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Your JEE Guide

MP Board Class X · Mathematics (Standard)

Sample Question Paper 4 · Session 2026-27

Time allowed: 3 hours **Maximum marks: 75**

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This is an original practice paper written to the MPBSE 2027 sample question paper pattern; it is not issued by MPBSE.

General instructions:

1. All questions are compulsory.
2. Sub-questions of question numbers 1 to 5 carry 1 mark each.
3. Question numbers 6 to 17 carry 2 marks each.
4. Question numbers 18 to 20 carry 3 marks each.
5. Question numbers 21 to 23 carry 4 marks each.
6. Internal choices are provided for question numbers 18 to 23.
7. Draw neat and clean labelled diagrams wherever required.

1.	**(i)** *Choose and write the correct option:* Which of the following is irrational? (a) $\sqrt{7}$ (b) $\sqrt{16}$ (c) $\frac{22}{7}$ (d) 0.25	1
	(ii) The graph of y = p(x) meets the x-axis at 3 points. The number of zeroes of p(x) is: (a) 0 (b) 2 (c) 1 (d) 3	1
	(iii) The solution of x + y = 5 and x − y = 1 is: (a) x = 4, y = 1 (b) x = 3, y = 2 (c) x = 5, y = 0 (d) x = 2, y = 3	1
	(iv) The sum of the roots of $2x^2 - 6x + 1 = 0$ is: (a) $\frac{1}{2}$ (b) 6 (c) 3 (d) –3	1
	(v) The number of terms in the AP 5, 9, 13, …, 85 is: (a) 81 (b) 22 (c) 21 (d) 20	1
	(vi) Every point on the y-axis has coordinates of the form: (a) (x, x) (b) (0, y) (c) (y, y) (d) (x, 0)	1

2.	**(i)** *Fill in the blanks:* For two positive integers a and b, HCF(a, b) × LCM(a, b) = _____.	1
	(ii) A linear polynomial has exactly _____ zero.	1
	(iii) A pair of linear equations representing parallel lines has _____ solution.	1
	(iv) In the quadratic equation $ax^2 + bx + c = 0$, a ≠ _____.	1
	(v) If a, b, c are in AP, then b = _____.	1
	(vi) The distance of the point (x, y) from the origin is _____.	1
3.	**(i)** *Write True or False:* 0.333… is a rational number.	1
	(ii) The polynomial $x^2 + 1$ has two real zeroes.	1
	(iii) The 3rd term of the AP 2, 5, 8, … is 8.	1
	(iv) The longest chord of a circle is its diameter.	1
	(v) tan 90° is not defined.	1
	(vi) cos θ increases as θ increases from 0° to 90°.	1
4.	Match column A with column B (r is the radius, h the height, l the slant height): Column A | Column B (i) Curved surface area of a cone | (a) $\frac{2}{3}\pi r^3$ (ii) Total surface area of a cylinder | (b) $2\pi r^2$ (iii) Surface area of a sphere | (c) $\frac{1}{4}\pi r^2$ (iv) Curved surface area of a hemisphere | (d) $4\pi r^2$ (v) Volume of a hemisphere | (e) $\pi r l$ (vi) Area of a quadrant of a circle | (f) $2\pi r(r + h)$	6
5.	**(i)** *Write the answer in one word or one sentence:* Write the decimal expansion of 3/8.	1
	(ii) Write a quadratic polynomial whose zeroes are 2 and 3.	1
	(iii) Which term of the AP 3, 6, 9, … is 30?	1
	(iv) Write the value of sin 45° cos 45°.	1
	(v) Write the length of the arc of a semicircle of radius 7 cm. (Use π = 22/7.)	1
	(vi) A bag has 3 red and 5 blue balls. Write the probability that a ball drawn at random is red.	1

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6.	Find the HCF and LCM of 135 and 225 by prime factorisation.	2
7.	Find the zeroes of $4x^2 - 4x + 1$.	2
8.	Is the pair 2x – 3y = 8, 4x – 6y = 9 consistent? Give a reason.	2
9.	Find the discriminant of $2x^2 - 4x + 3 = 0$ and state the nature of its roots.	2
10.	Find the 15th term of the AP –8, –5, –2, …	2
11.	△ABC ~ △PQR with AB = 4 cm, BC = 6 cm and PQ = 6 cm. Find QR.	2
12.	Find the distance between the points (–2, –3) and (4, 5).	2
13.	If sin θ = cos θ and θ is acute, find θ and tan θ + cot θ.	2
14.	A 10 m ladder leans against a wall, making an angle of 60° with the ground. How high up the wall does it reach?	2
15.	PA and PB are tangents from P to a circle, with PA = 8 cm and ∠APB = 60°. Find AB.	2
16.	Find the perimeter of a sector of a circle of radius 7 cm with an angle of 90°. (Use π = 22/7.)	2
17.	Two coins are tossed together. Find the probability of getting exactly one head.	2
18.	2 pencils and 3 erasers cost ₹9, and 4 pencils and 6 erasers cost ₹18. Can the cost of a pencil and of an eraser be found? Explain. **OR** Find the smallest number that leaves a remainder of 3 when divided by 12, 15 or 20.	3
19.	Show that the points A(1, 1), B(–1, –1) and $C(-\sqrt{3}, \sqrt{3})$ are the vertices of an equilateral triangle. **OR** In what ratio does the point P(3, 4) divide the segment joining A(1, 2) and B(6, 7)?	3
20.	Find the mean of the following data: Class: 5–15 | 15–25 | 25–35 | 35–45 | 45–55 Frequency: 4 | 9 | 14 | 8 | 5 **OR** Find the mode of the data: classes 5–15, 15–25, 25–35, 35–45, 45–55 with frequencies 4, 9, 14, 8, 5.	3

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21.	The sum of the squares of two consecutive odd positive integers is 290. Find the integers. **OR** The sum of three numbers in AP is 27 and their product is 648. Find the numbers.	4
22.	Prove that: (a) $(\sec\theta + \tan\theta)(1 - \sin\theta) = \cos\theta$; (b) $\sin^4\theta - \cos^4\theta = 1 - 2\cos^2\theta$. **OR** The angle of elevation of the top of a building from the foot of a tower is 30°, and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 60 m high, find the height of the building.	4
23.	A hemispherical bowl of internal radius 9 cm is full of a liquid. The liquid is poured into cylindrical bottles of radius 1.5 cm and height 4 cm. How many bottles are filled? **OR** One card is drawn from a well-shuffled pack of 52 cards. Find the probability of getting (a) a face card; (b) a spade; (c) not an ace; (d) a black queen.	4

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Answers and Marking Scheme

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

Question 1

(i) **(a)** $\sqrt{7}$. *Working:* 7 is not a perfect square.

(ii) **(d)** 3. *Working:* Zeroes are the x-coordinates of these points.

(iii) **(b)** x = 3, y = 2. *Working:* Adding: 2x = 6.

(iv) **(c)** 3. *Working:* −b/a = 6/2.

(v) **(c)** 21. *Working:* (85 − 5)/4 + 1.

(vi) **(b)** (0, y). *Working:* Its x-coordinate is 0.

Question 2

(i) a × b.

(ii) one.

(iii) no.

(iv) 0.

(v) (a + c)/2.

(vi) $\sqrt{x^2 + y^2}$.

Question 3

(i) True: it equals 1/3.

(ii) False: $x^2 + 1$ is always positive.

(iii) True.

(iv) True.

(v) True.

(vi) False: it decreases from 1 to 0.

4. (i) – (e) $\pi r l$; (ii) – (f) $2\pi r(r + h)$; (iii) – (d) $4\pi r^2$; (iv) – (b) $2\pi r^2$; (v) – (a) $\tfrac{2}{3}\pi r^3$; (vi) – (c) $\tfrac{1}{4}\pi r^2$

Question 5

(i) 0.375.

(ii) $x^2 - 5x + 6$.

(iii) The 10th.

(iv) ½.

(v) 22 cm.

(vi) 3/8.

6. 135 = $3^3 \times 5$, 225 = $3^2 \times 5^2$ (1). HCF = $3^2 \times 5$ = 45; LCM = $3^3 \times 5^2$ = 675 (1).

7. $4x^2 - 4x + 1 = (2x - 1)^2$ (1), so both zeroes are ½ (1).

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8. $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{1}{2}$, but $\frac{c_1}{c_2} = \frac{8}{9}$ (1). The lines are parallel, so the pair is inconsistent (1).

9. D = 16 – 24 = –8 (1). D < 0, so it has no real roots (1).

10. a = –8, d = 3 (1). $a_{15} = -8 + 14 \times 3 = 34$ (1).

11. Corresponding sides are proportional: AB/PQ = BC/QR (1). 4/6 = 6/QR, so QR = 9 cm (1).

12. $\sqrt{6^2 + 8^2}$ (1) = 10 units (1).

13. tan θ = 1, so θ = 45° (1). tan θ + cot θ = 1 + 1 = 2 (1).

14. sin 60° = h/10 (1), so $h = 5\sqrt{3}$ m ≈ 8.66 m (1).

15. PA = PB, so ∠PAB = ∠PBA = 60° (1). △PAB is equilateral, so AB = 8 cm (1).

16. Arc length = ¼ × 2 × 22/7 × 7 = 11 cm (1). Perimeter = 11 + 7 + 7 = 25 cm (1).

17. Outcomes HH, HT, TH, TT; favourable HT and TH (1). P = 2/4 = ½ (1).

18. 2x + 3y = 9 and 4x + 6y = 18 (1). $\frac{2}{4} = \frac{3}{6} = \frac{9}{18}$, so the lines coincide (1). There are infinitely many solutions, so the costs cannot be found uniquely (1).

OR 12 = 2² × 3, 15 = 3 × 5, 20 = 2² × 5 (1). LCM = 2² × 3 × 5 = 60 (1). The number is 60 + 3 = 63 (1).

19. $AB = \sqrt{4 + 4} = 2\sqrt{2}$ (1). $BC = \sqrt{(1 - \sqrt{3})^2 + (1 + \sqrt{3})^2} = \sqrt{8} = 2\sqrt{2}$ (1). $CA = \sqrt{(1 + \sqrt{3})^2 + (1 - \sqrt{3})^2} = 2\sqrt{2}$; all sides are equal (1).

OR Let the ratio be k : 1: $3 = \frac{6k+1}{k+1}$ (1), so 3k + 3 = 6k + 1 and k = 2/3 (1). The ratio is 2 : 3; check y: (2 × 7 + 3 × 2)/5 = 4 (1).

20. Class marks 10, 20, 30, 40, 50; fx = 40, 180, 420, 320, 250 (1). Σf = 40, Σfx = 1210 (1). Mean = 1210/40 = 30.25 (1).

OR Modal class 25–35; l = 25, f_1 = 14, f_0 = 9, f_2 = 8, h = 10 (1). Mode $= 25 + \frac{14-9}{28-9-8} \times 10$ (1) $= 25 + \frac{50}{11} \approx 29.55$ (1).

21. Let them be x and x + 2: $x^2 + (x + 2)^2 = 290$ (1). $2x^2 + 4x - 286 = 0$, i.e. $x^2 + 2x - 143 = 0$ (1). (x + 13)(x – 11) = 0 (1). x is positive, so the integers are 11 and 13 (1).

OR Let them be a – d, a, a + d: 3a = 27, so a = 9 (1½). 9(81 – d²) = 648, so d² = 9 and d = ±3 (1½). The numbers are 6, 9, 12 (1).

22. (a) LHS $= \frac{1+\sin\theta}{\cos\theta}(1 - \sin\theta) = \frac{1-\sin^2\theta}{\cos\theta}$ (1) $= \frac{\cos^2\theta}{\cos\theta} = \cos\theta$ (1). (b) LHS $= (\sin^2\theta - \cos^2\theta)(\sin^2\theta + \cos^2\theta) = \sin^2\theta - \cos^2\theta$ (1) $= 1 - 2\cos^2\theta$ (1).

OR From the foot of the building: tan 60° = 60/d, so $d = \frac{60}{\sqrt{3}} = 20\sqrt{3}$ m (2). From the foot of the tower: $h = d\tan 30^\circ = 20\sqrt{3} \times \frac{1}{\sqrt{3}}$ (1) = 20 m (1).

23. Volume of the bowl $= \frac{2}{3}\pi \times 9^3 = 486\pi$ cm³ (1½). Volume of a bottle $= \pi \times 1.5^2 \times 4 = 9\pi$ cm³ (1½). Number of bottles = 486π ÷ 9π = 54 (1).

OR (a) 12/52 = 3/13 (1). (b) 13/52 = 1/4 (1). (c) 48/52 = 12/13 (1). (d) 2/52 = 1/26 (1).

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