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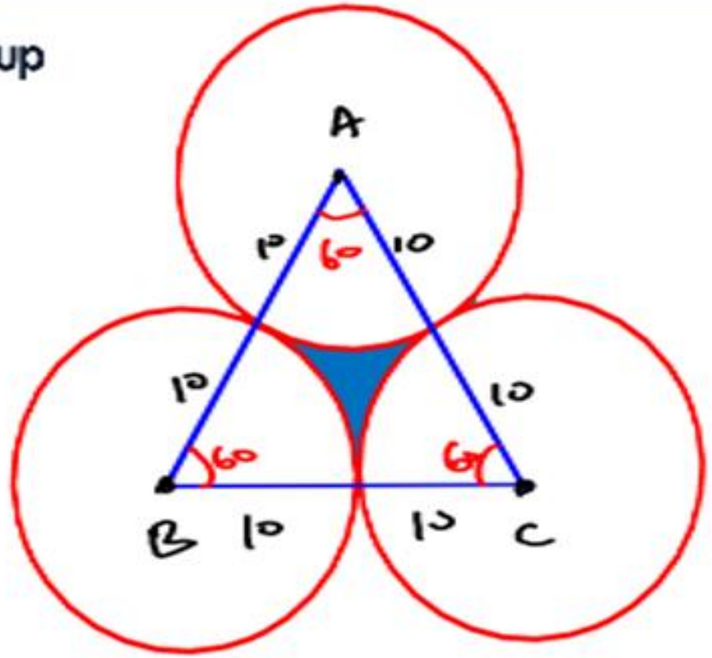
Sahi Prep Hai Toh Life Set Hai

MENSURATION-2D

Part – 3



Eg. Radius of each of the circle is 10 cm. Find the area of shaded region.

Area of shaded Part = Area of eq Δ - $\frac{1}{2}$ circle

$$= \frac{\sqrt{3}}{4}(20)^2 - \frac{1}{2}\pi \cdot 10^2$$

$$= 100\sqrt{3} - 50\pi$$

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Ans. $\left(100\sqrt{3}-50\pi\right)cm^2$

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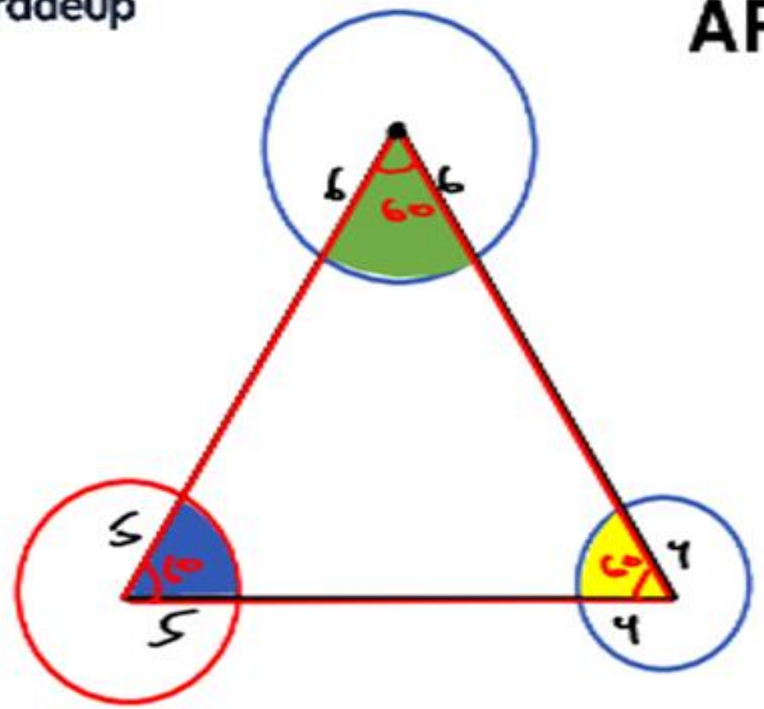
AREA GRAZED BY COW



An equilateral triangle whose side is 20 cm. Find the area grazed by the cows if they are attached by rope of length 6 cm, 5 cm and 4 cm on the 3 vertices.

$$\frac{1}{6}\pi 6^2 + \frac{1}{6}\pi \cdot 5^2 + \frac{1}{6}\cdot\pi\cdot 4^2$$

$$\frac{1}{6}\cdot\frac{22}{7}\left[36+25+16\right]$$

$$\frac{1}{\cancel{6}_3}\cdot\frac{\overset{11}{\cancel{22}}}{\cancel{7}}\cdot\cancel{77}\ 11 = \frac{121}{3}\ cm^2$$

Ans. $\frac{121}{3}\,cm^2$

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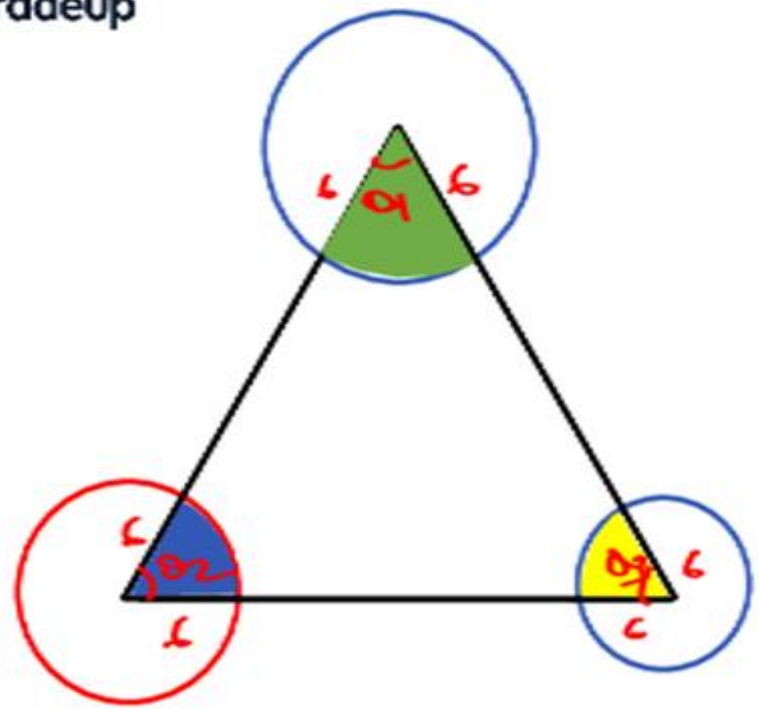

Eg. A triangle whose sides are 20 cm, 18 cm and 16 cm. Find the area grazed by the cows if they are attached by rope of length 6 cm on all the 3 vertices.

$$\frac{\pi 6^2 \theta_1}{360} + \frac{\pi 6^2 \theta_2}{360} + \frac{\pi \cdot 6^2 \cdot \theta_3}{360}$$

$$\frac{\pi \cdot 6^2}{360\ 2}\left[\ 180\ \right]$$

$$= \underline{\underline{18\pi\ cm^2}}$$

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Ans. $\frac{396}{7}\ cm^2$

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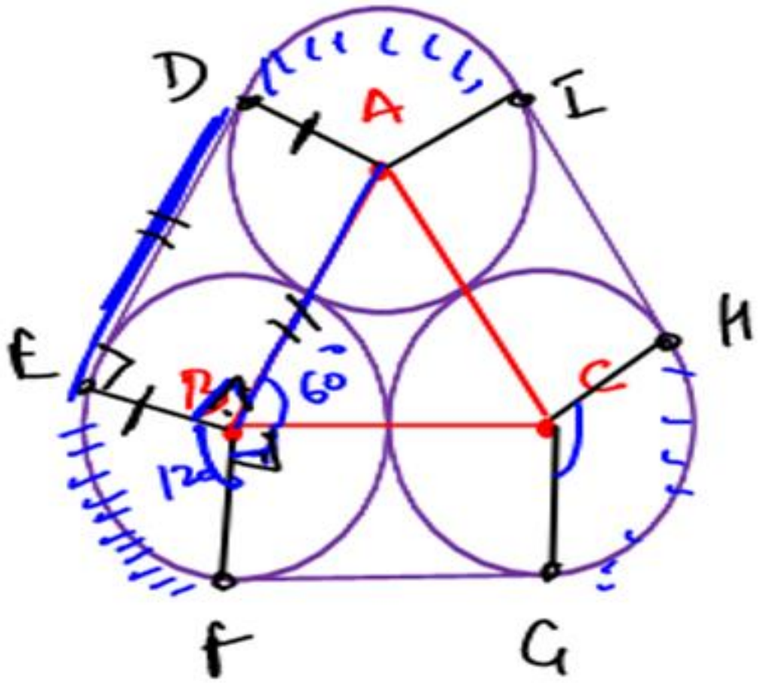
LENGTH OF RUBBER BAND



If the radius of each circle is 10 cm.

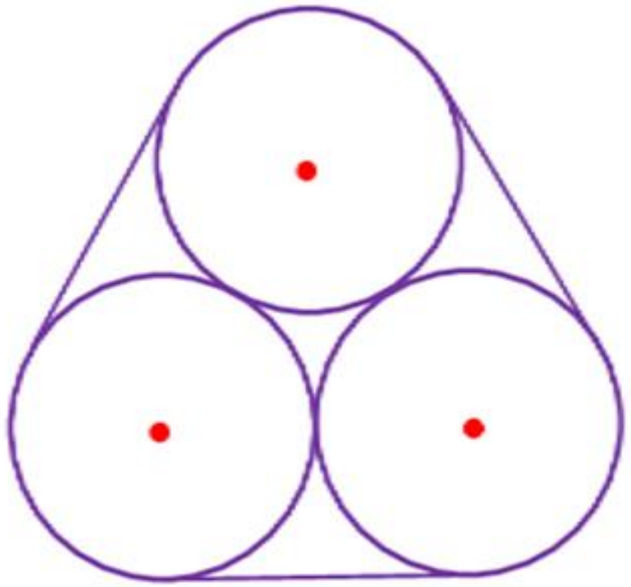
Find the length of rubber band.

length of Rubber Band

$= DE + FG + IH + \overset{\frown}{EF} + \overset{\frown}{GH} + \overset{\frown}{ID}$

$20 + 20 + 20 + 2\pi \cdot 10$

$60 + 20\pi$



Shortcut

→ $6R + 2\pi R$

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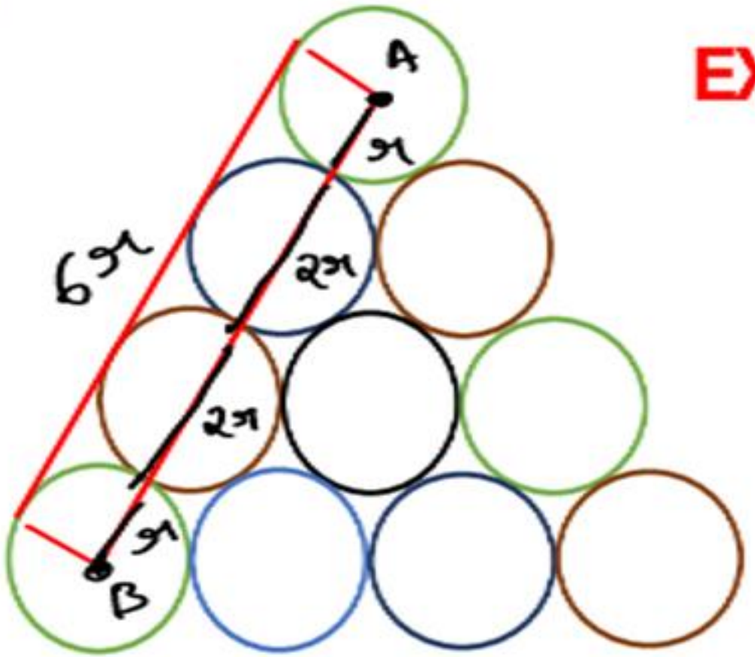
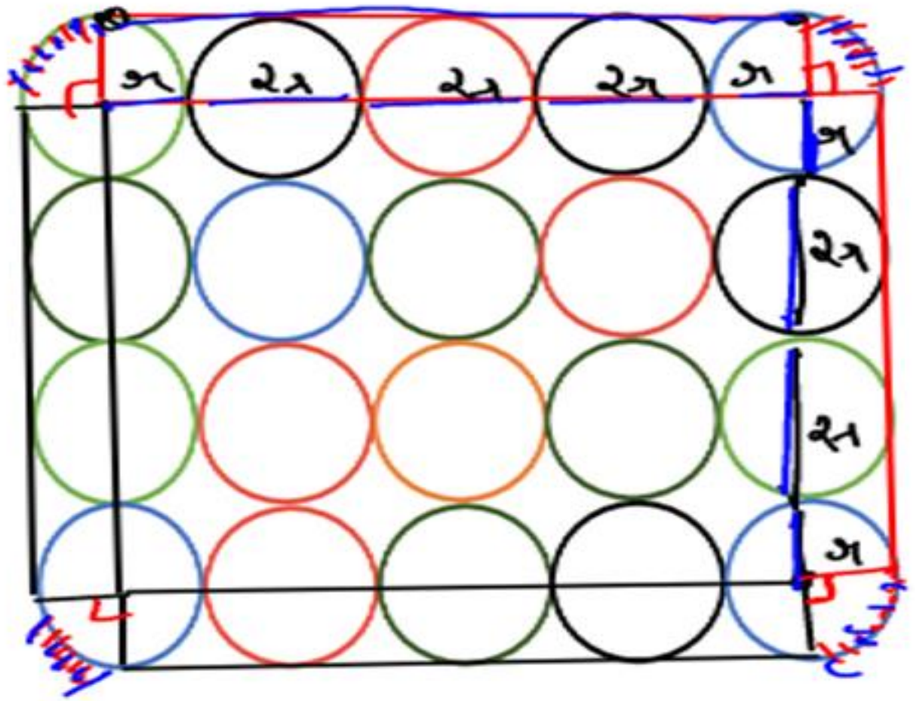


EXTENSION OF RUBBER BAND QUESTIONS

Eg If radius of each circle is r. Find the length of Rubber band ??

$\longrightarrow$ $18r + 2\pi r$



Eg If radius of each circle is r

Find length of Rubber band?

→ $28r + 2\pi r$

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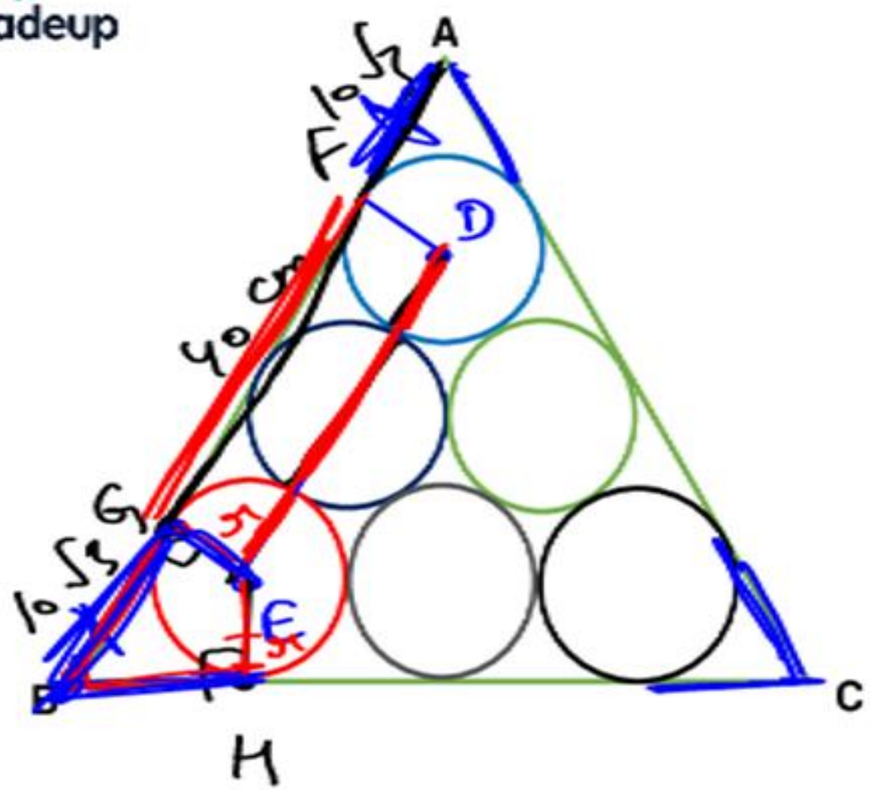


Equilateral Δ

If radius of each circle is 10 cm.

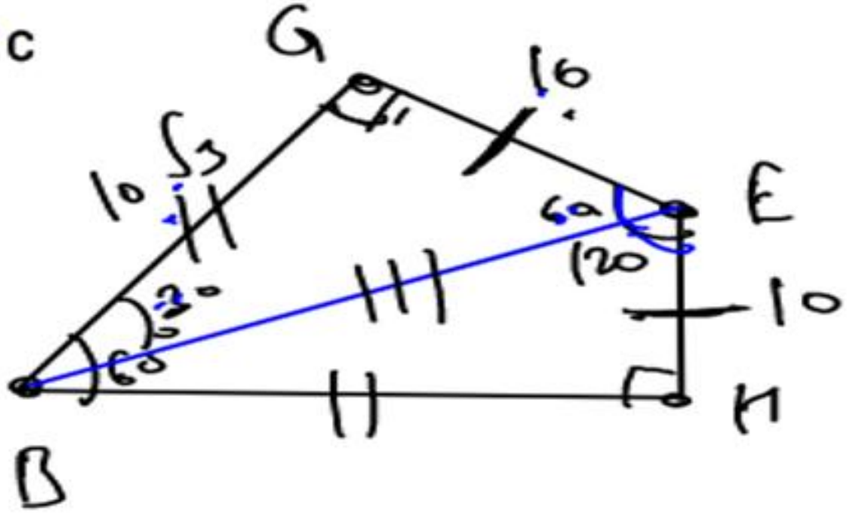
Find the side of equilateral Δ.

V. Imp

PYQ of SSC

$S = 40 + 20\sqrt{3}$

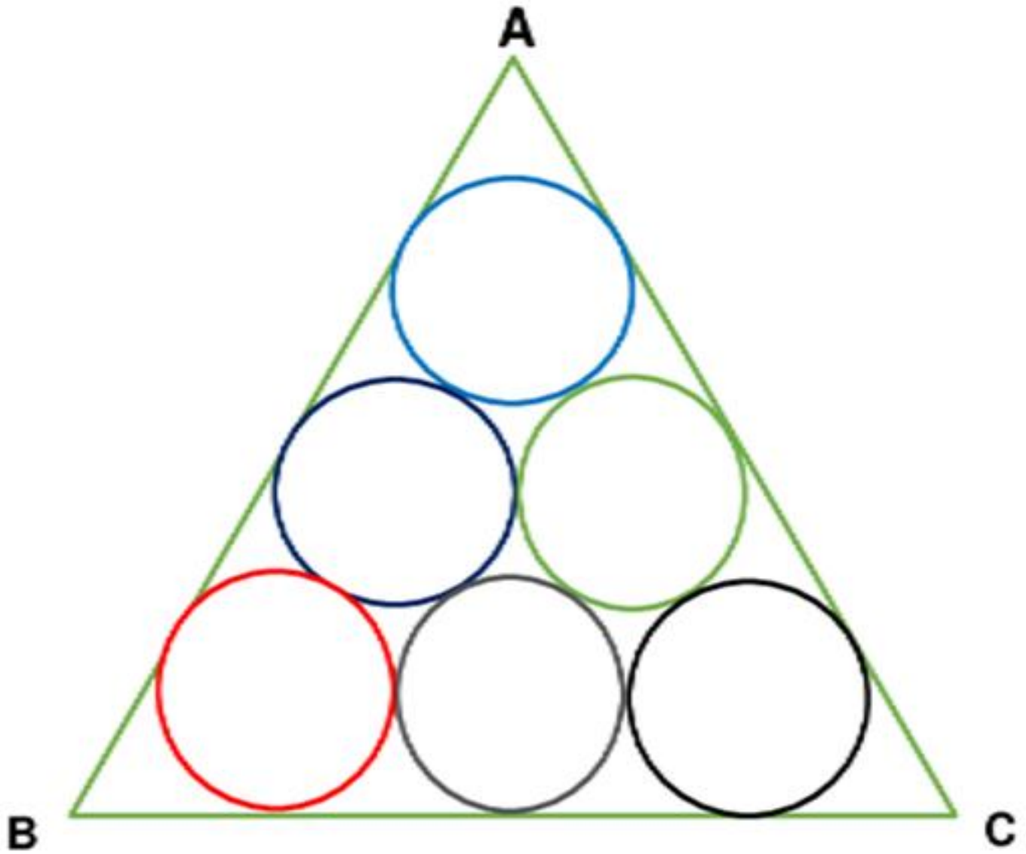
GB = FA (Symmetricity)

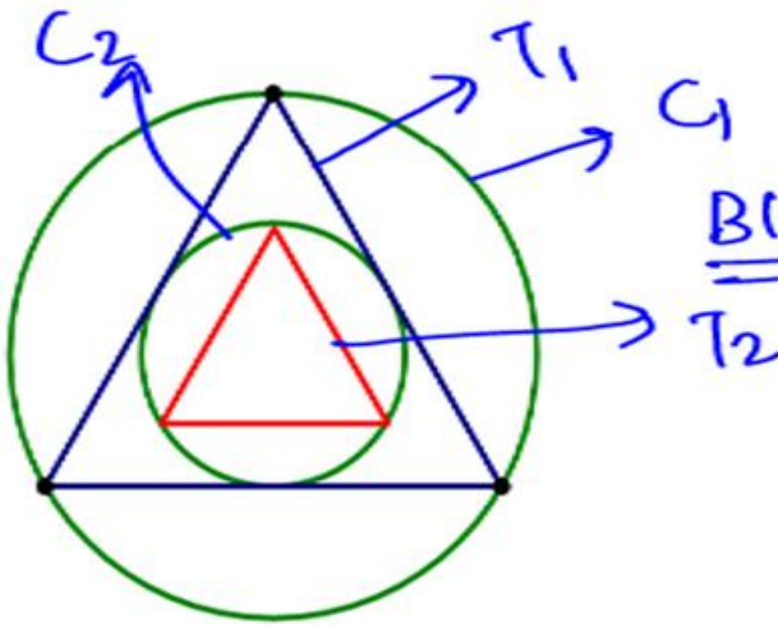


ΔGEB ~ HEB

30 – 60 – 90

1 : √3 : 2


A
B
C



Equilateral Δ

Blue Triangle → side S

If r = inradius

R = circumradius

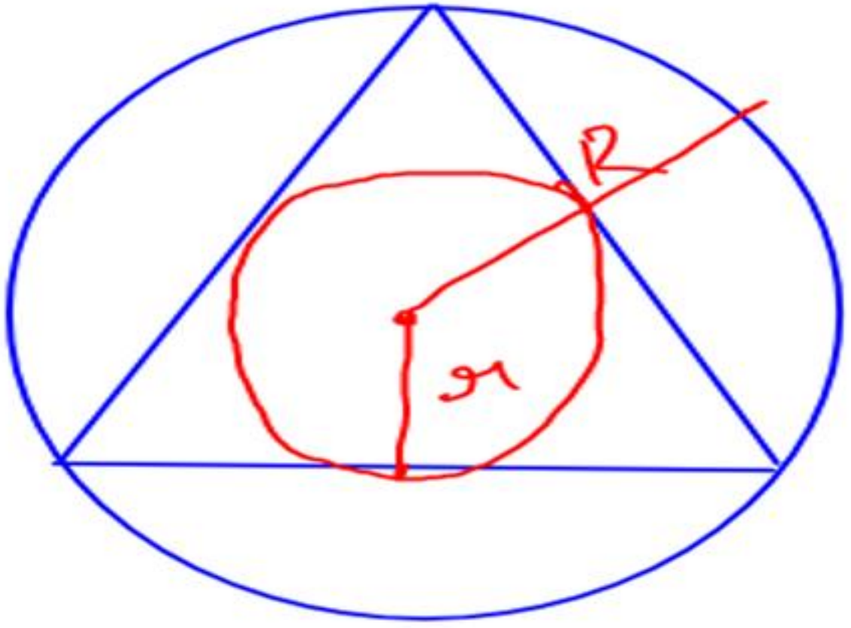
S = Side of equilateral triangle

$$\frac{r_2}{r_1} = \frac{1}{2}$$

radius of $C_2 = \frac{S}{2\sqrt{3}}$

radius of $C_1 = \frac{S}{\sqrt{3}}$

$$\frac{\text{Side of } \Delta T_2}{\text{Side of } \Delta T_1} = \frac{1}{2}$$



If side of eq Δ = 12cm

$r = ?? \quad \frac{12}{2\sqrt{3}} = 2\sqrt{3}$

$R = ??$

$\frac{12}{\sqrt{3}} = 4\sqrt{3}$

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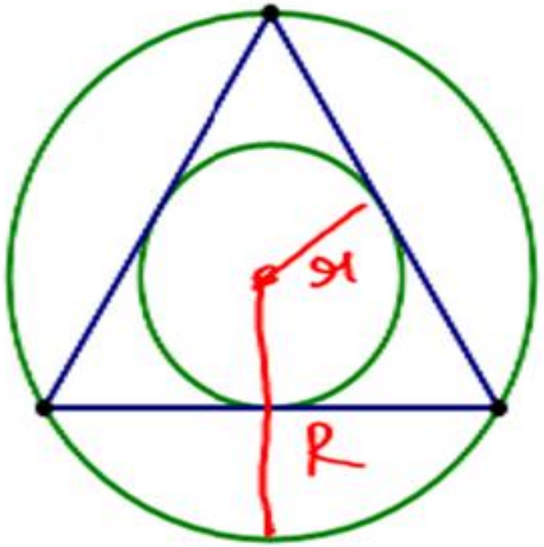


Equilateral Δ

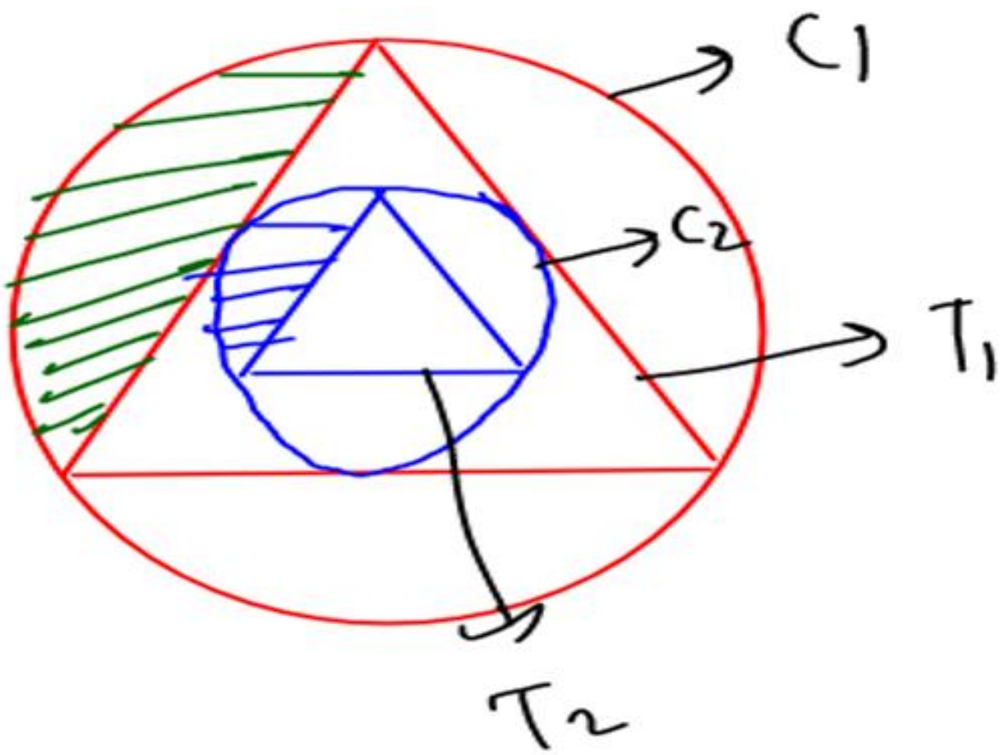
(i) Find : $\frac{r}{R}$ → $\frac{1}{2}$

(ii) $\frac{\text{Area of incircle}}{\text{Area of circumcircle}}$ → $\frac{1}{4}$

(iii) Find the ratio of r : S : R

$\frac{S}{2\sqrt{3}} : S : \frac{S}{\sqrt{3}}$

$1 : 2\sqrt{3} : 2$



$$\frac{\text{radius of } C_1}{\text{radius of } C_2} = \frac{2}{1}$$

$$\frac{\text{side of } T_1}{\text{side of } T_2} = \frac{2}{1}$$

$$\frac{\text{Green shaded}}{\text{Blue shaded}} = \frac{4}{1}$$

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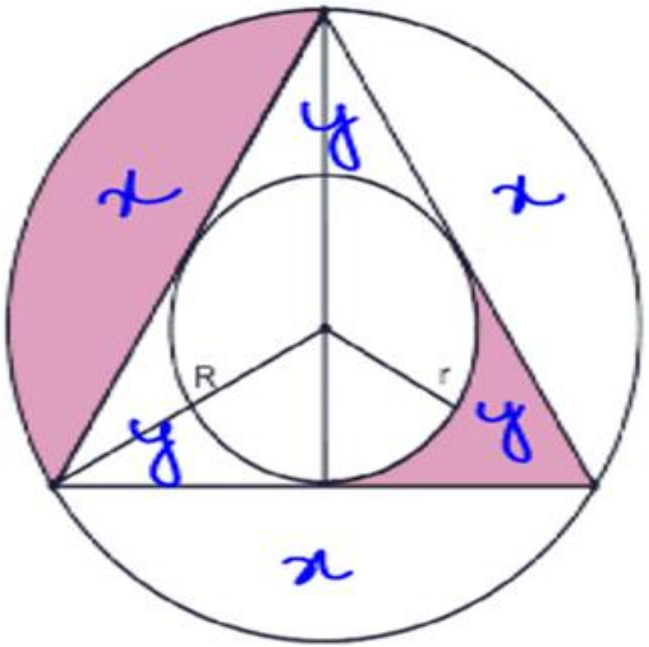
Eg. If side of an equilateral triangle is 12 cm. Find the area of shaded region.

Time 90sec



$x + y = ??$

$3x =$ Area of Bigger Circle − Area of Eq Δ — (1)

$3y =$ Area of eq Δ − Area of smaller circle — (2)

(1) + (2)

$3(x+y) = \pi R^2 - \pi r^2$

$3(x+y) = \pi (4\sqrt{3})^2 - \pi (2\sqrt{3})^2$

$3(x+y) = 36\pi$

$x + y = 12\pi$

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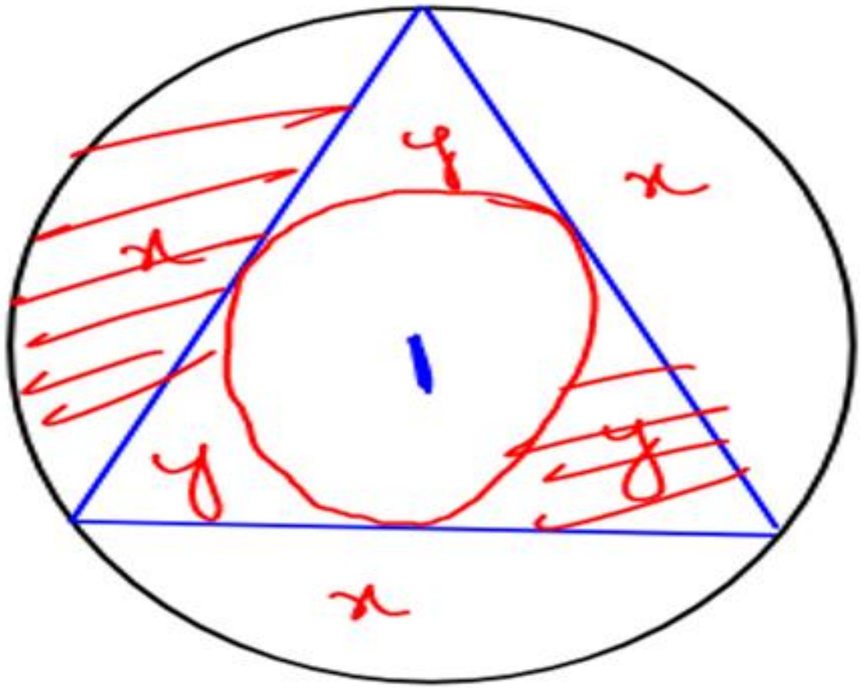
Ans. 12 π

$S = 12cm$

$x + y$



let Area of smaller circle → 1 unit

Area of Bigger circle → 4 unit

$1 + 3y + 3x = 4$

$x + y = 1$

$\pi \cdot r^2$

$\pi \left(\frac{12}{2\sqrt{3}}\right)^2 = 12\pi$

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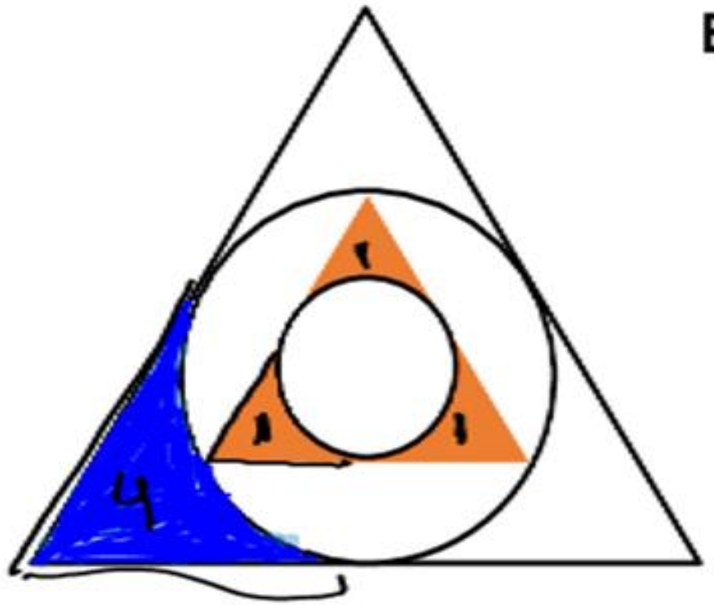
Equilateral Δ



Eg. Find : $\frac{\textit{Area of Orange region}}{\textit{Area of Blue region}}$ = $\frac{3}{4}$

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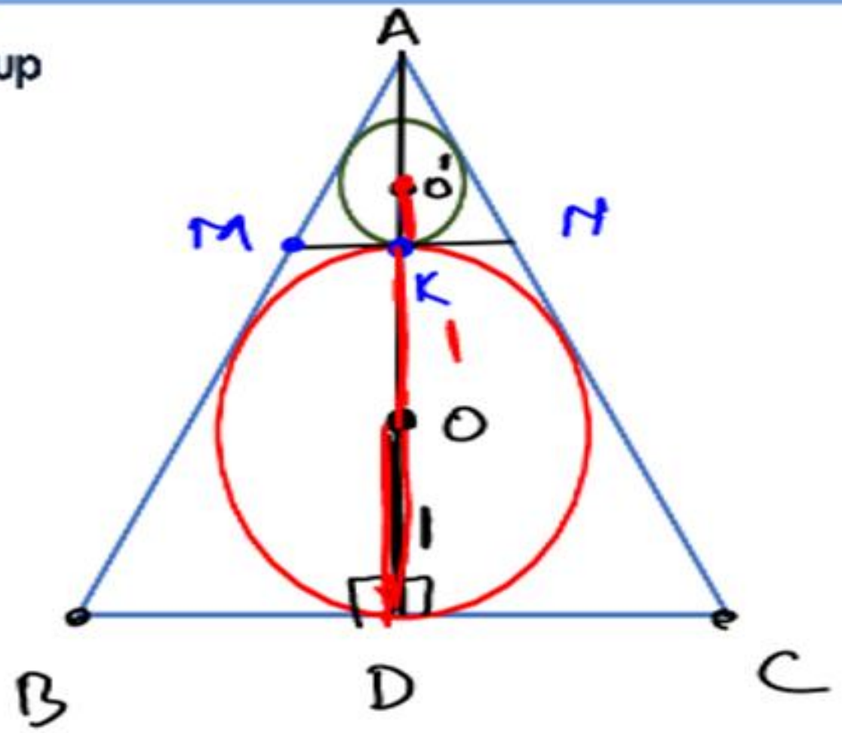
Ans. 3 : 4



Equilateral Δ

Eg. Find : $\frac{r}{R}$

$= \frac{1}{3}$

V. imp

O → Centroid ΔABC

$\frac{AO}{OD} = \frac{2}{1}$

If OD = 1, OK = 1

AK = 1 AO' = 2/3 O'K = 1/3

$\frac{O'K}{OK} = \frac{1/3}{1} = \frac{1}{3}$

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Ans. 1 : 3

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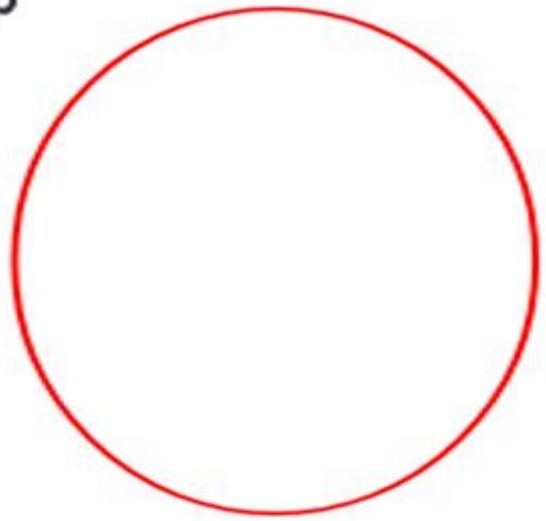

Area of Circle $\rightarrow \pi R^2$

Area of Circle $\propto R^2$

$\propto$ (Diameter)^2

	C_1	C_2
Radius	3	5
Area	9	25

	C_1	C_2
Diameter	3	5
Area	9	25

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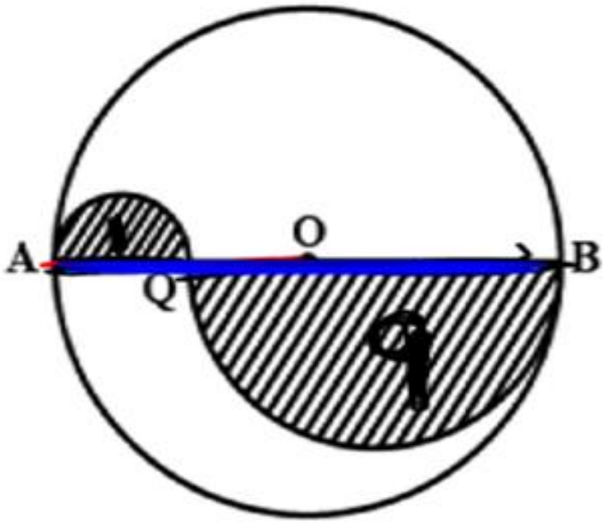

Diameter of bigger circle (AB) = 12 cm

If AQ = QO and O is centre of the bigger circle

Semi-circles are drawn taking AQ and QB as diameter as shown in the figure.

Find : $\frac{\textit{Area of shaded part}}{\textit{Area of complete circle}}$ = $\frac{10\ 5}{32\ 16}$

If AO = 1 QO = 1 OB = 2

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Ans. 5 : 16

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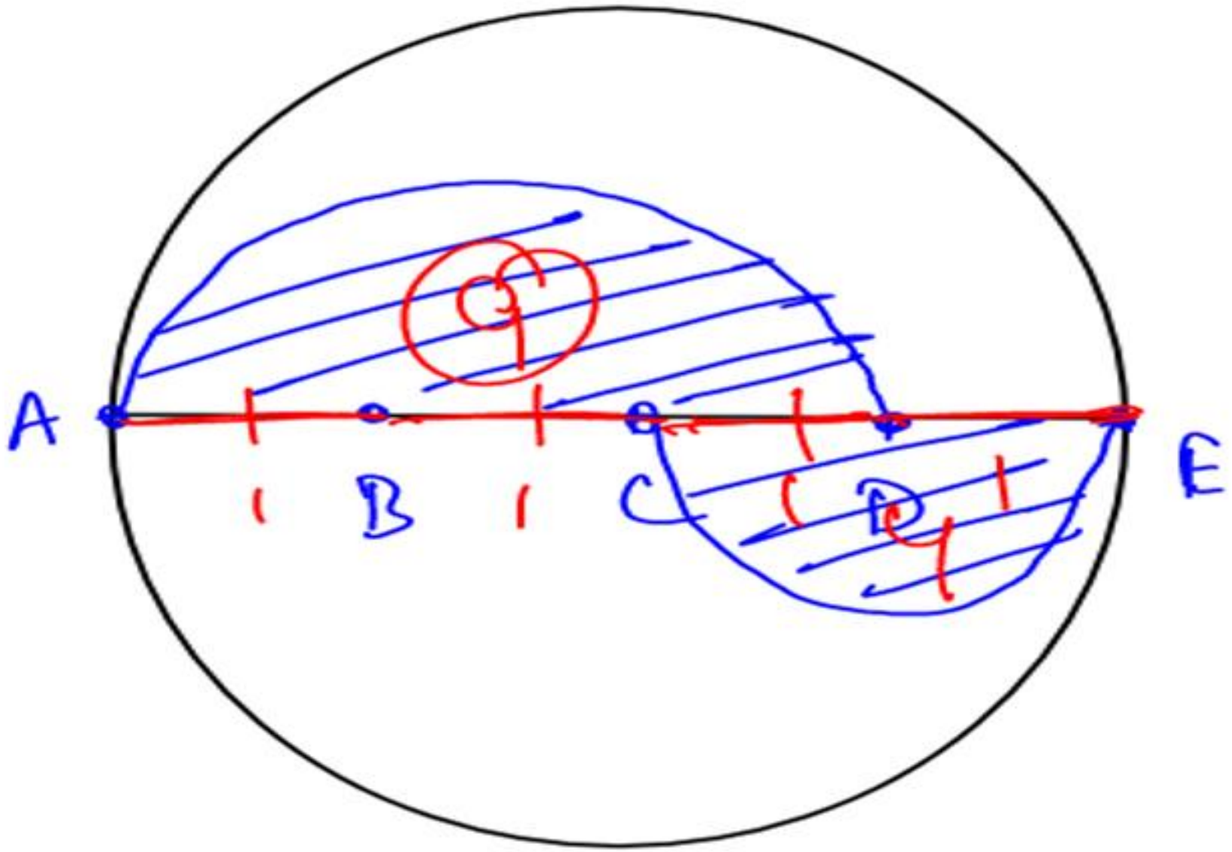

AB = BC = CD = DE

$$\frac{\text{Area of shaded}}{\text{Area of Complete Circle}} = \frac{13}{32}$$

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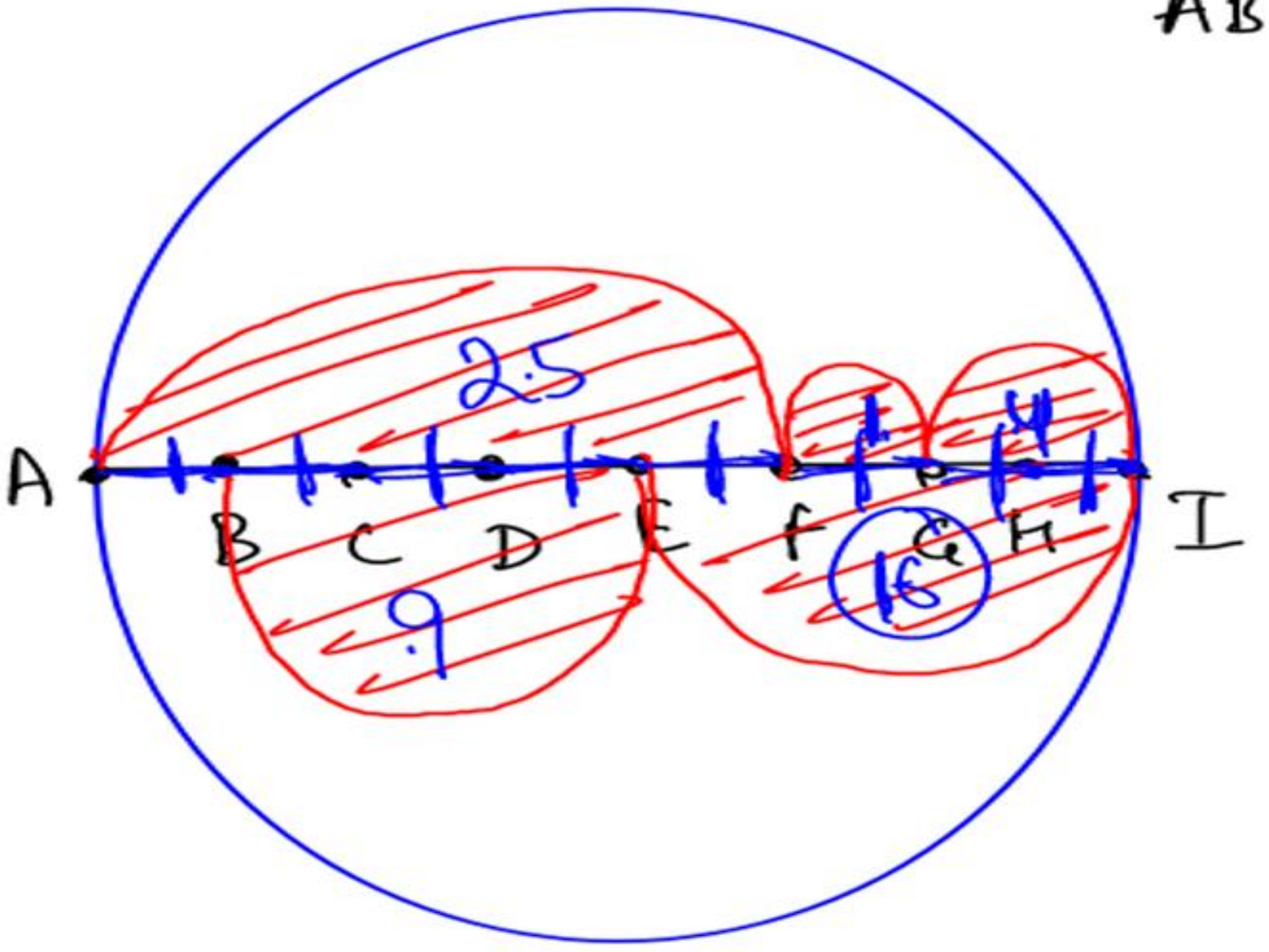
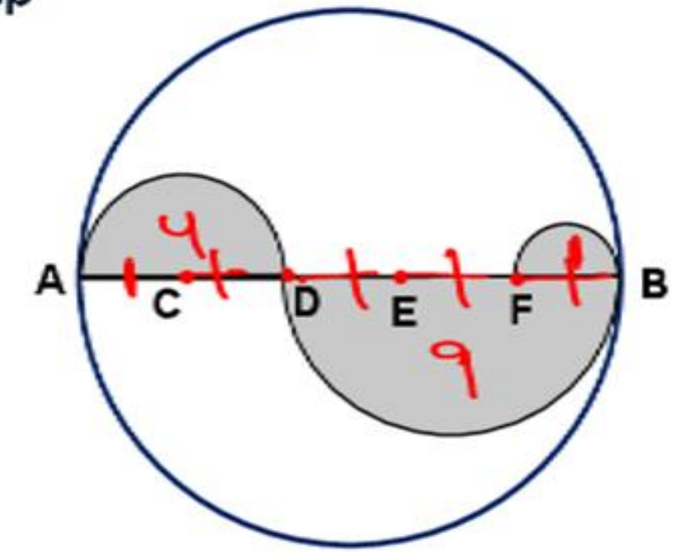
$AB = BC = CD = DE = EF = FG = GH = HI$



$$\frac{\text{Shaded Part}}{\text{Complete Circle}} = \frac{55}{128}$$



AB = Diameter of bigger circle

AC = CD = DE = EF = FB

Find : $\frac{\textit{Area of shaded part}}{\textit{Area of complete circle}}$ = $\frac{14 + 7}{50}$ 25

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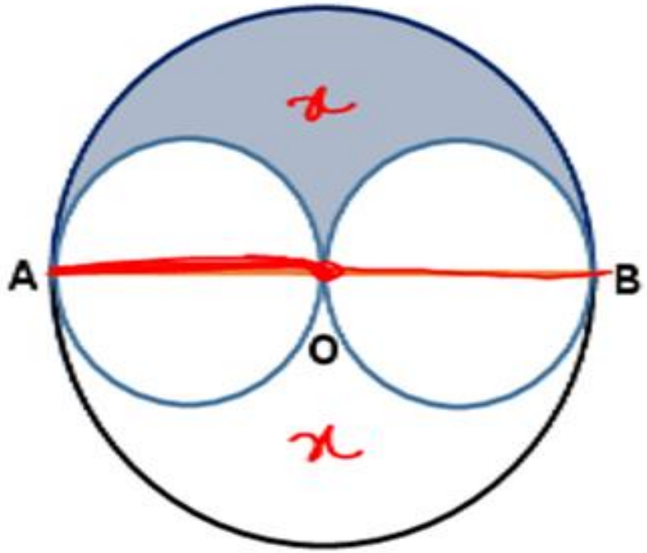
Ans. 7 : 25



Eg. O is centre of larger circle.

AB is diameter

AB = 20 cm

Find the area of shaded part.

$2x =$ Area of Bigger circle $-$ 2 Area of smaller circle

$2x = \pi(10)^2 - 2(\pi 5^2)$

$2x = 50\pi$

$$x = 25\pi$$

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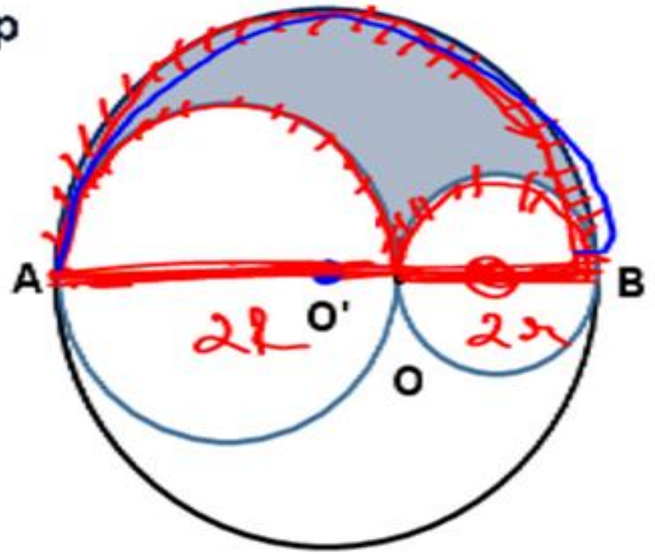
Ans. 25π



O' is the centre of the larger circle

AB = 20 cm

AO and OB are diameters of smaller circle

(i) Find the area of shaded region.

(ii) Find circumference of shaded region.

$2r + 2R = 20$

$r + R = 10$

(i) → Can't be determined b/c we don't know the value of Radius of smaller circles.

(ii) $\pi \cdot 10 + \pi \cdot r + \pi \cdot R$

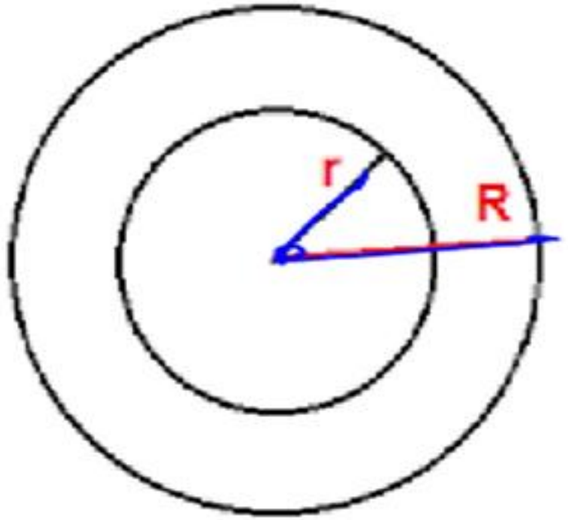
$10\pi + \pi(R + r)$

$10\pi + \pi(10) = \underline{\underline{20\pi \text{ cm}}}$

Ans. (i) Can't be determined

(ii) 20π

CONCENTRIC CIRCLES



Circles with the same centre.

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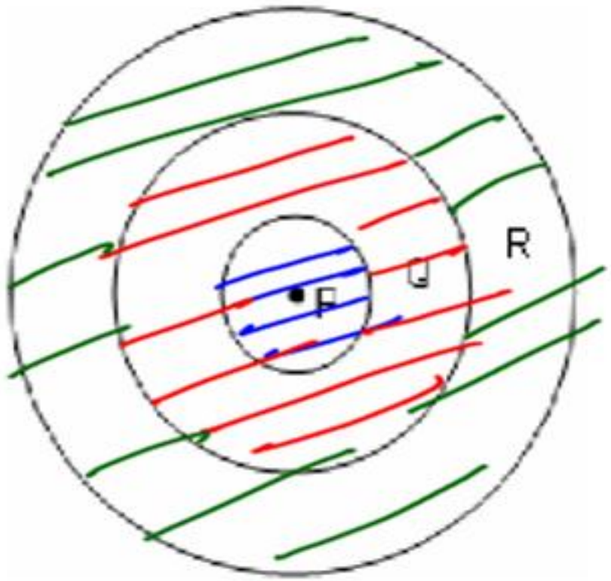

Radius of circles are in the ratio 1 : 2 : 3

Find the ratio of areas of region P : Q : R

Blue Red Green

P Q R

Area of circles → P : P+Q : P+Q+R

1 : 4 : 9

P Q R

1 : 3 : 5

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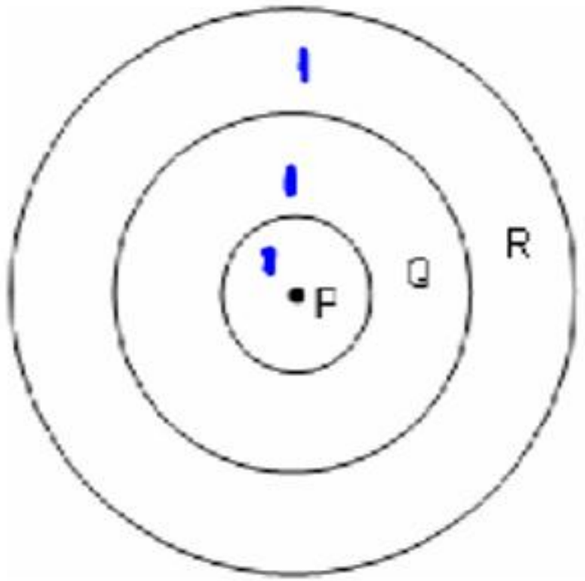
If area of region P, Q and R are equal and radius of the largest circle is 12 cm.

Find the radius of the smallest circle.



$$\frac{\text{Area of smallest circle}}{\text{Area of biggest circle}} = \frac{1}{3}$$

$$\frac{\text{radius of smallest circle}}{\text{radius of largest circle}} = \frac{1}{\sqrt{3}}$$

$$\frac{r}{12} = \frac{1}{\sqrt{3}} \qquad r = 4\sqrt{3}$$

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Ans. $4\sqrt{3}$

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Eg. If radius of a circle is reduced by n, then its area becomes half of its original area. Find the original radius of circle in terms of n.

	Radius	Area
Original	R	2
New	R − n	1

$$\frac{R}{R-n} = \frac{\sqrt{2}}{1}$$

$$R = \sqrt{2}R - \sqrt{2}n$$

$$R(\sqrt{2}-1) = \sqrt{2}n$$

$$R = \frac{\sqrt{2}n}{\sqrt{2}-1}$$

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Ans. $R = \dfrac{\sqrt{2}n}{\sqrt{2}-1}$

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REGULAR POLYGON

Area of a regular polygon of n sides where length of each side is a

$$Area = \frac{na^2}{4}\cot\left(\frac{180}{n}\right)$$