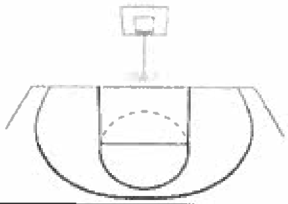
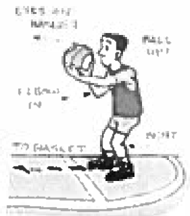
Name: ______________________________________ Hour: _____ Date: ______

Lesson 5.1: Day 1: How good is Mrs. Gallas at free throws?


Mrs. Gallas thinks she is a pretty good free throw shooter. How many free throws would you like to see Mrs. Gallas shoot before you could be confident guessing her free throw percentage? We'll watch Mrs. Gallas shoot free throws, when you are confident make a guess at her free throw percentage.

1. As each shot is attempted, keep track of the number of made free throws and the total number of shots attempted in the table below. When you think you know Mrs. Gallas' true free throw percentage, stop recording the shots.

Shot #	1	2	3	4	5	10	15	20	30	40	50	60	70	80
Result (Make or Miss)														
Proportion of Makes														

2. What do you think Mrs. Gallas' true free throw percentage is?

3. Sketch the graph displaying the proportion of made free throws.

4. How could you make your guess more accurate?

5. Mrs. Gallas has a ____% probability of making a free throw. Interpret this probability.

Name: ______________________________ Hour: _____ Date: ______

Lesson 5.1 Day 1– The Idea of Probability

Important ideas:

Check Your Understanding

1. Pedro drives the same route to work on Monday through Friday. His route includes one traffic light. According to the local traffic department, there is a 55% probability that the light will be red when Pedro reaches the light. Interpret the probability.

2. Probability is a measure of how likely an outcome is to occur. Match one of the probabilities that follow with each statement. Explain your answers to your neighbor.

   0 0.001 0.3 0.6 0.99 1

   (a) This outcome is impossible. It can never occur.

   (b) This outcome is certain. It will occur on every trial.

   (c) This outcome is very unlikely, but it will occur once in a while in a long sequence of trials.

   (d) This outcome will occur more often than not.

3. A husband and wife decide to have children until they have at least one child of each sex. The couple has had seven girls in a row. Their doctor assures them that they are much more likely to have a boy next. Explain why the doctor is wrong.

Name: ______________________________ Hour: _____ Date: ______

Lesson 5.1: Day 2: Are Soda Contests True?

Pepsi ran a promo contest for their 20 oz. bottles of soda. Some of the caps said, "Please try again!" while others said, "You're a winner!" Pepsi advertised the promotion with the slogan "1 in 6 wins a prize." Mrs. Gallas' statistics class wonders if the company's claim is true. To find out, all 30 students in the class go to the store, and each buys one 20-ounce bottle of the soda. **Two of the 30 students** get caps that say "You're a winner!"

1. How many winners would you expect to get out of a class of 30? Is it guaranteed?

Does this result give convincing evidence that the company's 1-in-6 claim is inaccurate? We will perform a **simulation** to help answer this question. We will **assume Pepsi is telling the truth**. If they are telling the truth, what is the probability of getting 2 or fewer winners in a class of 30 **purely by chance?** Let's find out.

2. What could we use to model a 1/6 probability? ___________ Assign certain outcomes to "Losers" and "Winners". List them below.

3. Roll your die 30 times to imitate the process of the students in Mrs. Gallas' statistics class buying their sodas. How many of them won a prize? ________

4. Repeat steps 1 and 2. How many won a prize this time? _________

5. Plot the number of prize winners for each trial of 30 to the dot plot on the board. (2 dots)

6. Sketch the class dot plot below.

7. What percent of the time did Mrs. Gallas' statistics class get two or fewer prizes, just by chance?

8. Does it seem plausible that the company is telling the truth but that the class just got unlucky? Or in other words, do we have **convincing evidence** that Pepsi is lying?

Name: ______________________________ Hour: _____ Date: ______

Lesson 5.1 Day 2– Simulation

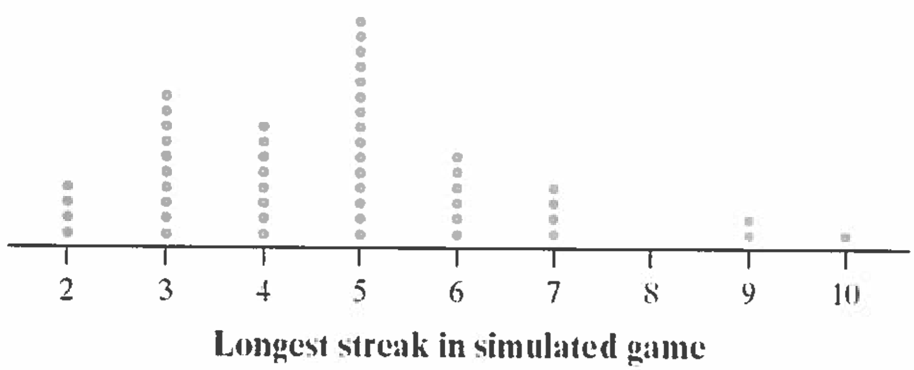
Important ideas:

Check Your Understanding

A basketball announcer suggests that a certain player is a streaky shooter. That is, the announcer believes that if the player makes a shot, the player is more likely to make the next shot. As evidence, the announcer points to a recent game where the player took 30 shots and had a streak of 10 made shots in a row. Is this convincing evidence of streaky shooting by the player? Assume that this player makes 50% of the shots and that the results of a shot don't depend on previous shots.

1. Describe how you would carry out a simulation to estimate the probability that a 50% shooter who takes 30 shots in a game would have a streak of 10 or more made shots.

The dotplot displays the results of 50 simulated games in which this player took 30 shots.

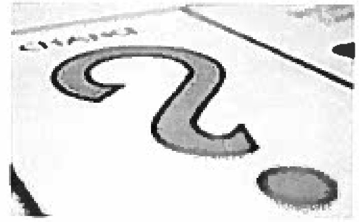


2. Explain what the two dots above 9 indicate.

3. What conclusion would you draw about whether this player was streaky? Explain your answer.

Name: ______________________ Hour: _____ Date: _____

Lesson 5.2: Day 1: Odds or evens, who will win?



We're going to play a game to answer this question. You and your partner must decide who will be "Odds" and who will be "Evens". Then you will roll two dice and **multiply** the numbers. If the product is odd, the odds person wins and vice versa for evens. Play 20 times, keeping track of how many wins each person has.

1. How many times did the odds win? __________

   Write this as a fraction out of 20 and turn it to a percentage. ________________

Maybe the odds just had a run of bad luck. Let's see how the rest of the class did with odds. Write the number of odds wins for your group in the table on the board.

2. Find the total percent of rolls that were odd products for the whole class. ______

   How does this compare to your group's results?

3. To determine the true probability of rolling an odd product, we should list out all possible products that we could get. Complete the table below to show all possible products (multiply).

4. Use your table to find the probability of rolling an odd product.

5. Which was closer to the percentage you found in #4, your group data or the classroom data? Why do you think that is?

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

6. Use the table to find the probability of rolling each of the following products:

a) 4 or a 5 b) Number besides 6 c) Number from 1 to 36

Name: ______________________________ Hour: _____ Date: _____

Lesson 5.2 Day 1– Basic Probability Rules

Important ideas:

Check Your Understanding

Suppose you tear open the corner of a bag of M&M'S® Milk Chocolate Candies, pour one candy into your hand, and observe the color. According to Mars, Inc., the maker of M&M'S, the probability model for a bag from its Cleveland factory is:

Color	Blue	Orange	Green	Yellow	Red	Brown
Probability	0.207	0.205	0.198	0.135	0.131	0.124

(a) Explain why this is a valid probability model.

(b) Explain why events Red and Blue are mutually exclusive

For each of the following write the event using proper notation and find the probability:

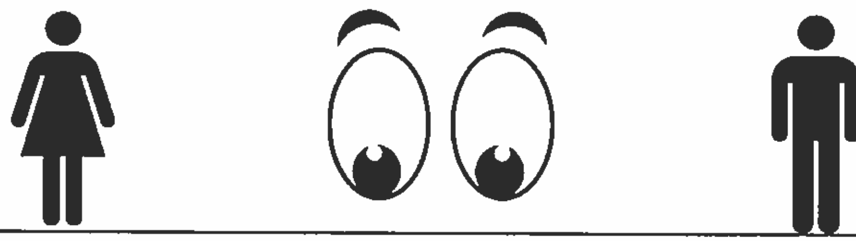
(c) Find the probability that you don't get a blue M&M.

(d) What's the probability that you get an orange or a brown M&M?

(e) What's the probability that don't get a red or a green?

Name: ______________________________ Hour: _____ Date: _____

Lesson 5.2: Day 2: What is the probability of being a brown eyed female?



To answer today's question we will randomly select 10 students to come up front. Use those students' information to answer the following questions.

1. In any given class, there are males and females who have blue, brown or green eyes. Create a table that shows all possible combinations of these gender and eye colors.

2. Using the 10 students chosen, find each of the following probabilities:

   P(Male) =

   P(Female) =

   P(Blue Eyes) =

   P(Brown Eyes) =

   P(Green Eyes) =

3. Find each of the following probabilities and explain why your answer makes sense.

   P(Male or Female) =

   P(Blue or Brown Eyes) =

4. Find each of the following probabilities and explain why your answer makes sense.

   P(Male or Blue Eyes) =

   P(Female or Brown Eyes) =

5. Find each of the following probabilities and explain why your answer makes sense.

   P(Not Green Eyes) =

   P(Not Male) =

Name: ______________________________ Hour: _____ Date: ______

Lesson 5.2: Day 2: Probability and the General Addition Rule

Big Ideas:

Check Your Understanding:

What is the relationship between educational achievement and home ownership? A random sample of 500 U.S. adults was selected. Each member of the sample was identified as a high school graduate (or not) and as a homeowner (or not). The two-way table displays the data. Suppose we choose a member of the sample at random. Define events

G: person is a high school graduate

H: person is a homeowner.

	High school graduate	Not a high school graduate
Homeowner	221	119
Not a homeowner	89	71

1. Explain in plain language what $P(G^c)$ means and find the probability.

2. Explain why $P(\text{G or H}) \neq P(\text{G}) + P(\text{H})$. Then find $P(\text{G or H})$.

3. Make a Venn diagram to the right to display the sample space of this chance process.

4. Write the event "is not a high school graduate but is a homeowner" in symbolic form and find the probability.

Name: ______________________________ Hour: _____ Date: ______

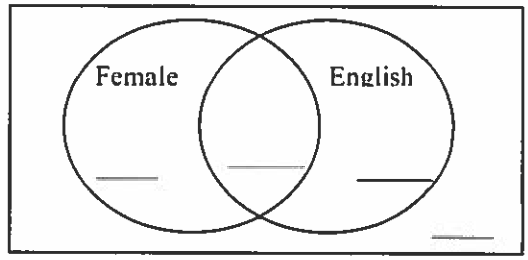
Lesson 5.3: Day 1: Do you prefer English or Math?

Definition: Two events are **independent** if knowing whether or not one event has occurred does not change the probability that the other event will occur.

Are the events "Female" and "prefers English" independent?

1. Collect class data to fill in the following two-way table and Venn Diagram.

	English	Math	Total
Female			
Male			
Total			



2. Suppose that we randomly choose a student from class. Find the following probabilities.

P(Female) =

P(English) =

P(not Female) =

P(not English) =

P(Female AND English) =

P(English AND not Female) =

P(Female AND not English) =

P(not Female AND not English) =

3. Find P(Female OR English).

4. What is the probability that a student prefers English, given that they are a female? Write as a percent.

5. What is the probability that a student prefers English, given that they are a male? Write as a percent.

6. Are the events "Female" and "prefers English" independent? Explain.

Name: ______________________________ Hour: _____ Date: _____

To get a deeper look at independence, consider the following distribution of all seniors at EKHS.

	English	Math	Total
Female	180	140	320
Male	150	130	280
Total	330	270	600

7. Find each of the following using the data in the table:

a. P(English)   b. P(English | Female)   c. P(English | not Female)

8. Fill in the table as if the events WERE independent.

	English	Math	Total
Female			320
Male			280
Total	330	270	600

9. Find each of the following using the INDEPENDENT table:

a. P(English)   b. P(English | Female)   c. P(English | Not Female)

10. What do you notice about your answers in #7 and #9?

11. Generalize: Complete the following statement:

If events A and B are independent then…

Name: ______________________________ Hour: _____ Date: ______

Lesson 5.3: Day 1: Conditional Probability and Independence

Big Ideas:

Check Your Understanding:

Yellowstone National Park surveyed a random sample of 1526 winter visitors to the park. They asked each person whether he or she owned, rented, or had never used a snowmobile. Respondents were also asked whether they belonged to an environmental organization (like the Sierra Club). The two way table summarizes the survey responses.

		Environmental club		
		No	Yes	Total
Snowmobile experience	Never used	445	212	657
	Renter	497	77	574
	Owner	279	16	295
	Total	1221	305	1526

Suppose we randomly select one of the survey respondents. Define events E: environmental club member, S: snowmobile owner, and N: never used.

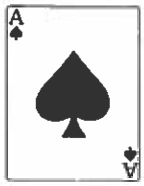
1. Find P(N | E). Interpret this value in context.

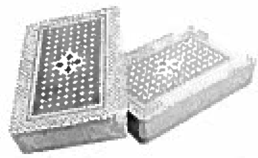
2. Given that the chosen person is not a snowmobile owner, what's the probability that she or he is an environmental club member? Write your answer as a probability statement using correct symbols for the events.

3. Are the events "Snowmobile owner" and "Environmental club member" independent? Explain.

Name: ______________________________ Hour: _____ Date: ______

Lesson 5.3: Day 2: Can you get a pair of Aces or a pair of Kings?





Rules of the game. Five cards total: two aces and three Kings. The player chooses their first card and records the results, and then chooses their second card (without replacement) and records the result. **The player wins if they get a pair of Aces or a pair of Kings.**

1. Choose one person who is the dealer and one who is the player. Play the game 10 times.

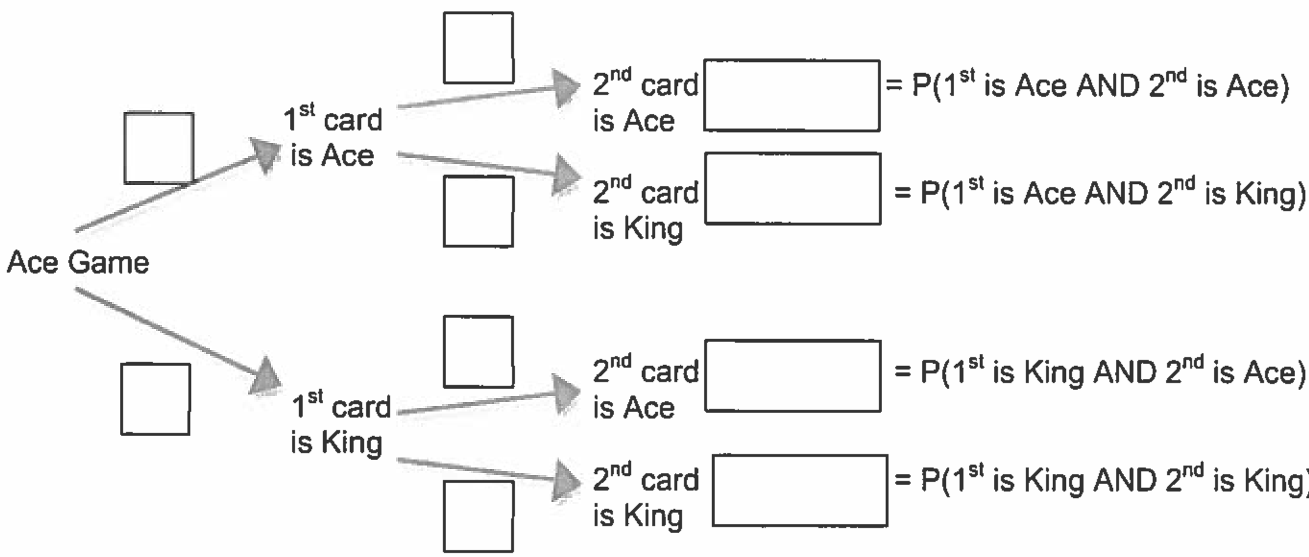
First card										
Second card										
Winner?										

Based on your 10 games, what is the probability of winning this game? __________

2. Go to the front of room to record the number of wins in 10 games.

Based on the whole class data, what is the probability of winning this game? __________

3. Let's try to use a Tree Diagram to calculate the theoretical probability. Fill in the blank boxes with the correct probabilities.



4. Find the theoretical probability of winning the game. ______________________________

5. What is the probability that the 1st card was a King, given that the person won the game?

Name: ______________________________ Hour: _____ Date: _____

Lesson 5.3: Day 2: Conditional Probability and Independence

Big Ideas:

Check Your Understanding:

A computer company makes desktop, laptop, and tablet computers at factories in two states: California and Texas. The California factory produces 40% of the company's computers and the Texas factory makes the rest. Of the computers made in California, 25% are desktops, 30% are laptops, and the rest are tablets. Of those made in Texas, 10% are desktops, 20% are laptops, and the rest are tablets. All computers are first shipped to a distribution center in Missouri before being sent out to stores. Suppose we select a computer at random from the distribution center and observe where it was made and whether it is a desktop, laptop, or tablet.

1. Construct a tree diagram to model this chance process.

2. Find the probability that the computer is a tablet.

3. If we select 4 computers at random from the distribution center (with replacement) what is the probability that at least 1 of the computers is a tablet computer?

4. Given that a tablet computer is selected, what is the probability that it was made in California?

PROBABILITY STRATEGIES

Strategy:	Example problem where this strategy would be useful	What this strategy looks like:

AP Statistics Activity Wrap-up

Name________________

Activity Name:

Describe the activity or context:	
What important statistical concepts did we learn?	

Activity Name:

Describe the activity or context:	
What important statistical concepts did we learn?	

Activity Name:

Describe the activity or context:	
What important statistical concepts did we learn?	

Activity Name:

Describe the activity or context:	
What important statistical concepts did we learn?	

Activity Name:

Describe the activity or context:	
What important statistical concepts did we learn?	

Activity Name:

Describe the activity or context:	
What important statistical concepts did we learn?	