

Name: *Key*

Date:




Topic:

Class:

Main Ideas/Questions Notes/Examples

Theoretical Probability Probability based on reasoning written as a ratio of favorable outcomes to total possible outcomes

Experimental Probability Probability of the ratio of times the event occurred to total number of trials

Theoretical vs. Experimental Probability Use the game "Rock, Paper, Scissors" as an example to compare theoretical probability to experimental probability.   
Rock Paper Scissors

Theoretical Probability Experimental Probability

Complete the table below showing who would win the game under the different combinations. Play 25 trials of "Rock, Paper, Scissors" with your partner. Tally how many times Partner A wins, Partner B wins, and the number of ties.

		Player A		
		Rock	Paper	Scissors
Player B	Rock	<i>X</i>	<i>A</i>	<i>B</i>
	Paper	<i>B</i>	<i>X</i>	<i>A</i>
	Scissors	<i>A</i>	<i>B</i>	<i>X</i>

Player A Wins	Player B Wins	Tie
Total:	Total:	Total:

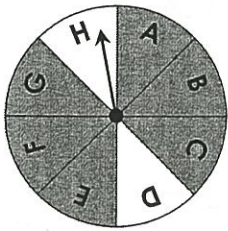
1. What is the probability of Player A winning? $\frac{3}{9} = \frac{1}{3}$
2. What is the probability of Player B winning? $\frac{3}{9} = \frac{1}{3}$
3. What is the probability of a tie? $\frac{3}{9} = \frac{1}{3}$

4. What percent of the trials did Partner A win?
5. What percent of the trials did Partner B win?
6. What percent of the trials resulted in a tie?

7. Do the theoretical results match the experimental results?

8. How could the experimental results get closer to the theoretical results?
More trials the closer you should get.

More Examples



9. The table below shows the results of rolling a standard die 50 times.

Result	Frequency
1	4
2	10
3	9
4	5
5	12
6	10

- a) What is the theoretical probability of rolling a 4?

$$\frac{1}{6}, 0.1667, 16.67\%$$

- b) What is the experimental probability of rolling a 4? Compare this to the theoretical probability.

$$\frac{5}{52} = 0.0962$$

9.62% ~~16.67%~~ $E < T$

10. The results of spinning the spinner to the left 75 times are shown below.

Result	Frequency
A	5 ✓
B	12 ✓
C	10 ✓
D	7
E	11 ✓
F	13 ✓
G	9 ✓
H	8

- a) What is the theoretical probability of spinning a shaded letter?

$$\frac{6}{8} = \frac{3}{4}, 0.75, 75\%$$

- b) What is the experimental probability of spinning a shaded letter? Compare this to the theoretical probability.

$$\frac{60}{75} = \frac{4}{5} = 0.8, 80\%$$

$E > T$

Using Samples to Predict

11. The table below shows the results of tossing a coin 100 times.

Result	Frequency
Heads	58
Tails	42

- a) Theoretically, how many heads would you expect to occur in 300 tosses?

$$150$$

- b) Based on the experiment, how many heads would you expect to occur in 300 tosses?

$$\frac{58}{100} = \frac{x}{300} \quad x = 174 \text{ heads}$$

12. The table below shows the results of randomly selecting a letter of the word **RHOMBUS** 80 times.

Result	Frequency
R	15
H	10
O	6
M	11
B	8
U	18
S	12

- a) Theoretically, if a letter is randomly selected 500 times, how many vowels would you expect?

$$\frac{2}{7} = \frac{x}{500} \quad x = 143 \text{ times}$$

- b) Based on the experiment, if a letter is randomly selected 500 times, how many vowels would you expect?

$$\frac{24}{80} = \frac{x}{500} \quad x = 150 \text{ times}$$