

SAMPLE PAPER – 4 CBSE BOARD CLASS - X MATHS

Time: 3 Hours

Max. Marks: 80

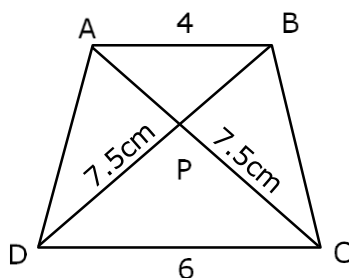
General Instructions:

1. This Question Paper has 5 Sections A, B, C, D, and E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 Questions of 2 marks of Section E.

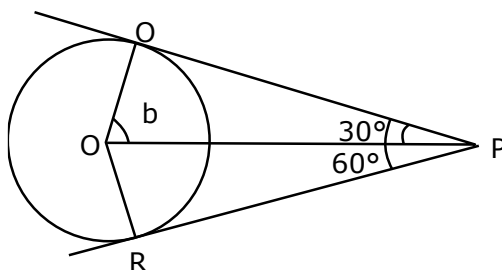
SECTION – A

1. If p and q are co-prime numbers, then p^2 and q^2 are
(A) even (B) coprime (C) not coprime (D) odd
2. If two positive integers 'a' and 'b' are written as $a = pq^2$ and $b = p^2q^2$, where 'p' and 'q' are prime numbers, then $\text{LCM}(a, b) =$
(A) pq (B) p^3q^2 (C) p^2q^3 (D) p^2q^2
3. The quadratic equation whose roots are $7 + \sqrt{3}$ and $7 - \sqrt{3}$ is
(A) $x^2 + 14x - 46 = 0$ (B) $x^2 - 14x + 46 = 0$
(C) $x^2 - 14x - 46 = 0$ (D) $x^2 + 14x + 46 = 0$
4. If $29x + 37y = 103$ and $37x + 29y = 95$ then
(A) $x = 3, y = 2$ (B) $x = 2, y = 1$ (C) $x = 2, y = 3$ (D) $x = 1, y = 2$
5. For what value of k , the equation $kx^2 - 6x - 2$ has real roots?
(A) $k \geq \frac{8}{2}$ (B) none of these (C) $k \leq -2$ (D) $k \leq \frac{-8}{2}$
6. If $P(-1, 1)$ is the midpoint of the line segment joining $A(-3, b)$ and $B(1, b + 4)$ then $b = ?$
(A) 0 (B) 2 (C) 1 (D) -1
7. $\Delta ABC \sim \Delta PQR$, if $PQ = 3\text{cm}$, $QR = 2\text{cm}$ and $RP = 2.5\text{cm}$, $BC = 4\text{cm}$, then perimeter of ΔABC is -
(A) 20 cm (B) 12 cm (C) 15 cm (D) 18 cm

8. In the given figure, if $AB \parallel DC$, then AP is equal to



- (A) 5 cm (B) 7 cm (C) 6 cm (D) 3.5 cm
9. In figure, PQ and PR are tangents drawn from P to a circle with centre O, if $\angle OPQ = 35^\circ$, then



- (A) $a = 40^\circ, b = 50^\circ$ (B) $a = 30^\circ, b = 60^\circ$
 (C) $a = 45^\circ, b = 45^\circ$ (D) $a = 35^\circ, b = 55^\circ$
10. $(\sec A + \tan A)(1 - \sin A)$
 (A) $\cos A$ (B) $\sec A$ (C) $\sin A$ (D) $\operatorname{cosec} A$
11. If the angles of elevation of a tower from two points at distances 'm' and 'n' where $m > n$ from its foot and in the same line from it are 30° and 60° , then the height of the tower is -
 (A) \sqrt{mn} (B) $\sqrt{m-n}$ (C) $\sqrt{\frac{m}{n}}$ (D) $\sqrt{m+n}$
12. If θ is an acute angle such that $\sec^2 \theta = 3$, then the value of $\frac{\tan^2 \theta - \operatorname{cosec}^2 \theta}{\tan^2 \theta + \operatorname{cosec}^2 \theta}$ is -
 (A) $\frac{1}{7}$ (B) $\frac{3}{7}$ (C) $\frac{2}{7}$ (D) $\frac{1}{7}$
13. A piece of wire 20cm long is bent into the form of an arc of a circle subtending an angle of 60° as its centre. The radius of the circle is -
 (A) $\frac{20}{6+x}$ cm (B) $\frac{30}{6+x}$ cm (C) $\frac{60}{\pi}$ cm (D) $\frac{15}{6+x}$ cm
14. A chord of a circle of radius 10cm subtends a right angle at the centre. The area of the minor segments (given, $\pi = 3.14$) is -
 (A) 32.5 cm^2 (B) 34.5 cm^2 (C) 30.5 cm^2 (D) 28.5 cm^2
15. A ticket is drawn from a bag containing 100 tickets from 1 to 100. The probability of getting a ticket with a number divisible by 10 is -
 (A) $\frac{3}{10}$ (B) $\frac{1}{10}$ (C) $\frac{4}{10}$ (D) $\frac{1}{5}$

16. If $\sum f_i u_i = 29$, $\sum f_i = 30$, $a = 47.5$ and $h = 15$, then the value of \bar{x} is -
 (A) 63 (B) 26 (C) 64 (D) 62
17. A sphere of radius 6 cm is dropped into a cylindrical vessel partly filled with water. The radius of the vessel is 8 cm. If the sphere is submerged completely, then the surface of the water rises by
 (A) 4.5 cm (B) 4 cm (C) 2 cm (D) 3 cm
18. The wickets taken by a bowler in 10 cricket matches are 2, 6, 4, 5, 0, 3, 1, 3, 2, 3. The mode of the data is -
 (A) 1 (B) 2 (C) 4 (D) 3

Directions (Q. Nos. 19 – 20) Each of these questions contains two statements.

Assertion (A) and Reason (R). Each of these question also has four alternative choices, any one of which is the correct answer. You have to select one of the codes (A), (B), (C) and (D) given below.

(A) A is true, R is true; R is a correct explanation for A.

(B) A is true, R is true; R is not a correct explanation for A.

(C) A is true; R is False.

(D) A is false; R is true.

19. **Assertion (A):** The point $(0, -3)$ lies on the y-axis.

Reason (R): The x-coordinate of the points on y-axis is zero.

(A) Both A and 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.

20. **Assertion (A):** If a number x is divided by $y(x, y)$ (both x and y are positive) then remainder will be less than x .

Reason (R): Dividend = Divisor \times Quotient \div Remainder

(A) Both A and R are true and R is the correct explanation of A

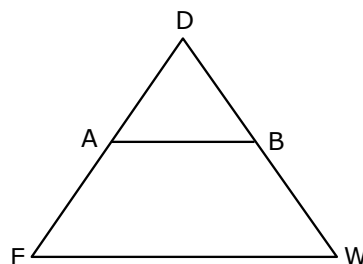
(B) Both A and R are true but R is not the correct explanation of A

(C) A is true but R is false

(D) A is false but R is true.

SECTION – B

21. On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the pair of linear equations are consistent, or inconsistent: $5x - 3y = 11$; $-10x + 6y = -22$.
22. In $\triangle DEW$, $AB \parallel EW$. If, $AD = 4\text{cm}$, $DE = 12\text{cm}$ and $DW = 24\text{cm}$, find the value of DB .



OR

In one diagonal of a trapezium divides the other diagonal in the ratio 1:2, prove that one of the parallel sides is double the other.

23. Prove that in two concentric circles, the chord of the larger circle, which touches the smaller circle is bisected the point of contact.
24. If $3 \cot A = 4$, find the value $\frac{\operatorname{cosec}^2 A + 1}{\operatorname{cosec}^2 A - 1}$.
25. In a circle with centre O and radius 5cm, AB is a chord of length $5\sqrt{3}$ cm. Find the area of sector AOB.

OR

The perimeter of a certain sector of a circle of radius 6.5cm is 31cm. Find the area of the sector.

SECTION – C

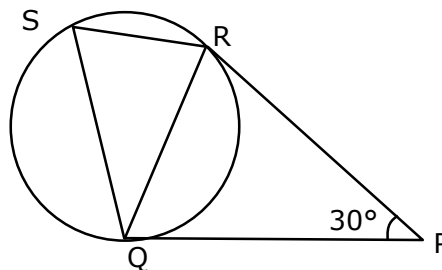
26. There is a circular path around a sports field. Sonia takes 18 minutes to drive one round of the field, while Ravi takes 12 minutes for the same. Suppose they both start at the same point and at the same time and go in the same direction. After how many minutes will they meet again at the starting point?
27. If α and β are the zeroes of the $x^2 + 7x + 7$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$.

28. If we add 1 to the numerator and subtract 1 from the denominator, a fraction reduces to 1. It becomes $\frac{1}{2}$ if we only add 1 to the denominator. What is the fraction? Solve the pair of the linear equation obtained by the elimination method.

OR

Use elimination method to find all possible solutions of the following pair of linear equations $ax + by - a + b = 0$ and $bx - ay - a - b = 0$.

29. In the given figure, tangent PQ and PR are drawn to a circle such that $\angle RPQ = 30^\circ$. A chord RS is drawn parallel to tangent PQ. Find the $\angle RQS$. Hint: [Draw a line through Q and perpendicular to QP.]



30. If $\angle B$ and $\angle Q$ are acute angles such that $\sin B = \sin Q$, then prove that $\angle B = \angle Q$.

OR

Prove: $\frac{1}{(\cot A)(\sec A) - \cot A} - \operatorname{cosec} A = \operatorname{cosec} A - \frac{1}{(\cot A)(\sec A) + \cot A}$

31. A group consists of 12 persons, of which 3 are extremely patient, other 6 are extremely honest and rest are extremely kind. A person from the group is selected at random. Assuming that each person is equally likely to be selected, find the probability of selecting a person who is –
- extremely patient,
 - extremely kind or honest.
- which of the above values you prefer more ?

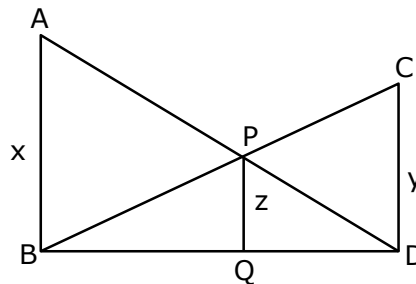
SECTION – D

32. The sum of ages of a father and his son is 45 years. Five year ago, the product of their ages (in years) was 124. Determine their present ages.

OR

The differences of two numbers is 5 and the difference of their reciprocals is $\frac{1}{10}$. Find the numbers.

33. In figure $AB \parallel PQ \parallel CD$, $AB = x$ units, $CD = y$ units and $PQ = z$ units, prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$.



34. A building is in the form of a cylinder surmounted by a hemispherical dome. The base diameter of the dome is equal to $\frac{2}{3}$ of the height of the building. Find the height of the building, if it contains $67\frac{1}{21}$ m³ of air.

OR

A solid consisting of a right cone standing on a hemisphere is placed upright in a right circular cylinder full of water and touches the bottom. Find the volume of water left in the cylinder, if the radius of the cylinder is 60 cm and its height is 180 cm, the radius of the hemisphere is 60 cm and height of the cone is 120 cm, assuming that the hemisphere and the cone have common base.

35. The following table shows the ages of the patients admitted in a hospital during a year:

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
Number of patients	6	11	21	23	14	5

Find the mode and the mean of the data given above. Compare and interpret the two measures of central tendency.

SECTION – E

36. Read the text carefully and answer the questions:

Kamla and her husband were working in a factory in Seelampur, New Delhi. During the pandemic, they were asked to leave the job. As they have very limited resources to survive in a metro city, they decided to go back to their hometown in Himachal Pradesh. After a few months of struggle, they thought to grow roses in their fields and sell them to local vendors as roses have been always in demand. Their business started growing up and they hired many workers to manage their garden and do packaging of the flowers.



In their garden bed, there are 23 rose plants in the first row, 21 are in the 2nd, 19 in 3rd row and so on. There are 5 plants in the last row.

- (i) How many rows are there of rose plants?
- (ii) Also, find the total number of rose plants in the garden.

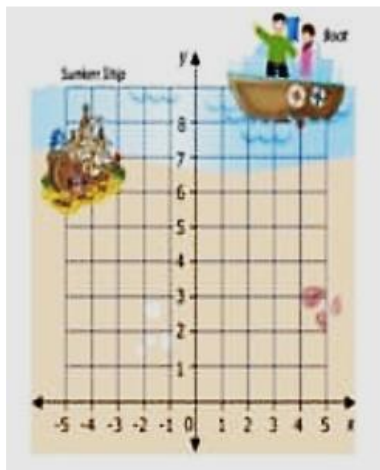
OR

If total number of plants are 80 in the garden, then find number of rows?

- (iii) How many plants are there in 6th row.

37. Read the text carefully and answer the questions:

Mary and John are very excited because they are going to go on a dive to see a sunken ship. The dive is quite shallow which is unusual because most sunken ship dives are found at depths that are too deep for two junior divers. However, this one is at 40 feet, so the two divers can go to see it.



They have the following map to chart their course. John wants to figure out exactly how far the boat will be from the sunken ship. Use the information in this lesson to help John figure out the following.

- (i) What are the coordinates of the boat and the sunken ship respectively?
- (ii) How much distance will Mary and John swim through the water from the boat to the sunken ship?

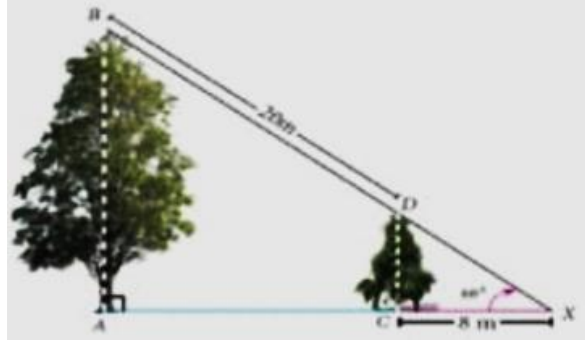
OR

If the distance between the points $(x, -1)$ and $(3, 2)$ is 5, then what is the value of x ?

- (iii) If each square represents 160 cubic feet of water, how many cubic feet of water will Mary and John swim through from the boat to the sunken ship?

38. Read the text carefully and answer the questions:

Two trees are standing on flat ground. The angle of elevation of the top of Both the trees from a point X on the ground is 60° . If the horizontal distance between X and the smaller tree is 8 m and the distance of the top of the two trees is 20 m.



- (i) Calculate the distance between the point X and the top of the smaller tree.
(ii) Calculate the horizontal distance between the two trees.

OR

Find the height of big tree.

- (iii) Find the height of small tree.