CLASS : X

SUBJECT : MATHEMATICS (SET-A)

Time : 3 Hrs.   M.M.: 90

General Instructions :

1. All questions are compulsory.

2. The question paper consists of 31 questions divided into four sections A, B, C and D.

    Section-A comprises of 4 questions of 1 mark each.

    Section-B comprises of 6 questions of 2 marks each.

    Section-C comprises of 10 questions of 3 marks each.

    Section-D comprises of 11 questions of 4 marks each.

3. Use of calculator is not permitted.

SECTION-A

Q1. Find the length of the shadow on the ground of a pole of height 6m when the angle of elevation of the Sun is such that $\tan\theta = \dfrac{3}{4}$.

Q2. The probability of happening of an event is $\dfrac{5}{9}$. Find the probability of non-happening of this event.

Q3. PQ is a tangent drawn from a point P to a circle with centre O and QOR is a diameter of the circle such that $\angle POR = 120°$. Find $\angle OPQ$.
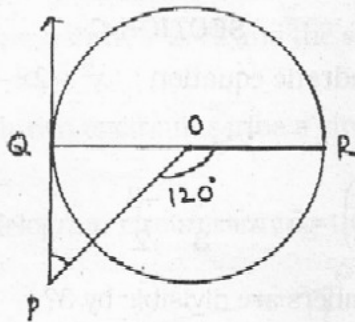

Q4. If the side of a cube is doubled, its volume will become how many times its original volume?

SECTION-B

Q5. Comment on the nature of roots of the quadratic equation $4x^2 - 5 = 2(x+1)^2 - 7$.

Q6. Find the relation between 'a' and 'b' if the points A(-2, 1), B(a, b) and C(4, -1) are collinear.

(E-1)

Q7. If the points A(6, 1), B(8, 2), C(9, 4) and D(p, 3) are the vertices of a parallelogram, taken in order, find the value of p.

Q8. In the figure, PSR, RTQ and PAQ are three semicircles of diameters 10cm, 3cm and 7cm respectively. Find the perimeter of the shaded region. [Use $\pi = 3.14$]
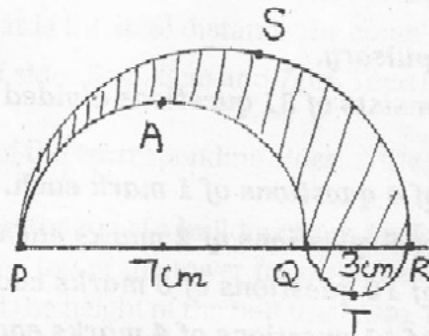
Q9. In the figure, $\triangle ABC$ is circumscribing a circle. Find the length of AB.
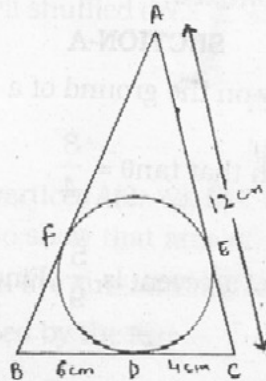
Q10. Two cones with same base radius 5cm and height 12cm are joined together along their bases. Find the surface area of the shape so formed. [$\pi = 3.14$]

SECTION-C

Q11. Find the roots of the quadratic equation : $x^2 + 2x - 195 = 0$

Q12. Solve for x :

$$3\left(\frac{3x - 1}{2x + 3}\right) - 2\left(\frac{2x + 3}{3x - 1}\right) = 5 \; ; x \neq \frac{1}{3}, \frac{-3}{2}$$

Q13. How many two-digit numbers are divisible by 3?

Q14. Prove that the lengths of tangents drawn from an external point to a circle are equal.

Q15. Draw a circle of radius 4.5cm. From a point 10.5cm away from its centre, construct the pair of tangents to the circle.

Q16. Two ships are there in the sea on either side of a lighthouse in such a way that the ships and the lighthouse are in the same straight line. The angles of depression of two ships as observed from the top of the lighthouse are 60° and 45°. If the height of the lighthouse is 200m, find the distance between the two ships. [Use $\sqrt{3} = 1.73$]

(E-2)

Q17. A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the numbers 1, 2, 3, ..., 12. What is the probability that it will point to

(a)   6

(b)   a prime number

(c)   a multiple of 4?
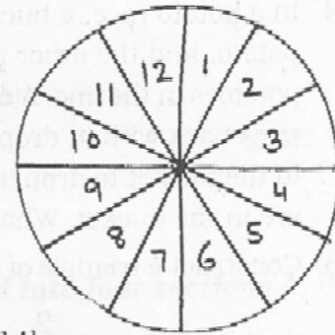
Q18. Find the area of the shaded region in the figure. [$\pi = 3.14$]
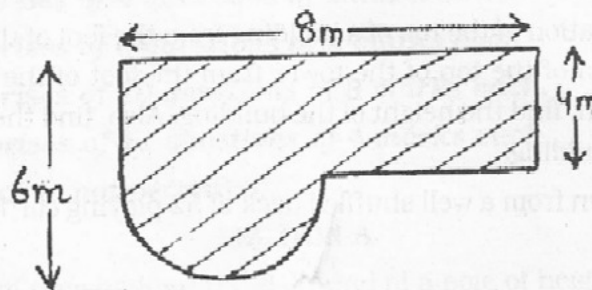
Q19. Show that A(1, –2), B(3, 6), C(5, 10) and D(3, 2) are the vertices of a parallelogram.

Q20. 150 spherical marbles, each of diameter 1.4cm, are dropped in a cylindrical vessel of diameter 7cm containing some water. If the marbles are completely immersed in water, find the rise in the level of water in the cylindrical vessel.

SECTION-D

Q21. The length of a rectangle is 5m more than its breadth. If the breadth were doubled and the length reduced by 9m, the area of the rectangle would have increased by 140m². Find the length and breadth of the rectangle.

Q22. The sum of 5th and 9th terms of an AP is 72 and the sum of 7th and 12th terms is 97. Find the AP.

Q23. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that

(a)   AB + CD = AD + BC.

(b)   If ABCD is a parallelogram circumscribing the circle, prove that ABCD is a rhombus.

(E-3)
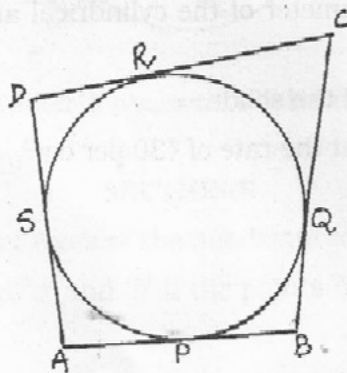
Q24. In a potato race, a bucket is placed at the starting point, which is 5m from the first potato, and the other potatoes are placed 3m apart in a straight line. There are 10 potatoes in the line. A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in, and she continues in the same way until all the potatoes are in the bucket. What is the total distance the competitor has to run?

Q25. Construct a triangle of sides 5cm, 6cm and 7cm. Then construct a triangle similar to it whose sides are $\dfrac{2}{3}$ of the corresponding sides of the first triangle.

Q26. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 50m high, find the height of the building. Also, find the distance between the tower and the building.

Q27. One card is drawn from a well shuffled deck of 52 playing cards. Find the probability that the card is:

    (a)   black king   (b)   red face card

    (c)   spade   (d)   jack of diamonds

Q28. There is a triangle ABC with vertices A(2, –2), B(4, 0) and C(–6, 2). Find the coordinates of point D of median AD. Also show that area of ΔABD is equal to area of ΔACD.

Q29. In a circle of radius 14cm, an arc subtends an angle of 60° at the centre. Find:

    (a)   area of the sector formed by the arc

    (b)   area of the segment formed by the corresponding chord $\left(\sqrt{3} = 1.73\right)$

Q30. (a)   A container of height 24cm is in the form of the frustum of a cone. The radii of lower and upper circular ends are 7cm and 14cm respectively. Find the volume of juice which can completely fill the container.

    (b)   Nitin takes a glass of fruit juice in his daily diet. Which value is being shown by him?

Q31. A solid is in the form of a cylinder with hemispherical ends. The total height of the solid is 17cm and the diameter of the cylindrical and hemispherical parts is 7cm. Find the

    (a)   total surface area of the solid

    (b)   cost of polishing it at the rate of ₹30 per cm^2.