Name _____ Date _____ Period _____

2 Coins, 3 People

Part 1: Experiment
Two coins will be flipped at the same time.
The three possible events are **Both Heads**, **Both Tails**, and **One of Each**.

Each person should take one of these events as their own. Record your name below the event that is yours.

Both Heads	**Both Tails**	**One of Each**
_____	_____	_____
Name	Name	Name

The two coins should be flipped at the same time, with the results tallied below. Flip the coins 30 times.

Both Heads	**Both Tails**	**One of Each**
_____	_____	_____
Tally	Tally	Tally

Who won the game? _____

Do you think the game was fair? Explain why or why not.

_____

_____

Part 2: Analysis
As each group shares which event won, record the results below.

Both Heads	**Both Tails**	**One of Each**
_____	_____	_____
Tally	Tally	Tally

Did one event seem to win more often? Why do you think this happened?

_____

Follow along with the teacher to draw a Tree Diagram showing all possible outcomes for tossing two coins.

Tree Diagram

1. Based on the tree diagram, how many different outcomes are there? _____

Looking at the outcomes, we see there are 3 different events: both heads, both tails and one of each. Are these events equally likely?

_____

3. Did one person have a high probability of winning this game? Why or why not?

_____

4. What does the term equally likely events mean?

_____

_____

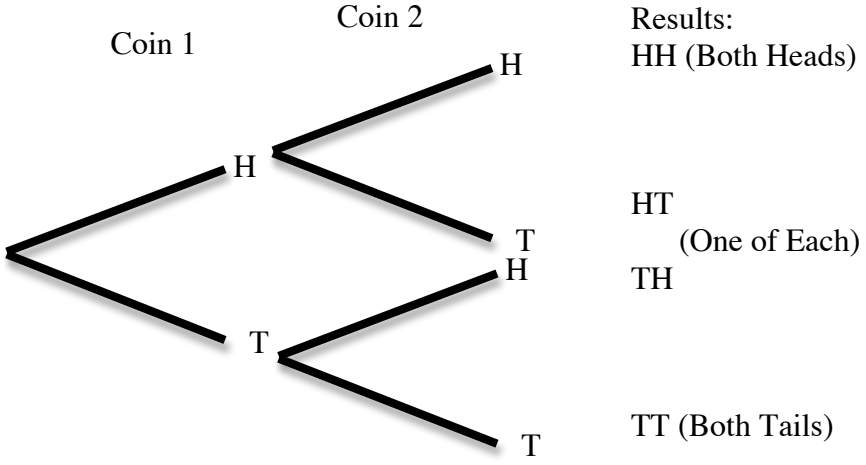
Teacher Directions

Materials:
2 coins for every 3 students

Objective:
Students will each be assigned an outcome for tossing 2 coins. By analyzing results, students will discover and explain the concept of equally likely outcomes.

Directions:
Pass out the activity sheet and have students read the scenario. Make sure students understand why there are three options (events) by having someone explain this to the class. Then put the class into groups of 3 and have each person decide which event they will take. Each student should write their name under their "event". Questions the students to make sure they understand that they need to complete 30 trials and to record tallies for each toss. Once they understand, pass out the dice and let them conduct the experiment. When they complete the experiment, have them answer the two questions independently. Take a quick poll to see if the class thinks the game was fair. Have them vote thumbs up for fair, thumbs down for not fair and sideways thumb for not sure.

When all groups are done (or time is up), conduct a class poll. Ask all students who had Both Heads as their event to stand up. Then, have everyone site down from that group who did NOT win. Have the class record a tally for each person still standing. Repeat this process for each of the other two events (Both Tails and One of Each). You should have almost every winner be from the "one of each" category. Ask again, was this fair? Tell students you need to further investigate the game to determine fairness, as it could be that all of the "one of each" group were just lucky. To do this, draw a Tree diagram to show all possible outcomes. Have the students copy this on their page.



Ask the class how many outcomes there are? Give them 30 second to think and then hold up fingers to vote. They should answer 4. Ask them how many *events* there are (they should answer 3). Ask if the 3 events are *equally likely*. Have the students think about and record their answers to the 4 questions. Come back as a class to discuss the big idea: There are 3 events, but they are not all *equally likely*, meaning, they don't all have the

same probability of occurring. So, "one of each" *should* have one as the probability was 50% as opposed to the other two events which each had a probability of 25%. Note: It is possible for someone with Both heads or Both tails to win; this is the difference between experimental and theoretical probability!