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SECOND TERMINAL EVALUATION - 2018
MATHEMATICS

E - 903

Time: 2½ hrs

STD: IX

Score: 80

Instructions

- Read all instructions carefully before answering
- Write necessary steps along with each answer
- Simplification with approximate values of $\sqrt{2}$, π etc need to be done only if specifically asked.
- First 15 minutes is cool-off time.

Answer any three from questions 1 to 4. Each question carries 2 scores.

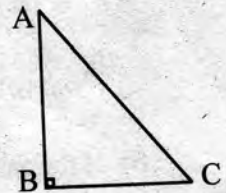
(3 X 2 = 6)

1. a) $\frac{7}{3} + \frac{7}{4} = \frac{28 + 21}{12} = \frac{49}{12} = \frac{7}{4} \times \frac{7}{3}$

Write another pair of numbers with their sum and product equal.

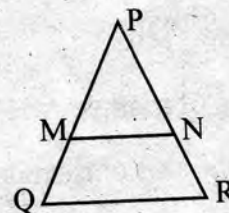
b) If $a + b = ab$, then $\frac{1}{a} + \frac{1}{b} = \dots\dots$

2. In triangle ABC, $\angle B = 90^\circ$, AB = 12 centimetres, BC = 5 centimetres. What is the circumradius of triangle ABC?



3. In the figure, MN is parallel to QR.
PM = 6 centimetres, PQ = 10 centimetres.

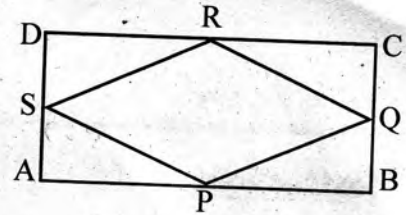
- a) What is the length of MQ?
b) What is PN : NR?



4. a) What is the number obtained on dividing the perimeter of a circle by its diameter?
b) What is the diameter of a circle of perimeter 6π centimetres?

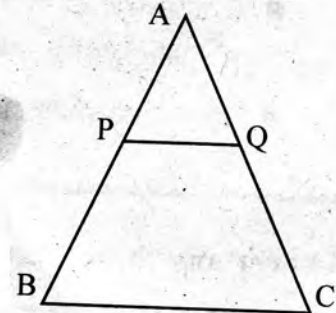
Answer any five from questions 5 to 11. Each question carries 3 scores.
(5 X 3 = 15)

5. The length and breadth of rectangle ABCD are 12 centimetres and 5 centimetres. P, Q, R, S are the mid points of sides.



- a) What is the most suitable name for quadrilateral PQRS?
b) Find the length of sides of PQRS.
6. Draw a circle of radius 3 centimetres. Draw an equilateral triangle with its vertices on the circle.

7. In the figure, PQ is parallel to BC. PA : PB = 2 : 3, AB = 15 centimetres, AQ = 4 centimetres.

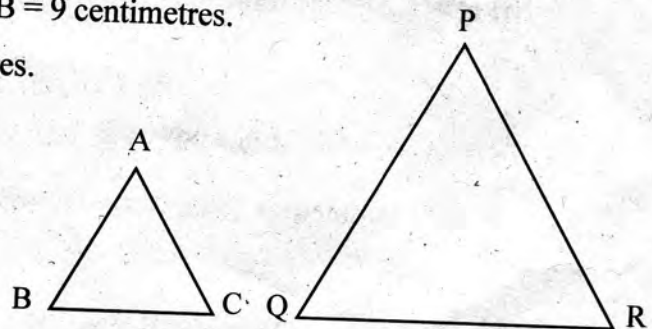


- a) Find AQ : QC.
b) What is the length of QC?
c) Find AQ : AC

8. $p(x) = x^2 - 3x + 2$, $q(x) = 3x + 1$

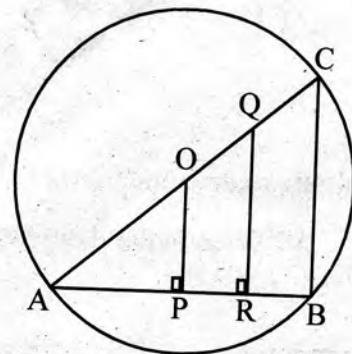
- a) Find $p(x) + q(x)$
b) If $p(x) + q(x) + r(x) = 0$, find $r(x)$.
c) What number is $p(1) + q(1) + r(1)$?

9. In the figure, $\angle A = \angle P$, $\angle B = \angle Q$, AB = 9 centimetres. AC = 10 centimetres, PR = 20 centimetres.



- a) What is the length of PQ?
b) If the perimeter of triangle ABC is 30 centimetres, what is the perimeter of triangle PQR?
c) If area of triangle ABC is $30\sqrt{2}$ square centimetres, what is the area of triangle PQR?

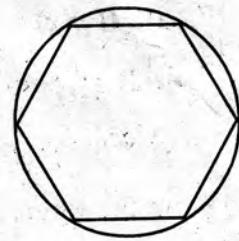
10. In the figure, O is the centre of the circle, $\angle P = \angle R = 90^\circ$, OP = 2 centimetres, PR = RB



- a) What is the measure of $\angle B$?
b) What is the length of BC?
c) Find the length of QR.

11. Perimeter of the regular hexagon in the figure is 24 centimetres.

- What is the length of a side?
- Find perimeter of the circle.

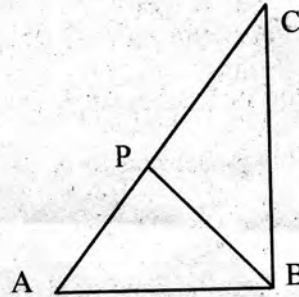


Answer any seven from questions 12 to 21. Each question carries 4 scores.

(7 X 4 = 28)

12. In the figure, $\angle ABC = \angle APB = 90^\circ$

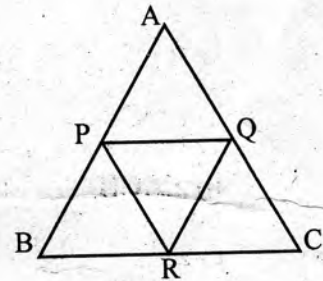
- How many triangles are there in the figure?
Which are they?
- Prove that these triangles are similar.



13. Draw triangle ABC with $AB = 6$ centimetres, $\angle A = 50^\circ$, $\angle B = 60^\circ$. Draw its circumcircle.

14. P, Q, R are the mid points of sides of triangle ABC.

- If $BC = 10$ centimetres, what is the length of PQ?
- If the area of triangle APQ is x , what is the area of triangle ABC?
- Find area of parallelogram PQRB.



d) Draw a triangle and then draw a parallelogram with area half the area of the triangle.

15. a) Write two natural numbers with sum 40.

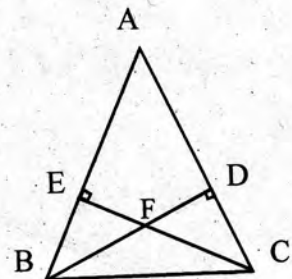
b) Write two natural numbers with difference 10.

c) If the sum of two natural numbers is 40 and their difference is 10, what are the numbers?

16. In the figure, $\angle E = \angle D = 90^\circ$, $\angle BFE = 65^\circ$

a) What is the measure of $\angle DFC$?

b) Prove that $FE \times FC = FD \times FB$.



17. a) If $p(x) = x^2 + x + k$, $p(0) = 1$, find value of k .

b) If $q(x) = x - 1$, find $r(x) = p(x) \times q(x)$.

c) What number is $r(1)$?

18. In the figure, the vertical lines are parallel.

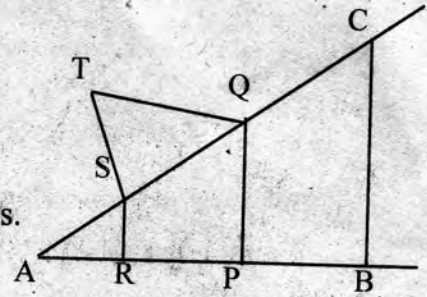
$$AR : RP : PB = 1 : 2 : 2,$$

$$AS = TS, QC = QT$$

a) What is the ratio of sides of triangle TSQ?

b) Find perimeter of the triangle if $SQ = 6$ centimetres.

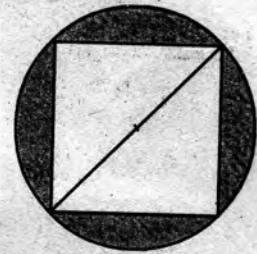
c) What is the length of AC?



19. Radius of the circle in the figure is 10 centimetres.

a) What is the area of the circle?

b) Find area of the shaded region.



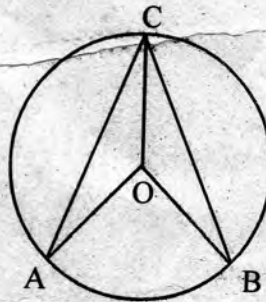
20. O is the centre of the circle, $\angle OAC = 20^\circ$, $\angle OBC = 20^\circ$, What are the measures of

a) $\angle OCA$

b) $\angle ACB$

c) $\angle AOC$

d) $\angle AOB$

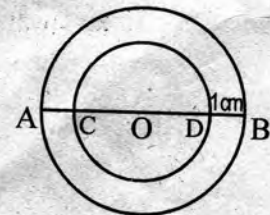


21. In the figure AB and CD are the diameters of the circles, $DB = 1$ centimetre.

a) If $CD = d$, what is the perimeter of the small circle?

b) If $CD = d$, find the diameter and perimeter of the large circle.

c) What is the difference in perimeters of the two circles?



Answer any five from questions 22 to 28. Each question carries 5 scores.

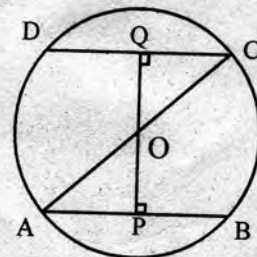
$$(5 \times 5 = 25)$$

22. In the figure, AC is the diameter and Q is the centre of the circle, AB and CD are two parallel chords. $\angle C = 30^\circ$, $OQ = 3$ centimetres.

a) $\angle A = \dots\dots$

b) What is the length of OP?

c) Find lengths of AB and CD.



23. The sides of a rectangle are 6 centimetres and 2 centimetres

a) Draw the rectangle.

b) Draw another rectangle of the same perimeter with sides in the ratio 5:4.

24. If $p(x) = x + 1$, $q(x) = x - 1$, $r(x) = x + 2$

a) Find $s(x) = p(x) \times q(x) \times r(x)$

b) Find $s(1)$, $s(-1)$, $s(-2)$

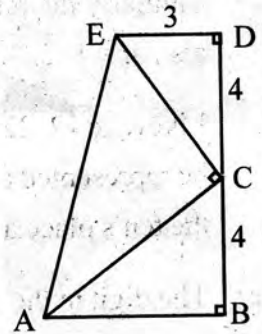
25. In the figure $\angle B = \angle D = \angle ECA = 90^\circ$, $BC = DC = 4$ centimetres,
 $ED = 3$ centimetres

a) What is the length of EC?

b) If $\angle ECD = x$, find $\angle ACB$

c) Find the length of AE.

d) $CE : AC : AE =$ _____



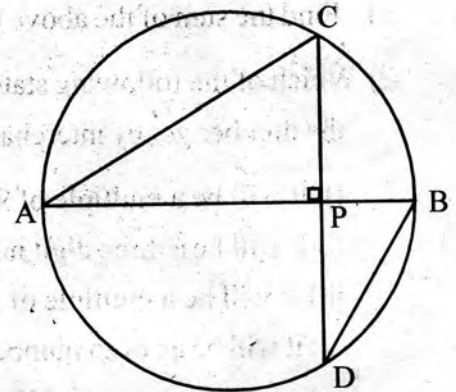
26. AB is the diameter of the circle. CD is a chord perpendicular to AB, $\angle A = \angle D$.

a) Write another pair of equal angles in the figure.

b) If $PC = 6$ centimetres, what is the length of PD?

c) Prove that $PA \times PB = PC^2$

d) If $PA = 9$ centimetres,
 $PC = 6$ centimetres, what is the length of PB?

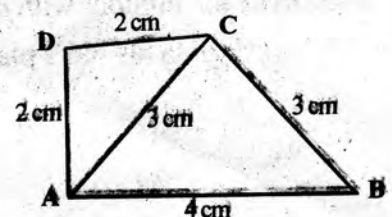


27. In quadrilateral ABCD, $AB = 4$ centimetres,

$BC = 3$ centimetres, $CD = 2$ centimetres,

$AD = 2$ centimetres, $AC = 3$ centimetres.

Draw quadrilateral ABCD. Draw another quadrilateral with same angles and sides two times as that of ABCD.



28. The length of an arc with central angle 40° , in a circle, is 8π centimetres.

- a) What is the length of an arc of central angle 100° in the same circle?
- b) What is the perimeter of the circle?
- c) Find the area of the circle.

Read the following mathematical idea and answer the questions that follow.

29. 10, 20, 30, ... are multiples of 10. They are in general represented as $10n$, where n is any natural number. To get two digit multiples of 10, take the numbers from 1 to 9 for n . Similarly the numbers 11, 21, 31, ..., 91 can generally be represented by $10n + 1$. Here also $n = 1, 2, 3, \dots, 9$.

Likewise 12, 22, 32,, 92 is represented as $10n + 2$. In short, all two digit numbers can be represented as $10n + m$, $n = 1, 2, 3, 4, \dots, 9$; $m = 0, 1, 2, \dots, 9$. Here n is the digit in the ten's place and m is the digit in the one's place.

- a) The digit in the ten's place of a number is a and the digit in its one's place is b . Write the number. (1)
- b) Which is the number obtained by interchanging the digits in the number mentioned above? (1)
- c) Find the sum of the above two numbers. (1)
- d) Which of the following statements is always true about the sum of a two digit number and the number got by interchanging its digits. (1)
 - i) It will be a multiple of 9
 - ii) It will be a three digit number.
 - iii) It will be a multiple of 11.
 - iv) It will be an even number.
- e) Find the peculiarity of the difference of a two digit number and the number got by interchanging its digits. (1)
- f) Write the number with p as the digit in the hundred's place, q as the digit in the ten's place and r as the digit in one's place. (1)