SAMAGRA SHIKSHA, KERALA

E 1003

A

SECOND TERMINAL EVALUATION - 2019-20

MATHEMATICS - X

Time : 2½ Hours

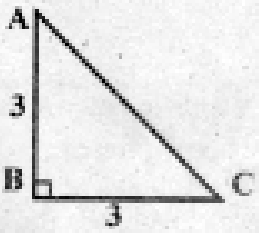
Score : 80

Instructions

- Read the instructions before answering the questions
- Give explanations wherever necessary
- Simplifications using approximate values of $\pi, \sqrt{2}, \sqrt{3}$ need to be done only if specifically asked.
- First 15 minutes time is cool – off time

Answer any 3 Questions from 1 to 4. Each question carries 2 scores. **(3 x2 = 6)**

1. ABC is a right triangle. AB = BC = 3cm
   a) What is the measure of $\angle A$?
   b) What is the length of AC?



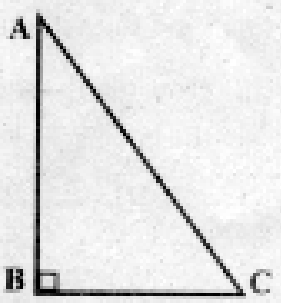
2. Even natural numbers below 9 are written in separate paper slips and put in a box
   a) How many paper slips are there in the box?
   b) When a slip is taken from the box, what is the probability of getting a prime number?
3. Four statements are given below. Two of them are true, which are they?
   a) (0, 5) is a point on the x axis
   b) (0, 5) is a point on the y axis
   c) Distance from (0, 5) to the x axis is 5
   d) Distance from (0, 5) to the y axis is 5
4. Sum of the first n odd numbers is 625. What number is n ?

Answer any 5 questions from 5 to 11. Each question carries 3 scores. **(5 x 3 = 15)**

5. In the triangle ABC, $\angle B = 90^0$

   AC = 5 cm, $\sin C = \frac{4}{5}$

   a) What is the length of AB ?
   b) Find cos C.

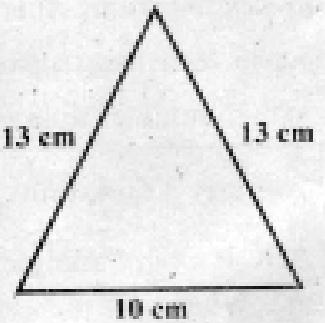


6. a) Without drawing coordinate axes, mark the pair of points (3, 5), (7, 8) left - right, top -bottom positions correctly.

   b) Two opposite vertices of a rectangle are (3, 5) and (7, 8). Sides of the rectangle are parallel to the coordinate axes. Write the coordinates of the other two vertices.

7. Draw a circle of radius 3 centimetres. Mark a point at a distance 7 centimetres from the centre. Draw tangents from that point to the circle.

8. The lateral face of a square pyramid is given in the figure.



   a) What is the length of the base edge ?

   b) Find the slant height of the pyramid

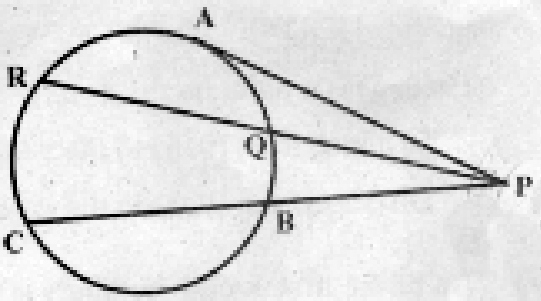
9. Total surface area of a sphere is 40 square centimetres. The sphere is divided into two hemispheres.

   a) What is the area of the plane surface of a hemisphere ?

   b) What is the total surface area of a hemisphere ?

   c) What is the ratio between the surface areas of a hemisphere and a sphere having the same radius ?

10. In the figure PA is a tangent. Chords CB and RQ are extended to meet at P. BC = 5 cm, PB = 4 cm.



   a) What is the length of PC ?

   b) What is PQ × PR ?

   c) Find the length of PA.

11. Height of a solid metal cone is 12 centimetres. Its radius is 9 centimetres.

   a) Find the volume of the cone.

   b) How many spheres of radius 1 centimetre can be made by melting and recasting the cone ?

Answer any 7 Questions from 12 to 21. Each question carries 4 scores. (7 x 4=28)

12. A boy standing on the bank of a river sees the top of a tree on the other bank at an angle of elevation 54°. Stepping 20 metres back, he sees it at an angle of elevation 27°. Find the height of the tree.

    (sin 27 = 0.45, cos 27 = 0.89, tan 27 = 0.51,

    sin 54 = 0.80, cos 54 = 0.59, tan 54 = 1.38)

13. First term of an arithmetic sequence is 28 and the common difference is – 4

    a) Write the arithmetic sequence.

    b) Find its 8^{th} term.

    c) What is the sum of its first 15 terms?

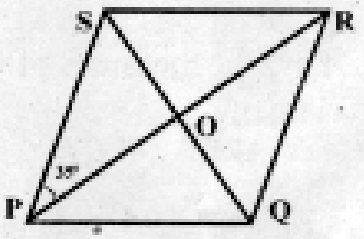
    d) What is the sum of the first 15 terms of the arithmetic sequence – 28, – 24, – 20, ...

14. PQRS is a rhombus. $\angle SPO = 35^0$, OS = 6 cm

    a) Measure of $\angle POS$ is .....

    b) Find the area of the rhombus

    (sin 35 = 0.57, cos 35 = 0.82, tan 35 = 0.70)



15. a) Length of a rectangle is $25 + x$ metres and its breadth is $25 - x$ metres. What is the perimeter of the rectangle?

    b) Find the length and breadth of a rectangle having perimeter 100 metres and area 525 square metres.

16. One side of an equilateral triangle is 5 centimetres. Draw the triangle and draw its incircle.

17. Radius of a cone is 30 centimetres and its height is 40 centimetres.

    a) What is the base perimeter of the cone ?

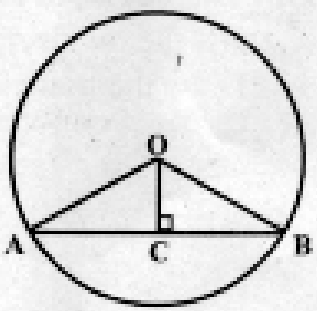
    b) What is the curved surface area of the cone ?

18. In the figure O is the centre of the circle. $\angle AOB = 120^0$, $\angle OCB = 90^0$, AB = 6 cm.

    a) What is the length of AC ?

    b) Find the radius of the circle.

    c) One angle of a triangle is 60^0 and the length of the side opposite to 60^0 is $6\sqrt{3}$ centimetres. What is the radius of the circumcircle ?



19. A quadrilateral is drawn by joining the points (3, 0), (8, 0), (11, 4) and (6, 4)

a) Find the length of each side of the quadrilateral.

b) What is the appropriate name of the quadrilateral?

20. a) $l^2 - \left(\frac{a}{2}\right)^2$, l^2, $l^2 + \left(\frac{a}{2}\right)^2$ are three consecutive terms of an arithmetic sequence.

What is the common difference ?

b) Slant height of a square pyramid is l and the base edge is a.

What is the length of lateral edge? What is its height?

c) The height of a square pyramid is $\sqrt{15}$ centimetres and the lateral edge is $\sqrt{19}$ centimetres. What is its slant height?

21. AB is the diameter of the circle. AB is extended to C and P is a point on the circle. $\angle A = 40^0$.

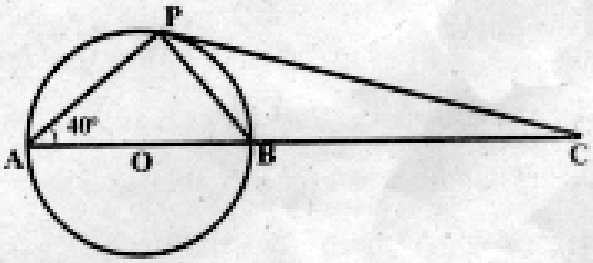
Find the measures of

a) $\angle BPC$

b) $\angle APC$

c) $\angle C$

d) If $\angle A = x$, prove that $\angle C = 90 - 2x$



Answer any 5 Questions from 22 to 28. Each question carries 5 scores. (5 x 5=25)

22. A circular sheet of radius 36 centimetres is divided into two sectors. Central angle of one sector is 120^0. The sectors are rolled up into cones.

a) What is the slant height of the cones?

b) What is the ratio of the central angles of the sectors?

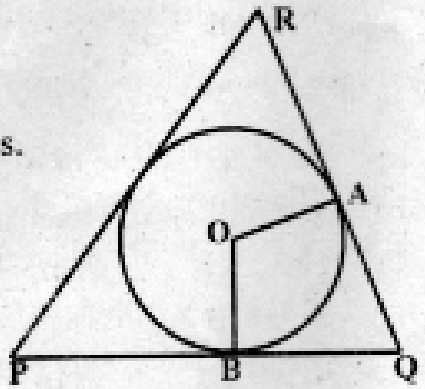
c) Find the radius of each cone.

d) What is the ratio of their radii?

23. a) O is the centre of the incircle of triangle PQR. $\angle AOB = 110^0$.

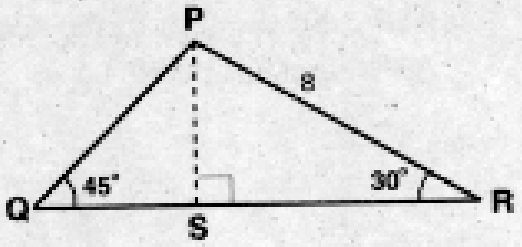
What is the measure of $\angle Q$?

b) Two angles of a triangle are 50^0 and 60^0 and the radius of the incircle is 2 centimetres. Draw the triangle.



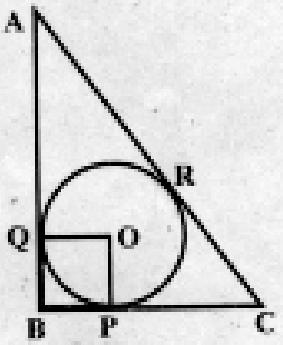
24. a) What is the sum of first 10 natural numbers ?
    b) Sum of the first n natural numbers is 231. What number is n ?

25. In the figure $\angle Q = 45^\circ$, $\angle R = 30^\circ$, $\angle PSR = 90^\circ$, PR = 8 cm.
    a) What is the length of PS ?
    b) Find the lengths of QR and QP
    c) Draw a triangle with ratio of the sides $\sqrt{2} : 2 : (1+\sqrt{3})$

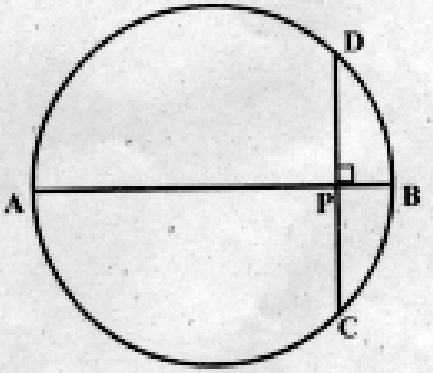


26. a) Draw the coordinate axes and mark the points A (6, 2), B (2, 6)
    b) Draw the square whose diagonal is AB.
    c) Write the coordinates of the other two vertices.

27. In triangle ABC, $\angle B = 90^\circ$, AB = 8 cm, BC = 6 cm. O is the centre of the incircle.
    a) What is the length of AC?
    b) Find the area of the triangle.
    c) Find the radius of the incircle.

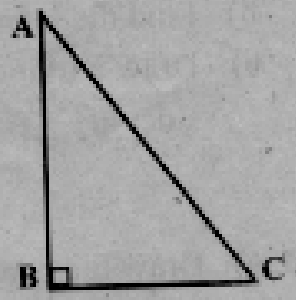


28. In the figure AB is the diameter of the circle. $\angle DPB = 90^\circ$, AP = 3 cm, PB = 1 cm
    a) What is the radius of the circle?
    b) Find the length of PD
    c) Draw an equilateral triangle of side $2\sqrt{3}$ cm.



Read the given concept carefully and write answers to the following questions. Each question carries one score **(6 x 1 = 6)**

29. In the figure $\angle B = 90^0$. Then, what is $\angle A + \angle C$? Sum of the angles of a triangle is 180^0. So the sum of the acute angles of a right triangle is 90^0. That is, if $\angle A = x$, then $\angle C = 90 - x$



$$\tan A = \frac{BC}{AB}$$

$$\tan C = \frac{AB}{BC}$$

$$\tan A \times \tan C = \frac{BC}{AB} \times \frac{AB}{BC} = 1$$

As the angle measure increases from zero to 90^0, tan value is also increasing from zero.

a) $\tan 0 =$ .....

b) If $\tan A \times \tan C = 1$, then $A + C =$ .....

c) $\tan 1 \times \tan 89 =$ .....

d) $\tan 45 =$ .....

e) If $\tan x = \tan(90 - x)$, then $x =$ .....

f) $\tan 1 \times \tan 2 \times \tan 3 \times$ ..... $\times \tan 89 =$ .....