

Lesson 56: Probability Part 1

By the end of the lesson, you will be able to:

- ~ Find a probability of an event
- ~ Find a probability of two or more events.

Lesson 56: Probability Part 1

In this class, we will find probabilities for discrete random variables. These are variables or outcomes to a phenomenon where *all possible outcomes* can be _____ (discrete) and there is no outcome that is systematically _____ over other possible outcomes (random).

Examples of discrete random variables: _____



Lesson 56: Probability Part 1

Example A: List the possible outcomes for the following discrete random variables.

- ~ Rolling a fair, six sided die. _____
- ~ Flipping a fair coin. _____
- ~ Picking two colored beads from a bag contain three beads (red, white, and blue) with replacement before the second pick.

Lesson 56: Probability Part 1

Probability: is a measure of the likeliness of an event.

Probability is defined as the ratio of the number of successes to the total number of possible outcomes. It can be expressed as a fraction, decimal, or percent.

Definition of Probability: $P(\text{success}) = \frac{\text{number of ways for success}}{\text{total possible outcomes}}$

Lesson 56: Probability Part 1

Example B: a bag of candy contains 12 red, 11 yellow, 5 green, 6 orange, 5 blue, and 16 brown candies.

- a.) What is the probability that you will randomly draw a yellow candy from the bag?

Lesson 56: Probability Part 1

Example B: a bag of candy contains 12 red, 11 yellow, 5 green, 6 orange, 5 blue, and 16 brown candies.

b.) What is the probability that you will NOT draw an orange candy from the bag?

Lesson 56: Probability Part 1

Example C: Suppose 3 letters are selected from the word *ARRANGEMENTS*. Find the probability of randomly selecting three consonants.

In this situation, it would take too long to *list* all the outcomes. First, find how many 3 letter groups meet the condition. There are 8 consonants in the word, and we need a group of 3. Since order doesn't matter, use a combination: _____

Next, find the total number of ways to choose 3 letters from the word. There are 12 letters in the word, and we are selecting a group of 3. _____

Then find the ratio of successes to total outcomes: _____

Lesson 56: Probability Part 1

Example D: The committee to organize the school prom has 6 seniors and 5 juniors. A subcommittee of 4 students is selected at random to choose the music for the prom. What is the probability that the subcommittee will contain 2 seniors and 2 juniors?

Lesson 56: Probability Part 1

Example D: The committee to organize the school prom has 6 seniors and 5 juniors. A subcommittee of 4 students is selected at random to choose the music for the prom. What is the probability that the subcommittee will contain 2 seniors and 2 juniors?

Choosing 2 seniors out of 6: $C(6,2) = 15$ $\underline{15} \cdot \underline{10} = 150$

Choosing 2 juniors out of 5: $C(5,2) = 10$

There are 150 ways to choose 2 juniors and 2 seniors from the committee.

Total number of ways a group of 4 can be selected from the committee of 11 people: $C(11,4) = 330$

Then find the ratio of successes to total outcomes:

$$\frac{C(6,2) \cdot C(5,2)}{C(11,4)} = \frac{150}{330}$$

$$= \frac{5}{11} = .4545$$

45.45%

Lesson 56: Probability Part 1

Two events are independent if the outcome of one event has no impact on the outcome of the second event. (Independent events are sometimes called *unconditional*.)

Probability of Independent Events:

$$P(A \text{ and } B) = P(A) \cdot P(B)$$

Lesson 56: Probability Part 1

Two events are dependent if the outcome of one event affects the outcome of the other event. When calculating the probability of the second event, you assume that the first event did occur. (Dependent events are sometimes called *conditional*.)

Probability of Dependent Events:

$$P(A \text{ and } B) = P(A) \cdot P(B \text{ following } A)$$

Lesson 56: Probability Part 1

Example E: Two dice are rolled. Find each probability.

a.) $P(1 \text{ and } 5)$

b.) $P(\text{even and odd})$

Lesson 56: Probability Part 1

Example E: Two dice are rolled. Find each probability.

c.) $P(2 \text{ different #'s})$

Lesson 56: Probability Part 1

Example F: There are 3 quarters, 4 dimes, and 5 nickels in a purse. Suppose 3 coins are to be selected without replacement. Find the probability that you will select a quarter, then a dime, then a nickel.

There are _____ total outcomes for selecting a coin. Each time a coin is selected, the number of coins in the purse is reduced by 1. This changes the probability of the next coin selection. Use multiplication to find the probability. $P(Q \text{ and then } D \text{ and then } N) =$

Lesson 56: Probability Part 1

When talking about probability, a lot of examples use decks of cards. So, here is what is contained in a deck of cards.

- There are 52 cards in a deck.
- 26 are red, 26 are black
- There are 4 suits with 13 cards each: clubs (black), spades (black), hearts (red), diamonds (red).
- Each suit contains: 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King, Ace (1)

Lesson 56: Probability Part 1

Example G: From a deck of 52 cards, 3 cards are randomly chosen. They are a 10, jack, and another 10, in that order.

- a.) Find the probability that this event occurs if each card is replaced each time.
- b.) Find the probability that this event occurs if each card is NOT replaced each time.

Lesson 56: Probability Part 1

By the end of the lesson, you will be able to:

- ~ Find a probability of an event
- ~ Find a probability of two or more events.

Can you?

Lesson 56: Probability Part 1

Homework:

Assignment 56