

1. A survey of high school students indicated that 33% are in a relationship, 25% are involved in sports, and 11% are involved in both. Use the information to answer the following questions.

(a) What is the probability that a student is involved in a relationship **given** that they're involved in sports?

$$P(R|S) = \frac{P(R \cap S)}{P(S)} = \frac{0.11}{0.25} = 0.44$$

(b) Is being in a relationship **independent** of being involved in sports? Justify your answer using probability (regardless of your own personal theories!).

$$P(R|S) = 0.44 \neq P(R) = 0.33 \Rightarrow \text{These are } \mathbf{dependent} \text{ events.}$$

2. A company has two suppliers for electrical components. China ships 73% of the electrical components used by the supplier. The probability that the component will be defective **given** that it was shipped from China is 0.06. What is the probability that a randomly selected component received by the supplier will ship from China **and** be defective?

$$P(C) = 0.73, P(D|C) = 0.06$$

$$\text{Using the Multiplication Rule: } P(C \cap D) = P(D|C)P(C) = 0.06(0.73) = 0.0438$$

3. You have a standard deck of 52 cards. Recall that a deck of cards has four suites (hearts, diamonds, spades, clubs), each with thirteen values (2-10, J, Q, K, A). Find the probability that you draw two aces **in a row** without replacing the first ace.

$$P(\text{1st A and 2nd A}) = P(\text{1st A}) \times P(\text{2nd A} \mid \text{1st A}) = \frac{4}{52} \times \frac{3}{51} = 0.0045$$

4. Your Pie, a great pizza place in Clemson, has 10 vegetable and 8 meat toppings to choose from. You have a coupon for a free pizza with five toppings. Use this information to answer the following questions.

(a) How many ways could you choose five **different toppings**? (Hint: Use the Combinations Rule.)

$${}_{18}C_5 = \frac{18!}{5!(18-5)!} = 8,568 \text{ ways to choose five different toppings}$$

(b) How many ways could you choose five **different vegetable toppings**?

$${}_{10}C_5 = \frac{10!}{5!(10-5)!} = 252 \text{ ways to choose five different vegetable toppings}$$

(c) If you randomly select toppings, what is the **probability** that you choose five different vegetable toppings? Round your answer to four decimal places. (Hint: Use your answers from parts a and b.)

$$P(\text{5 different veggie toppings}) = \frac{{}_{10}C_5}{{}_{18}C_5} = \frac{252}{8,568} = 0.0294$$