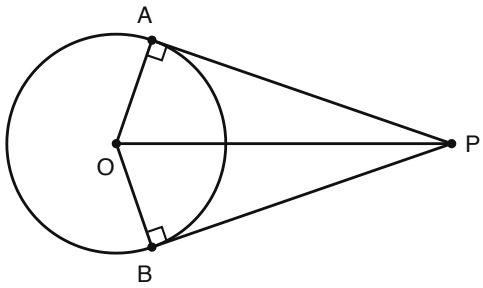
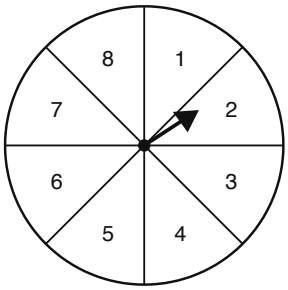
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35.	A juice glass is cylindrical inside, but its bottom has a raised hemispherical portion that reduces its capacity. The inner diameter of the glass is 5 cm and its height is 10 cm. Find its apparent capacity and its actual capacity. (use $\pi = 3.14$)  **OR** A solid toy is a hemisphere surmounted by a right circular cone. The cone is 2 cm high and the diameter of its base is 4 cm. Find the volume of the toy. If a right circular cylinder just encloses the toy, find the difference between the volumes of the cylinder and the toy. (use $\pi = 3.14$)  	5

Section E

36.	**Case study 1.** Rohit is 5 years older than his sister Riya. Three years from now, the product of their ages will be 84. (i) Taking Riya's present age as x years, write the equation that x satisfies. *[1]* (ii) Find the discriminant of this equation. *[1]* (iii) Find their present ages. *[2]* **OR** (iii) Find the product of their present ages. *[2]*	4

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37.	**Case study 2.** A circular garden has centre O and radius 9 m. A gate P is 15 m from O, and two straight paths PA and PB from the gate touch the boundary at A and B.  (i) Find the length of the path PA. *[1]* (ii) Write the measure of $\angle OAP$, with a reason. *[1]* (iii) Find the area of the quadrilateral OAPB. *[2]* **OR** (iii) Find the perimeter of the quadrilateral OAPB. *[2]*	4
38.	**Case study 3.** In a game, an arrow is spun and comes to rest pointing at one of the numbers 1 to 8, all equally likely.  (i) Find the probability that it points at 8. *[1]* (ii) Find the probability that it points at an odd number. *[1]* (iii) Find the probability that it points at a number greater than 2. *[2]* **OR** (iii) Find the probability that it points at a number less than 9. What kind of event is this? *[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. **(D)** 4. *Working:* $144 = 2^4 \times 3^2$.

2. **(B)** 2. *Working:* HCF(2, 4) = 2.

3. **(C)** –2. *Working:* $2 \cdot \frac{1}{4} + \frac{3}{2} + k = 0 \Rightarrow k = -2$.

4. **(A)** $x^2 - 1$. *Working:* $x^2 - 0 \cdot x + (-1) = x^2 - 1$.

5. **(A)** a = 3, b = 2. *Working:* Adding: 2x = 6, x = 3, y = 2.

6. **(D)** 2 and $-\frac{3}{2}$. *Working:* $(x - 2)(2x + 3) = 0$.

7. **(C)** 0. *Working:* $S_6 = 3(-10 + 5 \times 2) = 0$.

8. **(B)** 35th. *Working:* $21 - 3(n - 1) = -81 \Rightarrow n - 1 = 34 \Rightarrow n = 35$.

9. **(D)** 12 units. *Working:* Sides 4, 3 and $\sqrt{9 + 16} = 5$.

10. **(C)** –12. *Working:* Midpoint (–4, 4), so $\frac{a}{3} = -4$.

11. **(B)** 60°. *Working:* $\cos\theta = \frac{1}{2}$.

12. **(A)** 0. *Working:* $\frac{1-1}{1+1} = 0$.

13. **(B)** $\frac{20}{\sqrt{3}}$ m. *Working:* $h = 20\tan 30^\circ = \frac{20}{\sqrt{3}}$ m.

14. **(D)** 7.5 cm. *Working:* $\frac{4.5}{EC} = \frac{3}{5} \Rightarrow EC = 7.5$ cm.

15. **(C)** 50°. *Working:* The two angles are supplementary: 180° – 130° = 50°.

16. **(A)** 19.25 cm². *Working:* $\frac{45}{360} \times 154 = 19.25$ cm².

17. **(B)** 8 times. *Working:* Volume varies as r^3: $2^3 = 8$.

18. **(C)** $\frac{5}{8}$. *Working:* 5 black balls out of 8.

19. **(A)** Both Assertion (A) and Reason (R) are true and R is the correct explanation of A. *Working:* All three ratios are $\frac{1}{2}$, so the lines coincide; R explains A.

20. **(D)** A is false but R is true. *Working:* A is false: 5^n has no factor 2. R is true.

Section B

21. $6 = 2 \times 3$, $72 = 2^3 \times 3^2$, $120 = 2^3 \times 3 \times 5$ (1). HCF = 6, LCM $= 2^3 \times 3^2 \times 5 = 360$ (1).

22. $D = k^2 - 24 = 0$ (1), so $k = \pm 2\sqrt{6}$ (1).

OR $(x + 7)(x - 3) = 0$ (1): x = 3 or x = –7 (1).

23. Let the ratio be k : 1: $\frac{6k+2}{k+1} = 4 \Rightarrow k = 1$, ratio 1 : 1 (1). P is the midpoint, so $m = \frac{3-3}{2} = 0$ (1).

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24. In 5 minutes it turns 30° (1). Area $= \frac{30}{360} \times \frac{22}{7} \times 196 = \frac{154}{3} \approx 51.33$ cm² (1).

OR $\frac{60}{360} \times 2 \times \frac{22}{7} \times r = 8.8$ (1), so r = 8.4 cm (1).

25. $\tan A = \frac{3}{4}$, so LHS $= \frac{1-\frac{9}{16}}{1+\frac{9}{16}} = \frac{7}{25}$ (1). $\cos A = \frac{4}{5}$, $\sin A = \frac{3}{5}$: RHS $= \frac{16-9}{25} = \frac{7}{25}$. They are equal (1).

Section C

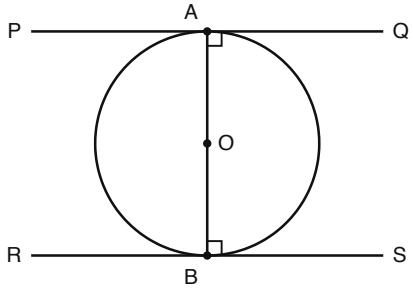
26. The number divides 245 – 5 = 240 and 1029 – 5 = 1024 (1). $240 = 2^4 \times 3 \times 5$, $1024 = 2^{10}$ (1). HCF $= 2^4 = 16$ (1).

27. $x^2 - \frac{7}{2}x + \frac{3}{2}$, or $2x^2 - 7x + 3$ (1). $2x^2 - 6x - x + 3 = (2x - 1)(x - 3)$ (1). Zeroes $\frac{1}{2}$ and 3 (1).

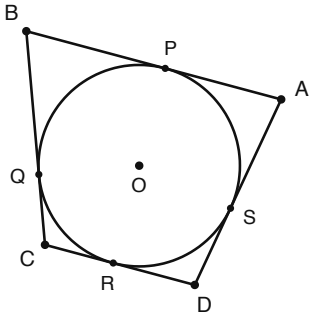
28. 5x + 7y = 50 and 7x + 5y = 46 (1). Adding: x + y = 8; subtracting: y – x = 2 (1). A pencil costs ₹3 and a pen ₹5 (1).

OR x + 10y = 105 and x + 15y = 155 (1). So y = 10, x = 5: ₹5 fixed and ₹10 per km (1). 25 km: 5 + 250 = ₹255 (1).

29. Let AB be a diameter, with tangents PQ at A and RS at B (figure, ½). A tangent is perpendicular to the radius at the point of contact, so $\angle OAQ = 90^\circ$ and $\angle OBS = 90^\circ$ (1). PQ and RS are both perpendicular to the line AB (1), so PQ ∥ RS (½).



OR Let the sides AB, BC, CD, DA touch the circle at P, Q, R, S. Triangles OAP and OAS are congruent (RHS), so OA bisects $\angle POS$; similarly OB, OC, OD bisect $\angle POQ$, $\angle QOR$, $\angle ROS$ (1). The four angles at O add up to 360°, so the halves give $\angle AOP + \angle BOP + \angle COR + \angle DOR = 180^\circ$ (1), i.e. $\angle AOB + \angle COD = 180^\circ$ (1).



30. LHS $= \frac{\cos^2 A + (1+\sin A)^2}{\cos A(1+\sin A)}$ (1) $= \frac{\cos^2 A + 1 + 2\sin A + \sin^2 A}{\cos A(1+\sin A)} = \frac{2(1+\sin A)}{\cos A(1+\sin A)}$ (1) $= \frac{2}{\cos A} = 2\sec A$ (1).

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31. Class marks 12, 14, …, 24; $\sum f = 44 + f$, $\sum fx = 752 + 20f$ (1). $18(44 + f) = 752 + 20f$ (1), so 2f = 40 and f = 20 (1).

Section D

32. Let x toys be made (½). Cost per toy = 55 – x, so $x(55 - x) = 750$ (1). $x^2 - 55x + 750 = 0$ (1). $(x - 25)(x - 30) = 0$ (1½). 25 or 30 toys (1).

OR Let the sides be x (smaller) and y: $x^2 + y^2 = 90$ (1) and $9x^2 + 4y^2 = 405$ (1). Substituting $y^2 = 90 - x^2$: $5x^2 = 45$ (1½), x = 3 (½), $y^2 = 81$, y = 9. The sides are 3 cm and 9 cm (1).

33. (i) $\frac{250}{25} + 1 = 11$ rungs (1½). (ii) d $= \frac{25 - 45}{10} = -2$ cm (1), so $a_6 = 45 - 10 = 35$ cm (1). (iii) $S_{11} = \frac{11}{2}(45 + 25) = 385$ cm (1½).

34. (i) In △ABC, DE // AC, so $\frac{BD}{DA} = \frac{BE}{EC}$ (1). In △ABE, DF // AE, so $\frac{BD}{DA} = \frac{BF}{FE}$ (1). Hence $\frac{BF}{FE} = \frac{BE}{EC}$ (1). (ii) In △ABC let D be the midpoint of AB and DE // BC meet AC at E. By BPT, $\frac{AE}{EC} = \frac{AD}{DB} = 1$ (1), so AE = EC and E is the midpoint of AC (1).

35. r = 2.5 cm (½). Apparent capacity $= \pi r^2 h = 3.14 \times 6.25 \times 10 = 196.25$ cm³ (1½). Hemisphere $= \frac{2}{3}\pi r^3 = \frac{2}{3} \times 3.14 \times 15.625 \approx 32.71$ cm³ (1½). Actual capacity ≈ 163.54 cm³ (1½).

OR r = 2 cm. Cone $= \frac{1}{3}\pi(4)(2) = \frac{8\pi}{3}$ (1); hemisphere $= \frac{2}{3}\pi(8) = \frac{16\pi}{3}$ (1). Toy $= 8\pi = 25.12$ cm³ (1). Cylinder: r = 2, h = 4, volume $16\pi = 50.24$ cm³ (1). Difference = 25.12 cm³ (1).

Section E

36. (i) $(x + 3)(x + 8) = 84$, i.e. $x^2 + 11x - 60 = 0$.
(ii) $121 + 240 = 361$.
(iii) $x = \frac{-11 + 19}{2} = 4$. Riya is 4 years and Rohit 9 years old. **OR** $(x + 15)(x - 4) = 0$ gives x = 4, so the ages are 4 and 9 years: product 36.

37. (i) $\sqrt{15^2 - 9^2} = 12$ m.
(ii) 90°, since a tangent is perpendicular to the radius at the point of contact.
(iii) Two right triangles each of area $\frac{1}{2} \times 9 \times 12 = 54$ m²: total 108 m². **OR** 9 + 12 + 12 + 9 = 42 m.

38. (i) $\frac{1}{8}$.
(ii) 1, 3, 5, 7: $\frac{4}{8} = \frac{1}{2}$.
(iii) 3 to 8: $\frac{6}{8} = \frac{3}{4}$. **OR** All 8 outcomes: probability 1. It is a sure event.

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