

**Topics:** Probability,  
Independent Events,  
Compound Probability

## Materials List

(per team of 2 or more)

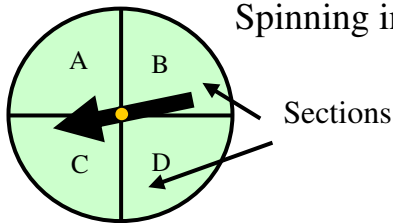
- ✓ Spinner with 4 equal sections labeled with 4 colors or letters. See RAFT Idea Sheets *Give it a Spin* and *Spinner on a Media Tray* for ways to make simple spinners.
- ✓ Penny
- ✓ Tally Sheet (see page 2), 2 copies

This activity can be used to teach:  
CO Math Standard 3: Data Analysis, Statistics and Probability

- Probability and Predictions
  - Independent Events
- 21<sup>st</sup> Century Skills
- Collaboration
- Grades: 5, 7, HS

# Adventures in Probability!

## Spinning in Circles



Experiment with independent events and find how often certain results occur!

## To Do and Notice (work in teams of two or more students)

### Experiment 1

1. Taking turns, spin the spinner 30 times, recording on the tally sheet the section where the spinner stopped for each spin.
2. Total the number of spins that stopped on each section.
3. Divide the totals per section by the total number of spins (30) – this gives the calculated experimental probability of the spinner stopping in a particular section.

### Experiment 2

4. Taking turns, flip a penny 30 times, recording heads or tails on the tally sheet.
5. Total the number of heads and tails and divide each by the total number of flips (30). This is the calculated experimental probability for heads and tails.

### Experiment 3

6. For each of 30 trials, spin the spinner then flip a penny, recording the results for each trial on the second copy of the tally sheet.
7. Calculate the observed experimental probability of the spinner landing in each section and of the penny landing heads or tails – as in experiments 1 and 2 above.
8. Compare the results of experiment 1 and 2 with the results of experiment 3.
9. Calculate the theoretical probability of a coin toss. Calculate the theoretical probability for a spin on a spinner with 4 equal fields. Compare with the experimental probability results. What is observed?

## The Math Behind the Activity

**Theoretical Probability** is the measure of how likely an event is to happen (called a favorable outcome), and is the number of favorable outcomes divided by the total number of possible outcomes. In this activity, the spinner has 1 out of 4 equal possible outcomes, so the theoretical probability of landing on C is  $\frac{1}{4}$ . Two events are **independent** if the occurrence of one does not change the probability of the other occurring. For example, spinning a spinner does not affect the probability of flipping a head on a coin and vice versa. If events are independent, then the theoretical probability of having independent events both occur (a compound event) is the product of the probabilities of each of them occurring. For instance, the theoretical probability of spinning a C followed by flipping a head on a coin is  $(\frac{1}{4})(\frac{1}{2}) = \frac{1}{8}$  (one out of eight favorable outcomes). The actual event, or **experimental probability**, of spinning a spinner and/or flipping coins may differ from the theoretical results; this may reflect physical imperfections in the materials used.

## Taking it Further

- What are the probabilities of the outcomes if the spinner sections differ in size?

**Web Resources** (Visit [www.raft.net/more](http://www.raft.net/more) for how-to videos and more ideas!)

- Examples of Independent Events - [http://www.mathgoodies.com/lessons/vol6/independent\\_events.html](http://www.mathgoodies.com/lessons/vol6/independent_events.html)

## Adventures in Probability Tally Sheet

Trial Number	Spinner				Penny	
	Section A ✓	Section B ✓	Section C ✓	Section D ✓	Heads ✓	Tails ✓
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
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21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
<b>Totals</b>						