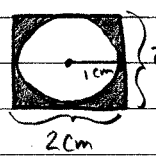


40. If you take a square piece of paper, cut out the largest circle possible then cut out the largest square possible, how does the area of the final square relate to the area of the initial square?

A) Understanding the problem & Guessing: Well, I physically did this to clarify the question being asked. After doing this, the problem became more clear to me. I now understand the importance of making a scale drawing to depict and solve this problem. I predict that in order to find a solution, I will need to use the area formulas for triangles and squares. I would guess that the final, small square has half of the area of the larger square. This would mean that the area of the paper thrown away = $1/2$ of the original square's area.



Computations to find the percentage shaded in the picture:

SQUARE CIRCLE

$$(2)^2 - (1)^2 \pi = \text{shaded area}$$

$$4 - \pi = \text{shaded area}$$

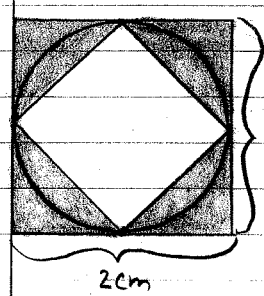
$$\left(\frac{4 - \pi}{4}\right) = \frac{X\%}{100\%} \quad (X = \text{percentage shaded})$$

$$x = 25(4 - \pi) \Rightarrow \text{percentage shaded}$$

If the length of the side of the square is 2 cm, $[25(4 - \pi)]\%$ of the area is shaded in the picture on the previous page.

B) Devising a Plan: To solve this problem, I will draw a picture to represent this problem. I will shade the TOTAL area to be discarded and assign a side length to the diagram. I will then use this along with the area formulas for triangles and squares to find a solution.

C) Carry out The Plan:



Area of one shaded triangle:

$$\frac{1}{2}bh \Rightarrow \frac{1}{2}(1 \cdot 1) = \frac{1}{2} \text{ cm}^2$$

4 triangles = $4 \cdot (\frac{1}{2}) = 2 \text{ cm}^2$

$2 \text{ cm}^2 = \text{total shaded area.}$

Area of entire large square:

$$b \cdot h \Rightarrow (2 \cdot 2) = 4 \text{ cm}^2$$

D) Looking back: Well, my guess was correct. Half of the original paper square was thrown away after making the cuts described in the book. If we began this process with a circle instead of a square, I would guess that the answer would still be the same. Half of the paper circle would be thrown away.

Verify