MBMT Geometry Round − Bernoulli

April 16, 2023

Full Name _____

Student ID Number _____

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

This round consists of **8** questions. You will have **30** minutes to complete the round. Each question is *not* worth the same number of points. Questions answered correctly by fewer competitors will be weighted more heavily. Please write your answers in a reasonably simplified form.

1 If the values of two angles in a triangle are 60 and 75 degrees respectively, what is the measure of the third angle?

2 Square $ABCD$ has side length 1. What is the area of triangle ABC?

3 An equilateral triangle and a square have the same perimeter. If the side length of the equilateral triangle is 8, what is the square's side length?

4 What is the maximum possible number of sides and diagonals of equal length in a quadrilateral?

5 A square of side length 4 is put within a circle such that all 4 corners lie on the circle. What is the diameter of the circle?

6 Patrick is rafting directly across a river 20 meters across at a speed of 5 m/s. The river flows in a direction perpendicular to Patrick's direction at a rate of 12 m/s. When Patrick reaches the shore on the other end of the river, what is the total distance he has traveled?

7 Quadrilateral $ABCD$ has side lengths $AB = 7$, $BC = 15$, $CD = 20$, and $DA = 24$. It has a diagonal length of $BD = 25$. Find the measure, in degrees, of the sum of angles ABC and ADC.

8 What is the largest P such that any rectangle inscribed in an equilateral triangle of side length 1 has a perimeter of at least P?