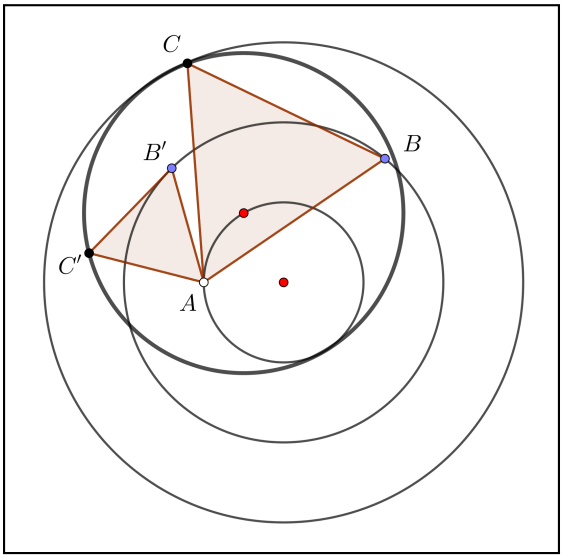
Equilateral Triangle on Three Concentric Circles

#3. Given three concentric circles, construct an equilateral triangle with a vertex on each circle.



Construction. Let the three radii be a, b, c, where $a < b < c$ and $c = a + b$. The image has $a = 1$, $b = 2$, $c = 3$ by way of example. Pick a point A on the inner circle and connect it to a point B on the middle circle. Rotate each such point B by $+\pi/3$ around A to reach point C. As B traverses the middle circle, C traverses another circle, the thick one as pictured. This is because rotations take circles to circles; the rotation also maps the circle centers, pictured in red. The derived circle is the same size as the original one, the middle circle. The derived circle is offset from the inner circle by a, the radius of the inner circle. It follows that the derived circle is tangent to the outer one, shown at point C in the image, and this construction provides the points of an equilateral triangle ABC with vertices on each of the concentric circles when $c = a + b$.

When $c > a+b$, there is no solution possible. When $b < c < a+b$, the outer circle will intersect the derived circle, producing two solutions. **QEF**.

– Mike Bertrand
September 4, 2026