Section 10.1: Outcomes and Events Notes

POD: Teacher Notes -

1.) Write the ratio of girls to boys in Classroom A.

$\frac{11}{14}$

	Boys	Girls
Classroom A	14	11
Classroom B	12	8

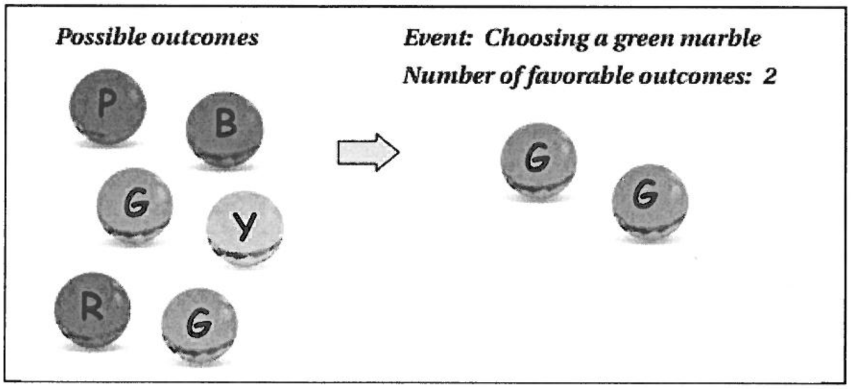
2.) Write the ratio of boys in Classroom B to the total number of students in both classes.

$\frac{4}{15}$

Objective: Students will be able to identify and count the outcomes of experiments.

Vocabulary:

1.) Experiment – An investigation or a procedure that has varying results.
2.) Outcomes – The possible results of an experiment.
3.) Event – A collection of one or more outcomes
4.) Favorable Outcomes – The outcomes of a specific event.



Examples:

1.) You roll a number cube.

a.) What are the possible outcomes?

1, 2, 3, 4, 5, 6

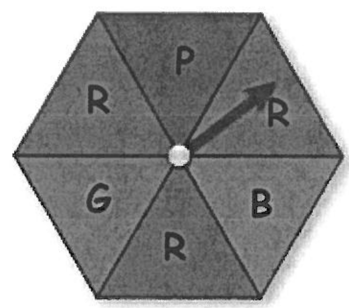
b.) What are the favorable outcomes of rolling an even number?

2, 4, 6

c.) What are the favorable outcomes of rolling a number greater than 5?

6

2.) You spin the spinner.



a.) How many possible outcomes are there?

6 outcomes

b.) In how many ways can spinning red occur?

3 ways

c.) In how many ways can spinning not purple occure?

5 ways

d.) What are the favorable outcomes of spinning not purple?

red, red, red, green, blue

3.) A bargain bin contains classical and rock CDs. There are 60 CDs in the bin. Choosing a rock CD and not choosing a rock CD have the same number of favorable outcomes. How many rock CDs are in the bin?

30 rock CDs

Section 10.2: Probability Notes

POD: You randomly choose one of the tiles shown below. Find the favorable outcomes of the event.

1.) Choosing a number greater than 5.

6, 7, 8, 9

2.) Choosing a number less than 3.

1, 2

Objective: Students will be able to find probabilities of events and understand the relationship between probability and likelihood.

Vocabulary:

1.) Probability – Number that measures the likelihood that an event will occur. Probabilities are between 0 and 1.

2.) Theoretical Probability – the likelihood that an event will occur (written as a fraction!!)

THEORECTICAL PROBABILITY FORMULA:

$$P(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total number of possible outcomes}}$$

Examples: Find the theoretical probability.

1.) You select a letter randomly from the following: I L L I N O I S. What is the probability of:

a.) choosing an L?

$$P(L) = \frac{2}{8} = \frac{1}{4}$$

b.) choosing a vowel?

$$P(\text{vowel}) = \frac{4}{8} = \frac{1}{2}$$

c.) choosing a N or S?

$$P(\text{N or S}) = \frac{2}{8} = \frac{1}{4}$$

2.) If you pick a number from 1-18, what is the probability of:

a.) picking a 6?

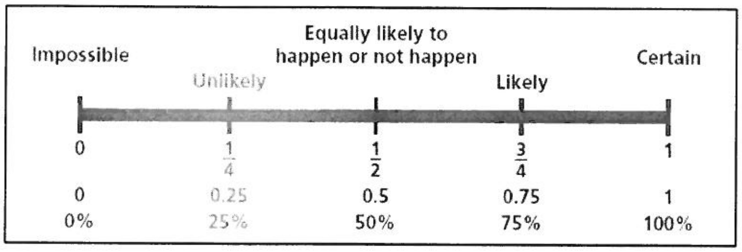
$$P(6) = \frac{1}{18}$$

b.) picking a multiple of 3?

$$P(\text{multiple of 3}) = \frac{6}{18} = \frac{1}{3}$$

c.) picking a number that has a 1 in it?

$$P(\text{\# that has a 1 in it}) = \frac{10}{18} = \frac{5}{9}$$



3a.) There is an 80% chance of thunderstorms tomorrow. Describe the likelihood of the event.

Since 80% is close to 75%, it is likely that there will be thunderstorms tomorrow.

3b.) There is a 100% chance that the temperature will be less than 120° F tomorrow.

It is certain that it will be less than 120° F tomorrow.

4.) The probability that you randomly draw a short straw from a group of 40 straws is $\frac{3}{20}$. How many are short straws?

$$\frac{3}{20} = \frac{x}{40}$$

$$\frac{20x}{20} = \frac{120}{20}$$

x = **6 straws**

Section 10.3: Experimental and Theoretical Probability Notes

POD: You have six green marbles, four yellow marbles, and two red marbles in a bag. What is the probability of:

1.) P(yellow or green)
5/6

2.) P(not yellow)
2/3

Objective: Students will be able to understand the difference between experimental and theoretical probabilities and use it to make predications.

Vocabulary:

1.) Experimental probability – probability based on experimental data or observation
2.) Simulation – a model used to find experimental probability
3.) Relative Frequency – the fraction or percent of the time that an event occurs during an experiment

EXPERIMENTAL PROBABILITY FORMULA:

$$P(\text{event}) = \frac{\text{number of times an event occurs}}{\text{total number of trials}}$$

Examples:

1.) Stacey selected shirts at random from her closet. The results are shown in the table below. For each part, find the experimental probability. Write the probability as a percent to the nearest tenth.

a.) P(blue) = $\frac{7}{30}$ = 23.3%

b.) P(red or white) = $\frac{15}{30}$ = 50%

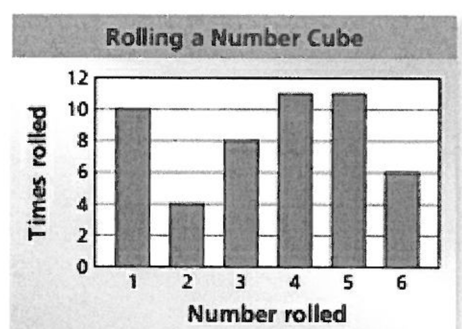
c.) P(not green or red) = $\frac{19}{30}$ = 63.3%

Color	Number of shirts
blue	7
green	5
orange	3
white	9
red	6

2.) The bar graph shows the results of rolling a number cube 50 times. What is the experimental probability of rolling an odd number.

10 + 8 + 11 = 29 rolls

$\frac{29}{50}$ = 58%



3.) It rains 2 out of the last 12 days in March. If this trend continues, how many rainy days would you expect in April?

$P(\text{rain}) = \frac{2}{12} = \frac{1}{6}$

$\frac{1}{6}(30) =$ **5 days**

4a.) Joe flipped a coin six times and his results were: H, T, T, T, H, T . What was his experimental probability of flipping tails?

$\frac{4}{6} = \frac{2}{3}$

4b.) What is the theoretical probability of flipping tails?

$\frac{1}{2}$

4c.) Why are these probabilities not always the same?

Theoretical probability is what <u>should</u> actually happen while experimental probability is what <u>actually</u> happens in an experiment.

Section 10.4: Compound Events Notes

POD: You pick a letter out of: M I N N E S O T A

1.) P(not vowel)

5/9

2.) P(N or S)

3/9 = 1/3

Objective: Students can use tree diagrams and tables to find the number of possible outcomes on events.

Vocabulary:

1.) Sample space – the collection of all possible outcomes

2.) Fundamental Counting principal – multiply the number of choices to get possible outcomes

Examples:

1a.) Construct an organized list for the following event: You roll a number cube and then toss a coin.

1H, 1T, 2H, 2T, 3H, 3T, 4H, 4T, 5H, 5T, 6H, 6T

1b.) What is the probability that you will roll a number greater than 4 and flip tails?

$\frac{2}{12} = \frac{1}{6}$ OR you can find it by: $\frac{2}{6} \cdot \frac{1}{2} = \frac{2}{12} = \mathbf{\frac{1}{6}}$

1c.) What is the probability that you will roll an even number and flip tails?

$\frac{3}{12} = \frac{1}{4}$ OR you can find it by: $\frac{3}{6} \cdot \frac{1}{2} = \frac{3}{12} = \mathbf{\frac{1}{4}}$

2a.) You are deciding what to wear today. You have two different pants you like: jeans and khakis, 3 different shirts: red, blue, pink, and two pairs of shoes: sandals and gym shoes. **Draw a tree diagram to find the total number of outcomes.**

Pants	Color	Shoes	Outcome
Jeans	Red	Sandals	JRS
		Gym Shoes	JRG
	Blue	Sandals	JBS
		Gym Shoes	JBG
	Pink	Sandals	JPS
		Gym Shoes	JPG
Khaki	Red	Sandals	KRS
		Gym Shoes	KRG
	Blue	Sandals	KBS
		Gym Shoes	KBG
	Pink	Sandals	KPS
		Gym Shoes	KPG

2b.) What is the probability that you will where a pink shirt?

4/12 = **1/3**

2c.) What is the probability that you will where a red shirt and sandals?

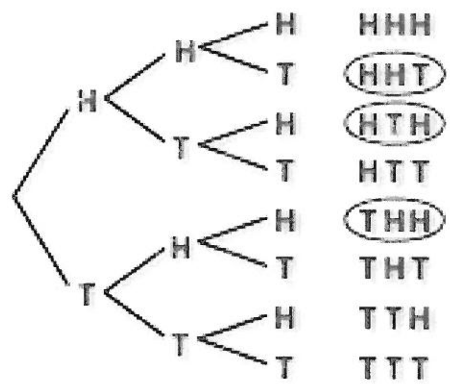
2/12 = **1/6**

3.) A restaurant offers 12 types of entrees, 6 types of appetizers, and 4 types of rice. How many meals of an appetizer, entrée, and rice are there?

Entrees		Appetizers		Rice		Total Meal Options
12	·	6	·	4	=	**288 choices**

4.) You flip three nickels. What is the probability of flipping two heads and one tails?

$\frac{3}{8}$ **or 37.5%**



Section 10.5: Independent and Dependent Events Notes

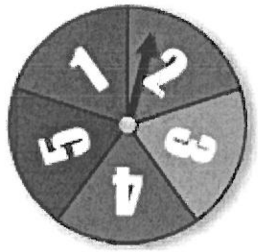
POD: You spin the spinner and flip a coin. Find the probability of the compound event.

1.) Spinning a 1 and flipping heads

1/10

2.) Spinning an even number and flipping tails.

1/5



Objective: Students will be able to identify independent and dependent events and use formulas to find them.

Vocabulary:

1.) Independent events – events for which the occurrence of one event ***does not affect*** the probability of the occurrence of the other

2.) Dependent events – events for which the occurrence of one event ***affects*** the probability of the other

Examples:

Identify the event as independent or dependent and explain why.

1.) Patty picks a book from the classroom library and then Philip picks a book.

Dependent- Philip may have wanted the same book.

Identify each event as independent or dependent. Then find the probability of each event.

2.) You roll a number cube once. Then you roll it again. What is the probability of rolling:

Independent Events

a.) P(2, greater than 4)

$$\frac{1}{6}\cdot\frac{2}{6}=\frac{2}{36}=\frac{1}{18}$$

b.) P(odd, then 5)

$$\frac{3}{6}\cdot\frac{1}{6}=\frac{3}{36}=\frac{1}{12}$$

3.) Three girls and two boys volunteer to represent their class at a school assembly. The teacher selects one name and then another from a bag containing the five students' names. What is the probability of:

Dependent Events

a.) P(boy, boy)

$$\frac{2}{5}\cdot\frac{1}{4}=\frac{2}{20}=\frac{1}{10}$$

b.) P(girl, boy)

$$\frac{3}{5}\cdot\frac{2}{4}=\frac{6}{20}=\frac{3}{10}$$

4.) You select two cards from below. Find the probability of the following:

M	I	S	S	I	S	S	I	P	P	I

a.) P(s, then vowel) - with replacing the first card

Independent Event

$$\frac{4}{11} \cdot \frac{4}{11} = \frac{16}{121}$$

b.) P(p, not vowel) - without replacing the first card

Dependent Event

$$\frac{2}{11} \cdot \frac{6}{10} = \frac{12}{110} = \frac{6}{55}$$

Section 10.6: Samples and Populations Notes

POD: You have eight red marbles, six blue, four white, and two green. Find the probability. You do not replace the marbles.

1.) P(red, not blue)

$\frac{8}{20} \times \frac{13}{19} = \frac{26}{95}$

2.) P(white, white)

$\frac{4}{20} \times \frac{3}{19} = \frac{3}{95}$

Objective: Students can determine when samples are representative of a population and use samples to make predictions.

Vocabulary:

1.) Population – an entire group of people
2.) Sample- part of the population who are surveyed
3.) Unbiased sample- representative of a population. It is selected at random and is large enough to provide accurate data.
4.) Biased sample- not representative of a population. One or more parts of the population are favored over others.

Examples: Determine if each example is biased or unbiased. Explain your reasoning. If it biased, explain how you would make it unbiased.

1.) You want to survey customers at a mall about their favorite store. You go into a clothing store to ask people. **Biased. People inside of a clothing store are more likely to say that is their favorite store. You need to ask people who are not actually in stores.**	2.) You want to know the favorite sport of students at Hadley. You give surveys to a random science class from each grade level. **Unbiased. Science classes have a random assortment of students. This is also a large enough sampling to look at for the school.**

Predictions:

3.) A survey asked 50 randomly chosen students if they were going to attend the school football game. 28 said yes. If there are 112 student tickets sold for the game, predict the number of students who attend the school.

$\frac{28}{50} = \frac{112}{x}$ 112(50) = 28x

$\frac{5600}{28} = \frac{28x}{28}$

x = 200 students

Valid Conclusions:

4.) You want to know how the residents of your town feel about adding a new stop sign. Determine whether each conclusion is valid.

a.) You survey the 20 residents who live closest to the new sign. Fifteen support the sign, and five do not. So, you conclude that 75% of the residents of your town support the new sign.

The sample is not representative of the population because residents who live close to the sign are more likely to support it.

b.) You survey 100 residents at random. Forty people support the new sign and sixty do not. So you conclude that 40% of the residents of your town support the new sign.

The sample is representative of the population, selected at random and large enough to provide accurate data.

Section 10.7: Comparing Populations Notes

POD: You ask 125 randomly chosen students to name their favorite food. There are 1500 students in the school.

1.) Predict the number of students in school whose favorite food is pizza.

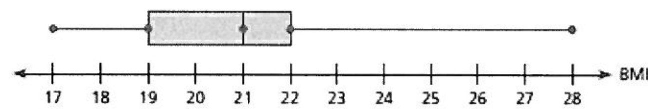
2.) Predict the number of students in school whose favorite food is pasta.

Favorite Food	
Pizza	58
Hamburger	36
Pasta	14
Other	17

Objective: Students can use measures of center and variation to compare populations.

> **Key Idea:** When comparing two populations, use the mean when both distributions are symmetric. Use the median and interquartile range when either one or both distributions are skewed.

Example #1: The box-and-whisker plot shows the body mass index (BMI) of a sixth grade class.



1a.) What fraction of the students have a BMI of at least 22?

About $\frac{1}{4}$ since that is the right whisker of the graph.

1b.) Is the data more spread out below the first quartile or above the third quartile? Explain.

The right whisker is longer than the left whisker so the data is more spread out above the third quartile than below the first quartile.

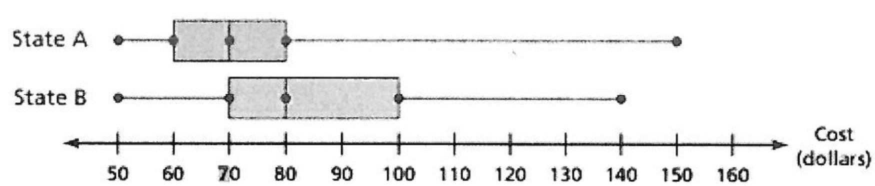
1c.) Find and interpret the interquartile range of the data.

22-19 = 3. So, the middle half of the students have a very similar BMI.

1d.) Find and interpret the range of data.

28 - 17 = 11. The greatest difference between BMI in sixth graders was 11 BMI.

Example #2: You want to compare the costs of speeding tickets in two states. The double box-and-whisker plot shows a random sample of 10 speeding tickets issued in two states.



2a.) Find the median of each state.

A = 70 **B = 80**

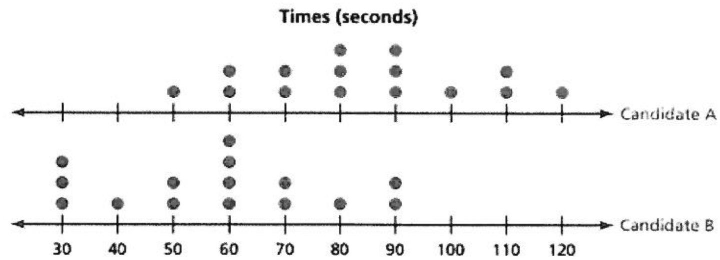
2b.) Find the IQR for each state.

A = 20 **B = 30**

2c.) Can you use this information to make a valid comparison about speeding tickets in the two states?

It looks like State B's speeding tickets generally cost more, however, this is not a big sample size.

Example #3: The double dot plot shows the time that each candidate in a debate spent answering each of 15 questions.



3a.) Find the mean for each candidate.

Mean A = 84 sec.

Mean B = 58 sec.

3b.) Can you make any conclusions from your findings?

The first candidate spent more time answering the vast majority of the questions.