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Sahi Prep Hai Toh Life Set Hai

MENSURATION-2D

Part - 4

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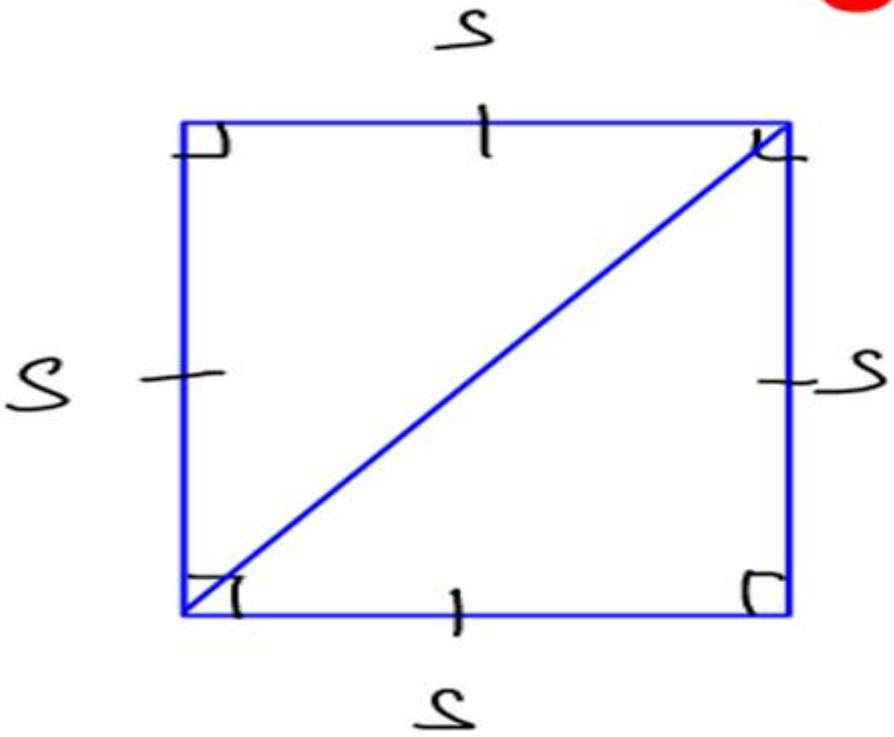
Agenda

- Squares
- Squares with circle

→ (85-90) min

SQUARE



Perimeter = $4S$

(D) Diagonal = $\sqrt{2} \cdot S$

Area = S^2

or

$\frac{(D)^2}{2}$

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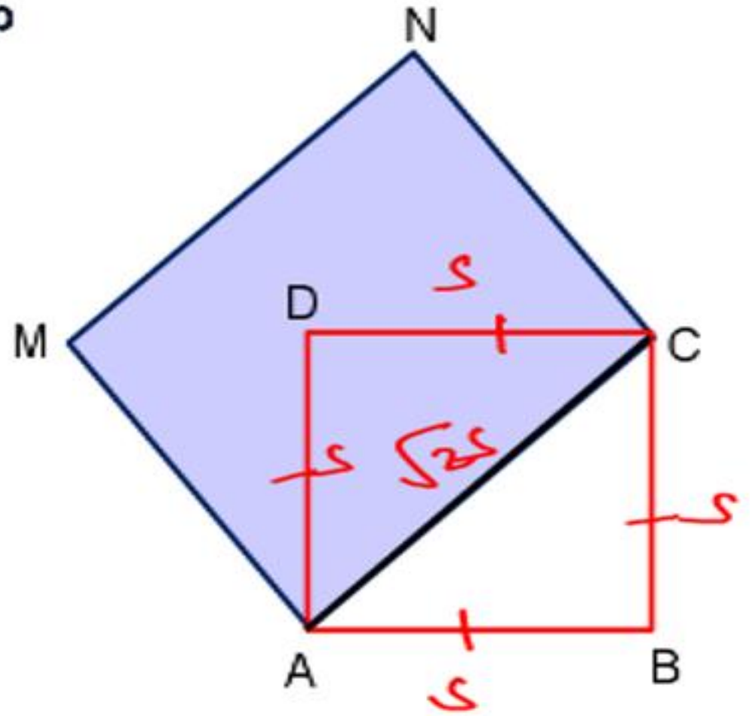
Perimeter $= 4s$

Area $= s^2$

Perimeter $\propto s$

Area $\propto s^2$

	s_1	:	s_2
Sides	3	:	4
Perimeter	3	:	4
Area	9	:	16



Q1. Find : $\dfrac{\textbf{Area of ACMN}}{\textbf{Area of ABCD}}$

$$\Rightarrow \frac{2s^2}{s^2} = \frac{2}{1}$$

ABCD → Square

ACNM → Square

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Ans. 2 : 1

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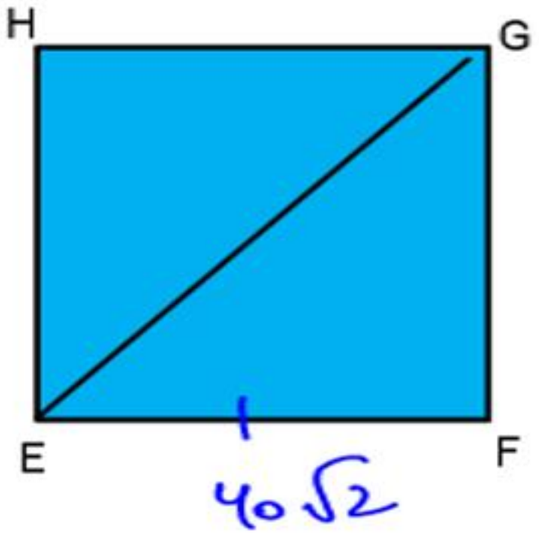
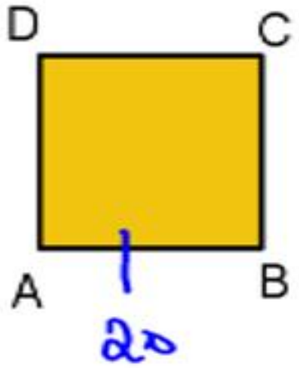
Q2. If area of square EFGH = 8 x Area of square ABCD
If AB = 20 cm, find EG.





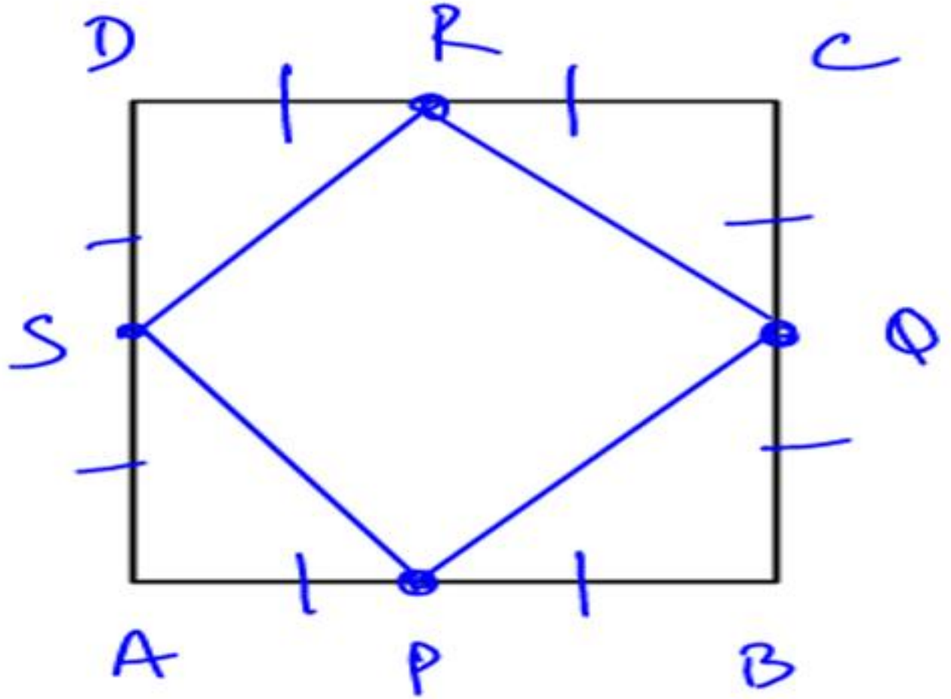
Area $\longrightarrow$ $8 : 1$

side $\longrightarrow$ $2\sqrt{2} : 1$

$EF = 40\sqrt{2}$

$EG = \sqrt{2}(40\sqrt{2})$

$= 80$ cm



Given

ABCD is a Square

P, Q, R & S are mid pts of AB, BC, CD & DA

Then

PQRS ⟶ Square

$$\text{Area of } PQRS = \frac{1}{2} \text{ area of } ABCD$$

$$\text{side of } PQRS = \frac{1}{\sqrt{2}} \text{ side of } ABCD$$

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Sum of Infinite GP $= \frac{a}{1-r}$

$a \rightarrow$ first Term

$r \rightarrow$ common Ratio

$0 < r < 1$

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Ans. 80 cm

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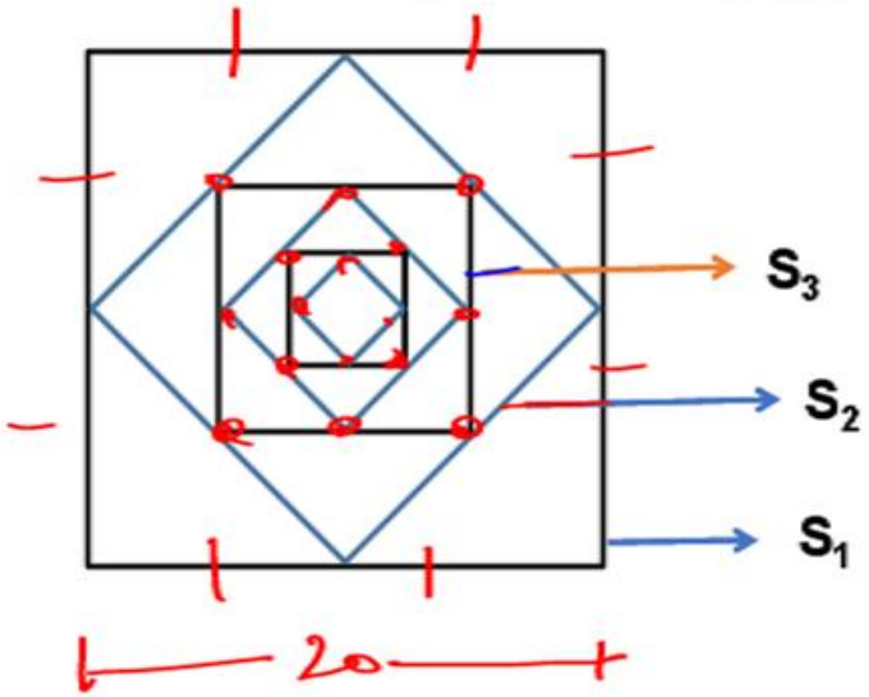
Q3. If side of S_1 = 20 cm



(i) $\frac{\text{Area of } S_6}{\text{Area of } S_3} = \frac{1}{8}$

(ii) $\frac{\text{Perimeter of } S_{18}}{\text{Perimeter of } S_{25}} = \frac{(\sqrt{2})^7}{1} = 8\sqrt{2}$

(iii) Area of $(S_1 + S_2 \ldots\ldots\ldots S_\infty)$

(iv) Perimeter of $(S_1 + S_2 \ldots\ldots\ldots S_\infty)$

Perimeter →

Side → $\sqrt{2}$

(iii) $\frac{400}{1-\frac{1}{2}} = 800\ cm^2$

(iv) $\frac{80}{1-\frac{1}{\sqrt{2}}} \Rightarrow \left(\frac{80\sqrt{2}}{\sqrt{2}-1}\right) cm$

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Ans.

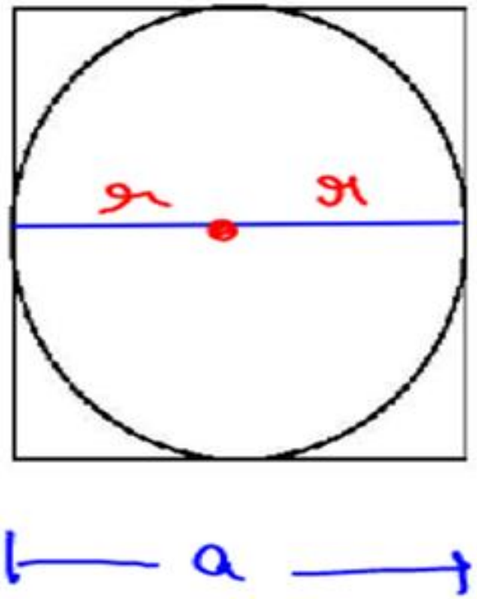
(i) 1 : 8

(ii) $8\sqrt{2}$: 1

(iii) 800

(iv) $\frac{80\sqrt{2}}{\sqrt{2}-1}$

CIRCLE INSCRIBED IN A SQUARE



Diameter of Circle = Side of Square

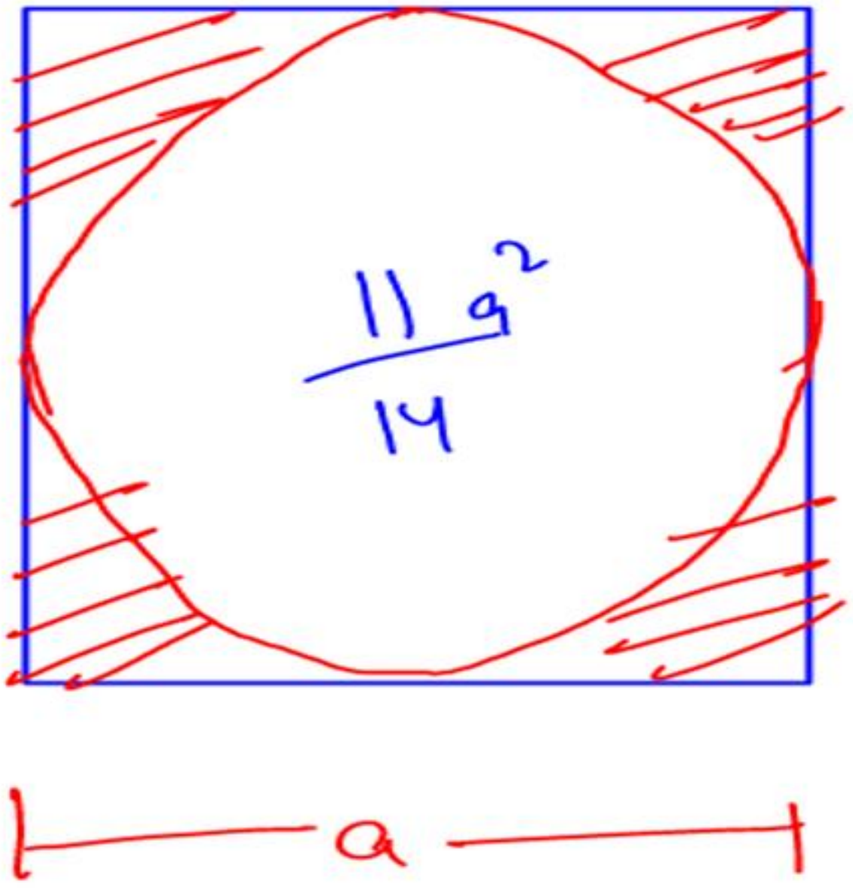
$$2r = a$$

$$r = \frac{a}{2}$$

Area of circle $\Rightarrow \pi r^2$

$\Rightarrow \frac{22}{7}\left(\frac{a}{2}\right)^2$

$\Rightarrow \frac{11\cancel{22}}{\cancel{28}\ 14}a^2$



Area of square

$= a^2$

Shaded Part

$= a^2 - \frac{11}{14}a^2$

$= \frac{3}{14}a^2$

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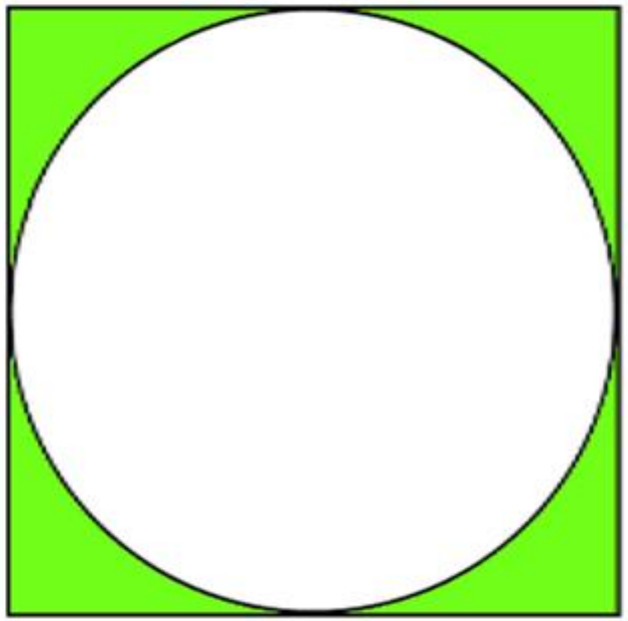
Q4(i). If side of square is 14 cm, find the shaded area.



Shaded Area → $\frac{3}{14} \times (14)^2$

$= 42 \text{ cm}^2$

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Ans. 42 cm^2

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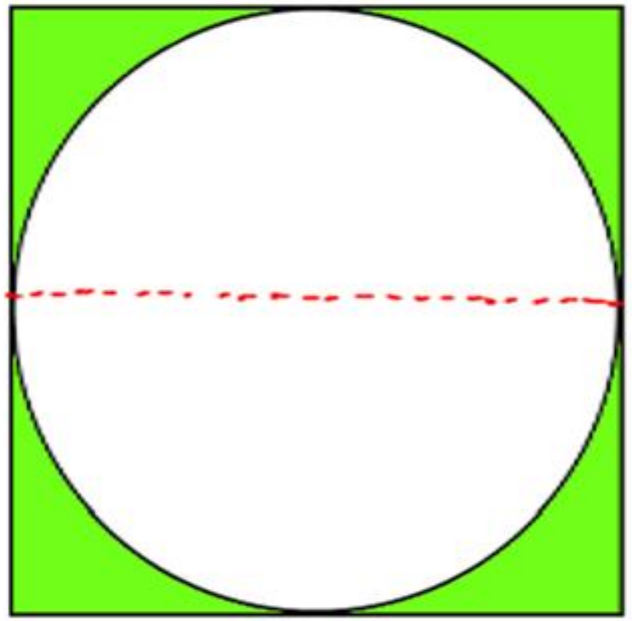
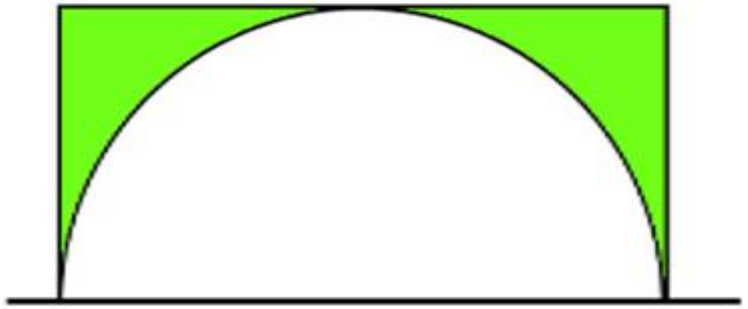
Q4(ii).





$$\frac{\text{Area of Shaded Region}}{\text{Area of Complete Figure}} = \frac{3}{14}$$

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Ans. 3 : 14

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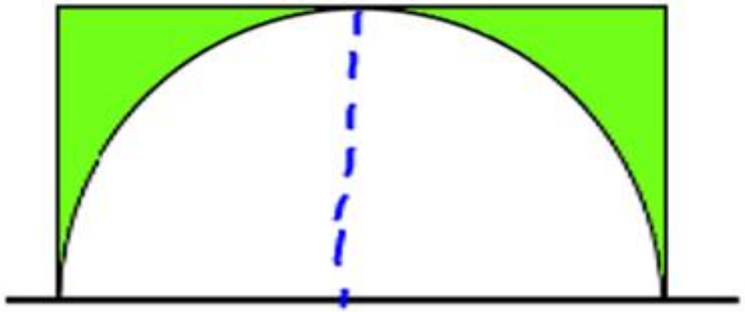
Q4(iii).

$$\text{Area of } \frac{\text{Shaded Region}}{\text{Complete Figure}} = \frac{3}{14}$$



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Ans. 3 : 14

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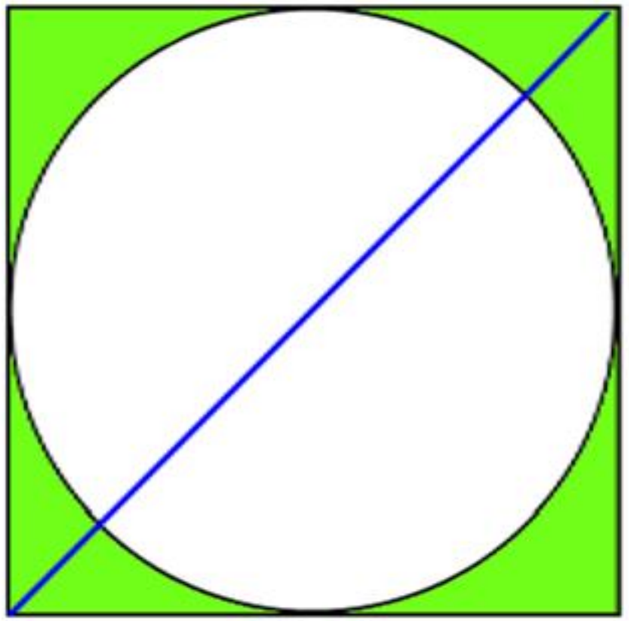
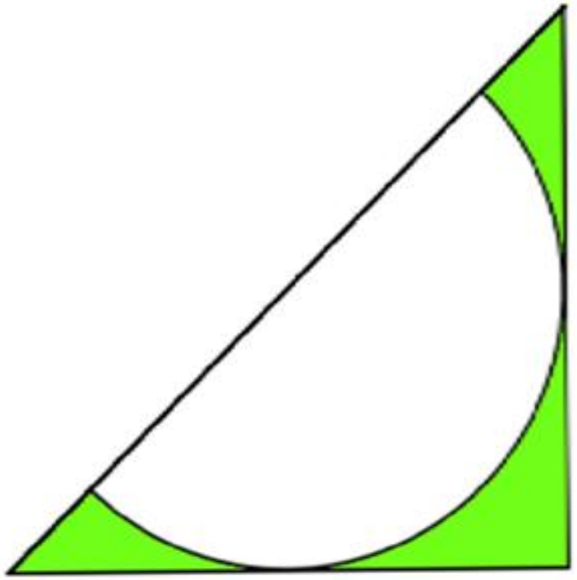
Q4(iv).





$$\text{Area} \frac{\text{Shaded Region}}{\text{Area Complete Figure}} = \frac{3}{(4}$$

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Ans. 3 : 14

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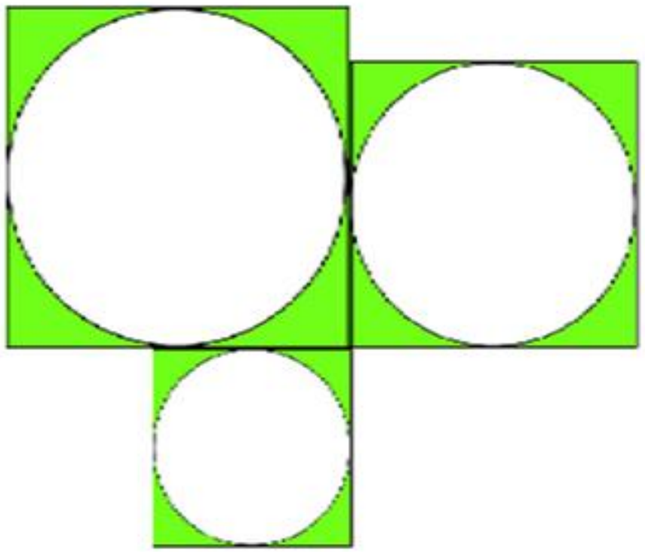
Q4(v).



$$\frac{\text{Shaded Region}}{\text{Complete Figure}} = \frac{3}{14}$$

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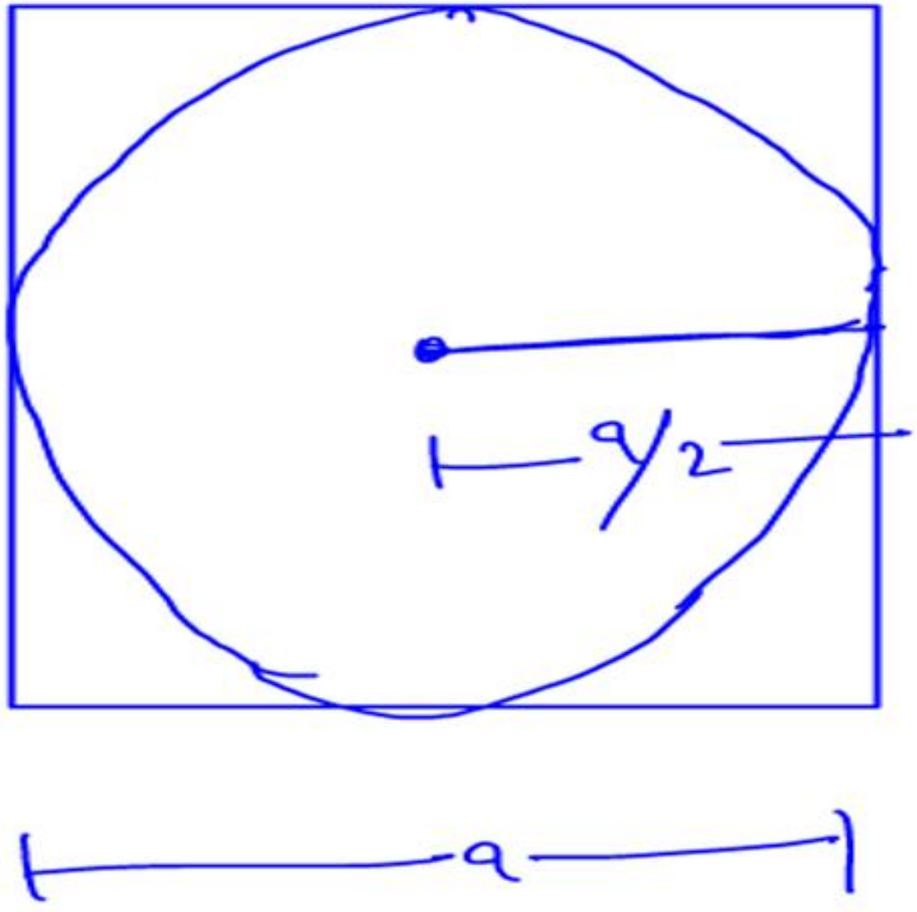
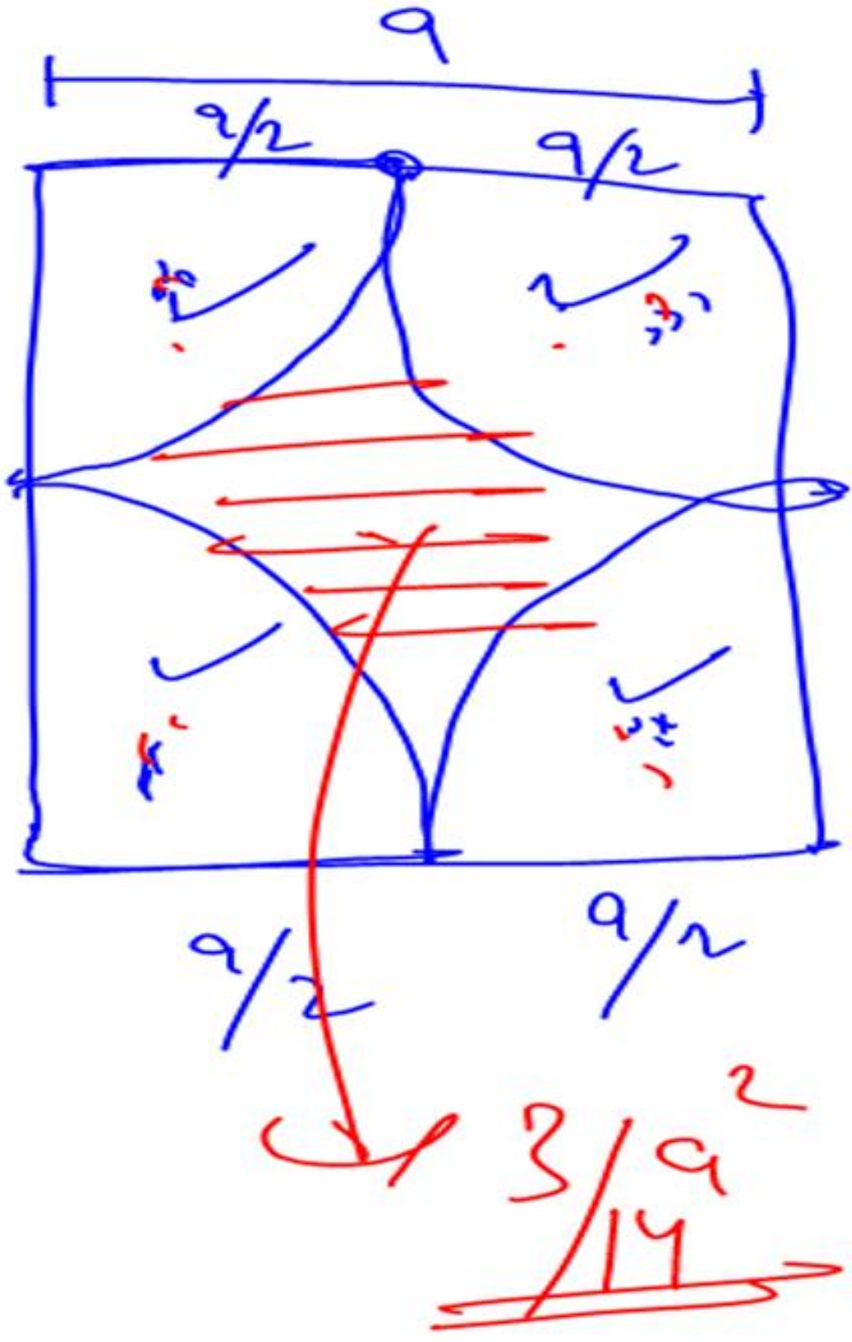
Ans. 3 : 14


a/2
a


a
a/2
a/2
a/2
a/2
3/16 a²

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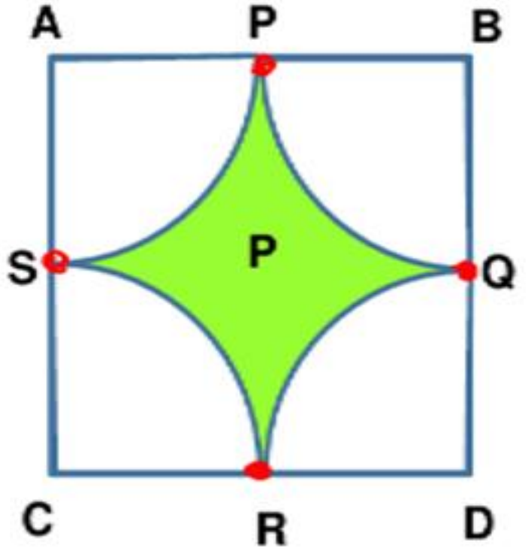
Q4(vi).



$$\text{Area}\ \frac{\text{Shaded Region}}{\text{Complete Figure}} = \frac{3}{14}$$

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Ans. 3 : 14

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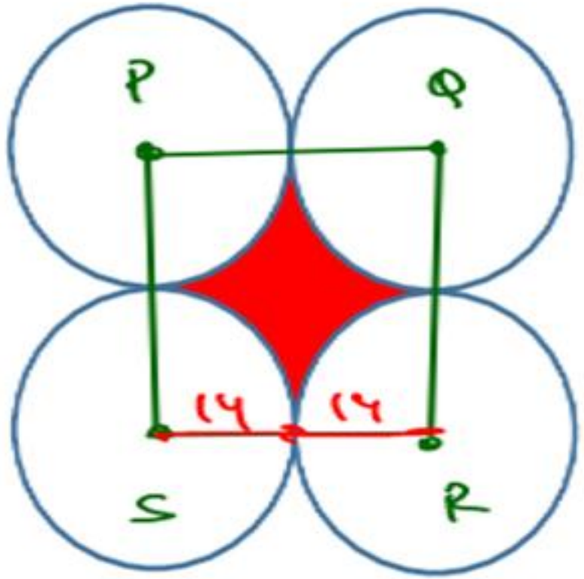

Q4(vii). If radius of all the circles is 14 cm, Find the area of the shaded region.

Sol^{n} PQRS → Square of side 28

Area of shaded Part

$$\rightarrow \frac{3}{14} \times 28 \cdot 28$$

$$\rightarrow 168\ cm^2$$

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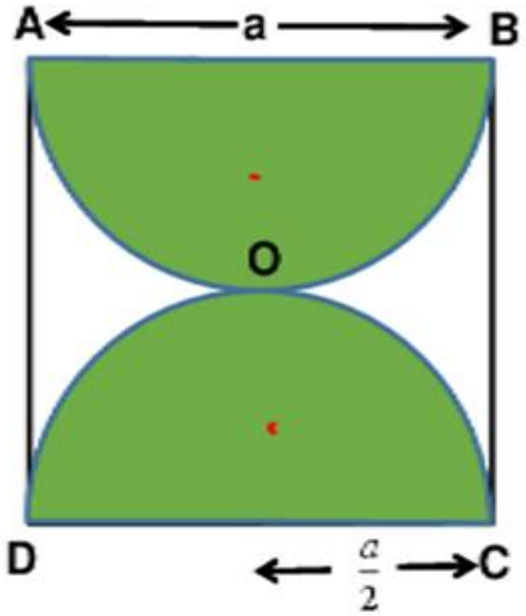
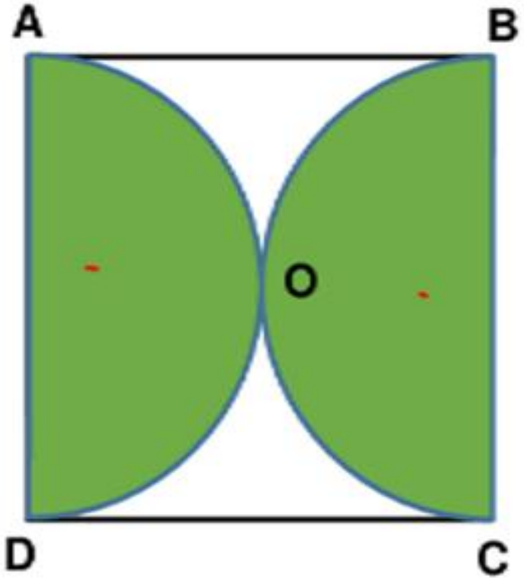
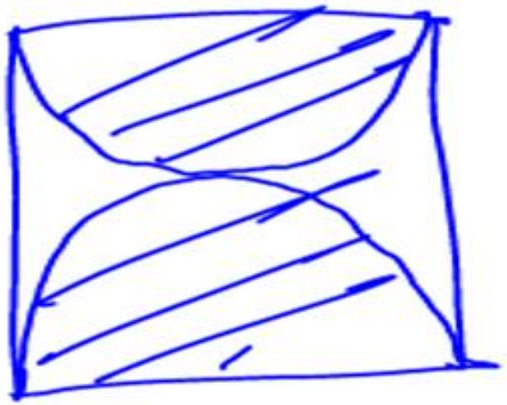
Ans. 168 cm^2





Q4(viii). $\dfrac{\text{Shaded Region}}{\text{Complete Figure}} = \dfrac{11}{14}$



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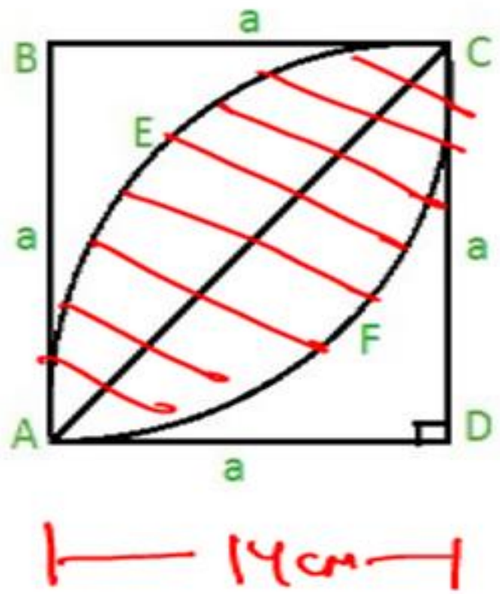
Ans. 11 : 14

LEAF BASED QUESTIONS



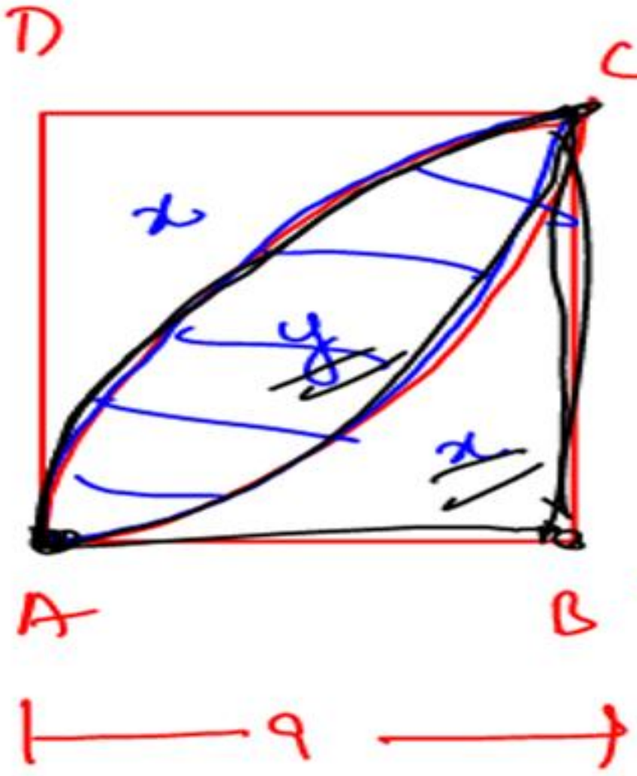
Q4(ix). ABCD is a square whose side is a,

a = 14 cm

Find the area of the leaf.

$$\frac{4}{7} \times 14 \times 14^{2}$$

$$112\ cm^{2}$$



I^st

Square → 2x + y × 1

Area of Quad → x + y × 2

Area of leaf → (2 × Area of Quad) − Area of Square

$$2 \times \left[\frac{\pi \cdot a^2}{4 \cdot 2}\right] - a^2$$

$$\frac{11}{7}a^2 - a^2 = \frac{4}{7}a^2$$

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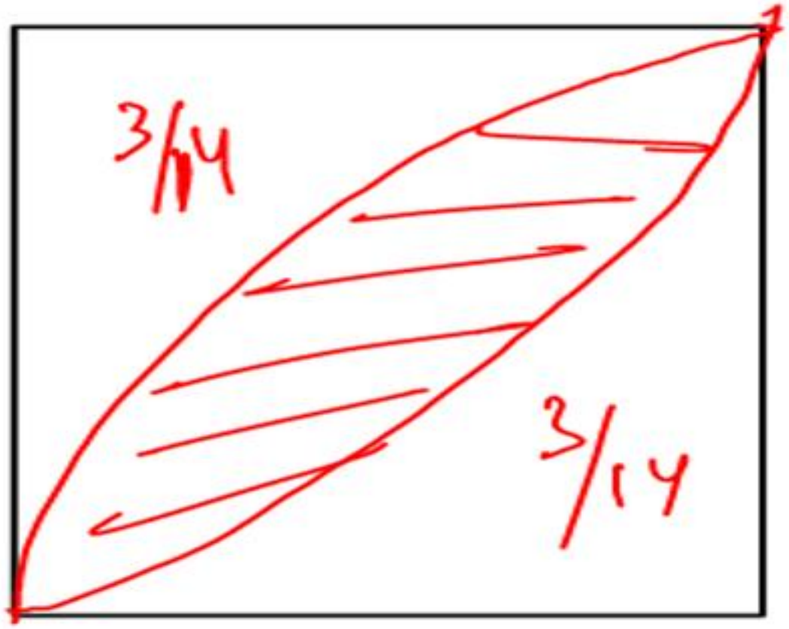
II nd Better Approach



Leaf

$\rightarrow 1 - \frac{3}{14} - \frac{3}{14}$

$\rightarrow \frac{8}{14} \frac{4}{7}$

Area of Leaf $\rightarrow \frac{4}{7} a^2$

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Ans. 112 cm^2

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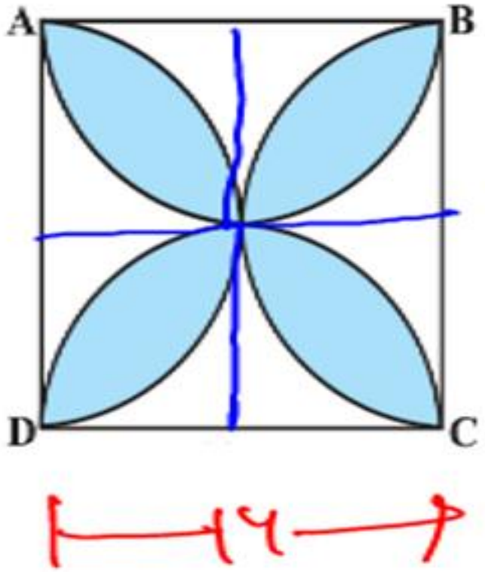
Q4(x). ABCD is a square whose side is 14 cm, Find the area of the shaded region.



Shade Area $= \frac{4}{7} a^2$

$\frac{4}{7} \times 14 \times 14$

112 cm^2

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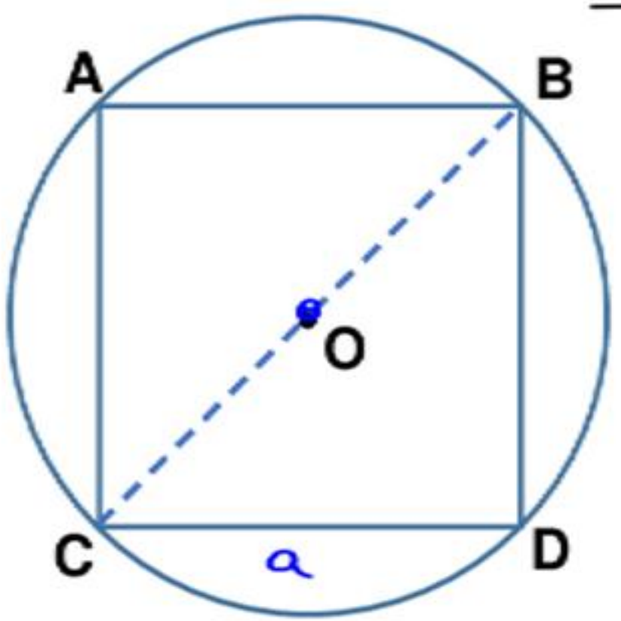
Ans. 112 cm^2

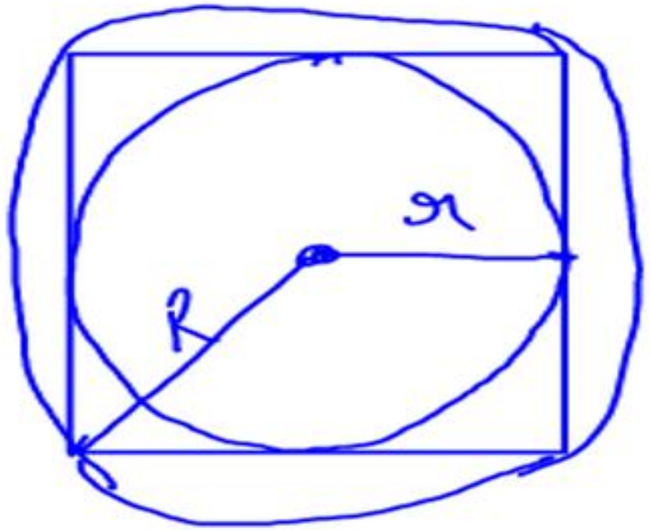
SQUARE INSCRIBED IN A CIRCLE



Diameter of circle = Diagonal of square

$$2R = \sqrt{2}a$$

$$R = \frac{a}{\sqrt{2}}$$

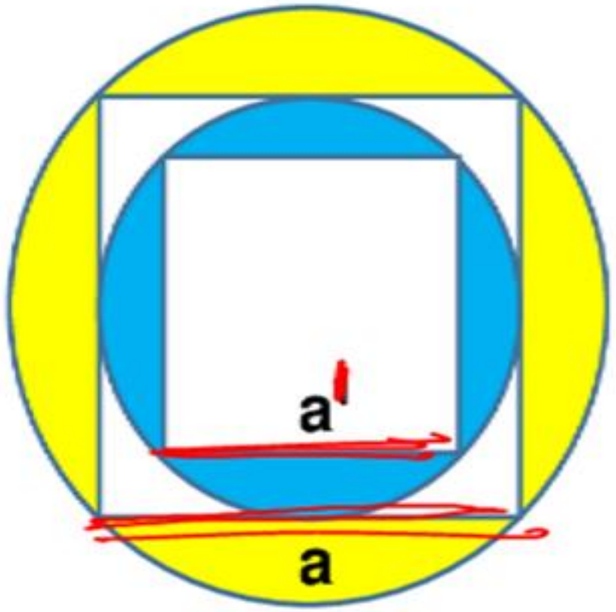


$$r = \frac{a}{2}$$

$$R = \frac{a}{\sqrt{2}}$$

$$\frac{\text{Inradius of square}}{\text{Circumradius of square}} = \frac{1}{\sqrt{2}}$$

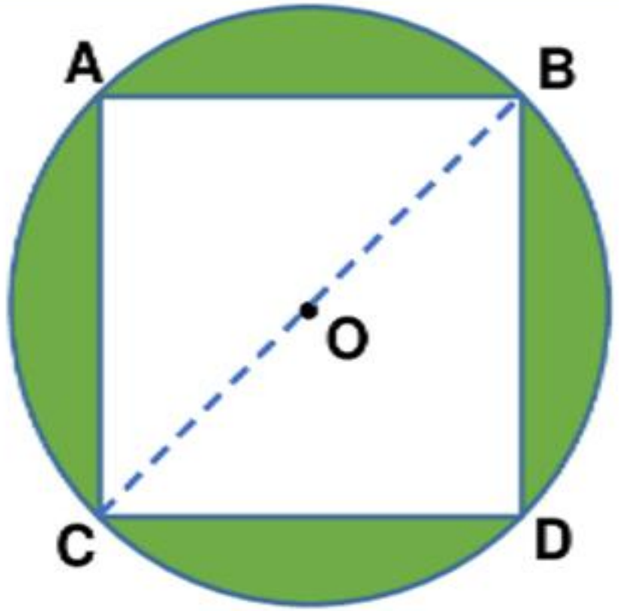
$$\frac{\text{Area of incircle}}{\text{Area of circumcircle}} = \frac{1}{2}$$



$$r = \frac{a}{2} \qquad R = \frac{a}{\sqrt{2}}$$

$$\frac{r}{R} = \frac{1}{\sqrt{2}}$$

$$\frac{a'}{a} = \frac{1}{\sqrt{2}}$$



Q5(i). Find the area of the largest square that can be drawn inside a circle of radius R.