

MBMT Geometry Round – Cantor

April 7, 2018

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 A circle has circumference 6π . Find the area of this circle.

_____ 2 Points A , B , and C are on a line such that $AB = 6$ and $BC = 11$. Find all possible values of AC .

_____ 3 A trapezoid has area 84 and one base of length 5. If the height is 12, what is the length of the other base?

_____ 4 27 cubes of side length 1 are arranged to form a $3 \times 3 \times 3$ cube. If the corner $1 \times 1 \times 1$ cubes are removed, what fraction of the volume of the big cube is left?

_____ 5 There is a 50-foot tall wall and a 300-foot tall guard tower 50 feet from the wall. What is the minimum a such that a flat "X" drawn on the ground a feet from the side of the wall opposite the guard tower is visible from the top of the guard tower?

_____ 6 Steven's pizzeria makes pizzas in the shape of equilateral triangles. If a pizza with side length 8 inches will feed 2 people, how many people will a pizza of side length of 16 inches feed?

_____ 7 Consider rectangle $ABCD$, with $1 = AB < BC$. The angle bisector of $\angle DAB$ intersects \overline{BC} at E and \overline{DC} at F . If $FE = FD$, find BC .

_____ 8 $\triangle ABC$ is a right triangle with $\angle A = 90^\circ$. Square $ADEF$ is drawn, with D on \overline{AB} , F on \overline{AC} , and E inside $\triangle ABC$. Point G is chosen on \overline{BC} such that EG is perpendicular to BC . Additionally, $DE = EG$. Given that $\angle C = 20^\circ$, find the measure of $\angle BEG$.