

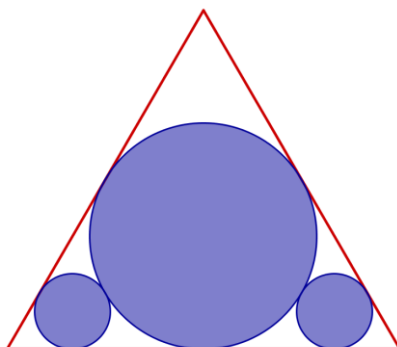
## Maths Item of the Month June 2011

### Circles in a triangle

In an equilateral triangle with side length 1 what is the largest area that can be covered by three non-overlapping circles?

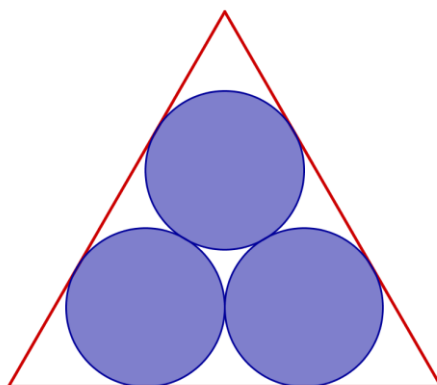
### Solution

The maximum area can be achieved fitting the circle with largest area inside the triangle and then fitting two more in two of the corners:



This gives an area of  $\frac{11\pi}{8}$  or 0.31997703 square units.

This is 1.4% larger than fitting three circles inside the triangle such that each circle is tangent to two sides of the triangle and the other two circles (these are known as Malfatti circles):



This has an area of  $\frac{6-3\sqrt{3}}{8}\pi$  or 0.31567021 square units.

The fact that the Malfatti circles do not give the maximum area was only observed in 1930.

More information on the history of the Malfatti problem and Malfatti circles can be found at: [http://en.wikipedia.org/wiki/Malfatti\\_circles](http://en.wikipedia.org/wiki/Malfatti_circles)