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Your JEE Guide

MP Board Class X · Mathematics (Standard)

Sample Question Paper 6 · 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:* The largest number that divides both 36 and 48 is: (a) 4 (b) 12 (c) 6 (d) 144	1
	(ii) If one zero of $x^2 - 7x + k$ is 3, the other zero is: (a) 3 (b) –4 (c) 4 (d) 7	1
	(iii) If x = 2 and y = 1 is a solution of 3x + ky = 10, then k is: (a) –4 (b) 2 (c) 1 (d) 4	1
	(iv) The equation $x^2 - 5x + 6 = 0$ has roots: (a) 2 and 3 (b) –2 and –3 (c) 1 and 6 (d) –1 and –6	1
	(v) If the nth term of an AP is 3n + 2, its common difference is: (a) 2 (b) 5 (c) 1 (d) 3	1
	(vi) The value of $\frac{2\tan 30^\circ}{1-\tan^2 30^\circ}$ is: (a) $\frac{1}{\sqrt{3}}$ (b) 1 (c) $\sqrt{3}$ (d) 0	1

2.	**(i)** *Fill in the blanks:* The prime factorisation of a composite number is unique, apart from the _____ of the factors.	1
	(ii) A polynomial of degree n has at most _____ zeroes.	1
	(iii) The graph of a linear equation in two variables is a _____.	1
	(iv) If a quadratic equation has two equal roots, its discriminant is _____.	1
	(v) The fixed number added to each term to get the next term of an AP is called the _____.	1
	(vi) The coordinates of the origin are _____.	1
3.	**(i)** *Write True or False:* The decimal expansion of 7/20 terminates.	1
	(ii) A quadratic polynomial always has two real zeroes.	1
	(iii) The pair x = 2y and 2x = 4y has a unique solution.	1
	(iv) A tangent to a circle meets it at exactly one point.	1
	(v) The value of tan θ increases as θ increases from 0° to 90°.	1
	(vi) The probability of an event E plus the probability of "not E" is 1.	1
4.	Match column A with column B: Column A | Column B (i) Mid-point of (a, b) and (c, d) | (a) $\frac{\theta}{360^\circ} \times 2\pi r$ (ii) Distance of (x, y) from the origin | (b) $\left(\frac{a+c}{2}, \frac{b+d}{2}\right)$ (iii) nth term of an AP | (c) $\frac{n(n+1)}{2}$ (iv) Sum of the first n natural numbers | (d) a + (n – 1)d (v) Roots of $ax^2 + bx + c = 0$ | (e) $\sqrt{x^2 + y^2}$ (vi) Length of an arc of angle θ | (f) $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	6
5.	**(i)** *Write the answer in one word or one sentence:* Write the LCM of 9 and 15.	1
	(ii) If $p(x) = x^2 - 4$, write p(2).	1
	(iii) Write the sum of the first 3 terms of the AP 5, 10, 15, …	1
	(iv) Write the value of tan 60° ÷ tan 30°.	1
	(v) Write the diameter of a circle whose area is 154 cm². (Use π = 22/7.)	1

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	(vi) Write the probability of getting a 7 when an ordinary die is thrown.	1
6.	Check whether 4^n can end with the digit 0 for some natural number n.	2
7.	If the zeroes of $x^2 + px + 12$ are 3 and 4, find p.	2
8.	Solve by substitution: 3x + y = 11, x – y = 1.	2
9.	Find the value of k for which $x^2 - kx + 9 = 0$ has equal roots.	2
10.	How many terms of the AP 3, 7, 11, … are needed to make the sum 300?	2
11.	The sides of two similar triangles are in the ratio 2 : 5. If the perimeter of the smaller is 24 cm, find the perimeter of the larger.	2
12.	Find y if the point (2, y) is equidistant from (1, 3) and (3, 5).	2
13.	If 3 cot A = 4, find $\frac{1-\tan^2 A}{1+\tan^2 A}$.	2
14.	The angle of elevation of the top of a 15 m tower from a point on the ground is 60°. Find the distance of the point from the foot of the tower.	2
15.	The radius of a circle is 8 cm and a point P is 17 cm from its centre. Find the length of the tangent from P.	2
16.	A wheel has a diameter of 70 cm. How far does it travel in 10 complete revolutions? (Use π = 22/7.)	2
17.	In a batch of 400 bulbs, 20 are defective. One bulb is picked at random. Find the probability that it is not defective.	2
18.	Prove that $\sqrt{7}$ is irrational. **OR** Find the zeroes of $4x^2 - 4x - 3$ and verify the relationship between the zeroes and the coefficients.	3
19.	Show that the points A(2, 1), B(5, 2), C(6, 4) and D(3, 3) are the vertices of a parallelogram. **OR** Find the coordinates of the point that divides the segment joining (–2, 5) and (6, –3) internally in the ratio 3 : 1.	3
20.	Find the mean of the following data: Class: 10–30 | 30–50 | 50–70 | 70–90 Frequency: 5 | 8 | 12 | 5 **OR** Find the mode of the data: classes 10–30, 30–50, 50–70, 70–90 with frequencies 5, 8, 12, 5.	3

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21.	A shopkeeper buys some books for ₹600. If he had bought 5 more books for the same amount, each book would have cost ₹4 less. How many books did he buy? **OR** The first and last terms of an AP are 8 and 350, and its common difference is 9. How many terms are there, and what is their sum?	4
22.	From a point on the ground, the angle of elevation of the bottom of a 10 m flagstaff fixed on top of a building is 30°, and of the top of the flagstaff is 45°. Find the height of the building. **OR** Prove that $\frac{\sin\theta}{1-\cos\theta} = \csc\theta + \cot\theta$.	4
23.	A toy is a cone of radius 3 cm mounted on a hemisphere of the same radius. The total height of the toy is 7 cm. Find its total surface area in terms of π, and its value using π = 22/7. **OR** Two dice are thrown together. Find the probability that (a) the sum is a prime number; (b) both numbers are even; (c) the sum is at least 10; (d) the numbers differ by 3.	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) **(b)** 12. *Working:* HCF(36, 48) = 12.

(ii) **(c)** 4. *Working:* Sum of zeroes = 7.

(iii) **(d)** 4. *Working:* 6 + k = 10.

(iv) **(a)** 2 and 3. *Working:* (x − 2)(x − 3) = 0.

(v) **(d)** 3. *Working:* Coefficient of n.

(vi) **(c)** $\sqrt{3}$. *Working:* $\frac{2/\sqrt{3}}{2/3} = \sqrt{3}$ (it equals tan 60°).

Question 2

(i) order.

(ii) n.

(iii) straight line.

(iv) 0.

(v) common difference.

(vi) (0, 0).

Question 3

(i) True: 20 = 2² × 5.

(ii) False: it may have none.

(iii) False: the lines coincide.

(iv) True.

(v) True.

(vi) True.

4. (i) – (b) $\left(\frac{a+c}{2}, \frac{b+d}{2}\right)$; (ii) – (e) $\sqrt{x^2 + y^2}$; (iii) – (d) a + (n − 1)d; (iv) – (c) $\frac{n(n+1)}{2}$; (v) – (f) $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$; (vi) – (a) $\frac{\theta}{360^\circ} \times 2\pi r$

Question 5

(i) 45.

(ii) 0.

(iii) 30.

(iv) 3.

(v) 14 cm.

(vi) 0.

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6. $4^n = 2^{2n}$, whose only prime factor is 2 (1). A number ending in 0 needs 5 as a factor, so 4^n never ends in 0 (1).

7. Sum of zeroes = 7 = –p (1), so p = –7 (1).

8. x = y + 1, so 3y + 3 + y = 11 and y = 2 (1). x = 3 (1).

9. D = k² – 36 = 0 (1), so k = ±6 (1).

10. $\frac{n}{2}[6 + 4(n-1)] = 300$, i.e. $2n^2 + n - 300 = 0$ (1). (2n + 25)(n – 12) = 0, so n = 12 (1).

11. Perimeters are in the ratio of sides (1). Larger perimeter = 24 × 5/2 = 60 cm (1).

12. $1 + (y-3)^2 = 1 + (y-5)^2$ (1). This gives –6y + 9 = –10y + 25, so y = 4 (1).

13. tan A = 3/4, so tan²A = 9/16 (1). Value = (7/16)/(25/16) = 7/25 (1).

14. tan 60° = 15/d (1), so $d = \frac{15}{\sqrt{3}} = 5\sqrt{3}$ m ≈ 8.66 m (1).

15. Tangent ⊥ radius at the point of contact (1). Length $= \sqrt{17^2 - 8^2} = 15$ cm (1).

16. Circumference = 22/7 × 70 = 220 cm (1). Distance = 10 × 220 = 2200 cm = 22 m (1).

17. Non-defective bulbs: 380 (1). P = 380/400 = 19/20 (1).

18. Suppose $\sqrt{7} = \frac{a}{b}$ with a, b co-prime integers, b ≠ 0. Then 7b² = a², so 7 divides a² and hence a (1). Write a = 7c: 7b² = 49c², so b² = 7c² and 7 divides b (1). Then 7 is a common factor of a and b, a contradiction; so $\sqrt{7}$ is irrational (1).

OR 4x² – 4x – 3 = (2x – 3)(2x + 1), zeroes 3/2 and –1/2 (1). Sum = 1 = –(–4)/4 (1). Product = –3/4 = c/a (1).

19. Mid-point of AC = (4, 2.5) (1). Mid-point of BD = (4, 2.5) (1). The diagonals bisect each other, so ABCD is a parallelogram (1).

OR $x = \frac{3\times6 + 1\times(-2)}{4} = 4$ (1½). $y = \frac{3\times(-3) + 1\times5}{4} = -1$ (1). The point is (4, –1) (½).

20. Class marks 20, 40, 60, 80; fx = 100, 320, 720, 400 (1). Σf = 30, Σfx = 1540 (1). Mean = 1540/30 ≈ 51.33 (1).

OR Modal class 50–70; l = 50, f_1 = 12, f_0 = 8, f_2 = 5, h = 20 (1). Mode $= 50 + \frac{12-8}{24-8-5} \times 20$ (1) $= 50 + \frac{80}{11} \approx 57.27$ (1).

21. $\frac{600}{x} - \frac{600}{x+5} = 4$ (1). This gives 3000 = 4x(x + 5), i.e. $x^2 + 5x - 750 = 0$ (1). (x + 30)(x – 25) = 0 (1). He bought 25 books (1).

OR 350 = 8 + (n – 1)9, so n – 1 = 38 and n = 39 (2). $S = \frac{39}{2}(8 + 350) = 39 \times 179 = 6981$ (2).

22. Let the building be h m high, at distance d. tan 30° = h/d, so $d = h\sqrt{3}$ (1). tan 45° = (h + 10)/d, so $h\sqrt{3} = h + 10$ (1). $h = \frac{10}{\sqrt{3}-1} = 5(\sqrt{3}+1)$ (1) ≈ 13.66 m (1).

OR Multiply numerator and denominator by $1 + \cos\theta$: $\frac{\sin\theta(1+\cos\theta)}{1-\cos^2\theta}$ (1½). $= \frac{\sin\theta(1+\cos\theta)}{\sin^2\theta} = \frac{1+\cos\theta}{\sin\theta}$ (1½). $= \csc\theta + \cot\theta$ = RHS (1).

23. Height of the cone = 7 – 3 = 4 cm; slant height $= \sqrt{4^2 + 3^2} = 5$ cm (1). Curved surface of the cone = πrl = 15π cm² (1). Curved surface of the hemisphere = 2πr² = 18π cm² (1). Total = 33π ≈ 103.71 cm² (1).

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OR (a) Sums 2, 3, 5, 7, 11: 1 + 2 + 4 + 6 + 2 = 15 outcomes, so 15/36 = 5/12 (1). (b) 9/36 = 1/4 (1). (c) Sums 10, 11, 12: 3 + 2 + 1 = 6, so 1/6 (1). (d) (1, 4), (2, 5), (3, 6) and reverses: 6/36 = 1/6 (1).

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