A

SAMAGRA SHIKSHA, KERALA
HALF YEARLY EVALUATION 2023-24
MATHEMATICS

Class : 9

Time : $2\frac{1}{2}$ hours

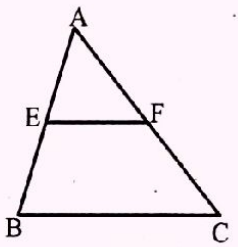
Score : 80

Instructions

- There is a 'cool off' time of 15 minutes in addition to the writing time. Use this time to get familiar with questions and plan your answers.
- Read the instructions carefully before answering the questions.
- Keep in mind, the score and time while answering the questions. Give explanations wherever necessary.
- No need to simplify irrationals like $\sqrt{2}, \sqrt{3}, \pi$ etc., using approximations unless you are asked to do so.

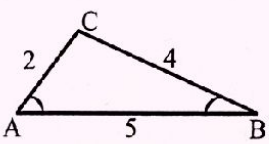
Answer any 3 Questions from 1 to 4. Each question carries 2 scores. **(3 × 2 = 6)**

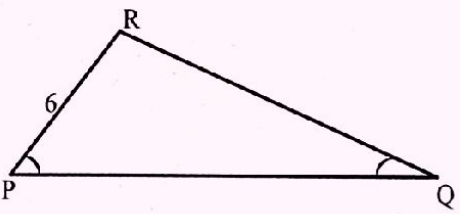
1. In the figure E is the mid point of AB.
   EF is parallel to BC.



   a) If AC=12 centimetres,what is the length of AF ?
   b) What is EF:BC ?

2. In the figure, $\angle A = \angle P$, $\angle B = \angle Q$, AB = 5 centimetres, BC = 4 centimetres, AC = 2 centimetres, PR = 6 centimetres.





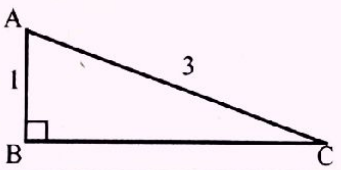
   a) What is the length of PQ?
   b) What is the ratio of the perimeters of ΔABC and ΔPQR ?

3. a) Which among the following is a polynomial ?

   (A) $x^2 + \frac{1}{x^2}$, (B) $x + \sqrt{x}$, (C) $x^2 + 2$, (D) $x + \frac{1}{x}$

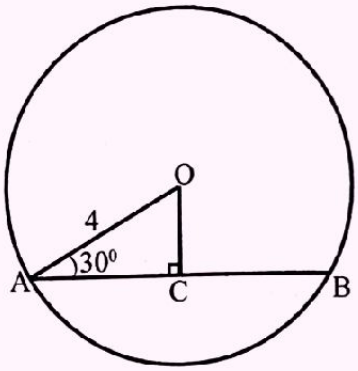
   b) If $P(x) = 2x + 1$, find $P(1)$.

4. In right triangle ABC, AB = 1 centimetre, AC = 3 centimetres.
   a) What is the length of BC ?
   b) Calculate the perimeter of ΔABC.



Answer any 4 Questions from 5 to 10. Each question carries 3 scores. (4 × 3 = 12)

5. In the figure, O is the centre of the circle with radius 4 centimetres and $\angle OAC = 30^0$.



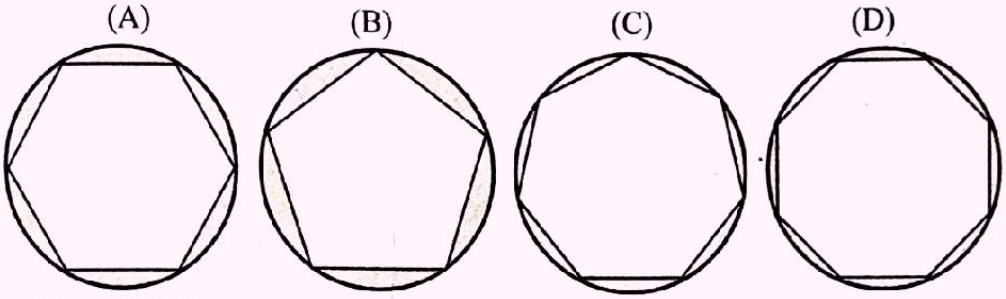
(a) Find $\angle AOC$.

(b) What is the length of OC ?

(c) Find AB.

6. Draw an equilateral triangle of perimeter 11 centimetres.

7. In the figure, vertices of the regular polygon are on the circle of same radius.



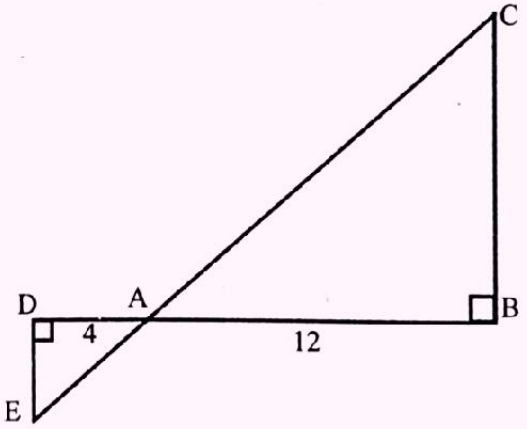
(a) In which figure, area of shaded portion is maximum ?

(b) If the radius of the circle in the figure is 2 centimetres, what is the area of the regular hexagon?

8. In the figure, $\angle B = \angle D = 90^0$

AB = 12 centimetres,

AD = 4 centimetres.



(a) If $\angle DAE = 40^0$, Find $\angle AED$.

(b) What is the measure of $\angle C$?

(c) $\frac{BC}{DE}$ = _____

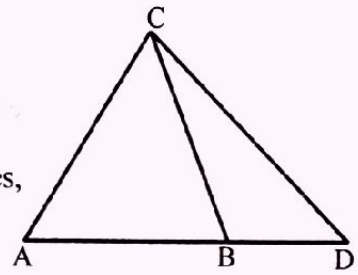
[3, 4, 8, 12]

9. $\frac{1}{9} = 0.1111...$ and $\frac{2}{9} = 0.2222...$

(a) Write the fractional form of 0.3333...

(b) Find the decimal form of $\sqrt{0.4444...} \times \sqrt{0.1111...}$

10. In the figure, AB:BD = 3:2.

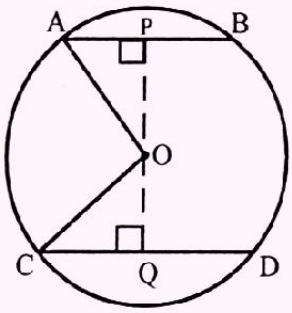


(a) If AB = 6 centimetres, find BD.

(b) If the area of the ΔABC is 12 square centimetres, find the area of ΔBDC and ΔADC.

Answer any 8 Questions from 11 to 21. Each question carries 4 scores. (8 × 4 = 32)

11. In the figure, O is the centre of the circle and radius is 17 centimetres. AB and CD are two parallel chords. If AB = 16 centimetres and CD = 30 centimetres.



(a) What is the length of AP.

(b) What is the length of OQ.

(c) What is the distance between the chords?

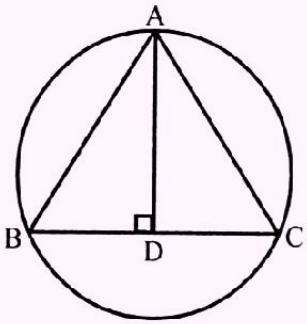
12. Draw a rectangle of perimeter 18 centimetres and sides are in the ratio 4:3.

13. The general form of a first degree polynomial is $ax+b,\ a\neq 0$.

(a) Write the equations representing the relation $P(1)=2$ and $P(2)=5$.

(b) What is the value of a and b ?

14. In the figure, ABC is an isosceles triangle. AB = AC = 5 centimetres, AD = 4 centimetres.

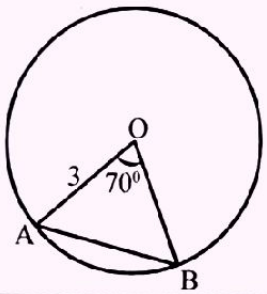


(a) Find the length of BD.

(b) Calculate the perimeter of ΔABC.

(c) If the circumradius is twice, find the perimeter of the triangle.

15. O is the centre of a circle of radius 3 centimetres. A, B are the vertices of the circle and $\angle AOB = 70^0$. Draw a triangle with area equal to ΔOAB and all three vertices are on the circle.



16. The difference between two numbers is 6 and the difference between its squares is 48.

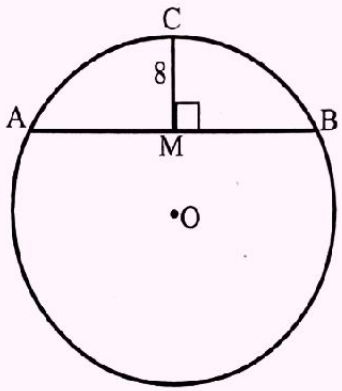
(a) Form the equations indicating above statement.

(b) What is the sum of the numbers ?

(c) What are the numbers ?

17. O is the centre of the circle and M is the midpoint of the chord AB.

$\angle CMB = 90^0$,
AB = 24 centimetres,
CM = 8 centimetres.

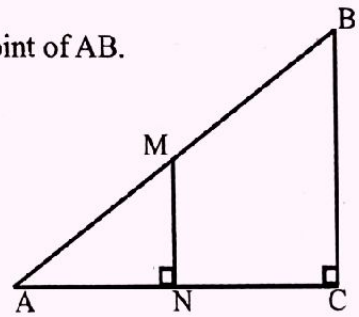


(a) AM = _____ centimetres

(b) If 'r' is the radius of the circle,
OM = _____

(c) Find the radius of the circle.

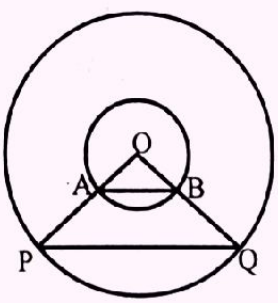
18. In the right triangle ACB, M is the mid point of AB.
MN is the perpendicular from M to AC.
If, BC = 12 centimetres and
AB = 20 centimetres



(a) What is the length of AC ?

(b) What is the perimeter of the small right triangle ?

19. In the figure, two circles are drawn with centre O. AB is the chord of small circle and PQ is that of large circle.
If OA = 4 centimetres,
OP = 6 centimetres.



(a) What is the length of PA ?

(b) OB : OQ = _____

(c) If AB = 3 centimetres,
what is the length of PQ ?

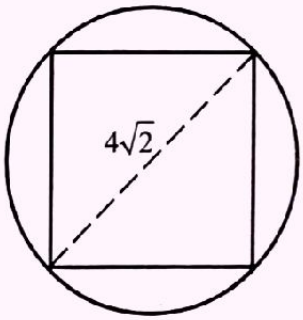
20. Length of a rectangle is 2 centimetres more than its breadth.

(a) If breadth is taken as x centimetres, what is its length ?

(b) Take the perimeter as $p(x)$, write the equation relating x and $p(x)$.

(c) Take the area of the rectangle as $a(x)$, write the equation relating x and $a(x)$.

21. Four vertices of a square are on the circle. The length of the diagonal of the square is $4\sqrt{2}$ centimetres, then



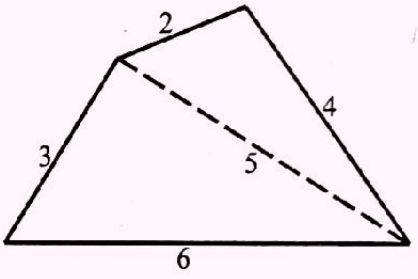
(a) What is the radius of the circle ?

(b) Find the area of the circle.

(c) If the radius of the circle is $4\sqrt{2}$ centimetres, What is the area of the square?

Answer any 6 Questions from 22 to 29. Each question carries 5 scores. ($6 \times 5 = 30$)

22. The measures given in the quadrilateral are in centimetres. Draw a quadrilateral with same angle and sides scaled by $1\frac{1}{2}$ times.

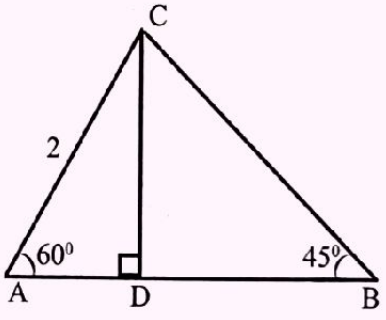


23. In triangle ABC, AC = 2 centimetres,
CD is the perpendicular drawn from C to AB.
Also $\angle A = 60^0$, $\angle B = 45^0$.

(a) What is $\angle ACD$?

(b) What is the length of CD ?

(c) What is the perimeter of ΔABC ?



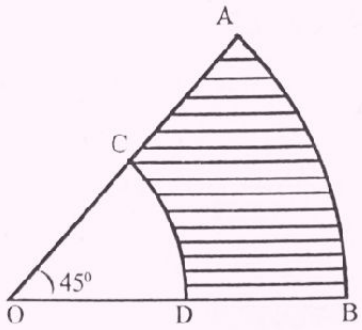
24. Consider a rectangle of perimeter 60 centimetres.

(a) What is its Length + Breadth ?

(b) If length is taken as x and its area is $a(x)$, write an equation relating x and $a(x)$.

(c) Find the value of $a(25)$ and $a(5)$?

25. The central angle of both the sectors are 45^0. Sum of its radii are 12 centimetres and area of the shaded part is 12π centimetres.



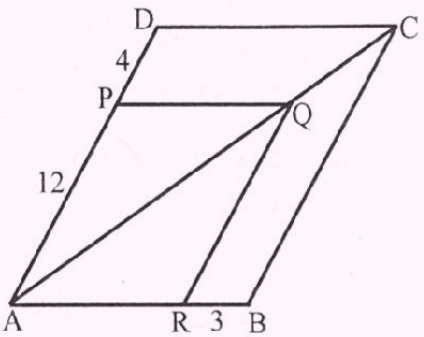
(a) If R is the radius of the large sector and r is that of small sector, Write the equation relating sum of its radii.

(b) Find the area of sectors OAB and OCD.

(c) Find the radii of given sectors.

26. Draw a triangle of side AB = 6.5 centimetres, $\angle A = 50^0$, $\angle B = 70^0$. Draw its circumcircle.

27. In the figure ABCD is a parallelogram.
PQ is parallel to AB and RQ is parallel to BC.
AP = 12 centimetres,
PD = 4 centimetres,
BR = 3 centimetres.

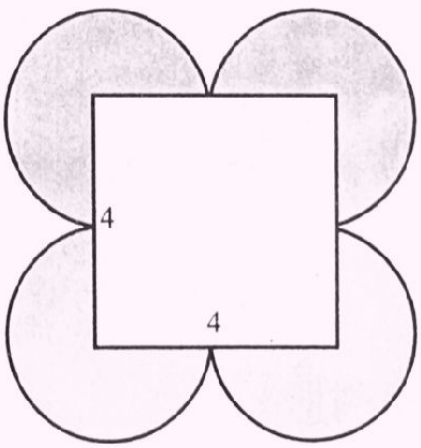


(a) What is AQ : QC ?

(b) AB = _____ centimetres.

(c) What is the perimeter of the parallelogram APQR ?

28. Four equal sectors are fixed with centres on the vertices of a square of side 4 centimetres is shown in the figure.



(a) What is the area of the square?

(b) What is the perimeter of the outer part?

(c) What is the area of the shaded part?

29. Read the pattern given below and answer the questions

$\frac{1}{2}+\frac{1}{4}=\frac{3}{4}=\frac{3}{2^2}$

$\frac{1}{4}+\frac{1}{8}=\frac{3}{8}=\frac{3}{2^3}$

$\frac{1}{8}+\frac{1}{16}=\frac{3}{16}=\frac{3}{2^4}$

.....

.....

(a) Write the next line.

(b) $\frac{1}{32}+\frac{1}{64}=$ _____ $=\frac{3}{2^6}$

(c) $\frac{1}{64}+\frac{1}{128}=\frac{3}{128}=$ _____

(d) $\frac{3}{2^2}, \frac{3}{2^3}, \frac{3}{2^4}$ and so on, write the 10^{th} number.

(e) Write the n^{th} number.