DIVERGING MATHEMATICS

Am I Ready for Advanced Trigonometry?

These questions are meant to help you gauge your readiness for Non-Euclidean Geometry. Getting the correct answers (which are on the last page) is a good, using a method that works in additional cases is better, but understanding *why* is the gold standard, and one that only you can assess. If you need to use technology to answer more than one of these questions, you are probably not a good fit.

1. A triangle has side with $a = 7$, $b = 15$, and $c = 20$. Find the measure of angles A, B, and C.

$$\cos(C) = \frac{a^2 + b^2 - c^2}{2ab}$$

2. Compute $\cos(\pi/12)$ exactly.

3. Suppose $a = 12$, $b = 10$, and $m\angle C = 75°$. Calculate the area of ΔABC exactly.

4. Find all values of θ that satisfy the following equation ($0 \leq \theta < 2\pi$.)

$$\sec(\theta) + \cos(\theta) + 1 = \tan(\theta)\sin(\theta)$$

5. Given an equilateral triangle with side-length 1, what is the side-length of the largest square that can fit inside of it?

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Answers:

1. Using Law of Cosines: $A = \arccos\left(\frac{24}{25}\right)$, $B = \arccos\left(\frac{4}{5}\right)$ and $C = \arccos\left(-\frac{3}{5}\right)$.
2. $\frac{1+\sqrt{3}}{2\sqrt{2}}$
3. $15\sqrt{2}(1+\sqrt{3})$
4. Simplify to $2\cos(\theta) + 1 = 0$, so $\theta = \frac{2\pi}{3}$ and $\frac{4\pi}{3}$.
5. $2\sqrt{3} - 3$