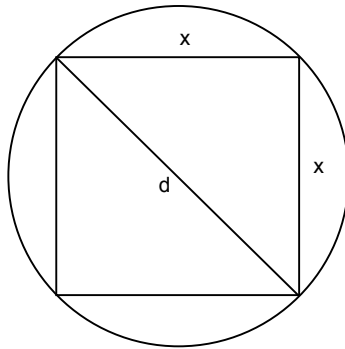

Problem of the Week

Solution Four

A piece of wire 40 inches long is cut into two pieces. One piece is formed into a square, while the other piece is formed into a circle that circumscribes the square. Determine the length of the shorter piece.

SOLUTION: The length of the shorter piece is $\frac{160}{\pi\sqrt{2} + 4}$.

Denote the diameter of the circle by d , and denote the length of a side of the square by x , as shown below:



By the Pythagorean theorem, we have $d = x\sqrt{2}$. By calculating the circumference of the circle (using the formula $C = \pi d$) and the perimeter of the square, we find that

$$x\pi\sqrt{2} + 4x = 40.$$

It follows that:

$$x = \frac{40}{\pi\sqrt{2} + 4}$$

Since the perimeter of the square is plainly smaller than the circumference of the circle, the answer to the problem will be the perimeter of the square, which is $4x$. The answer now follows immediately.