

Lesson Two: Applications of Probability

Applications of probability are found in situations involving medications, warranties, insurance, lotteries, weather predictions, vehicle recalls, games of chance, etc.

Example 1

A twenty sided die is rolled. State the probability of rolling a 19 or a 20. The common notation for stating the probability of rolling a 19 or a 20 would be $P(19 \text{ or } 20)$.



$$\begin{aligned} \text{Probability a 19 or 20} &= P(19) + P(20) & P(19) &= \frac{1}{20} \\ P(19 \text{ or } 20) &= P(19) + P(20) & P(20) &= \frac{1}{20} \\ P(19 \text{ or } 20) &= \frac{1}{20} + \frac{1}{20} \\ &= \boxed{\frac{2}{20}} \Rightarrow \boxed{\frac{1}{10}} \end{aligned}$$

Example 2

Using the same twenty sided die, determine $P(\text{rolling a 5 or less})$.

$$\begin{aligned} P(5 \text{ or less}) &= \frac{5}{20} \Rightarrow \boxed{\frac{1}{4}} \\ P(5, 4, 3, 2, 1) \end{aligned}$$

Example 3

In a school, there are 215 males and 258 females. One student is selected at random. State $P(\text{male})$.

$$\begin{aligned} P(\text{male}) &= \frac{\text{number of males}}{\text{total \# of males and females}} \\ &= \frac{215}{(215+258)} = \boxed{\frac{215}{473}} \Rightarrow \boxed{45.45\%} = \frac{215}{473} \times 100 \end{aligned}$$

Example 4

State the probability of choosing the letter "T" from the letters in the word "statistics"?

$$\begin{aligned} \text{S T A T I S T I C S} & \quad \underline{3 \text{ "T's"}}} \quad \text{total letters} = 10 \\ P(T) &= \frac{\text{Total T's}}{\text{total letters}} = \frac{3}{10} \quad \boxed{P(T) = \frac{3}{10}} \end{aligned}$$

Example 5

a) Random testing of cell phones shows that 2 out of every 500 cell phones are defective. State the probability of a randomly selected cell phone **not** being defective.

$$\begin{aligned} P(\text{not defective}) &= \frac{\text{not defective}}{\text{total \#}} \Rightarrow P(\text{not defective}) = \boxed{\frac{498}{500}} \\ P(\text{good}) & \quad \quad \quad = \underline{\underline{99.60\%}} \end{aligned}$$

b) If the cell phone company manufactures 10 000 cell phones, determine how many you would expect to be defective.

$$\frac{2}{500} \times 10\,000 = 40 \text{ cell phones}$$