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Your JEE Guide

MP Board Class X · Mathematics (Standard)

Sample Question Paper 5 · 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:* If HCF(65, 117) = 13, then LCM(65, 117) is: (a) 65 (b) 117 (c) 585 (d) 1170	1
	(ii) If $p(x) = x^2 - 3x + 2$, then p(1) is: (a) –1 (b) 1 (c) 2 (d) 0	1
	(iii) The pair of equations 3x + 2y = 6 and 6x + 4y = 18 has: (a) a unique solution (b) no solution (c) exactly two solutions (d) infinitely many solutions	1
	(iv) Which of the following is a quadratic equation? (a) $x^2 - 4 = 0$ (b) $x^3 + x = 1$ (c) $x(x + 1) = x^2 + 5$ (d) 2x + 3 = 0	1
	(v) The sum of the first 5 odd natural numbers is: (a) 15 (b) 20 (c) 25 (d) 30	1
	(vi) If sin A = 4/5 and A is acute, then cos A is: (a) $\frac{5}{3}$ (b) $\frac{4}{3}$ (c) $\frac{3}{4}$ (d) $\frac{3}{5}$	1
2.	**(i)** *Fill in the blanks:* $\sqrt{2} \times \sqrt{8}$ = _____, a rational number.	1

	(ii) The zeroes of p(x) are the x-coordinates of the points where its graph meets the _____.	1
	(iii) If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, the pair of linear equations has a _____ solution.	1
	(iv) The positive root of (x – 1)(x + 4) = 0 is _____.	1
	(v) If the 2nd and 3rd terms of an AP are 7 and 10, its first term is _____.	1
	(vi) The number of tangents to a circle at a point on it is _____.	1
3.	**(i)** *Write True or False:* The LCM of two numbers is always a multiple of their HCF.	1
	(ii) $x^3 - 1$ is a quadratic polynomial.	1
	(iii) The sum of the first n terms of an AP can be zero.	1
	(iv) All isosceles triangles are similar.	1
	(v) sin 60° = 2 sin 30°.	1
	(vi) The total surface area of a solid hemisphere is $3\pi r^2$.	1
4.	Match column A with column B: Column A: (i) $1 + \tan^2 A$; (ii) $1 + \cot^2 A$; (iii) $\frac{\sin A}{\cos A}$; (iv) $\frac{1}{\sin A}$; (v) $\frac{1}{\cos A}$; (vi) $\frac{\cos A}{\sin A}$ Column B: (a) $\csc^2 A$; (b) cot A; (c) sec A; (d) tan A; (e) $\sec^2 A$; (f) cosec A	6
5.	**(i)** *Write the answer in one word or one sentence:* Write the HCF of 17 and 19.	1
	(ii) If x = 1 is a root of $x^2 + kx - 3 = 0$, write k.	1
	(iii) In an AP with common difference 3, write $a_{10} - a_5$.	1
	(iv) Write the value of $\cos^2 60^\circ + \sin^2 30^\circ$.	1
	(v) Write the radius of a sphere whose surface area is 616 cm². (Use π = 22/7.)	1
	(vi) A die is thrown. Write the probability of getting a number less than 7.	1
6.	Find the HCF and LCM of 18, 24 and 60.	2
7.	Find the zeroes of $x^2 - x - 12$ and check that their product is c/a.	2

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8.	Solve by elimination: x + 2y = 8 and 3x – 2y = 8.	2
9.	Find the roots of $x^2 - 6x + 9 = 0$ and state their nature.	2
10.	The 3rd term of an AP is 12 and its 7th term is 24. Find its first term and common difference.	2
11.	In △ABC, DE // BC with AD/DB = 3/5 and AC = 5.6 cm. Find AE.	2
12.	Find the point that is one-third of the way from A(1, –2) to B(7, 4).	2
13.	Evaluate $\frac{1-\tan^2 45^\circ}{1+\tan^2 45^\circ}$.	2
14.	A boy 1.5 m tall stands 20 m from a building. The angle of elevation of the top of the building from his eyes is 45°. Find the height of the building.	2
15.	Two tangents to a circle of radius 5 cm are drawn from an external point and are inclined to each other at 90°. Find the length of each tangent.	2
16.	Find the area swept by the minute hand of a clock, 10.5 cm long, in 20 minutes. (Use π = 22/7.)	2
17.	A number is chosen at random from 1 to 30. Find the probability that it is a multiple of 4.	2
18.	Find the roots of $x^2 - 2\sqrt{3}x + 3 = 0$ and state their nature. **OR** The sum of a two-digit number and the number formed by reversing its digits is 110. The tens digit exceeds the units digit by 4. Find the number.	3
19.	TP and TQ are tangents from T to a circle with centre O and radius 6 cm. If OT = 10 cm, find TP and the area of the quadrilateral OPTQ. **OR** The mean of the following data is 25. Find the missing frequency p. Class: 0–10 | 10–20 | 20–30 | 30–40 | 40–50 Frequency: 5 | 18 | 15 | p | 6	3
20.	A circle of radius 7 cm is inscribed in a square. Find the area of the region inside the square but outside the circle. (Use π = 22/7.) **OR** A bag has 4 red, 5 white and x black balls. The probability of drawing a black ball is 1/4. Find x, and the probability of drawing a red ball.	3
21.	Find the sum of all multiples of 9 between 100 and 400. **OR** The hypotenuse of a right triangle is 25 cm, and its other two sides differ by 5 cm. Find the sides.	4

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22.	Two poles of equal height stand 100 m apart. From a point on the ground between them, the angles of elevation of their tops are 45° and 30°. Find the height of the poles. **OR** Prove that: (a) $\tan^2 A - \sin^2 A = \tan^2 A \sin^2 A$; (b) $\cot A - \tan A = \frac{2\cos^2 A - 1}{\sin A \cos A}$.	4
23.	A solid cylinder of radius 3 cm and height 4 cm is melted and recast into a solid sphere. Find the radius of the sphere. **OR** Find the median of the following data: Height (cm): 140–145 | 145–150 | 150–155 | 155–160 | 160–165 Students: 5 | 15 | 25 | 30 | 25	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) **(c)** 585. *Working:* 65 × 117 ÷ 13.

(ii) **(d)** 0. *Working:* 1 − 3 + 2.

(iii) **(b)** no solution. *Working:* 3/6 = 2/4 ≠ 6/18: parallel lines.

(iv) **(a)** $x^2 - 4 = 0$. *Working:* The last one simplifies to x = 5, which is linear.

(v) **(c)** 25. *Working:* 1 + 3 + 5 + 7 + 9.

(vi) **(d)** $\frac{3}{5}$. *Working:* $\sqrt{1 - 16/25}$.

Question 2

(i) 4.

(ii) x-axis.

(iii) unique.

(iv) 1.

(v) 4.

(vi) one.

Question 3

(i) True.

(ii) False: its degree is 3.

(iii) True: e.g. 3, 1, −1, −3.

(iv) False: their angles can differ.

(v) False: sin 60° = √3/2, but 2 sin 30° = 1.

(vi) True: 2πr² + πr².

4. (i) – (e) $\sec^2 A$; (ii) – (a) $\csc^2 A$; (iii) – (d) tan A; (iv) – (f) cosec A; (v) – (c) sec A; (vi) – (b) cot A

Question 5

(i) 1.

(ii) 2.

(iii) 15.

(iv) ½.

(v) 7 cm.

(vi) 1.

6. 18 = 2 × 3², 24 = 2³ × 3, 60 = 2² × 3 × 5 (1). HCF = 2 × 3 = 6; LCM = 2³ × 3² × 5 = 360 (1).

7. (x − 4)(x + 3), so the zeroes are 4 and −3 (1). Product = −12 = c/a (1).

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8. Adding: 4x = 16, so x = 4 (1). Then 2y = 4 and y = 2 (1).

9. $(x-3)^2=0$, so x = 3, 3 (1). The roots are real and equal (D = 0) (1).

10. a + 2d = 12 and a + 6d = 24, so 4d = 12 and d = 3 (1). a = 6 (1).

11. AE/EC = 3/5, so AE = (3/8) × 5.6 (1) = 2.1 cm (1).

12. It divides AB in the ratio 1 : 2 (1). Point = ((7 + 2)/3, (4 – 4)/3) = (3, 0) (1).

13. tan 45° = 1 (1), so the value is (1 – 1)/(1 + 1) = 0 (1).

14. tan 45° = h/20, so h = 20 m above eye level (1). Height = 20 + 1.5 = 21.5 m (1).

15. With the two radii to the points of contact, they form a quadrilateral with four right angles and two adjacent sides equal (radii), i.e. a square (1). Each tangent is 5 cm (1).

16. In 20 minutes it turns through 120° (1). Area $=\frac{120}{360}\times\frac{22}{7}\times 10.5^2=115.5$ cm² (1).

17. 4, 8, …, 28: 7 numbers (1). P = 7/30 (1).

18. D = 12 – 12 = 0, so the roots are real and equal (1). $(x-\sqrt{3})^2=0$ (1), so $x=\sqrt{3},\sqrt{3}$ (1).

OR (10x + y) + (10y + x) = 110, so x + y = 10; and x – y = 4 (1). Solving: x = 7, y = 3 (1). The number is 73 (1).

19. OP ⊥ TP, so $TP=\sqrt{10^2-6^2}=8$ cm (1). △OPT and △OQT are congruent right triangles (1). Area = 2 × ½ × 6 × 8 = 48 cm² (1).

OR Σf = 44 + p and Σfx = 25 + 270 + 375 + 35p + 270 = 940 + 35p (1). $\frac{940+35p}{44+p}=25$ (1). 940 + 35p = 1100 + 25p, so p = 16 (1).

20. The side of the square is 14 cm, so its area is 196 cm² (1). Area of the circle = 22/7 × 49 = 154 cm² (1). Required area = 42 cm² (1).

OR $\frac{x}{9+x}=\frac{1}{4}$ (1), so 4x = 9 + x and x = 3 (1). P(red) = 4/12 = 1/3 (1).

21. The multiples are 108, 117, …, 396 (1). 396 = 108 + (n – 1)9 gives n = 33 (1). $S=\frac{33}{2}(108+396)$ (1) = 8316 (1).

OR $x^2+(x+5)^2=625$ (1). $x^2+5x-300=0$, i.e. (x + 20)(x – 15) = 0 (1½). x = 15 (½). The sides are 15 cm and 20 cm (1).

22. Let the point be x m from the first pole: h = x tan 45° = x (1). Also $h=(100-x)\tan 30^\circ=\frac{100-x}{\sqrt{3}}$ (1). So $x\sqrt{3}=100-x$ and $x=\frac{100}{\sqrt{3}+1}=50(\sqrt{3}-1)$ (1). Height ≈ 36.6 m (1).

OR (a) LHS $=\frac{\sin^2 A}{\cos^2 A}-\sin^2 A=\frac{\sin^2 A(1-\cos^2 A)}{\cos^2 A}$ (1) $=\tan^2 A\sin^2 A$ (1). (b) LHS $=\frac{\cos^2 A-\sin^2 A}{\sin A\cos A}$ (1) $=\frac{2\cos^2 A-1}{\sin A\cos A}$, using $\sin^2 A=1-\cos^2 A$ (1).

23. Volume of the cylinder = π × 9 × 4 = 36π cm³ (1½). $\frac{4}{3}\pi r^3=36\pi$ (1), so r³ = 27 and r = 3 cm (1½).

OR Cumulative frequencies 5, 20, 45, 75, 100; N/2 = 50 (1). Median class 155–160; l = 155, cf = 45, f = 30, h = 5 (1). Median $=155+\frac{50-45}{30}\times 5$ (1) ≈ 155.83 cm (1).

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