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Your JEE Guide

MP Board Class X · Mathematics (Standard)

Sample Question Paper 1 · 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 HCF of 26 and 91 is: (a) 26 (b) 13 (c) 7 (d) 1	1
	(ii) The zeroes of the polynomial $x^2 - 9$ are: (a) 9 and –9 (b) 3 only (c) 3 and –3 (d) 0 and 9	1
	(iii) The pair of equations 2x + 3y = 5 and 4x + 6y = 10 has: (a) infinitely many solutions (b) exactly two solutions (c) no solution (d) a unique solution	1
	(iv) The common difference of the AP 3, 8, 13, 18, … is: (a) 3 (b) –5 (c) 8 (d) 5	1
	(v) The distance between the points (2, 3) and (5, 7) is: (a) 25 (b) 5 (c) √7 (d) 7	1
	(vi) The value of sin 30° + cos 60° is: (a) 1 (b) 0 (c) $\frac{1}{2}$ (d) $\sqrt{3}$	1
2.	**(i)** *Fill in the blanks:* Every composite number can be written as a product of _____ numbers.	1

	(ii) A polynomial of degree 2 is called a _____ polynomial.	1
	(iii) The discriminant of the quadratic equation $ax^2 + bx + c = 0$ is _____.	1
	(iv) A tangent to a circle is _____ to the radius through the point of contact.	1
	(v) The value of tan 45° is _____.	1
	(vi) The probability of an impossible event is _____.	1
3.	**(i)** *Write True or False:* $\sqrt{2}$ is a rational number.	1
	(ii) A quadratic polynomial can have at most two zeroes.	1
	(iii) All equilateral triangles are similar.	1
	(iv) The mid-point of the segment joining (2, 4) and (6, 8) is (4, 6).	1
	(v) The value of sin θ can be greater than 1.	1
	(vi) The sum of the probabilities of all the elementary events of an experiment is 1.	1
4.	Match column A with column B (r is the radius, h the height):	6

Column A	Column B
(i) Area of a circle	(a) $2\pi r$
(ii) Circumference of a circle	(b) πr^2
(iii) Volume of a cylinder	(c) $\frac{4}{3}\pi r^3$
(iv) Volume of a cone	(d) $\pi r^2 h$
(v) Curved surface area of a cylinder	(e) $\frac{1}{3}\pi r^2 h$
(vi) Volume of a sphere	(f) $2\pi r h$

5.	**(i)** *Write the answer in one word or one sentence:* Write the LCM of 4 and 6.	1
	(ii) Write the sum of the zeroes of $x^2 - 5x + 6$.	1
	(iii) Write the 10th term of the AP 2, 4, 6, …	1
	(iv) Write the value of $\sin^2\theta + \cos^2\theta$.	1
	(v) How many tangents can be drawn to a circle from a point outside it?	1
	(vi) If the mean of 2, 4, 6 and x is 5, find x.	1
6.	Given that $\sqrt{2}$ is irrational, prove that $7 + \sqrt{2}$ is irrational.	2
7.	Find a quadratic polynomial whose zeroes have sum –3 and product 2.	2

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8.	Solve by substitution: x + y = 14, x – y = 4.	2
9.	Find the roots of $x^2 - 3x - 10 = 0$ by factorisation.	2
10.	Which term of the AP 7, 13, 19, … is 205?	2
11.	In △PQR, ST ∥ QR with S on PQ and T on PR. If PS = 1.5 cm, SQ = 3 cm and PT = 1 cm, find TR.	2
12.	Find the point that divides the line segment joining (2, 1) and (7, 6) internally in the ratio 3 : 2.	2
13.	If sin A = 3/5, find cos A and tan A.	2
14.	A tower is 30 m high. The angle of elevation of its top from a point on the ground is 30°. How far is the point from the foot of the tower?	2
15.	A point is 25 cm from the centre of a circle of radius 7 cm. Find the length of the tangent from the point to the circle.	2
16.	Find the area of a sector of a circle of radius 21 cm with an angle of 60°. (Use π = 22/7.)	2
17.	A die is thrown once. Find the probability of getting a number greater than 4.	2
18.	Find the zeroes of $3x^2 - x - 4$ and verify the relationship between the zeroes and the coefficients. **OR** The sum of two numbers is 25 and their difference is 7. Find the numbers by the elimination method.	3
19.	Find the area of the minor segment of a circle of radius 10.5 cm cut off by a chord that subtends a right angle at the centre. (Use π = 22/7.) **OR** PA and PB are tangents from an external point P to a circle with centre O. If ∠APB = 50°, find ∠AOB and ∠OAB.	3
20.	Find the mean of the following data: Marks: 10–20 | 20–30 | 30–40 | 40–50 | 50–60 Students: 4 | 6 | 12 | 5 | 3 **OR** Find the mode of the data: marks 10–20, 20–30, 30–40, 40–50, 50–60 with 4, 6, 12, 5 and 3 students.	3

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21.	The length of a rectangular plot is 3 m more than its breadth, and its area is 70 m². Find its length and breadth. **OR** Find the sum of all two-digit natural numbers that are divisible by 7.	4
22.	From the top of a 15 m tall building, the angle of elevation of the top of a tower is 60° and the angle of depression of its foot is 45°. Find the height of the tower. **OR** Prove that $\frac{1-\cos A}{1+\cos A} = (\csc A - \cot A)^2$.	4
23.	A tent is a cylinder of height 3 m and radius 7 m, surmounted by a cone of the same radius and slant height 10 m. Find the area of canvas needed and its cost at ₹50 per m². (Use π = 22/7.) **OR** A bag has 5 red, 8 white and 7 black balls. One ball is drawn at random. Find the probability that it is (a) red; (b) white; (c) not black; (d) green.	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)** 13. *Working:* 26 = 2 × 13 and 91 = 7 × 13.

(ii) **(c)** 3 and –3. *Working:* (x – 3)(x + 3).

(iii) **(a)** infinitely many solutions. *Working:* The second equation is twice the first: the lines coincide.

(iv) **(d)** 5. *Working:* 8 – 3 = 5.

(v) **(b)** 5. *Working:* $\sqrt{3^2 + 4^2}$.

(vi) **(a)** 1. *Working:* ½ + ½.

Question 2

(i) prime.

(ii) quadratic.

(iii) $b^2 - 4ac$.

(iv) perpendicular.

(v) 1.

(vi) 0.

Question 3

(i) False: it is irrational.

(ii) True.

(iii) True: their angles are all 60°.

(iv) True.

(v) False: $0 \le \sin\theta \le 1$ for acute angles.

(vi) True.

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

Question 5

(i) 12.

(ii) 5.

(iii) 20.

(iv) 1.

(v) Two.

(vi) (12 + x)/4 = 5, so x = 8.

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6. Suppose $7+\sqrt{2}=r$, a rational number; then $\sqrt{2}=r-7$ (1). r – 7 is rational, but $\sqrt{2}$ is irrational, a contradiction; so $7+\sqrt{2}$ is irrational (1).

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

8. x = 14 – y, so 14 – 2y = 4 (1), giving y = 5 and x = 9 (1).

9. (x – 5)(x + 2) = 0 (1), so x = 5 or x = –2 (1).

10. 7 + (n – 1)6 = 205 (1), so n – 1 = 33 and n = 34 (1).

11. By the basic proportionality theorem, PS/SQ = PT/TR (1), so 1.5/3 = 1/TR and TR = 2 cm (1).

12. x = (3 × 7 + 2 × 2)/5 = 5 (1), y = (3 × 6 + 2 × 1)/5 = 4; the point is (5, 4) (1).

13. cos A = $\sqrt{1-\frac{9}{25}}=\frac{4}{5}$ (1). tan A = sin A / cos A = 3/4 (1).

14. tan 30° = 30/d (1), so $d=30\sqrt{3}$ m ≈ 51.96 m (1).

15. The tangent is perpendicular to the radius, so by Pythagoras (1) the length is $\sqrt{625-49}=24$ cm (1).

16. Area $=\frac{60}{360}\times\frac{22}{7}\times 21^2$ (1) = 231 cm² (1).

17. Favourable outcomes 5 and 6: 2 of 6 (1). P = 1/3 (1).

18. $3x^2 – x – 4 = (3x – 4)(x + 1)$, so the zeroes are 4/3 and –1 (1). Sum = 4/3 – 1 = 1/3 = –(–1)/3 = –b/a (1). Product = –4/3 = c/a (1).

OR x + y = 25 and x – y = 7 (1). Adding: 2x = 32, so x = 16 (1). Then y = 9; the numbers are 16 and 9 (1).

19. Sector area $=\frac{90}{360}\times\frac{22}{7}\times 10.5^2=86.625$ cm² (1). Triangle area = ½ × 10.5 × 10.5 = 55.125 cm² (1). Segment = 86.625 – 55.125 = 31.5 cm² (1).

OR OA ⊥ PA and OB ⊥ PB, so in quadrilateral OAPB, ∠AOB = 360° – 90° – 90° – 50° (1) = 130° (1). OA = OB, so △OAB is isosceles and ∠OAB = (180° – 130°)/2 = 25° (1).

20. Class marks 15, 25, 35, 45, 55; fx = 60, 150, 420, 225, 165 (1). Σf = 30, Σfx = 1020 (1). Mean = 1020/30 = 34 (1).

OR Modal class 30–40, with l = 30, f_1 = 12, f_0 = 6, f_2 = 5, h = 10 (1). Mode $=30+\frac{12-6}{24-6-5}\times 10$ (1) $=30+\frac{60}{13}\approx 34.6$ (1).

21. Let the breadth be x m; then x(x + 3) = 70 (1). $x^2+3x-70=0$, i.e. (x + 10)(x – 7) = 0 (1). The breadth cannot be negative, so x = 7 (1). Breadth 7 m, length 10 m (1).

OR The numbers are 14, 21, …, 98, an AP with a = 14, d = 7 (1). 98 = 14 + (n – 1)7 gives n = 13 (1). $S=\frac{13}{2}(14+98)$ (1) = 728 (1).

22. Angle of depression 45°: the distance between the building and the tower is d = 15 m (1½). The top of the tower is h_1 above the top of the building: $h_1=d\tan 60^\circ=15\sqrt{3}$ m (1½). Height of the tower $=15+15\sqrt{3}=15(1+\sqrt{3})\approx 40.98$ m (1).

OR RHS $=\left(\frac{1}{\sin A}-\frac{\cos A}{\sin A}\right)^2=\frac{(1-\cos A)^2}{\sin^2 A}$ (1½). $\sin^2 A=1-\cos^2 A=(1-\cos A)(1+\cos A)$ (1). So RHS $=\frac{(1-\cos A)^2}{(1-\cos A)(1+\cos A)}=\frac{1-\cos A}{1+\cos A}$ = LHS (1½).

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23. Curved surface of the cylinder = 2πrh = 2 × 22/7 × 7 × 3 = 132 m² (1½). Curved surface of the cone = πrl = 22/7 × 7 × 10 = 220 m² (1). Canvas = 352 m² (½). Cost = 352 × 50 = ₹17,600 (1).

OR Total 20 balls. (a) 5/20 = 1/4 (1). (b) 8/20 = 2/5 (1). (c) 13/20 (1). (d) 0, as there are no green balls (1).

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