SAMPLE PAPER – 3
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

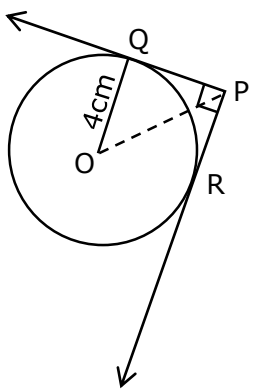
1. Find the LCM of smallest two digit composite number and smallest composite number.
(A) 22 (B) 23 (C) 20 (D) 21

2. Values of k for which the quadratic equation $2x^2 - kx + k = 0$ has real and equal roots, is :
(A) 0 only (B) 4 (C) 8 only (D) 0, 8

3. The quadratic equation $2x^2 - \sqrt{5}x + 1 = 0$ has
(A) two distinct real roots (B) two equal real roots
(C) no real roots (D) more than 2 real roots

4. X-axis divides the line segment joining the points (2, –3) and (5, 6) in the ratio.
(A) 1:2 (B) 2:1 (C) 2:5 (D) 5:2

5. In the given figure, from an external point P, two tangents PQ and PR are drawn to a circle of radius 4cm with centre O. If $\angle QPR = 90°$, then length of PQ is -



(A) 3cm (B) 4cm (C) 2cm (D) $2\sqrt{2}$ cm

6. Which of these is the polynomial whose zeroes are $\frac{1}{3}$ and $\left(-\frac{3}{4}\right)$?

(A) $12x^2 + 5x - 3$ (B) $12x^2 - 5x - 3$ (C) $12x^2 + 13x + 3$ (D) $12x^2 - 13x - 3$

7. If $\cos A = \frac{1}{2}$, then the value of $12 \cot^2 A - 2$ is:

(A) 5 (B) 4 (C) 3 (D) 2

8. If α, β are the zeroes of the quadratic polynomial $p(x) = x^2 - (k + 6)x + 2(2k - 1)$, then the value of k, if $\alpha + \beta = \frac{1}{2}\alpha\beta$,is -

(A) –7 (B) 7 (C) –3 (D) 3

9. $(x^2 + 1)^2 - x^2 = 0$ has

(A) four real roots (B) two real roots

(C) no real roots (D) one real roots

10. In the following figure, ST||QR, point S divides PQ in the ratio 4:5. If ST = 1.6cm, what is the length of QR?

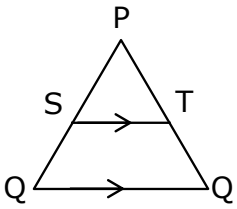
(A) 0.71cm

(B) 2cm

(C) 3.6cm

(D) 4cm

(Note: The figure is not to scale)



11. Two dice are rolled simultaneously. What is the probability that 6 will come up at least once ?

(A) $\frac{1}{6}$ (B) $\frac{7}{36}$ (C) $\frac{11}{36}$ (D) $\frac{13}{36}$

12. The total surface area of the combined figure i.e., hemisphere dome with radius 14m and cuboidal shaped top with dimensions 8m × 6m × 4m is :

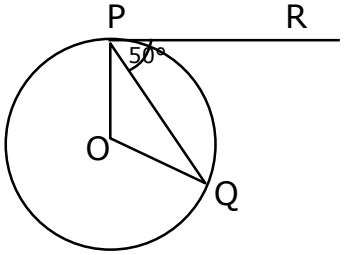
(A) 1200 sq. m (B) 1232 sq. m

(C) 1392 sq. m (D) 1932 sq. m

13. In a ΔABC, $\angle A = x°$, $\angle B = (3x - 2)°$, $\angle C = y°$. Also $\angle C - \angle B = 9°$. The sum of the greatest and the smallest angles of this triangle is -

(A) 107° (B) 135° (C) 155° (D) 145°

14. In the given figure, 'O' is the centre of circle, PQ is a chord and the tangent PR at P makes an angle of 50° with PQ, then $\angle POQ$ is equal to:



(A) 100° (B) 80° (C) 90° (D) 75°

15. The probability that the drawn card from a pack of 52 cards is neither an ace nor a spade is -

(A) $\frac{9}{13}$ (B) $\frac{35}{52}$ (C) $\frac{10}{13}$ (D) $\frac{19}{26}$

16. The value of $\frac{1}{\tan\theta+\cot\theta}$ =

(A) cos θ sin θ (B) sec θ sin θ (C) tan θ cot θ (D) sec θ cosec θ

17. The zeroes of the polynomial $x^2 - 3x - m(m + 3)$ are

(A) m, m + 3 (B) –m, m + 3 (C) m, –(m + 3) (D) –m,– (m + 3)

18. Two identical fair dice have numbers 1 to 6 written on their faces. Both are tossed simultaneously. What is the probability that the product of the numbers that turn up is 12 ?

(A) $\frac{1}{36}$ (B) $\frac{1}{9}$ (C) $\frac{1}{6}$ (D) $\frac{1}{3}$

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 probability that a number selected at random from the number 1, 2, 3, ……, 15 is a multiple of 4, is $\frac{1}{3}$.

Reason (R): Two different coins are tossed simultaneously. The probability of getting at least one head is $\frac{3}{4}$.

20. **Assertion (A):** If the length of the ladder placed against a wall is twice the distance between the foot of the ladder and the wall, then the angle made by the ladder with the horizontal is 60°.

Reason (R): If a tower is 20m high and its shadow on the ground is $20\sqrt{3}$ m long, then the sun's altitude is 60°.

SECTION – B

21. If xy = 180 and HCF (x, y) = 3, then find the LCM (x, y)

22. p and q are zeroes of the polynomial $2x^2 + 5x - 4$. Without findings the actual values of p and q, evaluate (1 – p)(1 –q). Show your steps.

23. If x = –2 is the common solution of quadratic equation $ax^2 + x - 3a = 0$ and $x^2 + bx + b = 0$, then find the value of a^2b.

OR

Find the value of 'k' for which the quadratic equation $2kx^2 - 40x + 25 = 0$ has real and equal roots.

24. A number is chosen at random from the numbers –5, –4, –3, –2, –1, 0, 1, 2, 3, 4, 5. Then find the probability that square of this number is less than or equal to 1.

25. The areas of two similar triangles are 64 cm^2 and 121 cm^2. If the length of a side of the larger triangle is 55 cm, find the length of the corresponding side of the smaller triangle. Show your work.

SECTION – C

26. Find the co-ordinate of the point P which divides the line segment joining the points A(–2, 5) and B(3, –5) in the ratio 2:3.

27. The HCF of two numbers is 145 and their LCM is 2175. If one number is 725. Find the other number.

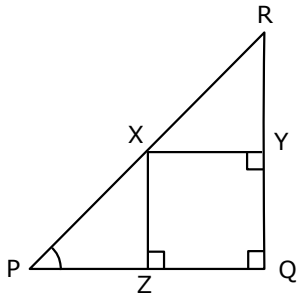
OR

Given that $\sqrt{3}$ is irrational, prove that $5+2\sqrt{3}$ is irrational.

This contradiction has arisen due to our wrong assumption that $5 + 2\sqrt{3}$ is rational. So, $5 + 2\sqrt{3}$ is irrational.

28. ΔPQR is right angled at Q. QX$\perp$PR, XY$\perp$RQ and XZ $\perp$PQ are drawn. Prove that

$XZ^2 = PZ \times ZQ$



29. Prove that : $\frac{\tan^2 A}{\tan^2 A - 1} + \frac{\text{cosec}^2 A}{\sec^2 A - \text{cosec}^2 A} = \frac{1}{1 - 2\cos^2 A}$

OR

Prove that: $\frac{\sin\theta}{\cot\theta + \text{cosec}\,\theta} - \frac{\sin\theta}{\cot\theta - \text{cosec}\,\theta} = 2$

30. Prove the following that:

$\frac{\tan^3\theta}{1+\tan^2\theta} + \frac{\cot^3\theta}{1+\cot^2\theta} = \sec\theta\,\text{cosec}\,\theta - 2\sin\theta\cos\theta$

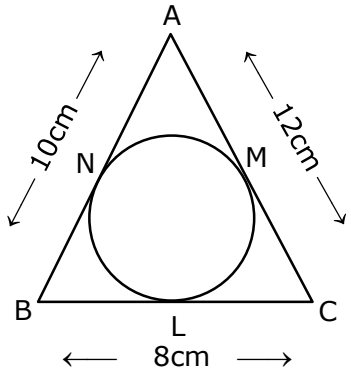
OR

$\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$

31. Had Aarush scored 8 more marks in a Mathematics test, out of 35 marks, 7 times these marks would have been 4 less than square of his actual marks. How many marks did he get in the test?

SECTION – D

32. In the given figure a circle is inscribed in a ΔABC having sides BC = 8cm, AB = 10 cm and AC = 12cm. Find the length BL, CM and AN.



OR

Prove that the parallelogram circumscribing a circle is a rhombus.

33. From a solid right circular cylinder of height 14cm and base radius 6cm, a right circular cone of same height and same base removed. Find the volume of the remaining solid.

34. Which term of the A.P. 3, 15, 27, 39, … will be 120 more than its 21^{st} term ?

OR

In an A.P., the sum of first n terms is $\frac{n}{2}(3n + 5)$. Find the 25^{th} term of the A.P.

35. Heights of 50 students of class X of a school are recorded and following data is obtained:

Heights (in cm)	130-135	135-140	140-145	145-150	150-155	155-160
Number of students	4	11	12	7	10	6

Find the median height of the students.

SECTION – E

36. **Read the following text and answer the following questions on the basis of the same:**

Manpreet Kaur is the national record holder for women in the shot-put discipline. Her throw of 18.86m at the Asian Grand Prix in 2017 is the biggest distance for an Indian female athlete. Keeping her as a role model, Sanjitha is determined to earn gold in Olympics one day. Initially her throw reached 7.56m only. Being an athlete in school, she regularly practiced both in the mornings and in the evenings and was able to improve the distance by 9cm every week.
During the special camp for 15 days, she started with 40 throws and every day kept increasing the number of thrown by 12 to achieve this remarkable progress.

I. How many throws Sanjitha practiced on 11^{th} day of the camp ?

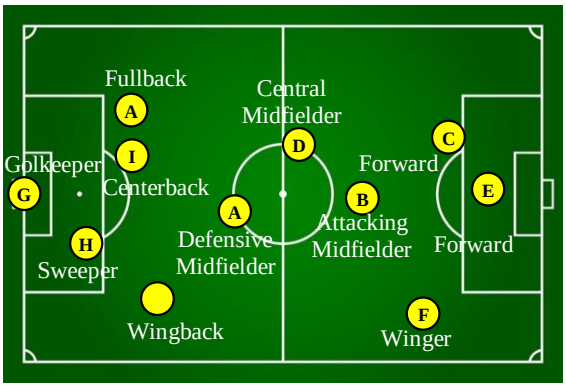
II. What would be Sanjitha's throw distance at the end of 6 months.

OR

When will she be able to achieve a throw of 11.16 m ?

III. How many throws did she do during the entire camp of 15 days ?

37. Tharunya was thrilled to know that the football tournament is fixed with a monthly timeframe from 20th July to 20th August 2023 and for the first time in the FIFA Women's World Cup's history, two nations host in 10 venues. Her father felt that the game can be better understood if the position of players is represented as points on coordinate plane.



(i) At an instance, the midfielders and forward formed a parallelogram. Find the position of the central midfielder (D) if the position of other players who formed the parallelogram are: A(1, 2), B(4, 3) and C(6, 6).

(ii) Check if the Goal Keeper G(–3, 5), Sweeper H(3, 1) and Wing-back K(0, 3) fall on a same straight line.

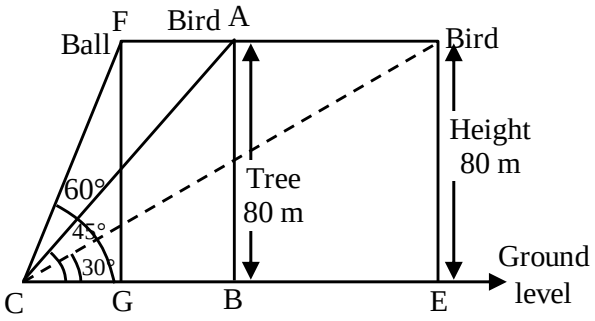
OR

Check if the Full back J(5, –3) and centre-back I(–4 ,6) are equidistant from forward C(0, 1) and if C is the mid-point of IJ.

(iii) If Defensive midfielder A(1, 4), Attacking midfielder B(2, –3) and Striker E(a, b) lie on the same straight line and B is equidistant from A and E, find the position of E.

38. One evening, Kaushik was in a park. Children were playing cricket. Birds were singing on a nearby tree of height 80 m. He observed a bird on the tree at an angle of elevation of 45°.

When a sixer was hit, a ball flew through the tree frightening the bird to fly away. In 2 seconds, he observed the bird flying at the same height at an angle of elevation of 30° and the ball flying towards him at the same height at an angle of elevation of 60°.



(i) At what distance from the foot of the tree was he observing the bird sitting on the tree ?

(ii) How far did the bird fly in the mentioned time ?

OR

After hitting the tree, how far did the ball travel in the sky when Kaushik saw the ball ?

(iii) What is the speed of the bird in m/min if it had flown $20(\sqrt{3}+1)$m ?