

## SECOND TERMINAL EVALUATION - 2017 MATHEMATICS

Time: 2½ Hours

Std: IX

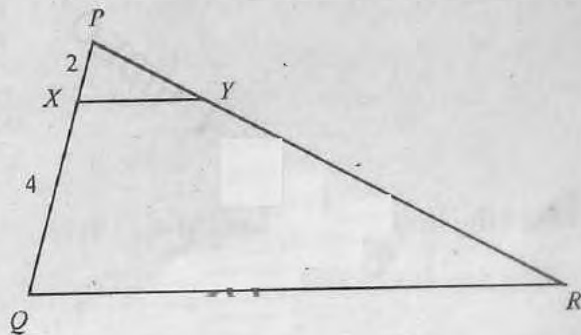
Total Score: 80

Instructions

- Read the instruction carefully before answering each question
- Necessary steps should be written against each answer
- Simplification using approximate values of  $\pi$ ,  $\sqrt{2}$ ,  $\sqrt{3}$  need to be done only if specifically asked
- First 15 minutes is cool off time.

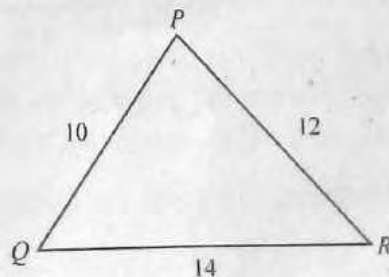
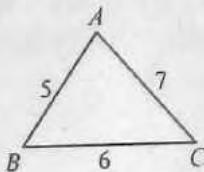
**Answer any three from questions 1 to 4 . Each carries 2 scores (3x2=6)**

1. In the figure XY is parallel to QR. PX = 2centimetres, QX= 4 centimetres, PR = 9 centimetres



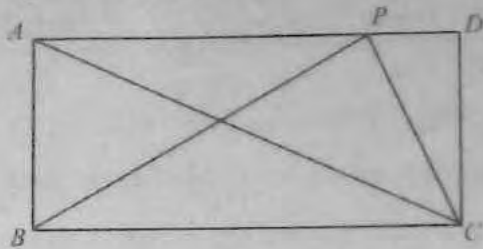
- a) Find PY : YR  
b) Find the length of PY

2. In the figure,

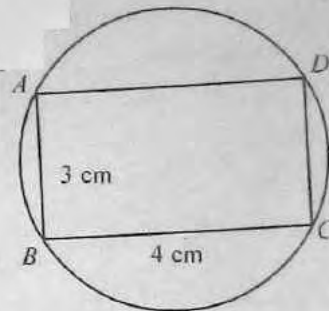


- a) How many times the sides of the large triangle is longer than that of the small triangle?  
b) Write the angles of the two triangles which are equal.

3. Given the area of triangle BPC is 10 square centimeters,



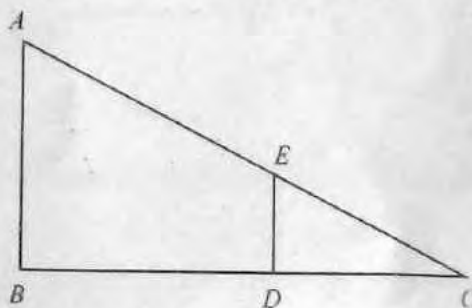
- Find the area of triangle ABC
  - Find the area of rectangle ABCD
4. In the figure, all the vertices of the rectangle ABCD are points of the circle.



- Find the length of diameter of the circle
- Find the circumference of the circle

**Answer any 5 from questions 5 to 11 . Each carries 3 scores (5x3=15)**

- Write the following rational numbers in ascending order  $\frac{3}{4}, \frac{4}{5}, \frac{5}{7}$
  - Find one more rational number between  $\frac{3}{4}, \frac{4}{5}$
- The top end of a pillar is tied tightly with a rope to a peg as shown in the figure. The distance between the peg and the foot of the pillar is 6 metres. When Appu places a scale of length 1 metre that touches the rope as shown in the figure, the distance between the peg and the scale is  $1\frac{1}{2}$  metres.



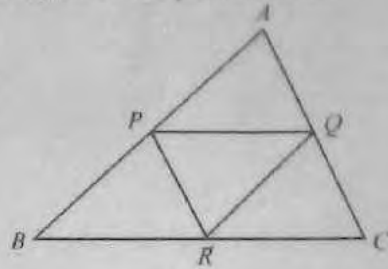
- Find the distance between the scale and pillar
- Calculate the height of the pillar

7. Given,  $p(x) = 2x^3 - 4x^2 + 5x + 5$

a) Find  $p(0)$

b) Which is the polynomial to be added to  $p(x)$  to get  $2x^3 + 5x$ ?

8. The midpoints of sides of triangle ABC are P, Q, R. If the perimeter of triangle PQR is 18 centimetres.

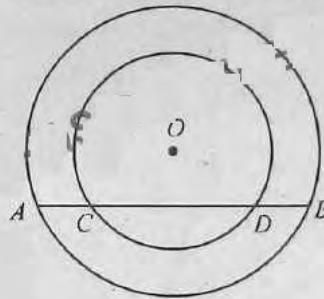


a) How many times of PQ is BC?

b) What is the perimeter of triangle ABC?

9. The cost of one bag and an umbrella is Rs.1000. Cost of the bag is Rs. 300 more than the cost of umbrella. Find the price of a bag and an umbrella

10. In the figure, O is the centre of both the circles. Radius of the small circle is 13 centimetres and the distance from the centre to the chord CD is 5 centimetres. If  $AC = 3$  centimetres



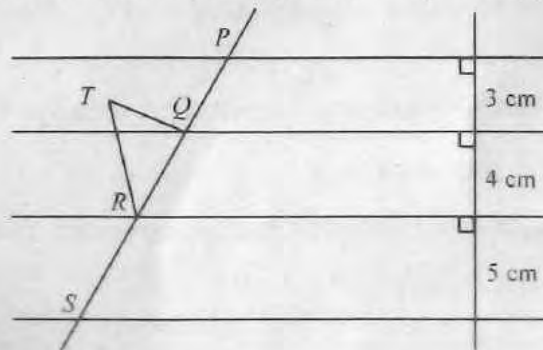
a) Calculate the length of CD

b) Calculate the length of AB

11. Draw a line of length 13 centimetres and divide it in the ratio 1 : 2 : 3

**Answer any 7 from questions 12 to 21 . Each carries 4 scores (7x4=28)**

12. In the figure, the horizontal lines are parallel. The distance between them are 3 centimetres, 4 centimetres, 5 centimetres respectively. If  $QR = 8$  centimetres, then



a) Find the ratio  $PQ : QR : RS$

b) If  $RS = RT$ ,  $PQ = QT$ , find the perimeter of triangle QRT

13. In quadrilateral ABCD,  $AB = 6$  centimetres,  $AD = 4$  centimetres,  $CD = 5$  centimetres,  $\angle A = 120^\circ$ ,  $\angle D = 120^\circ$ . Draw quadrilateral ABCD and construct a triangle of equal area.

14.  $1 - \frac{1}{3} = \frac{2}{1 \times 3}$

$$\frac{1}{2} - \frac{1}{4} = \frac{2}{2 \times 4}$$

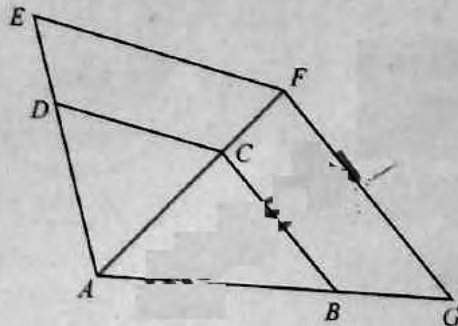
$$\frac{1}{3} - \frac{1}{5} = \frac{2}{3 \times 5}$$

a) Write the next row of the given pattern

b) Write the 10<sup>th</sup> row.

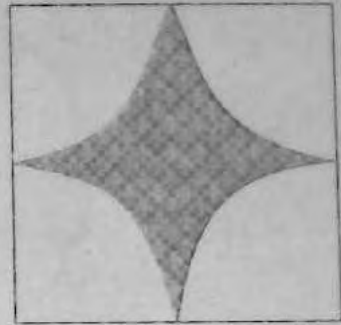
c) Establish the relation  $\frac{1}{n-1} - \frac{1}{n+1} = \frac{2}{(n-1)(n+1)}$

15. In the following figure, the sides AB, AD and the diagonal AC of the quadrilateral ABCD are extended and marked the points G, E, F. Also EF, FG are parallel to the sides DC, CB respectively and  $AC : CF = 2 : 1$

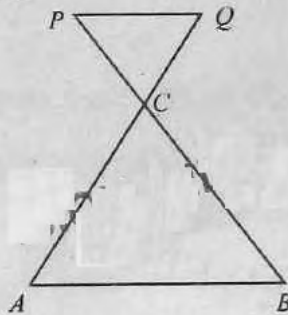


- a) Find the ratio  $AB : BG$
- b) If  $AB = 10$  centimetres, what is  $AG$ ?
- c) How many times the perimeter of quadrilateral AGFE is the perimeter of quadrilateral ABCD?
16. The length of a rectangle is 1 less than 2 times of its breadth. Then
- a) Write the breadth, if the length is  $x$
- b) Write the polynomials expressing the area and perimeter of the rectangle
17. If  $p(x) = 3x^3 - 2x^2 + 4x - 1$  and  $q(x) = x^3 + 4x^2 - 5$
- a) Find  $p(x) + q(x)$
- b) Find  $p(x) - q(x)$

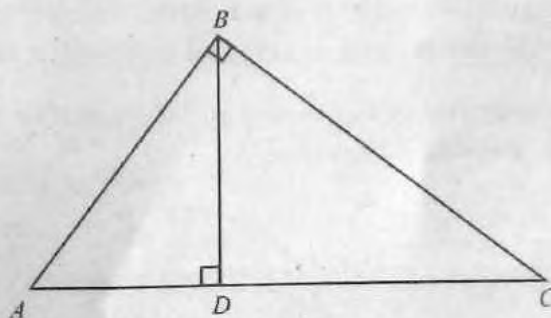
18. The length of a side of the square in the given figure is 4 centimetres. Sectors are drawn with vertices of the square as centres .



- What is the radius of the sectors?
  - Find the total area of all the four sectors
  - Find the area of the shaded region
19. In the figure , the sides AC and BC are extended to the points Q and P respectively. If  $\angle A = \angle B$  .

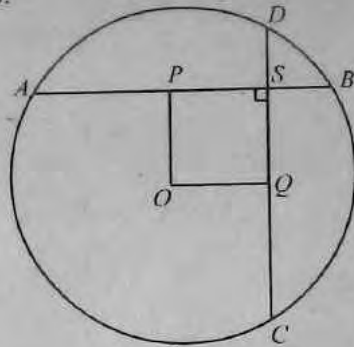


- Write the equal angles of triangles ABC and PQC
  - Prove that  $AC \times QC = BC \times PC$
20. In triangle ABC,  $\angle B = 90^\circ$  and BD is perpendicular to AC



- If  $\angle A = x^\circ$ , write the angles of triangles ABD and BDC
- Prove that  $BD^2 = AD \times CD$

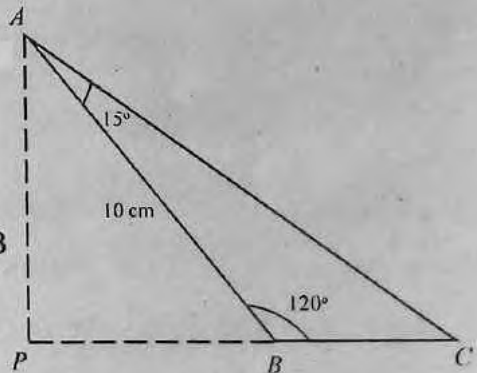
21. In the circle,  $AB, CD$  are two equal chords of the circle. They are mutually perpendicular also.



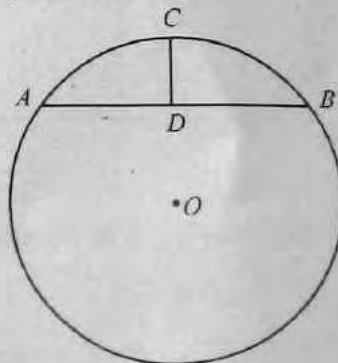
- If the distance from the centre to the chord  $AB$  is  $d$ , what is the distance from the centre to the chord  $CD$ ?
- What type of a quadrilateral is  $OQSP$ ?
- Prove that  $BS = DS$

**Answer any 5 from questions 22 to 28 . Each carries 5 scores (5x5=25)**

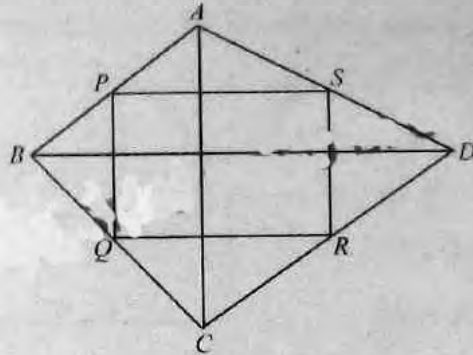
22. In the figure,  $\angle B = 120^\circ$ ,  $\angle A = 15^\circ$ ,  $AB = 10$  centimetres . Also distance from  $A$  to  $BC$  is  $AP$ .



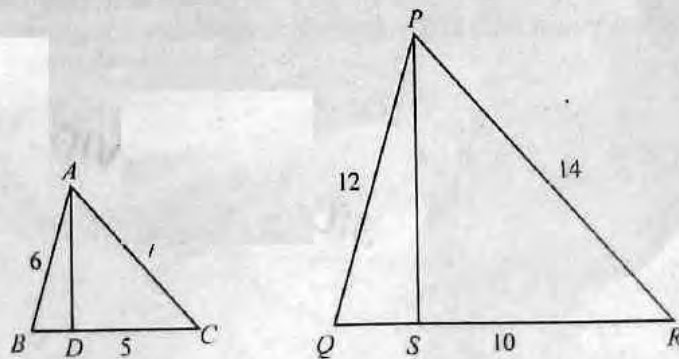
- Write the angle measures of triangle  $APB$
  - Find the lengths of  $AP, PB$
  - Calculate the area of triangle  $ABC$
23. Draw the triangle with two sides 6 centimetres, 8 centimetres and the angle between them is  $40^\circ$ . Draw its circumcircle and measure its radius
24. In the figure,  $O$  is the centre of the circle, and the distance between the points  $A, B$  is 4 centimetres and  $CD = 1$  centimetre.



- a) Taking  $r$  as radius, find the distance OD  
 b) Find the relationship between the lengths OD, OB, DB  
 c) Calculate the radius
25. The midpoints of the sides of the quadrilateral ABCD are P, Q, R, S respectively. When they are joined a rectangle is obtained.



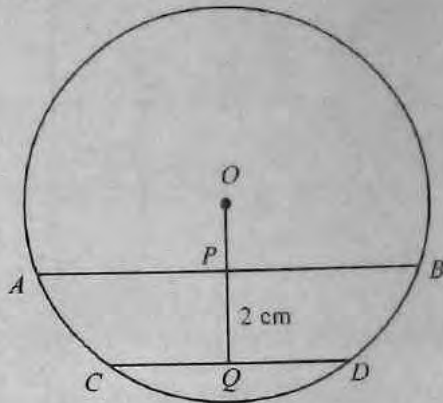
- a) Which are the lines parallel to BD?  
 b) What is the angle between the diagonals of quadrilateral ABCD? Why?  
 c) What types of a quadrilaterals make a rectangle when the midpoints of its sides are joined?
26. In the figure, the sides of triangle ABC are 5 centimetres, 6 centimetres, 7 centimetres and the sides of triangle PQR are 10 centimetres, 12 centimetres, 14 centimetres



- a) If  $\angle B = x^\circ$ , find  $\angle Q$   
 b) The perpendicular from A to BC is AD and the perpendicular from P to QR is PS. Write the measures of angles of triangles ABD and PQS  
 c) How many times of AD is PS?  
 d) How many times the area of triangle ABC is the area of triangle PQR?

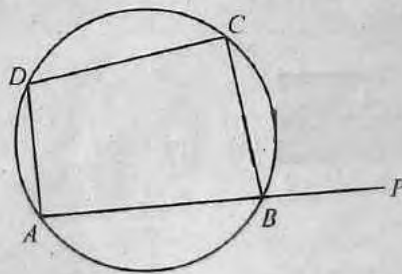
27. a) Write a polynomial  $p(x)$  of degree 1  
 b) If  $q(x) = p(x)(x - 1)$ , find  $q(x)$   
 c) Find the sum of the coefficients of  $q(x)$   
 d) What is the sum of the coefficients of  $(ax^2 + bx + c)(x - 1)$ ?
28. In the figure,  $AB, CD$  are two parallel chords of the circle with centre  $O$  and the distance between them is 2 centimetres. If  $AB = 8$  centimetres,  $CD = 4$  centimetres

- a) Write the length of  $OQ$ , if  $OP = x$   
 b) Compute the value of  $x$   
 c) Find the radius of the circle  
 d) Calculate the area of the circle



**Read the following, understand the mathematical concepts in it and answer the questions that follow. Each question carries 1 score. (6x1=6)**

29. The four vertices of quadrilateral are the points of the circle. Such quadrilaterals are called cyclic quadrilaterals and their opposite angles are supplementary. That is  $\angle A + \angle C = 180^\circ$ . We can draw a circle passing through the four vertices of a quadrilateral if and only if the opposite angles are supplementary.



- a) If  $\angle A = 100^\circ$ , then  $\angle C = \dots\dots\dots$   
 b) If  $\angle PBC = \angle ABC$  what is the measure of  $\angle D$ ?  
 c) Which among the following is a cyclic quadrilateral?  
 [ Trapezium, Parallelogram, Rhombus, Rectangle ]  
 d) If  $\angle ABC = 70^\circ$ , what is the measure of  $\angle PBC$ ?  
 e) If  $\angle PBC = 100^\circ$ , what is the measure of  $\angle D$ ?  
 f) If  $\angle PBC = 2 \times \angle ABC$ , find  $\angle D$