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 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.

1. What is the length of the diagonal of a rectangle with side lengths 6 and 10?

2. Draw both diagonals of a rectangle with side lengths 6 and 10. Find the measure of all angles formed to the nearest degree.

3. Suppose a triangle has side lengths 6 and 10, and form an angle of 120°. What's the length of the 3rd side?

4. Suppose a triangle has side lengths 6 and 10, and one of the angles (not the included angle) is 30°. What are the possible lengths for the 3rd side?

5. Given a circle with diameter 10 and an inscribed angle of 30°, find the measure of the intercepted arc in terms of π.

6. Given a circle with diameter 10, find the area of the sector with measure 72° in terms of π.
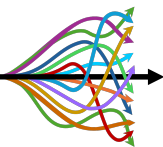
Answers:

1. $2\sqrt{34}$

2. Angles near the vertices are $31°$ and $59°$, angles where the diagonals cross are $62°$ and $118°$.

3. Draw the altitude to the side with length 10 to form a right triangle with base $10 + 3$ and height $3\sqrt{3}$. Third side is 14.

4. If the $30°$ angle is next to the side with length 6, then the altitude to the third side is 3, and it's length is $3\sqrt{3} + \sqrt{91}$. If the $30°$ angle is next to the side with length 10, then the altitude to the third side is 5 and we have the ambiguous case! The third side is $5\sqrt{3} \pm \sqrt{11}$.

5. Radius is 5, central angle is $60° = \frac{\pi}{3}$ rad, so intercepted arc is length $\frac{5\pi}{3}$.

6. Radius is 5, central angle is $72° = \frac{2\pi}{5}$ rad, so area of the sector is 20π.