

Quiz #2

1. Fifty children went to a party where cookies and ice cream were served: 12 children took cookies; 17 took ice cream. True or false: 29 children must have had cookies or ice cream. Explain briefly.

False. The statement assumes the 12 children who took cookies and the 17 who took ice cream are disjoint events, but they may overlap. 29 is the maximum possible number of people that had cookies or ice cream if no one took both.

2. A 6-sided die is rolled 6 times.

- (a) The chance that the first roll is a 1 OR the last roll is 1 equals _____.

A. $\frac{1}{6} + \frac{1}{6}$ B. $\frac{1}{6} \times \frac{1}{6}$ C. neither of these

- (b) The chance that the first roll is a 1 AND the last roll is a 1 equals _____.

A. $\frac{1}{6} + \frac{1}{6}$ B. $\frac{1}{6} \times \frac{1}{6}$ C. neither of these

3. A deck of cards is shuffled.

- (a) The chance that the top card is the ace of spades OR the bottom card is the ace of spades equals _____.

A. $\frac{1}{52} + \frac{1}{52}$ B. $\frac{1}{52} \times \frac{1}{52}$ C. neither of these

- (b) The chance that the top card is the ace of spades AND the bottom card is the ace of spades equals _____.

A. $\frac{1}{52} + \frac{1}{52}$ B. $\frac{1}{52} \times \frac{1}{52}$ C. neither of these

4. A box contains 8 red marbles and 3 green marbles. Six marbles are drawn at random without replacement.

- (a) How many total distinct outcomes are possible for the six draws? (Order does not matter; you do not need to simplify numerically)

There are a total of $8 + 3 = 11$ marbles, and we choose 6 of them. Thus, the total number of distinct outcomes is

$$\binom{11}{6}.$$

- (b) How many outcomes result in all 3 green marbles being drawn (you do not need to simplify numerically)?

If all 3 green marbles are drawn, then the remaining $6 - 3 = 3$ marbles must be chosen from the 8 red marbles. The number of such outcomes is

$$\binom{3}{3} \binom{8}{3}.$$

- (c) Write an expression for the probability that all 3 green marbles are drawn (you do not need to simplify numerically).

The probability is given by the ratio of favorable outcomes to total outcomes:

$$P(\text{all 3 green}) = \frac{\binom{3}{3} \binom{8}{3}}{\binom{11}{6}}.$$