

Today's Learning Goal(s):

By the end of the class, I will be able to:

- a) calculate the experimental probability of an event.

MBF 3CI
Unit 2: Probability



MBF 3CI

2.1 Probability Experiments

Date: Feb. 22/17

INTRODUCE THE CHAPTER PROBLEM: THE MONTY HALL PROBLEM

Most of the most significant events of our lives involve random chance – some people we meet, the weather, the stock market, etc...

Probability is the study that gives a numerical value to the chance that an event will occur, when we admit we do not know and cannot know what will happen.

(*Note:* all probability values can be no lower than 0% and no greater than 100%).

Definitions

Suppose we have one fair die and we are interested in determining the probability of rolling a 3. In math we write this as: $P(\text{rolling a } 3)$

$$P(\text{Rolling a } 3) = \frac{1}{6}$$



A **probability experiment** involves performing a number of steps to help us measure the chance of an event occurring in the future.

For example, rolling a fair die 500 times, and recording the outcomes.

A **trial** is a step in a probability experiment that produces an observation.

For example, rolling a die.

An **outcome** is the observable result of a single trial.

For example, when one rolls a die, the possible outcomes are: 1, 2, 3, 4, 5, 6.

An **event** is an outcome or a collection of outcomes that one is interested in studying.

For example, rolling a three.

The **experimental probability** is the probability of an event that one has observed when performing an experiment. It can be calculated as:

$\text{Experimental probability} = \frac{\text{number of trials with successful outcomes}}{\text{number of trials}}$
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For example, if 500 trials (rolling a die) were performed, and 97 of them generated an outcome of 3, then the experimental probability is $\frac{97}{500}$ or 19%.

Probability Experiment #1:

Using a TI Graphing Calculator, flip a fair coin 10 times and observe the outcomes.

Before starting, for this experiment, define:

Probability Experiment: 👉 **flipping a fair coin 10 times**

Trial: 👉 **flipping a coin**

Outcomes: 👉 **Heads or Tails**

Event: 👉 **Heads**



To access the program, press: **APPS, PROB Sim**, then press any key.
Once in the app, choose: **Toss Coins**.

Select **SET** to go to Settings. On this screen, change the **Trial Set** to **10**, then press **OK**.

You now want to have a table that keeps track of the outcomes of your trials.

Press **TABL**. Get the calculator to toss the coin 10 times by pressing **TOSS**.

The last row in the table will tell you how many Heads were tossed.

Record the number of trials versus number of "Heads" that occurred in the table that follows.

Number of trials	Number of Heads
10	2

Now calculate the Experimental Probability:

$$P(\text{Heads}) = \frac{2}{10}$$

$$= \frac{1}{5}$$

$$= 0.2$$

Probability Experiment #2:

Flip a fair coin 40 *more* times using the app, for a total of 50 trials. Record the number of trials versus number of "Heads" that occurred below:

Number of trials	Number of Heads
50	24

Now calculate the Experimental Probability. $P(\text{Heads}) = \frac{24}{50} = 0.48$

Note: this is for a total of 50 trials

Comment on the results for the experimental probability for 10 trials versus 50 trials.

50 trials was closer to expected than 10 trials

Quit the app by pressing **ESC**, which will return you to the main menu. Now select **QUIT**.

Clear the memory on your calculator. Go back into the app. Once in the app, you will change the number of trials so that you can complete:

Number of trials	Number of Heads
1000	

Comment on the results for the experimental probability of 10 trials vs 50 trials vs 1000 trials.

10 trials	50 trials	1000 trials
$\frac{2}{10} = 0.2$	$\frac{24}{50} = 0.48$	$\frac{484}{1000} = 0.484$

Today's Entertainment: p. 66 # 1 to 4, 6, 7

+ think about the solution to the "Monty Hall Problem"

Your FIRST PRIORITY today is to be fully prepared for tomorrow's Unit 1 Summative.