

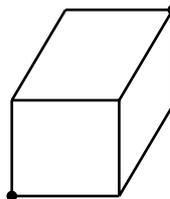


Sponsored by: UGA Math Department, UGA Math Club,
UGA Parents and Families Association

TEAM ROUND / 45 MINUTES

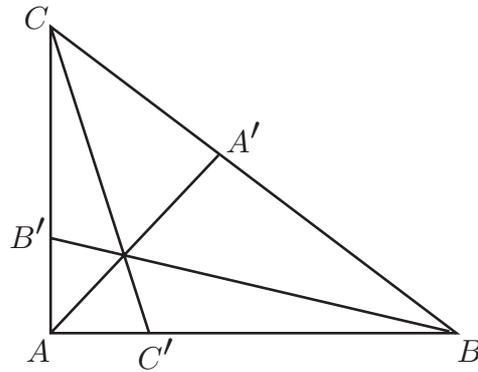
No calculators are allowed on this test. You do not have to provide proofs; only the answers matter. Each problem is worth 50 points, for a total of 200 points.

Problem 1. (Crawling Ant) An ant is crawling on a surface of a rectangular box with sides 9, 10, and 11 cm (see the picture). What is the smallest distance it must crawl to get from one corner to the opposite corner, farthest from the first one?



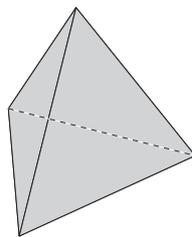
Problem 2. (A triangle problem) In a triangle ABC with right angle A , one has $AB = 4$ and $AC = 3$. On the sides AB , BC and CA the points

C' , A' , and B' are chosen in such a way so that the lines AA' , BB' , CC' intersect at one point, and $AB' = 1$, $AC' = 1$ (see the picture). Find BA' .



Problem 3. (Irregular dice) One can check (but you don't have to) the following amazing fact: if you throw two irregular dice – one with numbers 1, 3, 4, 5, 6, 8 painted on it, and another with 1, 2, 2, 3, 3, 4 – then the sums of the two numbers (i.e. 2, 3, ..., 12) will appear with the same probabilities as if you were throwing two regular dice, with the numbers 1 through 6 painted on them.

Now, here is your problem: find two irregular tetrahedral dice (with 4 faces instead of 6), so that the sums (i.e. 2, 3, ..., 8) appear with the same probabilities as if you were throwing two regular dice. The numbers painted must be positive integers and, as in the example above, they may repeat. Your answer must be two sets of 4 integers each.



Problem 4. (The jackpot) The odds of winning the jackpot in the MegaBux lottery are 1 in 70 million. This week, 70 million tickets were sold for the latest drawing. What is the probability, in percent, that at least one winning ticket was sold? Round your answer to the closest integer.