

MBMT Geometry Round – Descartes

March 30, 2019

Full Name _____

Team 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 Triangle ABC has $AB = 3$, $BC = 4$, and $\angle B = 90^\circ$. Find the area of triangle ABC .
- _____ 2 Let $ABCDEF$ be a regular hexagon. Given that $AD = 5$, find AB .
- _____ 3 Caroline glues two pentagonal pyramids to the top and bottom of a pentagonal prism so that the pentagonal faces coincide. How many edges does Caroline's figure have?
- _____ 4 The hour hand of a clock is 6 inches long, and the minute hand is 10 inches long. Find the area of the region swept out by the hands from 8:45AM to 9:15AM of a single day, in square inches.
- _____ 5 Circles A , B , and C are all externally tangent, with radii 1, 10, and 100, respectively. What is the radius of the smallest circle entirely containing all three circles?
- _____ 6 Four parallel lines are drawn such that they are equally spaced and pass through the four vertices of a unit square. Find the distance between any two consecutive lines.
- _____ 7 In rectangle $ABCD$, $AB = 2$ and $AD > AB$. Two quarter circles are drawn inside of $ABCD$ with centers at A and C that pass through B and D , respectively. If these two quarter circles are tangent, find the area inside of $ABCD$ that is outside both of the quarter circles.
- _____ 8 Triangle ABC is equilateral. A circle passes through A and is tangent to side BC . It intersects sides AB and AC again at E and F , respectively. If $AE = 10$ and $AF = 11$, find AB .