Name:_____**Date:**_____**Period:**_____

9-1 Percent & Probability

Standard

- B.S.CP.A.1 Understand and use basic counting techniques in contextual settings.

Objective

- SWBAT use theoretical, experimental and simulation methods IOT find the probability of an event.

Key Concepts

_____- a model of an event used to estimate the experimental probability of an event.

_____- the set of all possible outcomes in an experiment.

_____- when each outcome in a sample space has the same chance of occurring.

take note

Key Concept   Experimental Probability

experimental probability of event: $P(\text{event}) = \dfrac{\text{number of times the event occurs}}{\text{number of trials}}$

take note

Key Concept   Theoretical Probability

If a sample space has n equally likely outcomes and an event A occurs in m of these outcomes, then the **theoretical probability** of event A is $P(A) = \frac{m}{n}$.

Sample space: n outcomes

Event A: m outcomes

Examples

1. (I do) What is the theoretical probability?

    a. getting a 5 on one roll of a standard number cube?

    b. getting a sum of 5 in one roll of two standard number cubes?

	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

2. (I do) Of the 60 vehicles in the parking lot, 15 are pickup trucks. What is the experimental probability that a vehicle is a pickup truck? What is the probability a vehicle is NOT a pickup truck?

3. (We do) A bag contains 36 red blocks, 48 green blocks, 22 yellow blocks and 19 blue blocks. You pick one block from the bag at random. What is the theoretical probability of the following?
    a. P(green)

    b. P(yellow or green)

    c. P(blue or not red)

4. (They do) Suppose you flip 2 pennies. What is the probability that the flip will show 1 head and 1 tail?

----------------------------Lesson 9-1 Independent Practice/Lesson Check-------------------------

Use the cards at the right. Then give the probability of drawing at random each of the following cards.   CINCINNATI

1. P(N) _____   2. P(C) _____   3. P(I) _____

Suppose you flip 3 coins. What is the probability that the flip will show:

4. 3 heads? _____   5. 2 tails, 1 head? _____

Suppose you roll a die 60 times. Predict how many times you will roll each of the following.

6. a 4 _____   7. a number greater than 4 _____

8. a number less than 4 _____   9. a number other than 4 _____

10. an odd number _____   11. a number between 3 and 4 _____

9-3 Compound Events

9-4 Independent Events

Standard

- B.S.CP.A.2 Compute a probability when the event and/or sample space are not given or obvious.
- B.S.CP.A.3 Recognize the concepts of conditional and joint probability in real world events.
- B.S.CP.A.4 Recognize the concept of independence expressed in real-world contexts.

Objective

- SWBAT use theoretical and experimental probabilities IOT find the probability of a compound event.
- SWBAT use theoretical and experimental probabilities IOT to determine whether events are independent or dependent

Key Concepts

_____ - when the occurrence of one event affects how a second event can occur.

_____- when the occurrence of one event does not affect how a second event can occur.

_____- two events that cannot happen at the same time.

take note

Key Concept   Probability of A and B

If A and B are independent events, then $P(A \text{ and } B) = P(A) \cdot P(B)$.

take note

Key Concept   Probability of A or B

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

If A and B are mutually exclusive events, then $P(A \text{ or } B) = P(A) + P(B)$.

1. (I do) Identify the pair as independent or dependent. Explain.
   a. Roll a number cube, then spin a spinner.

   b. Pick one flashcard and then another from the same stack of 30 flashcards.

   c. Select a coin at random from your pocket. You replace the coin and select again.

2. (We do) At a picnic there are 10 diet drinks and 5 regular drinks. There are also 8 bags of fat-free chips and 12 bags of regular chips. What is the probability that you pick a diet drink and fat-free chips?

3. (We do) About 37% of students take Spanish in high school and 15% take French. What is the probability that a student is taking Spanish or French?

4. (They do) A standard number cube is tossed. Find each probability.

   a. P(2 or even)   b. P(odd or prime)   c. P(even or less than 5)

5. (They do) Suppose you have 5 books in your backpack. Three are novels, one is a biography, and one is a poetry book. Today you grab one book out of your bag and return it later. Tomorrow you do the same thing. What is the probability you grab a novel both days?

------------------------Lesson 9-3/9-4 Independent Practice/Lesson Check------------------------

1. A and B are independent events. Find P(A and B).

   a. $P(A) = \frac{1}{6}$, $P(B) = \frac{2}{5}$ **b.** $P(A) = \frac{9}{20}$, $P(B) = \frac{3}{4}$

2. C and D are mutually exclusive events. Find P(C or D).

   a. $P(C) = \frac{2}{5}$, $P(D) = \frac{3}{5}$ **b.** $P(C) = \frac{1}{2}$, $P(D) = \frac{3}{8}$

3. Events A and B are not mutually exclusive. If $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{4}$ and $P(A \text{ and } B) = \frac{1}{8}$, Find P(A or B).

4. Explain the difference between mutually exclusive events and independent events.

5. The weather forecast for the weekend is a 30% chance of rain on Saturday and a 70% chance of rain on Sunday. Your friend says that means there is a 100% chance of rain this weekend. What error did your friend make?

9-5 Permutations & Combinations

Standard

- B.S.CP.A.1 Understand and use basic counting techniques in contextual settings.

Objective

- SWBAT use the fundamental counting principle to determine the number of permutations and combinations.

Key Concepts

_____ describes the method of using multiplication to count.

nPr-the number of _____ of **n** items in a set arranged **r** items at a time. (order matters)

nCr-the number of _____ of **n** items in a set chosen **r** items at a time. (order does <u>NOT</u> matter)

_____ $n! = n(n - 1) \cdot ... \cdot 3 \cdot 2 \cdot 1$

take note

Key Concept   Fundamental Counting Principle

If event M can occur in m ways and is followed by event N that can occur in n ways, then event M followed by event N can occur in $m \cdot n$ ways.

Example   3 pants and 2 shirts give $3 \cdot 2 = 6$ possible outfits.

Examples

1. (I do) Many motor vehicle license plates are arranged with a series of 3 letters followed by a series of 3 numbers. How many possible license plates can there be of this style?

2. (I do) In how many ways can you file 12 folders one after another in a drawer?

3. (We do) Ten students are in a race. First, second and third place will earn medals. In how many ways can 10 runners finish first, second, third (no ties allowed)?

4. (We do) Permutation or Combination? A teacher divides the class into 8 groups for a project. She decides to display 4 of the projects. In how many different ways can the teacher select the projects for display?

5. (They do) Permutation or Combination? In a raffle, three winners are chosen. The first ticket drawn wins $100, the second wins $50, the third wins $10. In how many different ways can you draw 3 winning tickets out of a total of 25 raffle tickets?

-----------------------------Lesson 9-5 Independent Practice/Lesson Check--------------------------

1. You have five shirts and four pairs of pants. How many different ways can you arrange your shirts and pants into outfits?
2. To create a passcode, you need to first choose a letter and then, three single-digit numbers. How many different passcodes can you create?
3. Evaluate
   a. $10!$ b. $_6P_3$ c. $_7C_5$

4. How many different nine-player batting orders can be chosen from a baseball team of 16?

5. Explain the difference between permutations and combinations.
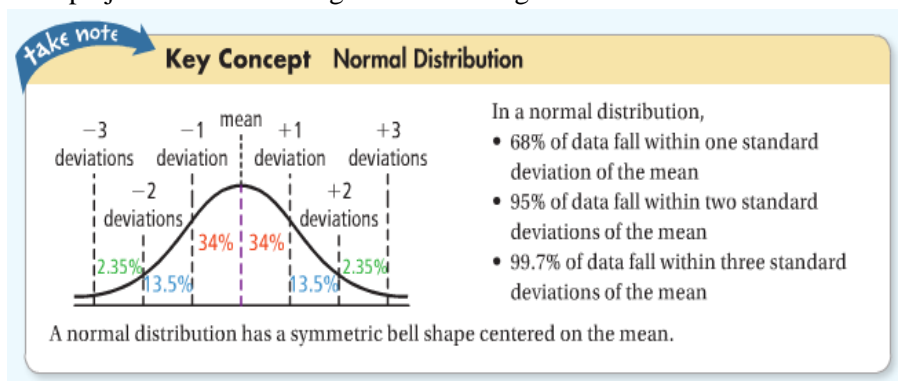
9-6 thru 9-8 Analyzing Data

Standard

- B.S.ID.A.1 Use statistics appropriate to the shape of the data to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
- B.S.ID.B2 Interpret and use data from tables, chart, and graphs.

Objective

- SWBAT interpret and use data IOT analyze and compare data.

Key Concepts

- **population**: all members of a set
- **sample**: part of a population
- **convenience sample**: any members of the population that are readily available
- **self-selected sample**: only members of the population that volunteer
- **systematic sample**: order the population and select from it at regular intervals
- **random sample**: all members of the population are equally likely to be chosen
- **observational study**: you measure or observe people in a way that does not affect them
- **controlled experiment**: there are 2 groups in which one group receive treatment and one does not (control group), then you compare the effects.
- **survey**: you ask every member of a sample certain questions.
- **leading survey question**: suggesting that you want a certain answer.
- **loaded survey question**: using words that cause strong reactions
- **confusing survey question**: asking about more than one issue or using double negatives
- **ambiguous survey question**: a question that offers answers that overlap
- **bias**: prejudice in favor or against something.

take note

Key Concept Normal Distribution

−3 deviations   −1 deviation   mean   +1 deviation   +3 deviations
−2 deviations   +2 deviations
2.35%   13.5%   34%   34%   13.5%   2.35%

A normal distribution has a symmetric bell shape centered on the mean.

In a normal distribution,
- 68% of data fall within one standard deviation of the mean
- 95% of data fall within two standard deviations of the mean
- 99.7% of data fall within three standard deviations of the mean

Examples

1. (I do) Find the mean, median, mode, range, minimum, maximum, interquartile range, variance and standard deviation of the data. Then create a box & whisker plot. Are there any outliers?
62, 64, 68, 74, 80, 84, 86, 86, 84, 78, 70, 64

2. (We do) A newspaper wants to find what percent of the city's population favors a property tax increase to raise money for local parks. Identify the sampling method and any bias.
   a. A newspaper article invites readers to call and express their opinions.

   b. A reporter interviews people leaving the park.

   c. A survey service calls every 50ᵗʰ person in a local phone book.

3. (I do) The mean body length of a male eel is 15.7 inches, and the standard deviation is 2.8 inches.
   a. Sketch a normal distribution curve showing 1, 2 and 3 standard deviations away from the mean.

   b. What is the probability that a male eel is between 10.1 and 21.3 inches?

   c. What is the probability that a male eel is greater than 18.5 inches?

------------------Lesson 9-6 thru 9-8 Independent Practice/Lesson Check-------------------------

1. Find the mean, median, mode, range, minimum, maximum, interquartile range, variance and standard deviation of the data. Then create a box & whisker plot. Are there any outliers?
   Data: 90, 100, 110, 40, 98, 102, 112, 90, 92

2. To investigate a community's reading habits, a newspaper conducts a poll from a table near the exit of a history museum. What is the sampling method used and does the method have any bias? Explain.

3. A survey asks, "Aren't handmade gifts always better than tacky purchased gifts?" Does this survey question have any bias? Explain and give the question type.

4. A set of data has a normal distribution with a mean of 50 and a standard deviation of 8. Sketch a normal distribution curve and determine the percent of data within each interval.
   a. from 42 to 58   b. greater than 34   c. less than 50