1. _____ An ant walks around on the coordinate plane. It moves from the origin to (3,4), then to (-9, 9), then back to the origin. How many units did it walk? Express your answer as a decimal rounded to the nearest tenth.

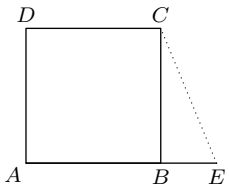
2. _____ A cup with a volume of 8 fluid ounces is filled at the rate of 0.5 ounces per second. However, a hole at the bottom of the cup also drains it at the rate of 0.3 ounces per second. Once the cup is full, how many ounces of water will have drained out of the cup?

3. _____ Calculate $1 + 2 + 3 + 4 - 5 - 6 - 7 - 8 + 9 + \cdots - 96 + 97 + 98 + 99 + 100$

4. _____ AB is the diameter of circle O. A random point P is selected on O so that $AP = 4$ and $BP = 3$. Points C and D are drawn on circle O so that OC bisects AP and OD bisects BP. What is the degree measure of $\angle COD$?

5. _____ 3 builders are scheduled to build a house in 60 days. However, they suffer from a bout of procrastination and thus do nothing for the first 50 days. Panicked, they realize in order to build the house on time, they must hire more workers *and* work twice as fast as they would have originally. If the new workers they hire also will work at the doubled rate, how many new workers will they need to hire? Assume each builder works at the same rate as the others and they do not get in each other's way.

6. _____ Square $ABCD$ has side length 4. Side AB is extended to point E so that AE has the same length as AC, as shown below. What is the length of EC? Express your answer as a decimal to the nearest hundredth.

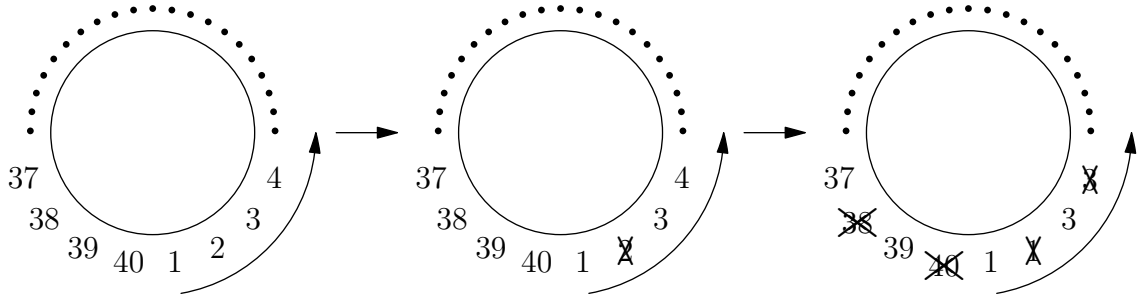


7. _____ How many positive integers less than or equal to 150 have exactly three distinct prime factors?

8. _____ Greg plays a game in which he is given three random 1 digit numbers, each between 0 and 9, inclusive, with repeats allowed. He is to put these three numbers into any order. Exactly one ordering of the three numbers is correct, and if he guesses the correct ordering, he wins \$150. What are Greg's expected winnings for this game, given that he randomly guesses one valid ordering when he plays?

9. _____ Kevin develops a method for shuffling a stack of 10 cards numbered 1 through 10. He starts with the unshuffled pile, which is in perfect order with 1 at the top and 10 at the bottom. He takes the top card off the unshuffled pile and places it in what he calls the shuffled pile. Then, he flips a coin. If the coin is heads, he takes the card at the top of the unshuffled pile and places it at the top of the shuffled pile. If the coin comes up tails, he places the card at the at the bottom of the shuffled pile. He repeats this process for all the remaining cards. What is the probability that at the end of this shuffling, the top card is a prime number? Express your answer as a common fraction.

10. _____ 40 people, numbered 1 through 40 counterclockwise, sit around a circular table. They begin playing a game. Each person is initially considered "alive". Starting with person 1, the first person eliminates the closest "alive" person to their right (so Person 1 eliminates Person 2). Then the next "alive" person, moving counterclockwise, eliminates the closest "alive" person to their right (so since Person 2 is eliminated, Person 3 eliminates Person 4). This process continues until there is only 1 "alive" person remaining. What is the number of the last "alive" person?



In the last step here, Person 39 eliminates Person 40. Next turn, Person 1 eliminates the closest person to his right, Person 3.

Answer key

1. 30.7
2. 12
3. 202
4. 90
5. 6
6. 4.33
7. 11
8. 33
9. 43/512
10. 17