Decimal Drop

Name_____Date_____

Trial 1: Capture distances with only decimeter markings

Name	Trial 1	Trial 2	Trial 3	Average
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Trial 2: Capture distances with centimeter markings

Name	Trial 1	Trial 2	Trial 3	Average
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Decimal Drop

Name_____Date_____

Trial 1: Capture distances with only decimeter markings

Name	Trial 1	Trial 2	Trial 3	Average
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Trial 2: Capture distances with centimeter markings

Name	Trial 1	Trial 2	Trial 3	Average
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

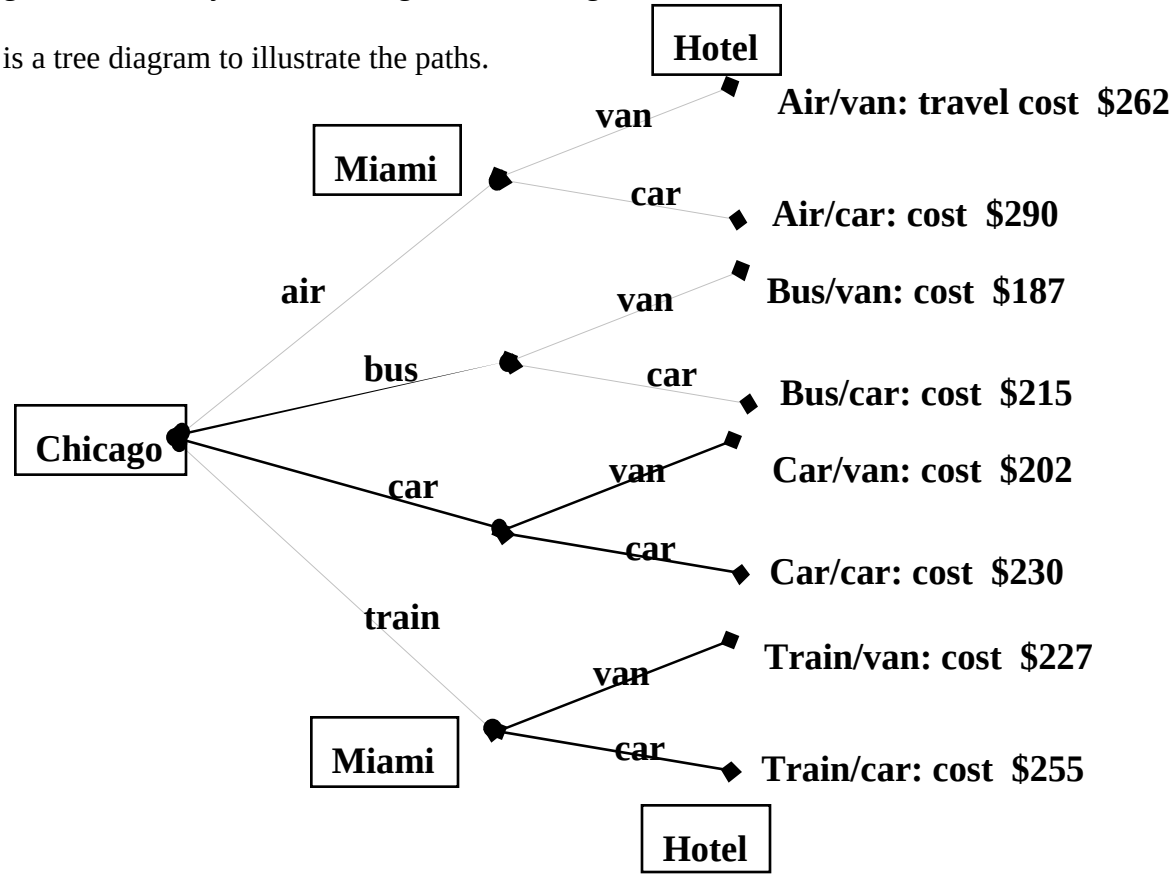
Name_____Date_____

Tree Diagrams and the Fundamental Counting Principle

The **Fundamental Counting Principle** tells us that if we have two decisions to make, and there are ***M*** ways to make the first decision, and ***N*** ways to make the second decision, the product of ***M*** and ***N*** tells us how many different outcomes there are for the overall decision process. In general, when a series of decisions are to be made, the product of all the ways to make individual decisions determines the number of outcomes there are.

Example: A travel agent plans trips for tourists from Chicago to Miami. He gives four ways to get from town to town: air, bus, car, train. Once the tourists arrive, there are two ways to get to the hotel: hotel van or car. Since there are four ways to make the first decision, and two ways to make the second, there are eight different ways tourists can get from Chicago to their Miami hotel.

Here is a tree diagram to illustrate the paths.



1. If these eight outcomes are chosen equally by tourists, what is the probability that a randomly selected tourist used a car for both parts of the trip?
2. What is the probability that a randomly selected tourist used a car on at least one part of the trip?
3. What is the probability that the trip cost less than $200?
4. What is the probability that the trip cost over $250?
5. If the tourists were flying to New York, there would be a third way to get to the hotel – subway. Draw a tree diagram to show the possible routes. How does this relate to the Fundamental Counting Principle?

Name_____Date_____

Tree Diagrams and the Fundamental Counting Principle (cont.)

Andy has asked his girlfriend to make all the decisions for their date on her birthday. She will pick a restaurant and an activity for the date. Andy will choose a gift for her. The local restaurants include Mexican, Chinese, Seafood, and Italian. The activities she can choose from are Putt-Putt, bowling, and movies. Andy will buy her either candy or flowers.

How many outcomes are there for these three decisions?
Draw a tree diagram to illustrate the choices.

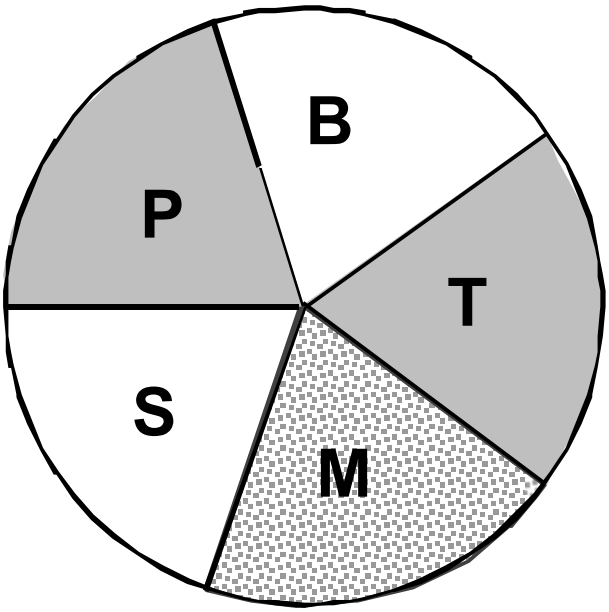
Dinner for Two	Cost for two	Gift Cost
Mexican - $20	Putt-Putt - $14	Flowers - $25
Chinese - $25	Bowling - $10	Candy - $7
Seafood - $30	Movies - $20	
Italian - $15		

1. If all the possible outcomes are equally likely, what is the probability that the date will cost over $50?
2. What is the maximum cost for the date? The minimum?
3. What is the average cost for this date?
4. What is the probability that the date costs exactly $60?
5. What is the probability that the date costs under $40?

Name_____Date_____

My Word!

Group member	Task
A	Spin the letter spinner
B	Toss coin for a vowel: Heads = A Tails = I
C	Toss coin for a letter: Heads = E Tails = R



I. Make a tree diagram to show the possible words.
What is the probability that your group will make a word?

B

T

M

S

P

Name_____Date_____

My Word! continued.

II. Do the experiment 25 times. What percentage of the time did your group form a word?

				Check here if you formed a word
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____
6.	_____	_____	_____	_____
7.	_____	_____	_____	_____
8.	_____	_____	_____	_____
9.	_____	_____	_____	_____
10.	_____	_____	_____	_____
11.	_____	_____	_____	_____
12.	_____	_____	_____	_____
13.	_____	_____	_____	_____
14.	_____	_____	_____	_____
15.	_____	_____	_____	_____
16.	_____	_____	_____	_____
17.	_____	_____	_____	_____
18.	_____	_____	_____	_____
19.	_____	_____	_____	_____
20.	_____	_____	_____	_____
21.	_____	_____	_____	_____
22.	_____	_____	_____	_____
23.	_____	_____	_____	_____
24.	_____	_____	_____	_____
25.	_____	_____	_____	_____

III. Compare theoretical probability with experimental probability.

IV. Would you play this game? What if a carnival had this experiment as a game? To play you pay 50 cents, and if you make a word, you win 75 cents. Discuss the fairness of this game and the wisdom of playing or running the game.

Name_____Date_____

Frequency Distribution

Materials needed: 25 unbroken pieces of dried spaghetti pasta, metric ruler, recording sheet.

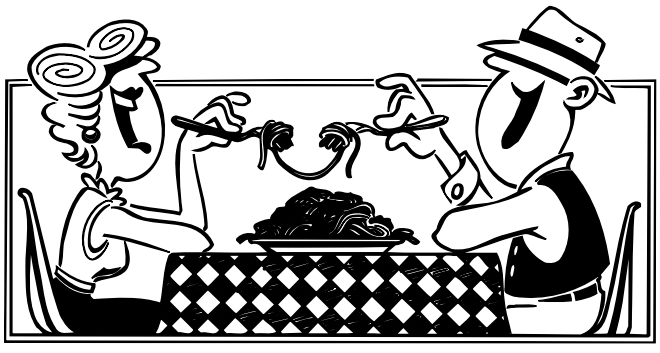
Work with a partner. Break each of the spaghetti strands into two pieces. The breaking point should vary in as random a pattern as possible.

Measure each piece to the nearest mm and record the lengths in the frequency distribution table shown below.

Length	Tally	Frequency	Percentage
0 – 2 cm	_____	_____	_____
3 - 5 cm	_____	_____	_____
6 – 8 cm	_____	_____	_____
9 – 11 cm	_____	_____	_____
12 – 14 cm	_____	_____	_____
15 – 17 cm	_____	_____	_____
18 – 20 cm	_____	_____	_____

Is there a problem with the categories selected? How can you correct this?
Fix the problem and complete the table.

Length	Tally	Frequency	Percentage
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



Name_____Date_____

Space Race

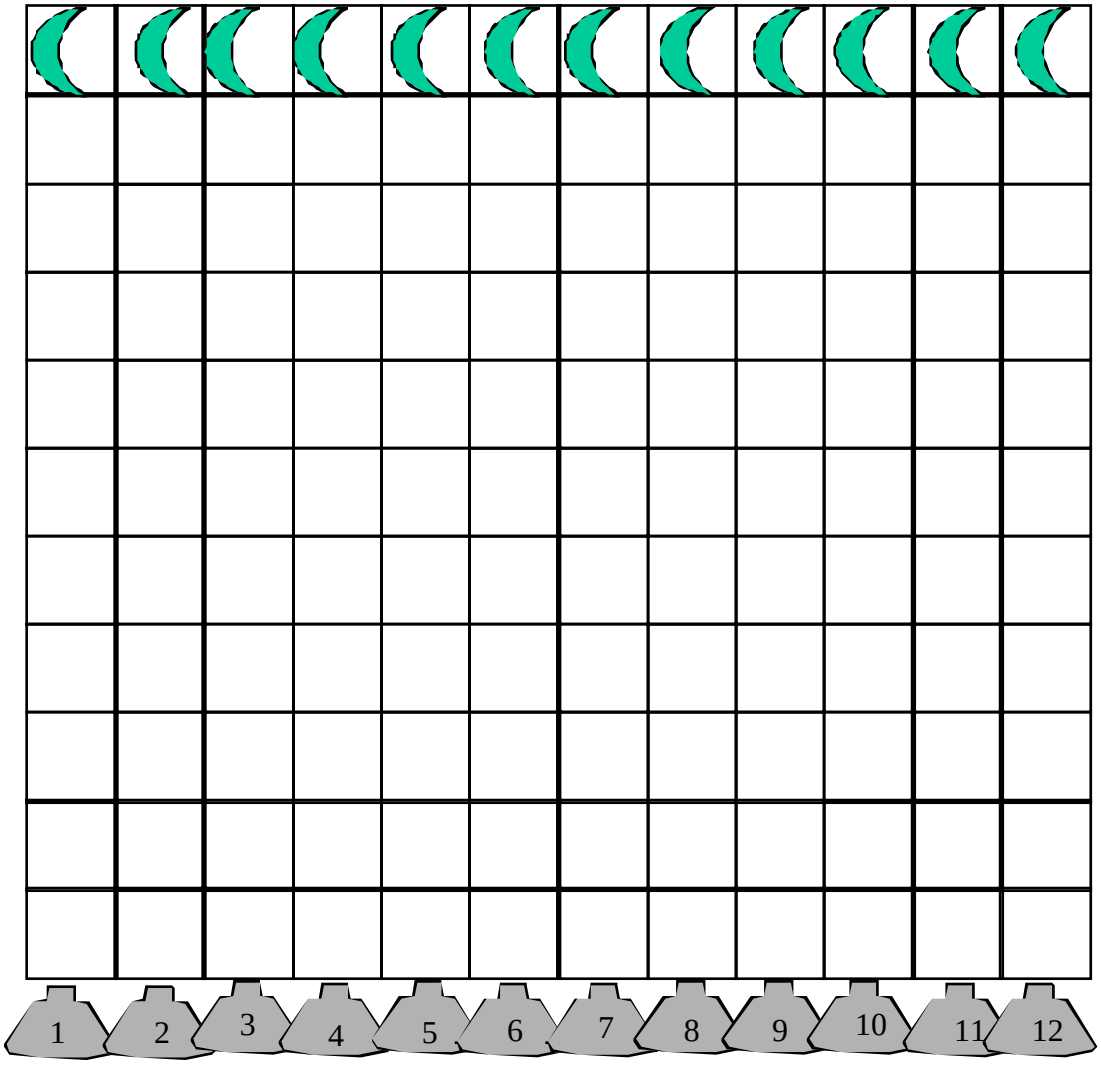
In 1957 the USSR launched the first satellite, Sputnik, into space. This started a space race between the USSR and the USA. Start your own space race below.

Roll a pair of dice. Each time you roll the dice, make an **X** in one of the boxes above the number That represents the sum of the numbers on the dice you rolled.

Which space capsule will reach the Moon first?

Which would you want to be riding on?

Run the race three times if you have time.



Name_____Date_____

Application Contingency

Age Range	Men	Women	Totals
20-29	30	18	48
30-39	24	24	48
40-49	80	40	120
50 and over	6	18	24
Totals	**140**	**100**	**240**

The table above shows the ages and gender of candidates who applied for the space colony. Use the information to answer the questions below.

1. There were 240 applicants. If all the applications are put in a barrel and one is drawn, what is the probability of drawing the application of someone from 40-49 years of age?

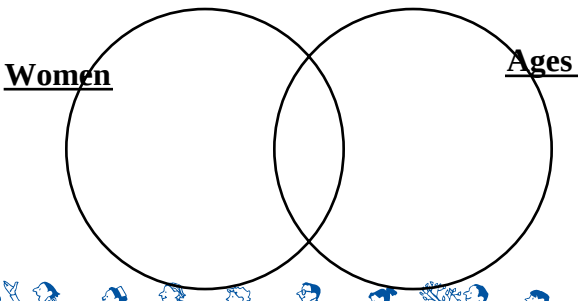
2. What is the probability of drawing the application of a woman?

3. What is the probability of drawing the application of a man 40-49 years old?

4. Susan picked an application from the barrel and said "I have the application of someone over 50." What is the probability that she had the application of a woman?

5. What is the probability of drawing an application of someone at least 40 years old?

6. Susan made a Venn Diagram as shown below. Indicate the number of applicants in each section of the diagram. How many will be in each section?



Name_____Date_____

Mini Review - Probability

A class has access to these random number generators: some regular six-sided dice, some 12-sided dice, a spinner marked 1-10, and fair coins.

1. Someone in your class believes that if you toss heads on a coin, then the next toss is more likely to be tails than heads. Describe how you would design an experiment to test this. Carry out the experiment and describe the results.

2. Someone in your class wants to know the probability that when five people meet, at least two of them will be born in the same month. Describe how you would design an experiment to test this. Carry out the experiment and describe the results.

3. The *Bubble Chew* company puts 10 different Action Man cards in its packs - one card per pack.

What is the probability that you will have to buy fewer than 20 packs of gum to get the entire set?

How would you design an experiment to test this?
Carry out this experiment and describe the results.

Name_____Date_____

Mini Review – Probability (cont.)

Answer each question below.

4. If a coin is fair, how many times can you expect to toss heads out of 50 tries?

5. If you roll a fair die, what is the probability of rolling a three?

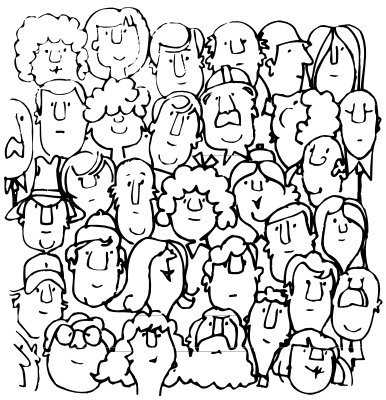
   If you roll this die 600 times, how many times can you expect to roll a three?

   If you roll this die six times, how many times can you expect to roll a three?

6., On Saturday afternoons, at a movie theater, there is an equal probability that the customers are male or female. Which is more likely, A or B?

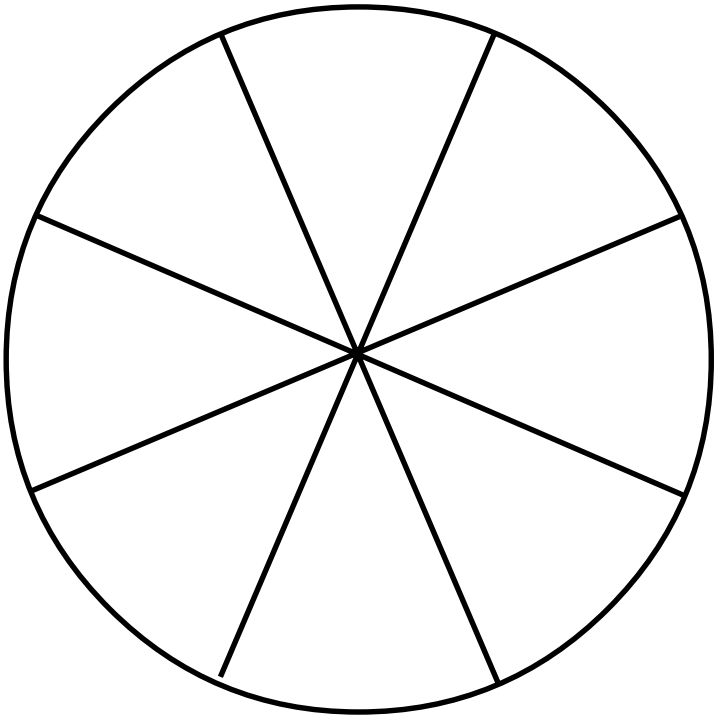
   A When the 200 seats fill up, 100 customers are male and 100 are female.
   B When the first two customers come in, one is male and one is female.

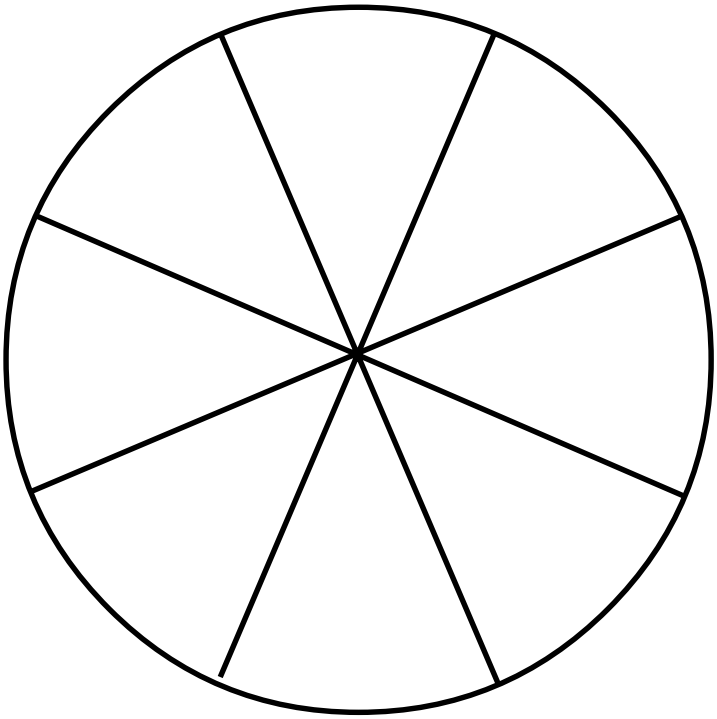
   Explain your answer.



Name_____ **Date**_____

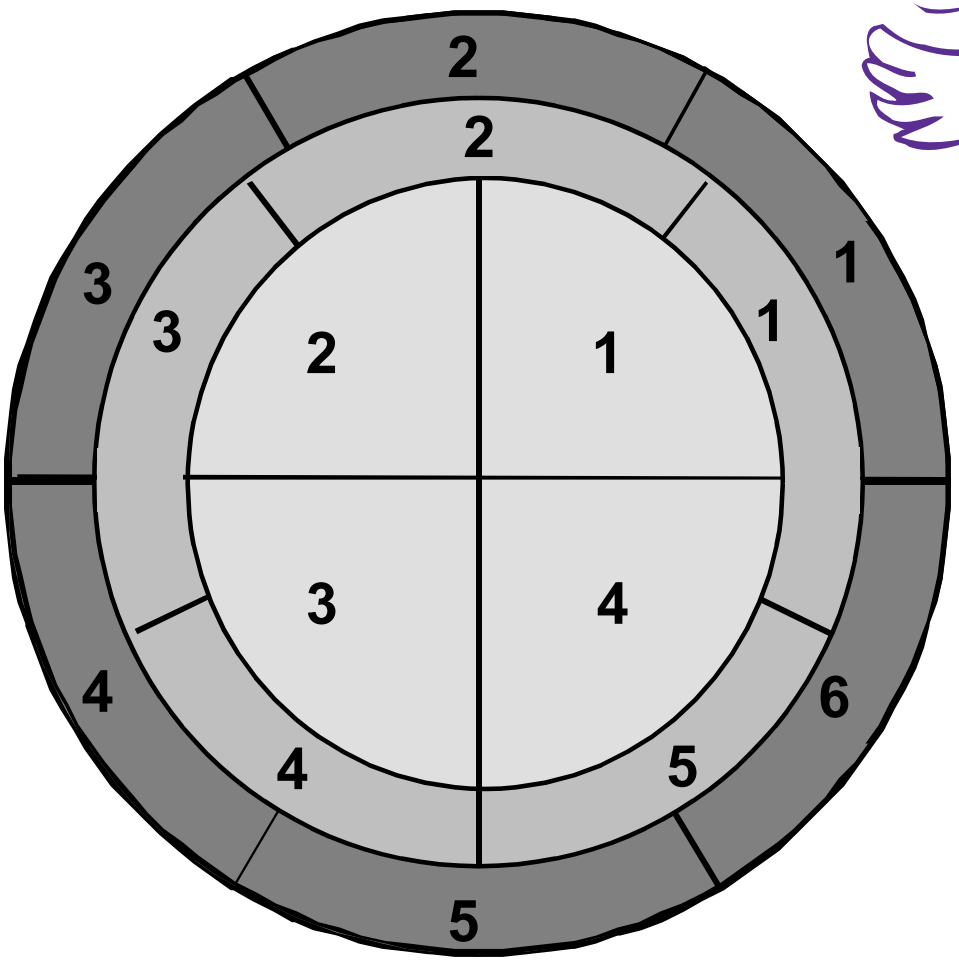
Making Spinners





Name_____Date_____

Are Spinners Really Random?



Name_____**Date**_____

Estimating Wildlife Populations

The container provided for your group contains all the trout in a lake. The Wildlife Commission has asked you to estimate how many there are.

Procedure:

1. Count out 20 blue marbles (or other items as designated by your teacher) and place them into the container. Close the container and mix well. (These items represent tagged trout that the wildlife manager puts into the lake.)

2. Use the cup provided (a half cup measure for example) and dip into the bag removing a sample of marbles. (This represents the wildlife managers sampling fish.) Repeat this sampling several times. After each trial, return the captured "trout" to the "lake." Record the results below.

Trial #	Total number of Marbles	Number of "tagged" marbles	% of "tagged" marbles
1			
2			
3			
4			
5			

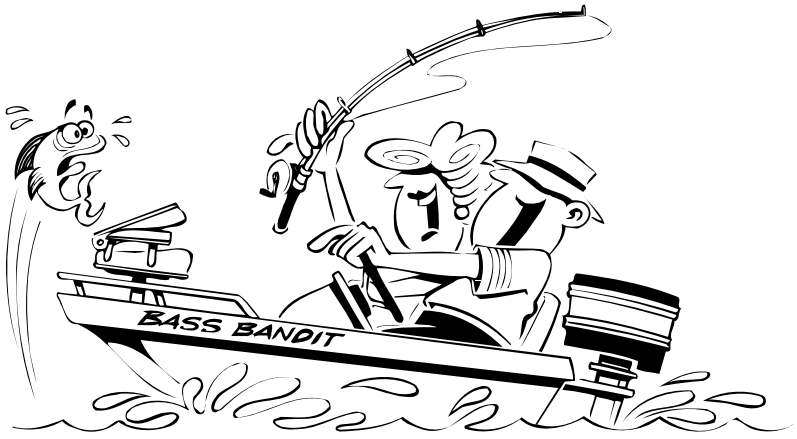
3. Average the results from the five trials above. Use this as an experimental value for Probability(catching a tagged fish).

_____

4. Use the equation below to calculate an estimate of the number of trout in the lake.

$$P(\text{catching a tagged trout}) = \frac{\text{Number of tagged trout in the lake}}{\text{Number of total trout in the lake}}$$

5. If time permits, exchange containers with another group and repeat the experiment. Compare your results with those of the other group.



Name_____Date_____

Spin to Win!

You are going to conduct an experiment in which you will spin both spinners and record the value spun, for example, if you spin a **two** and a **dime**, you will record **$0.20**.

1. What are the possible outcomes? What is the probability of each outcome?

2. Now conduct the experiment 36 times and record your results in the table below.

Trial#	Coin	Number	Value	Trial #	Coin	Number	Value	Trial #	Coin	Number	Value
1				13				25			
2				14				26			
3				15				27			
4				16				28			
5				17				29			
6				18				30			
7				19				31			
8				20				32			
9				21				33			
10				22				34			
11				23				35			
12				24				36			

3. How do your results compare with the theoretical probability?

4. Now make a pie chart of your results. Show the number of times you got exactly 50 cents, more than 50 cents, and less than 50 cents.

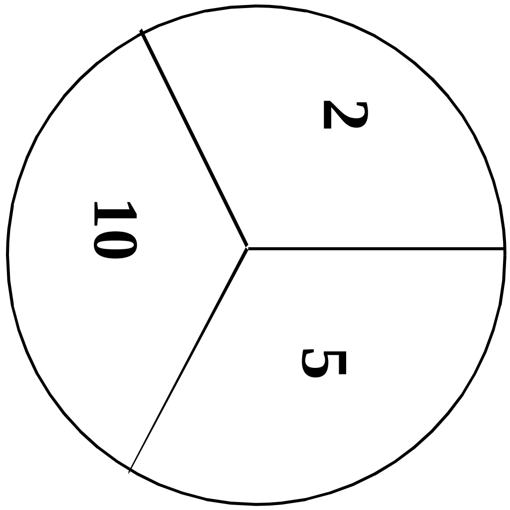
5. Calculate the probability of getting exactly 50 cents, less than 50 cents, more than 50 cents. How does this compare with your pie chart?

6. Suppose this were a carnival game. You must pay 55 cents to play it, and you win what you spin. Discuss the fairness of this game and the wisdom of playing it or running it.

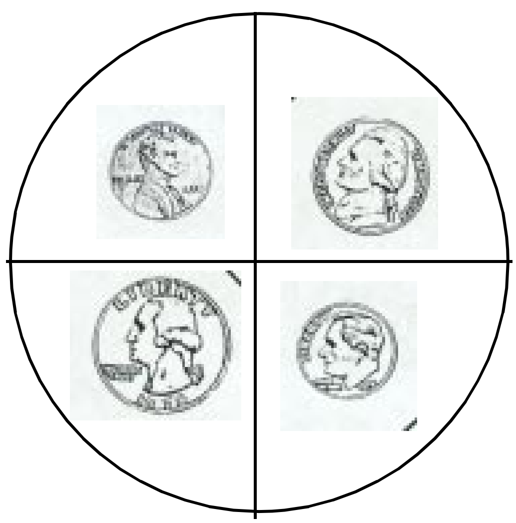
Name____Date___________

Spin to Win!

Number of Coins



Type of Coin



Name_____**Date**_____

Losing Your Marbles

Marbles are dropped into the top of this device. After they pass through several junction points, they come out into one of the round containers at the bottom.

At each junction point, there are two channels that the marble might follow. There is an equally likely chance that the marble will fall left or right at each junction.

If 16 marbles are dropped into the top chute, how many are expected to end up in each of the round containers?

What is the probability of a marble falling into each of the five circles?

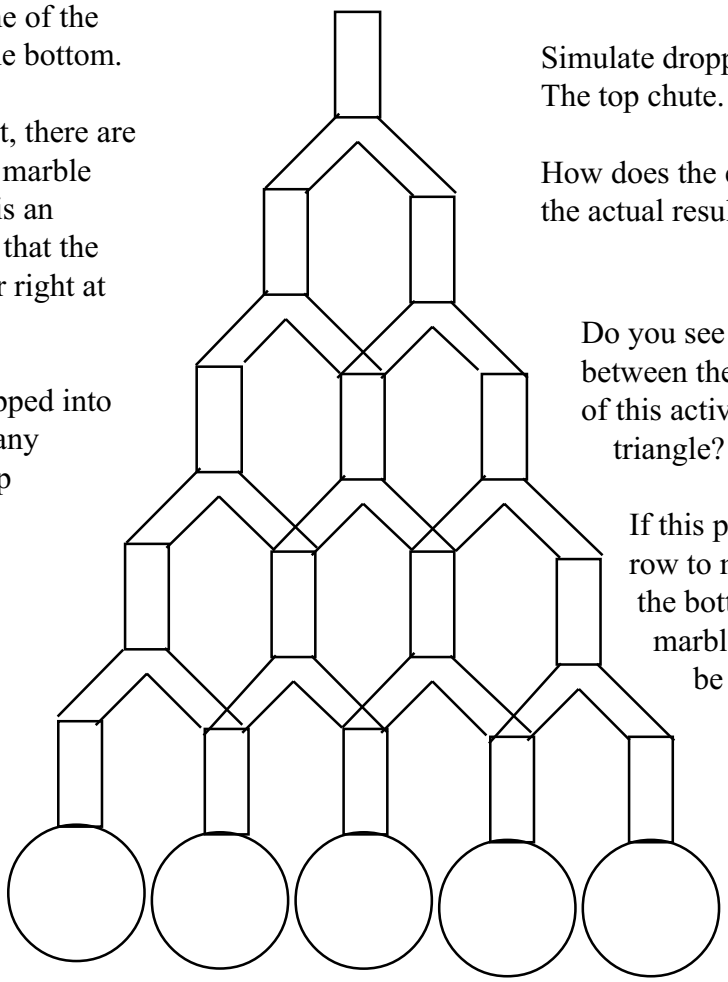
Use a coin to determine whether a marble will fall left or right (heads = right, tails = left).

Simulate dropping 16 marbles into The top chute. Record your results.

How does the expected compare with the actual results?

Do you see a relationship between the theoretical outcome of this activity and Pascal's triangle?

If this pyramid had one more row to make six circles at the bottom, how many marbles out of 32 would be expected to fall into each of the six circles?



	1	2	3	4	5
Expected					
Actual	___	___	___	___	___

Probability of Falling into a Specific Circle

Five circles:

1	2	3	4	5
____	____	____	____	____

Six circles:

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