

Mathematics Problem of the Week

Problem Number: 314

Posted on Tuesday, October 11, 2022

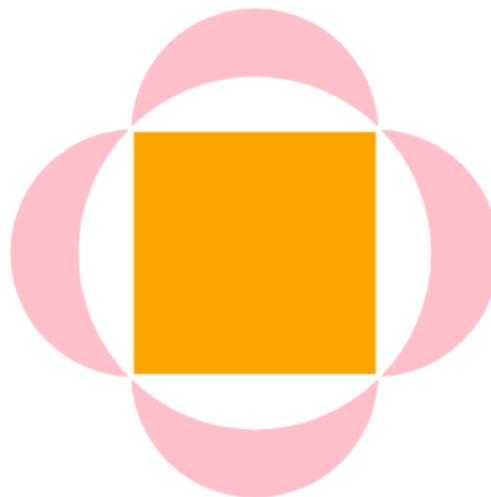
Deadline: Monday, October 17, 2022 at noon

Fun with Shapes

In the following figure:

- A square of side 8 covers parts of a full white circle.
- The white circle covers parts of four pink semi-circles (half circles).

Show that the surface area of the orange square is equal to the surface area of the pink regions.



What You Might Need:

Area of a circle of radius r is πr^2 and area of a square of side s is s^2 .

Submit your answers to mathproblem@kpu.ca

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Solution:

By Pythagorean, since the square is of sides 8, then the diameter of the white circle is $8\sqrt{2}$ which means the radius of the circle is $4\sqrt{2}$. The white regions surface area is then $\pi \times (4\sqrt{2})^2 - 8 \times 8 = 32\pi - 64$.

The surface area of the pink region is:

“area of 4 semicircles (two circles) of radius 4 - area of the white regions”

Thus

$$\text{area} = 2 \times \pi \times 4^2 - (32\pi - 64)$$

$$= 32\pi - 32\pi + 64 = 64$$

which is the same as the area of the orange square.