Math Modeling: Probability A Game of Multiplication:

Name_____ Class Period_____

Probability: describes the chance that an uncertain event will occur.

Theory vs. Experiment

- What does theoretical mean?_____
  Once you get the theoretical probability you can use proportions to predict probability for any number of tries.

$$P(E) = \frac{\#\ of\ possible\ outcomes\ of\ E}{total\ \#\ of\ outcomes\ in\ the\ sample\ space}$$

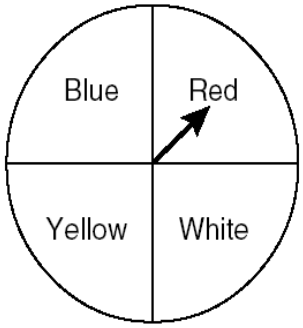
- What does experimental mean?_____

$$P(E) = \frac{\#\ of\ times\ event\ E\ occurs}{total\ \#\ of\ trials} = \frac{\#\ successes}{\#\ tries}$$

Now for experimental data TAKS style!

1.

A spinner was spun 20 times. The results are shown in the table below.



Spinner Results

Red	7
White	5
Blue	4
Yellow	4

Which color on the spinner has the same experimental probability as theoretical probability?

F Red
G White
H Blue
J Yellow

What is the theoretical probability of spinning and landing on blue? _____(write as both a fraction and a decimal).

Will this be the same for the other colors?_____

If they spin 4 times, theoretically, how many should be blue?
$.25 \times \quad = \quad$

Theoretically, how many should be blue out of 20 spins?
$.25 \times \quad = \quad$

Since this is the same for the other colors, what color has this value?

_____

2.

The table below shows the results of rolling a fair number cube 50 times during a classroom activity.

Number-Cube Data

Outcome	Frequency
1	7
2	12
3	10
4	9
5	8
6	4

What is the difference between the theoretical probability of rolling a number less than 4 and the experimental results recorded in the table above?

F 8%

G 79%

H 58%

J 29%

Rolling a number **less** than 4, includes what numbers?_____

What is the theoretical probability of rolling a number **less** than 4?_____

That is what percent?_____
OR!!
If you roll a die, 1should come up $\frac{1}{6}$ times. Same for 2 and 3, so how many total that is you can add them up and get the same value = ____
* (the sum of probabilities will equal 1)

Experimental probability:
How many times did the "fair cube" come up 1, 2 and 3? ___ + ___ + ___ =_____

Total rolls of the number cube?_____
Experimental probability is_____
What is this as a percent?_____

In case we have forgotten the actual TAKS problem, what are we asked to do???? What is the DIFFERENCE between the theoretical and experimental?

3.

Reggie is a professional baseball player. He has the following batting record.

Type of Hit	Number
Singles	210
Doubles	20
Triples	1
Home runs	6
No hits	574

Based on this record, what is the probability that Reggie will get a hit during his next time at bat?

A 0.413

B 0.186

C 0.292

D 0.366

How many times total at bat?_____

How many total "hits"?_____

Make a fraction and divide

MULTIPLE EVENTS: MULTIPLY!

4.

At Reyna High School 50% of the students eat lunch in the school cafeteria. In the same school 10% of the students participate in sports. What is the probability that a student selected at random eats in the school cafeteria and participates in sports?

F $\frac{1}{2}$

G $\frac{1}{10}$

H $\frac{1}{20}$

J $\frac{1}{60}$

Now we are looking at 2 events. So we calculate the probability of each event and multiply.

Probability is already given as a percentage, convert to a decimal.

50%=_____

10%=_____

Now multiply:_____ and convert back to a fraction (MATH –ENTER –ENTER)

5.

The table below shows the results of a number cube being rolled.

Outcome	Frequency
1	6
2	2
3	2
4	3
5	2
6	0

Based on these results, what is the experimental probability of rolling a 1?

A 2.5%

B $\frac{1}{6}$

C $\frac{2}{5}$

D 0.6

- Outcome is the number rolled on the die
- Frequency is how many times that number came up.

What is the experimental probability equation given on page 1?

_____

Now use the formula to calculate the experimental probability for rolling a **1:**

_____

6. WITH OR WITH OUT REPLACING???

A jar contains 6 red marbles and 10 blue marbles, all of equal size. If Dominic were to randomly select 1 marble without replacement and then select another marble from the jar, what would be the probability of selecting 2 red marbles from the jar?

A $\frac{9}{64}$

B $\frac{1}{8}$

C $\frac{3}{5}$

D $\frac{3}{8}$

Once again, the key to success is attention to what facts are being given. When the marbles are being taken out of the jar, are they being replaced? **y/n**

Total marbles?_____

Red?..... 6 out of ____.
Probability 1st marble is red?____
Don't put it back.

Now, how many marbles?____

Now, how many reds?.....5 out of ___
Probability?_____

Now, just multiply.

++++++++++++++++++++++

What if they put the first red marble back, what would be the probability of pulling 2 red marbles out?

_____

7.

Heidi has a main-course choice of a hamburger, a hot dog, an egg roll, a taco, a fish sandwich, or a chicken sandwich. She has a side-order choice of french fries, corn chips, potato chips, or a salad. Heidi's beverage choice can be a soda, fruit punch, milk, or water. Which is the best method to determine how many different combinations Heidi could choose?

F Add the total number of items in the 3 categories together

G Multiply the total number of main-course choices by the total number of side-order choices and add the product to the total number of beverage choices

H Multiply the sum of the total number of main-course choices and the total number of side-order choices by the total number of beverage choices

J Multiply the total number of items in each of the 3 categories together

The Fundamental Counting Principle:

If there are **a** ways for one activity to occur, and **b** ways for a second activity to occur, then there are **a • b** ways for both to occur (works when there are more than 2 activities)

So here simply multiply; don't get bogged down with all the words. Read carefully.