

Circles and Squares

T1

This diagram shows a circle with one square inside and one square outside.

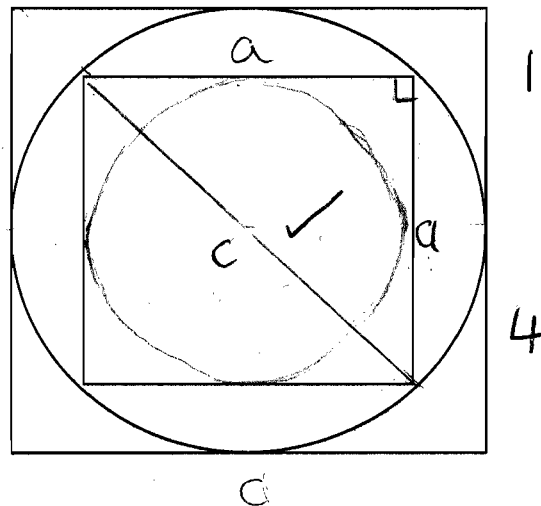
1. What is the ratio of the areas of the two squares?

Show your work

1:2 ✓

$c^2 = a^2 + a^2$ pythagorean theorem
 $c^2 = 2a^2$
 → smaller square = a^2 ✓
 larger square = c^2 ✓

$\frac{1}{2}$



2. If a second circle is inscribed inside the smaller square, what is the ratio of the areas of the two circles? Explain your reasoning.

1:2 ✓

$c^2 = 2a^2$

Smaller circle = $\pi (\frac{1}{2}a)^2$ ✓

larger circle = $\pi (\frac{1}{2}c)^2$ ✓

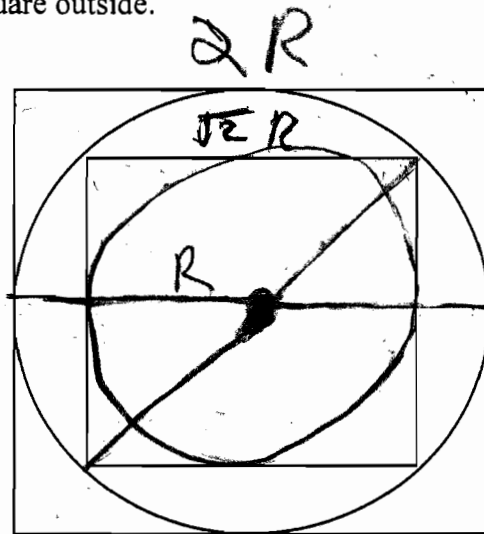
$\frac{\pi (0.25)(a^2)}{\pi (0.25)(c^2)} = \frac{a^2}{c^2} = \frac{1}{2}$ ✓

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Show your work

2:1 ✓

$$\begin{aligned} \wedge \\ (2R)^2 &= 4R^2 \\ 4R^2 &= 4R^2 \\ 2R^2 &= R^2 \\ \sqrt{2}R &= R \end{aligned}$$



$$\begin{aligned} (\sqrt{2}R)^2 &: 4R^2 \\ 2R^2 &: 4R^2 \end{aligned} \quad (3)$$

2. If a second circle is inscribed inside the smaller square, what is the ratio of the areas of the two circles? Explain your reasoning.

2:1 ✓

$$\wedge \left(\frac{\sqrt{2}R}{2} \right)^2 \pi : R^2 \pi$$

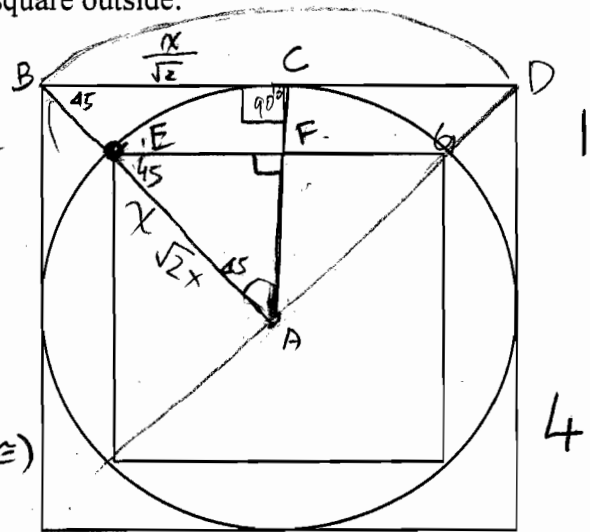
$$\frac{2R^2}{4} \pi : R^2 \pi$$

$$\cancel{R^2} \pi : \cancel{4} R^2 \pi$$

$$1:2$$

(3)

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1. What is the ratio of the areas of the two squares?
Show your work

2:1 ✓

Suppose $AB = x$

draw $AC \perp BD$ so $\angle CAB$ is 45°

therefore $\angle ABC$ is 45° ✓

$\triangle ABC$ is special $45-45-90 \triangle$ ✓

$BC = \frac{x}{\sqrt{2}}$, as is CA (square) and AE (radii \cong)

$BD = \frac{2x}{\sqrt{2}}$

area big square = $(\frac{2x}{\sqrt{2}})^2 = \frac{4x^2}{2} = 2x^2$ ✓

since $AE = \frac{x}{\sqrt{2}}$, EF and $FA = \frac{x}{2}$ (special $45-45-90 \triangle$)

$EG = 2(\frac{x}{2}) = x$

area small square = $(x)^2 = x^2$ ✓

$\frac{2x^2}{x^2} = \frac{2}{1}$

2. If a second circle is inscribed inside the smaller square, what is the ratio of the areas of the two circles? Explain your reasoning.

πr^2 - area of a circle

2:1 ✓

Big circle \rightarrow radius

$\pi (\frac{x}{\sqrt{2}})^2$

$\pi (\frac{x^2}{2})$ ✓

Small circle

$AF \cong EF$ (square)

$\pi (\frac{x}{2})^2$ - radius

$\pi (\frac{x^2}{4})$ ✓

$\frac{x^2}{2} : \frac{x^2}{4}$

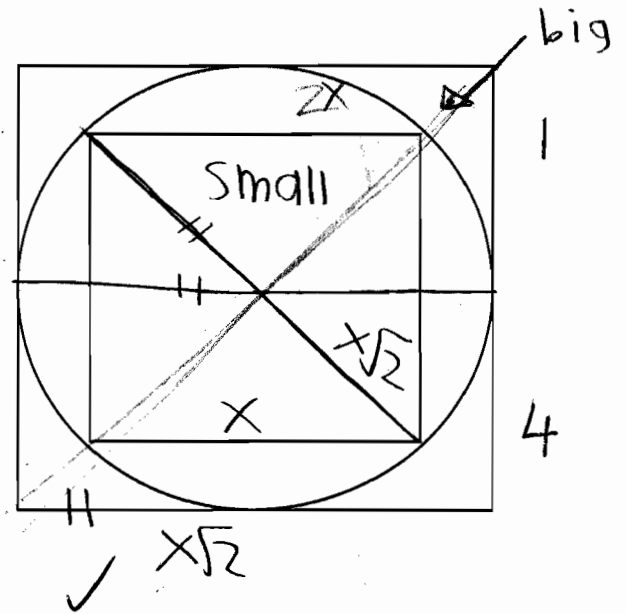
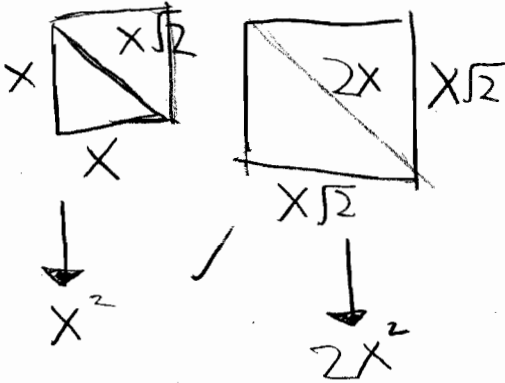
$x^2 : \frac{x^2}{2}$ ✓

2:1 the large circles area is 2 time larger than the small circles

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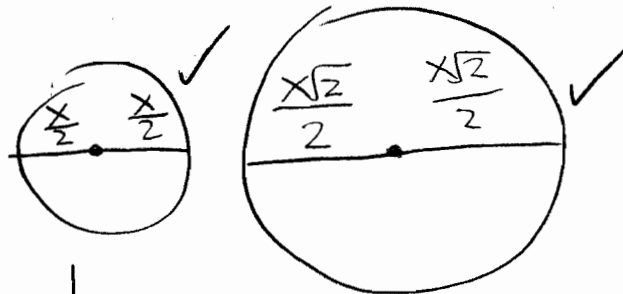
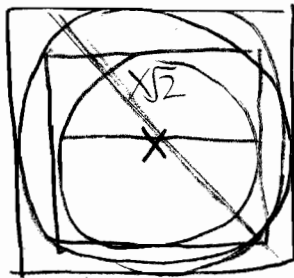
1. What is the ratio of the areas of the two squares?
Show your work

Small:big → (1:2) ✓



2. If a second circle is inscribed inside the smaller square, what is the ratio of the areas of the two circles? Explain your reasoning.

Small:big → 1:√2 × 0



(2)

$$\frac{x}{2} \times \frac{x\sqrt{2}}{2} = \frac{x^2\sqrt{2}}{4}$$

$$\frac{x^2\sqrt{2}}{4} \div \frac{x^2}{4} = \sqrt{2}$$

Small : big

1 : √2

This diagram shows a circle with one square inside and one square outside.

1. What is the ratio of the areas of the two squares?

Show your work

2:1 ✓

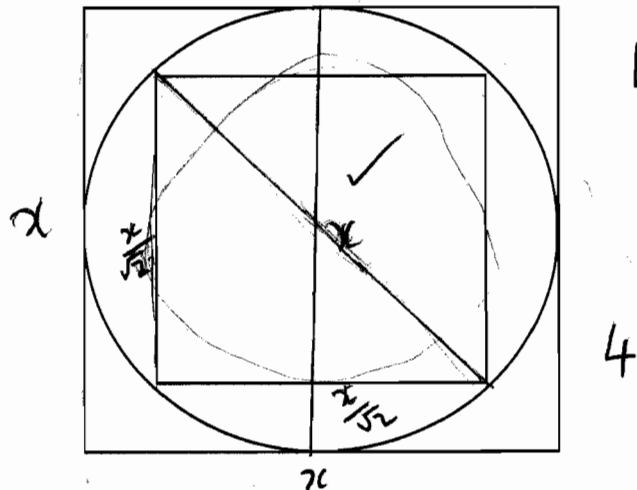
length & width of big square = x

diagonal of square = x

length & width of small square = $\frac{x}{\sqrt{2}}$ ✓

$x^2 : \frac{x^2}{2}$ ✓

$\frac{x^2 \times 2}{x^2 \times 2} : \frac{2x^2}{x^2} = \frac{2}{1}$



$x^2 : \frac{x^2}{2}$

$\frac{x^2 \times 2}{x^2 \times 2} = \frac{2}{1}$

2. If a second circle is inscribed inside the smaller square, what is the ratio of the areas of the two circles? Explain your reasoning.

2:1 ✓

radius of big circle = $\frac{1}{2}x$

$\frac{x}{\sqrt{2}} \times \frac{1}{2} = \frac{x}{2\sqrt{2}}$ ✓

$\pi \left(\frac{x}{2\sqrt{2}} \right)^2$

area of big circle $\pi \left(\frac{1}{2}x \right)^2$

$\frac{\pi \frac{1}{4}x^2 \times 8}{\pi \frac{x^2}{8} \times 8} = 4$

$\frac{\pi \frac{1}{4}x^2 \times 8}{\pi \frac{x^2}{8} \times 8} = 4$

$\frac{2x^2}{1x^2} = 2$