Introduction to Probability Quiz

1. At a sporting event, cheerleaders will throw 50 bundled T-shirts into the crowd. The T-shirt sizes consist of 10 small, 15 medium, and the remainder either large or extra large. Suppose Ana catches a T-shirt. What is the probability that she will catch a T-shirt that is not a size small?

(A) 0.10

(B) 0.20

(C) 0.50

(D) 0.67

(E) 0.80 ✓

Answer E

Correct. There are 50 total T-shirts and 10 are small, so 40 are not small. The probability is thus $\frac{40}{50} = 0.80$.

2. A middle school chess club has 5 members: Adam, Bradley, Carol, Dave, and Ella. Two students from the club will be selected at random to participate in the county chess tournament. What is the probability that Adam and Ella will be selected?

(A) $\frac{1}{20}$

(B) $\frac{1}{10}$ ✓

(C) $\frac{1}{8}$

(D) $\frac{1}{7}$

(E) $\frac{1}{4}$

Answer B

Correct. The two players selected could be AB, AC, AD, AE, BC, BD, BE, CD, CE, or DE, so there are 10 equally likely possible outcomes. Alternatively, there are $\binom{5}{2} = 10$ outcomes when 2 people are chosen from 5 people. One of these outcomes is AE, so the probability is $\frac{1}{10}$.

3. A fair die with its faces numbered from 1 to 6 will be rolled. Which of the following is the best interpretation of the probability that the number landing face up will be less than 3 ?

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(A) For many rolls of the die, the long-run relative frequency of a number less than 3 landing face up is $\frac{1}{3}$. ✓

(B) For many rolls of the die, the long-run relative frequency of a number less than 3 landing face up is $\frac{1}{2}$.

(C) For many rolls of the die, the long-run relative frequency of a number less than 3 landing face up is $\frac{2}{3}$.

(D) For three rolls of the die, a number less than 3 will land face up one time.

(E) It will take three rolls of the die before a number less than 3 lands face up for the first time.

Answer A

Correct. A roll of a fair die can result in 6 possible outcomes. There are 2 outcomes with a number less than 3 (1 and 2). In the long run, the relative frequency of rolling a number less than 3 is $\frac{2}{6} = \frac{1}{3}$.

4. A store owner reports that the probability that a customer who purchases a lawn mower will also purchase an extended warranty is 0.68.

Which of the following is the best interpretation of the probability 0.68 ?

(A) For all customers who purchase a lawn mower, 68% will also purchase an extended warranty. ✓

(B) For all customers of the store, 68% will purchase a lawn mower.

(C) For all customers who purchase an extended warranty, 68% will use the warranty.

(D) From the next 25 customers, 17 will purchase an extended warranty.

(E) From the next 25 customers, 17 will purchase a lawn mower.

Answer A

Correct. In the long run, the relative frequency with which a customer who purchases a lawn mower will purchase an extended warranty is 0.68.

5. The probability that a randomly selected visitor to a certain website will be asked to participate in an online survey is 0.40. Avery claims that for the next 5 visitors to the site, 2 will be asked to participate in the survey.

Is Avery interpreting the probability correctly?

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(A) Yes, because 2 out of 5 is equal to 40%.
(B) Yes, because participants in the survey are selected at random.
(C) No, because there could be voluntary response bias.
(D) No, because only 40% of all people will visit the site.
(E) No, because 0.40 represents probability in the long run over many visits to the site. ✓

Answer E

Correct. Over many visits, the long-run relative frequency of being asked to participate is 0.40, or 2 out of 5. Such a ratio does not apply to a single observation of 5 visits.

6. In a parking lot with 200 cars, 50 cars are white, 30 cars are red, and 20 cars are silver. One car will be selected at random from the parking lot. If each car in the parking has only one color, which of the following cannot be the probability that the selected car will be green?

(A) 0
(B) 0.1
(C) 0.2
(D) 0.5
(E) 0.6 ✓

Answer E

Correct. Of the 200 cars in the lot, at least 100 are not green, which means that the probability of selecting a car that is not green is at least 0.5. Selecting a car that is green and selecting a car that is not green are complements and their probabilities must sum to 1. Therefore the probability of selecting a car that is green cannot be greater than 0.5.