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Activity Sheet for the May, 2020, MATHCOUNTS Mini

Warm-Up!

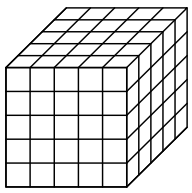
Try these problems before watching the lesson.

1. Mary will randomly choose an integer from the integers 1 to 100, inclusive. If Mary chooses a multiple of 4, what is the probability she will choose a perfect square? Express your answer as a common fraction.

2. A bag contains red and yellow balls. There are ten of each color and they are numbered 1 through 10. If Arthur draws two balls at random, without replacement, what is the probability that he draws the yellow ball numbered 3 followed by a red ball? Express your answer as a common fraction.

3. A bag contains ten balls, some of which are red and the rest of which are yellow. When two balls are drawn at random at the same time, the probability that both balls are red is $\frac{1}{15}$. How many balls in the bag are red?

4. The surface of a $5 \times 5 \times 5$ cube is painted blue and then cut into unit cubes, as shown.



   (a) How many of the unit cubes have more than three blue faces?

   (b) How many of the unit cubes have exactly three blue faces?

   (c) How many of the unit cubes have exactly two blue faces?

   (d) How many of the unit cubes have exactly one blue face?

   (e) How many of the unit cubes have no blue faces?

The Problem

Andy has a cube of edge length 8 cm. He paints the outside of the cube red and then divides the cube into smaller cubes, each of edge length 1 cm. Andy randomly chooses one of the unit cubes and rolls it on a table. If the cube lands so that an unpainted face is on the bottom, touching the table, what is the probability that the entire cube is unpainted? Express your answer as a common fraction.

Follow-up Problems

5. There are 12 girls and 8 boys in Ms. Jones' math class. She selects a group of three students at random to work on a project. What is the probability that this group includes at least one boy? Express your answer as a common fraction.

6. Two coins are flipped until at least one of them is heads. What is the probability that both of them are heads? Express your answer as a common fraction.

7. Let S be the set of all five-digit numbers such that the sum of their digits is 43. What is the probability that a number randomly selected from set S will be divisible by 11? Express your answer as a common fraction.

8. Mandvil has one standard quarter and one special quarter with heads on both sides. He selects one of these two coins at random, and without looking at it first, he flips the coin three times. If he flips a head three straight times, what is the probability that he selected the special quarter? Express your answer as a common fraction.

Share Your Thoughts

Have some thoughts about the video? Want to discuss the problems on the Activity Sheet? Visit the MATHCOUNTS Facebook page or the Art of Problem Solving Online Community (www.artofproblemsolving.com).