MBMT Geometry Round — Brahmagupta

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 Bob has a rectangular pie. His pie has a width of 4, and a length of 5. What is the area of his pie?

2 Betty travels 6 parsecs north and 8 parsecs west to get to school. August leaves from the same location as Betty except he travels in a straight line directly to school. How much more distance did Betty travel than August?

3 Linda has a plot of land with an area of 16 square meters. If she wants to create four congruent square pens for her farm animals using all her land, how much fencing will she need in meters?

4 5 congruent squares with side length 2 are packaged together below. The middle square is offset by 45 degrees and is tangent to each of the other squares at the midpoint of each of its sides. Find the distance between the marked corners.

5 In the diagram below, lightly shaded donuts with inner radius 1 and outer radius 2 are connected by a darkly shaded rectangular strip with width 1. Given that the area in the darkly shaded section is the same as the area of the lightly shaded sections put together, find the height of the darkly shaded region.

6 In triangle XYZ, two sides are 5 and 10 units long, and the angle between them is 60 degrees. Find the area of the triangle.

7 In triangle ABC, points D and E lie on sides AB and AC, respectively, such that AD = DE = BE = BC. If $\angle$ BAC = $\angle$ CBE, what is $\angle$ BED in degrees?

8 Arnold the Ant starts at the top of a regular octahedron with side length 2. What is the shortest distance Arnold needs to walk to reach the opposite corner, given that he can only travel along the surface of the octahedron?