Team ID: _____ **Room number:** _____

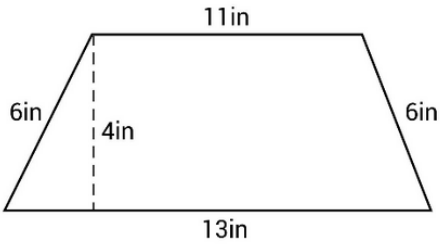
#	Answer	Points (0/1)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Total:

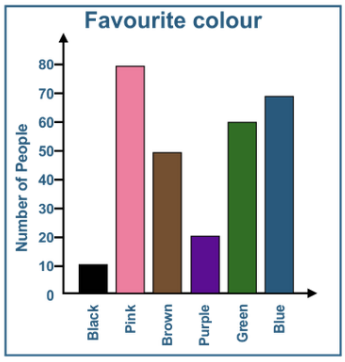
Problems

1. In the state of Mathia, there are three cities: Brainville, Quadratica, and Pythagorea. The distance from Brainville to Quadratica is 60 miles, and the distance from Quadratica to Pythagorea is 80 miles. If a train travels from Brainville to Quadratica at a speed of 20 miles per hour and then from Quadratica to Pythagorea at a speed of 40 miles per hour, what is the train's average speed as it travels from Brainville to Pythagorea?

2. Euclid wants to get a pool at his house. He has 4 different shapes to choose from: a circle (C) with a diameter of 18, a rectangle (R) with sides that are 9 and 14, a triangle (T) with a height of 20 and a base of 9, and a trapezoid (A). The trapezoid's dimensions are shown in the image. Which pool shape will allow Euclid to have the biggest pool?



3. Ms. Hashemi surveyed all her students to find out what their favorite color was. She decides to choose one of her students at random to give a prize. What is the probability that the chosen student likes one of the three least popular colors? Answer as a reduced common fraction.



4. A school has lockers numbered 1 through 14 in ascending order. All the lockers are initially closed. Henry starts at number 1 at the beginning of the hall. Then, Henry walks up the hall and opens every locker. Next, he goes up the hall again starting at number 1 and stops at every second locker, meaning he stops at lockers 2,4,6.... For each locker he stops at, he closes it if it's open or opens it if it's closed. He starts at number 1 and walks up the hall yet again. This time, he stops at every third locker while following the same stopping procedure as before. He repeats this process until he has walked up the hall and stopped at every 14th locker. How many lockers will be open after he finishes?

5. Old MacDonald had a farm. On his farm, the ratio of eyes to wings is 10:1. There are 436 legs on the farm. Chickens are the only animals with wings (they each have two), and all animals have two eyes. Chickens and the people running the farm each have two legs, and all other animals have four legs. There are 10 people on the farm. How many chickens are on Old MacDonald's farm?

6. On 80% of Henry's math tests, he scored 100. However, he scored 53 on 10% of them and 76 on 10% of them. Brian scored a 95 on 70% of his math tests while scoring an 82 on 20% of them and a 45 on 10% of them. Alex chooses one test score from each of them at random. Statistically, by how many points should Alex expect Henry's randomly chosen test score to be higher than Bryan's?

7. Grace rolls 1 six-sided die and Wilbert flips 4 fair coins. What is the probability, as a fraction, that Grace rolls a higher number than the number of heads Wilbert flips?

8. Andrew is island hopping in the Pacific Ocean. He hops in straight lines from Quam to New Gana, then to Tawanda, then to Doze Island, then back to Quam. The four islands create a convex quadrilateral with diagonals from Quam to Tawanda and New Gana to Doze Island. Tawanda is 25 miles away from Quam. The distance from Quam to New Gana is the same as the distance from Quam to Doze Island. The distance from New Gana to Tarawa is 26 miles. Andrew recorded his total distance traveled at each stop, and it was always an integer. What is the maximum possible total distance that Andrew could have traveled?

9. After a long day at math club, Rafferty rushes home to unleash his dog. Before being unleashed, his dog is tied with a leash of 5 meters to the corner of a square doghouse with a side length of 4 meters. How much space, in square meters, does the dog have to roam before being unleashed?

10. Oh no! Dr. Eichner's candy has been stolen by a student. Each student is either a "liar" (a student who makes statements that are always false) or a "truth-teller" (a student who makes statements that are always true. The students make the following statements:

    Henry: Either Brianna or Iris stole the candy.

    Brianna: Henry is a liar.

    Iris: I didn't steal the candy.

    Andrew: Exactly two of us are truth-tellers.

    Henry: The person who stole the candy is a liar.

    Brianna: Either the person who stole the candy is the only liar or I stole the candy.

    Iris: Either Andrew or Brianna stole the candy

    Andrew: Brianna didn't steal the candy.

    With only this information, Dr. Eichner figures out who stole his candy. How many letters are in the culprit's name?

Solutions

1. 28
2. C or Circle
3. $\frac{8}{29}$
4. 3
5. 12
6. 5.5
7. $\frac{2}{3}$
8. 200
9. $\frac{77\pi}{4}$
10. 4