मंगलाताई भागवत फाऊंडेशन

Mathematics - Part II

Std : X

Time-2 Hrs **Marks 40**

Notes :

1) All questions are compulsory
2) Use of calculator is not allowed
3) Figures to the right of the questions indicate full marks
4) Draw proper figures for answers wherever necessary.
5) The marks of construction should be clear and distinct. Do not erase them.
6) While writing any proof, drawing relevant figure is necessary. Also the proof should be consistent with these figures.

Q.1. A) Choose the correct alternative. **(4)**

1) ΔABC & ΔDEF are equilateral triangles. If A (ΔABC) : A (ΔDEF) = 1:2 & AB = 4, then what is the length of DE ?

   (a) $2\sqrt{2}$ (b) 4 (c) 8 (d) $4\sqrt{2}$

2) Out of the following, which is Pythagorean triplet ?

   (a) (5,12,4) (b) (3,4,2) (c) (8,15,17) (d) (5,5,2)

3) ∠ACB is inscribed in arc ACB of a circle with centre 'O', If ∠ACB = 65^0. Find m (arc ACB)

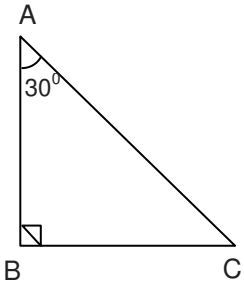
   a) 130^o b) 295^o c) 230^o d) 65^o

4) $1 + \tan^2\alpha$ = ?

   a) $\sin^2\alpha$ b) $\sec^2\alpha$ c) $\text{cosec}^2\alpha$ d) $\cot^2\alpha$

B) Solve the following questions. **(4)**

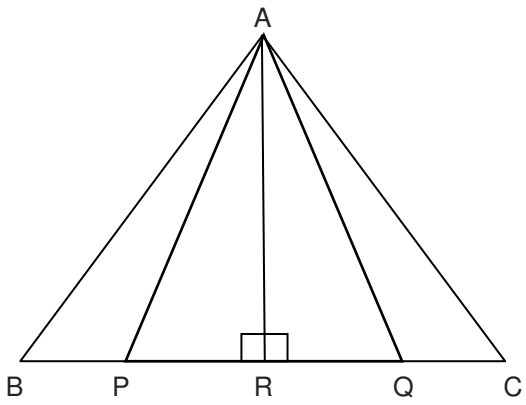
1) In ΔABC, BC = 3cm. Find AB.



2) Find the surface area of a sphere of radius 7cm.
3) Draw segment AB of length 7cm. and bisect it.
4) If $\tan\alpha = 1$ then find $\sec\alpha$.

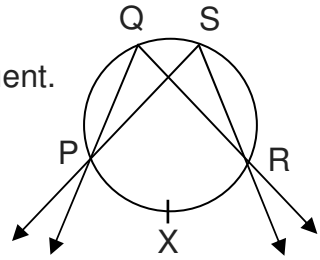
Q.2. A) Complete the following activities. (Any two) **(4)**

1) For the given figure, Fill in the blanks property to complete the following activity.



$$\frac{A(\Delta ABC)}{A(\Delta APQ)} = \frac{\square}{\square} \times \frac{\square}{\square} = \frac{\square}{\square}$$

2) To prove that – angles inscribed in the same arc are congruent.



Given : ∠PQR & ∠PSR are inscribed in the same arc.
Arc PXR is intercepted by the angles.

To prove : ∠PQR ≅ ∠PSR

Proof : m∠ PQR = $\frac{1}{2}$ *m*(arc PXR) …(i)… $\square$

m∠ $\square$ = $\frac{1}{2}$ *m*(arc PXR) ...(ii)… $\square$

m∠ $\square$ = *m*∠PSR ... [from (1) & (2)]

∴ ∠PQR ≅ ∠PSR … Angles equal in measure are congruent

3) How many solid cylinders of radius 6cm. and height 12cm. can be made by melting a solid sphere of radius 18cm. ?

Activity : Radius of the sphere, r = 18cm.
For cylinder, radius R = 6cm. height H = 6 cm.
Number of cylinder that can be made

$$= \frac{\text{Volume of the sphere}}{\square}$$

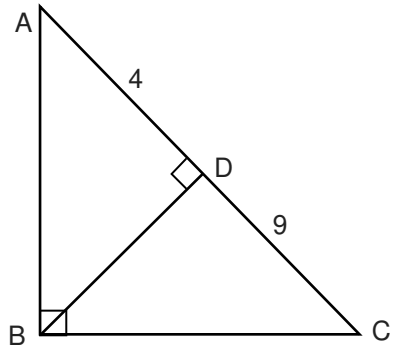
$$= \frac{\frac{4}{3}\pi r^3}{\square}$$

$$= \frac{\frac{4}{3} \times 18 \times 18 \times 18}{\square}$$

$$= \square$$

Q.2. B) Solve the following questions (Any Four) **(8)**

1) In right-angled ΔABC, BD ⊥ AC. If AD = 4, DC = 9, then find BD.



2) If $\sec\alpha = \frac{25}{7}$ then find the value of $\tan\alpha$.

3) Construct tangent to a circle with centre A & radius 3-4 cm. at any point P on it.

4) Find the centroid of the triangle whose vertices are given below.

(-7, 6) (2, -2) (8, 5)

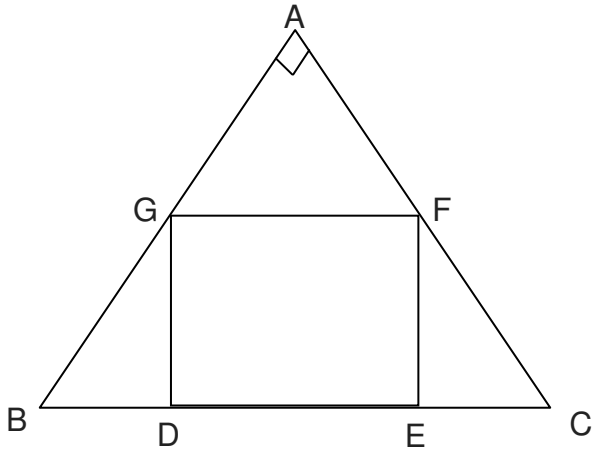
5) Find the surface are of a sphere of radius 3.5 cm.

Q.3. A) Complete the following activity (Any One) **(3)**

1) Complete the following activity to prove that $DE^2 = BD \times EC$

In the given figure, the vertices of square DEFG are on the sides of ΔABC,

m ∠A = 90^0.



Proof **:** Prove that ΔFGA ~ Δ GBD … (1)

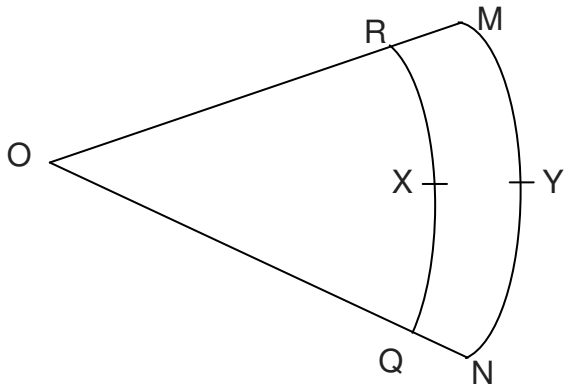
Prove that ΔFGA ~ Δ CFE … (2)

ΔFGA ~ Δ CFE … (from (1) & (2)

Write the ratio of corresponding sides.

Use : FE = DE & DG = DE to prove that $DE^2 = BD \times EC$

2) In figure 'O' is the centre of the sector, $\angle ROQ = \angle MON = 60^0$, OR = 7 cm, OM = 21cm. Find the lengths of arc RXQ & arc MYN (π = 22/7)



Solution :-

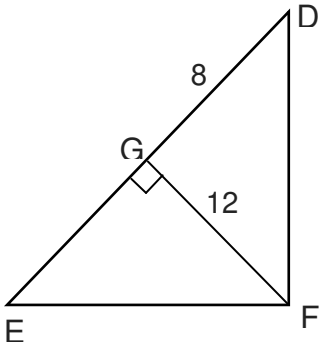
ℓ(arc RXQ) = $\frac{\angle ROQ}{\square}$ x $\square$ x 2π

ℓ(arc RXQ) = $\square$

ℓ(arc MYN) = $\frac{\angle MON}{\square}$ x 2π x $\square$

ℓ(arc MYN) = $\square$

B) Solve the following questions. (Any Two) **(6)**

1) 

In give figure, $\angle$ DEF = 90^0, FG $\perp$ ED,
If GD = 8, FG = 12
Find i) EG ii) FD iii) EF

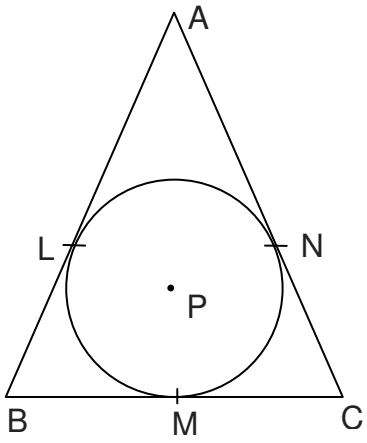
2) Prove that – Tangent segments drawn from an external point to a Circle are congruent.

3) Draw a circle with radius 4.2 cm. Construct tangents to the circle from a point at a distance of 7cm. from the centre.

4) When an observer at a distance of 12m from a tree looks at the top of the tree, the angle of elevation is 60^0. What is the height of the tree ? ($\sqrt{3}$ = 1.73)

Q.4 Solve the following questions. (Any Two) **(8)**

1)

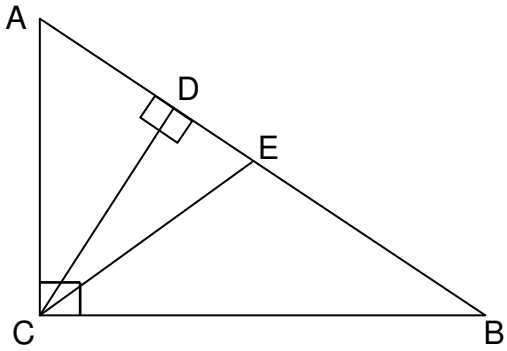


A circle with centre 'P' is inscribed in the ΔABC side AB, side BC and side AC touch the circle at point L,M,N respectively. Radius of the circle is $\mathfrak{r}$.

Prove that :

$\Delta(\Delta ABC) = \frac{1}{2}(AB + BC + AC) \times \mathfrak{r}$

2) In (ΔABC), ∠ACB = 90^0, Seg CD ⊥ side AB & Seg CE is angle bisector of ∠ACB.



Prove that :

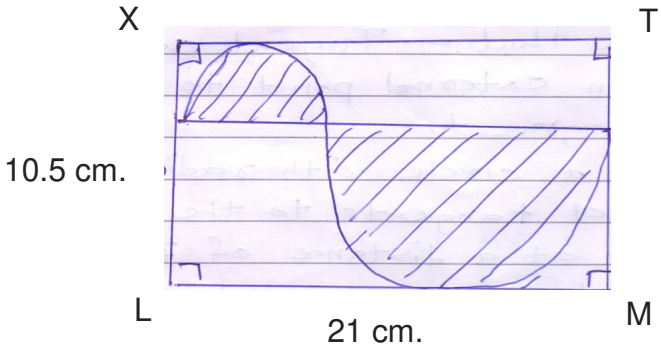
$\frac{AD}{BD} = \frac{AE^2}{BE^2}$

3) If the point P (x, y) is equidistant from the points A (a + b, b – a) & B (a – b, a + b) Prove that bx = ay

Q.5 Solve the following questions. (Any One) **(3)**

1) Show that the points (2,0), (-2,0) & (0, 2) are the vertices of a triangle. Also state with reason the type of the triangle.

2)



In the above figure, XLMT is a rectangle, LM = 21 cm., XL = 10.5 cm. Diameter of the smaller semicircle is half the diameter of the larger semicircle. Find the area of non-shaded region.

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