

Time limit: 15 minutes.

Instructions: This tiebreaker contains 5 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. A bus leaves San Mateo with n fairies on board. When it stops in San Francisco, each fairy gets off, but for each fairy that gets off, n fairies get on. Next it stops in Oakland where 6 times as many fairies get off as there were in San Mateo. Finally the bus arrives at Berkeley, where the remaining 391 fairies get off. How many fairies were on the bus in San Mateo?
2. Let a and b be two real solutions to the equation $x^2 + 8x - 209 = 0$. Find $\frac{ab}{a+b}$. Express your answer as a decimal or a fraction in lowest terms.
3. Let a , b , and c be positive integers such that the least common multiple of a and b is 25 and the least common multiple of b and c is 27. Find abc .
4. It takes Justin 15 minutes to finish the Speed Test alone, and it takes James 30 minutes to finish the Speed Test alone. If Justin works alone on the Speed Test for 3 minutes, then how many minutes will it take Justin and James to finish the rest of the test working together? Assume each problem on the Speed Test takes the same amount of time.
5. Angela has 128 coins. 127 of them have the same weight, but the one remaining coin is heavier than the others. Angela has a balance that she can use to compare the weight of two collections of coins against each other (that is, the balance will not tell Angela the weight of a collection of coins, but it will say which of two collections is heavier). What is the minimum number of weighings Angela must perform to guarantee she can determine which coin is heavier?