

Mathematics Problem of the Week (233)

This week's winner is:

Gabriele Tregnago

Contact Lin Hammill (Surrey Fir 348) or Judy Bicep (Richmond,3335) for your prize or email MathProblem@kpu.ca.

Submitting correct solutions to problem 233 were:

Stephen Borgen
David Luna

Problem 233 solution:

Since the radius of the inner circle is 1, the sides of the square are 2.

Let x , and s be as in the diagram. The triangle is equilateral so each of its angles is 60° .

Triangle ABC is similar to the 30-60-90 triangle on the right.

$$\text{Thus } \frac{x}{2} = \frac{1}{\sqrt{3}} \Rightarrow x = \frac{2}{\sqrt{3}}.$$

The side of the equilateral triangle is of length s and $s = 2 + 2x$, so $s = 2 + \frac{4}{\sqrt{3}}$.

Since the angles of the large triangle are 60° , angle DEF is 30° and so angle EDF is 60° .

$$\text{Then, by similar triangles, } \frac{r}{s/2} = \frac{2}{\sqrt{3}} \Rightarrow r = \frac{s}{\sqrt{3}} = \frac{2 + \frac{4}{\sqrt{3}}}{\sqrt{3}} = \frac{2\sqrt{3} + 4}{3} \approx 2.488.$$

