

TUES

Name: Key

Date:

Topic:

Class:

Main Ideas/Questions      Notes/Examples

**THEORETICAL**  
PROBABILITY

What should happen in an experiment  
Example:  
If tossing a coin, the probability of it landing on heads is  $\frac{1}{2} = .5 = 50\%$ .

**EXPERIMENTAL**  
PROBABILITY

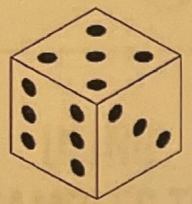
What does happen in an experiment  
Example:  
A coin was tossed 100 times. Heads appeared 60 times. Therefore, the probability of the coin landing on heads on the next toss is  $\frac{60}{100} = \frac{3}{5} = .2 = 20\%$ .

**THEORETICAL VS. EXPERIMENTAL**  
PROBABILITY

Roll a standard die <sup>30</sup> times and record the results in the table below:  
**Results will vary - EXAMPLE**

Result	1	2	3	4	5	6
Frequency		1		1		

Answer each question based on theoretical probability and experimental probability using your results.



Sample Space  
1, 2, 3, 4, 5, 6

Total Outcomes  
(6)

	Theoretical Probability	Experimental Probability
1. What is the probability that the next roll is an odd number? {1, 3, 5}	$\frac{3}{6} = .5 = 50\%$	$\frac{18}{30} = .6 = 60\%$
2. What is the probability that the next roll is a 1 or a 4? {1, 4}	$\frac{2}{6} = .333 = 33.3\%$	$\frac{11}{30} = .367 = 36.7\%$
3. What is the probability that the next roll is at least 2? {2, 3, 4, 5, 6}	$\frac{5}{6} = .833 = 83.3\%$	$\frac{25}{30} = .833 = 83.3\%$
4. Out of 100 rolls, about how many times would you expect to roll a 3?	$\frac{1}{6} = \frac{x}{100}$ $6x = 100$ $x = 16.6 \approx 17$	$\frac{5}{30} = \frac{x}{100}$ $30x = 500$ $x = 16.6 \approx 17$
5. Do the theoretical results match the experimental results? For #'s 3 and 4 they do.		
6. How could the experimental results get closer to the theoretical results? Perform more trials		

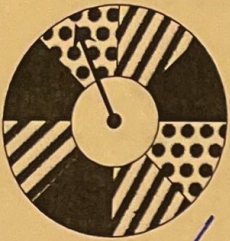


## MORE EXAMPLES

S.S. =

A, C, C, E, L

T.O. =  
5



8

7. A letter in the word **ACCEL** is chosen 50 times. Results are shown in the table below.

Result	Frequency
A	14
C	5
C	7
E	15
L	9

50

a) What is the theoretical probability of choosing a C?

$$\frac{2}{5} = .4 = 40\%$$

b) What is the experimental probability of choosing a C? Compare this to the theoretical probability.

$C = 5 + 7 = 12$

$$\text{Exp} = \frac{12}{50} = .24 = 24\%$$

Exp is lower by 16%

8. The spinner to the left is spun 80 times. Results are shown in the table below.

Result	Frequency
Stripes	27
Polka Dots	18
Solid	35

80

a) What is the theoretical probability of the spinner not landing on polka dots?

$$\frac{6}{8} = .75 = 75\%$$

b) What is the experimental probability of the spinner not landing on polka dots? Compare this to the theoretical probability.

$27 + 35 = 62$

$$\frac{62}{80} = .775 = 77.5\%$$

Exp was 2.5% higher

## USING SAMPLES TO PREDICT

SS. =

Mon  
Tues  
Wed  
thurs  
fri  
sat  
sun

T.O. =

7

9. A day of the week is chosen at random 40 times. Results are shown in the table below.

Result	Frequency
Sunday	3
Monday	12
Tuesday	2
Wednesday	10
Thursday	8
Friday	1
Saturday	4

40

a) Theoretically, if a day of the week is chosen 150 times, how many times would you expect a day that starts with the letter T?

$$\frac{2}{7} = \frac{x}{150}$$

$$7x = 300$$

$$x \approx 42.8 \approx 43 \text{ times}$$

b) Based on the experiment, if a day of the week is chosen 150 times, how many times would you expect a day that starts with the letter T?

$2 + 8 = 10$

$$\frac{10}{40} = \frac{x}{150}$$

$$40x = 1500$$

$$x = 38 \quad 38 \text{ times}$$

10. A small deck of cards has 4 kings, 3 queens, 2 jacks, and 1 ace. Eli chooses one card at random 75 times and records his results in the table below.

Result	Frequency
King	27
Queen	20
Jack	16
Ace	12

75

a) Theoretically, how many times would you expect to draw an ace out of 200 draws?

$$\frac{1}{10} = \frac{x}{200}$$

$$10x = 200$$

$$x = 20 \text{ times}$$

b) Based on Eli's experiment, how many times would you expect to draw an ace out of 200 draws?

$$\frac{12}{75} = \frac{x}{200}$$

$$75x = 2400$$

$$x = 32 \text{ times}$$

SS {K, K, K, K, Q, Q, Q, J, J, A} T.O. = 10