

**Time limit:** 15 minutes.

**Instructions:** This tiebreaker contains 3 short answer questions. All answers must be expressed in simplest form unless specified otherwise. You will submit answers to the problem as you solve them, and may solve problems in any order. You will not be informed whether your answer is correct until the end of the tiebreaker. You may submit multiple times for any of the problems, but **only the last submission for a given problem will be graded**. The participant who correctly answers the most problems wins the tiebreaker, with ties broken by the time of the last correct submission.

**No calculators.**

1. Point  $E$  is on side  $CD$  of rectangle  $ABCD$  such that  $\frac{CE}{DE} = \frac{2}{5}$ . If the area of triangle  $BCE$  is 30, what is the area of rectangle  $ABCD$ ?
2. What is the largest possible height of a right cylinder with radius 3 that can fit in a cube with side length 12?
3. A triangle has side lengths of 7, 8, and 9. Find the radius of the largest possible semicircle inscribed in the triangle.