PRE-BOARD EXAMINATION - FEBRUARY 2018

MATHEMATICS

SET-B

Class: X | Max. Marks: 80

Date: | Duration: 3 Hrs

General Instructions:

1. All questions are compulsory.
2. The question paper consists of **30** questions divided into **4** sections, section **A, B, C** and **D**.
3. **Section A** contains **6** questions of **1** mark each, **Section B** contains **6** questions of **2** marks each, **Section C** contains **10** questions of **3** marks each and **Section D** contains **8** questions of **4** marks each.
4. There is no overall choice. However, an internal choice has been provided in four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
5. Use of calculators is not permitted.

SECTION - A

Question numbers 1 to 6 carry 1 mark each.

1. The HCF and LCM of two numbers are 9 and 360 respectively. If one number is 45, write the other number.
2. For what value of k, are the numbers x, $2x+k$ and $3x+6$ three consecutive terms of an A.P.?
3. Find the value of m if $P(4, -2)$ is the midpoint of the line segment joining the points $A(5m, 3)$ and $B(-m, -7)$.
4. Find a quadratic polynomial whose sum and product of the zeroes are $\frac{1}{3}$ and -1 respectively.
5. From a point on the ground, which is 15 m away from the foot of a tower, the angle of elevation of the top of the tower, is found to be 60°. Find the height of the tower.
6. The length of a tangent from a point A at a distance 5 cm from the centre of the circle is 4 cm. Find the radius of the circle.

SECTION – B

Question numbers 7 to 12 carry 2 marks each.

7. Two dice are rolled simultaneously. Write down all the possible outcomes. Find the probability that the sum of numbers appearing on the two dice is 10.
8. Prove that $\sqrt{5}$ is irrational.

9. For which values of k does the pair of linear equations given below has unique solution?

   $4x+ky+8=0$ *and* $2x+2y+2=0$

10. The fourth term of an A.P. is 11. The sum of the fifth and seventh terms of an A.P. is 34. Find its common difference.

11. From a pack of 52 playing cards, one card is drawn at random. Find the probability that the card drawn is

    (i) neither a red card nor a queen

    (ii) a face card.

12. If *(-2, -1), (a, 0), (4, b)* and *(1, 2)* are the vertices of a parallelogram, find the values of a and b.

SECTION – C

Question numbers 13 to 22 carry 3 marks each.

13. Use Euclid's division lemma to show that the square of any positive integer is either of the form $3m$ or $3m+1$ for some integer m.

14. Obtain all the zeroes of $x^4 - x^3 - 22x^2 + 2x + 40$, if two of its zeroes are $\sqrt{2}$ *and* $-\sqrt{2}$.

15. The caretaker of a swimming pool changes the water every day. The swimming pool is filled with water by three pipes with uniform flow. The first two pipes operating simultaneously, fill the pool in the same time during which the pool is filled by the third pipe alone. The second pipe fills the pool five hours faster than the first pipe and four hours slower than the third pipe. Find the time required by each pipe to fill the pool separately. What value of the caretaker is being depicted here?

OR

While boarding an aeroplane, a passenger got hurt. The pilot made arrangements to hospitalize the injured and so the plane left 30 minutes later than its scheduled time. To reach the destination 1500 km away in time, it had to increase the speed by 250 km/h from the usual speed. Find its usual speed. What values of the pilot is being depicted here?

16. Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.

17. If the point *(x, y)* be equidistant from the points *(a+b, b-a)* and *(a-b, a+b)*. Prove that $bx = ay$.

OR

Find the area of the quadrilateral whose vertices when taken in order are $(-3, 2), (5, 4), (7, -6)$ *and* $(-5, -4)$.

18. XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$.

19. If $\sec\theta + \tan\theta = p$, show that $\frac{p^2-1}{p^2+1} = \sin\theta$

OR

Evaluate: $\left(\frac{3\cos 43^\circ}{\sin 47^\circ}\right)^2 - \frac{\cos 37^\circ \operatorname{cosec} 53^\circ}{\tan 5^\circ \tan 25^\circ \tan 45^\circ \tan 65^\circ \tan 85^\circ} + \frac{\sin^2 35^\circ}{\cos^2 55^\circ}$

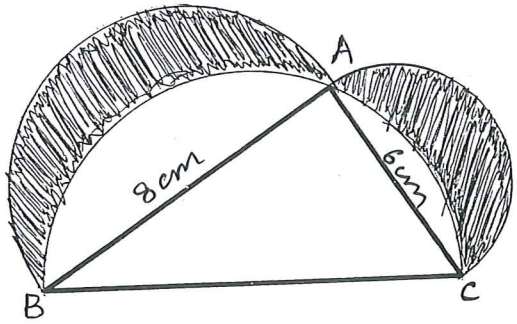
20. The following are the ages of 300 patients getting medical treatment in a hospital on a particular day:

Age (in years)	10-20	20-30	30-40	40-50	50-60	60-70
No. of patients	60	42	55	70	53	20

Find its mode.

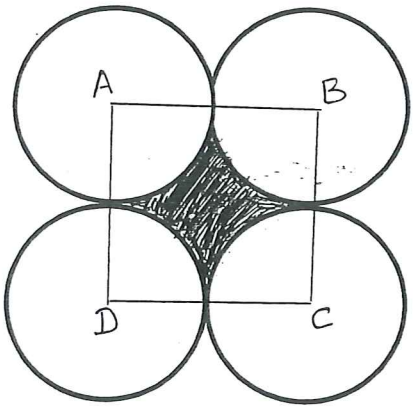
21. A bucket made of metal sheet is in the form of a frustum of a cone of height 16 cm with diameter of its lower and upper ends as 16 cm and 40 cm respectively. Find the cost of the bucket if the metal sheet used is Rs. 20 per 100 cm^2.
(Use $\pi = 3.14$)

22. In the figure, ABC is a right-angled triangle at A. Semicircles are drawn on AB, AC and BC as diameters. Find the area of the shaded region.



OR

In the figure, ABDC is a square of side 14 cm. With centres A, B, C and D, four circles are drawn such that each circle touch externally two of the remaining three circles. Find the area of the shaded region.



SECTION – D

Question numbers 23 to 30 carry 4 marks each.

23. State and prove Pythagoras theorem.

OR

State and prove the converse of Pythagoras theorem.

24. Solve the linear equations graphically $2x + y = 6$ *and* $2x - y = -2$. Shade the region bounded by these lines and *x-axis*. Also find the area of the shaded region.

25. A balloon moving with the wind at a height of 1500 m horizontally above the ground is observed at a certain point on earth to subtend an angle of 60°. After sometime, the angle of elevation reduces to 30°. Find the distance travelled by the balloon during the interval.

26. The radii of the internal and external surfaces of a metallic spherical shell are 3 cm and 5 cm respectively. It is melted and recast into a solid right circular cylinder of height $10\frac{2}{3}$ cm. Find the diameter of the base of the cylinder.

OR

A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full of ice cream. This ice cream is to be filled into cones of height 12 cm and diameter 6 cm having a hemispherical shape on the top. Find the number of such cones which can be filled with ice cream.

27. Draw a triangle with sides 6 cm, 7 cm and 8 cm. Then draw a triangle whose sides are $\frac{2}{3}$ times the corresponding sides of the first triangle.

28. Prove that: $\frac{sinA-cosA+1}{sinA+cosA-1} = \sec A + \tan A$

29. The sum of the first five terms of an AP and the sum of the first seven terms of the same AP is 167. If the sum of the first ten terms of this AP is 235, find the sum of its first twenty terms.

30. The following table gives production of wheat of 100 farms of a village.

Production (in kg/ha)	50 – 55	55 – 60	60 – 65	65 – 70	70 – 75	75 – 80
Number of farms	2	8	12	24	38	16

Change the distribution to 'more than type' distribution and draw its ogive. Also find the median from the graph.

OR

The median of the following data is 525. Find the missing frequencies, if the total frequency is 100.

CI	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
f	2	5	x	12	17	20	y	9	7	4

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