Name: _____   Date: _____
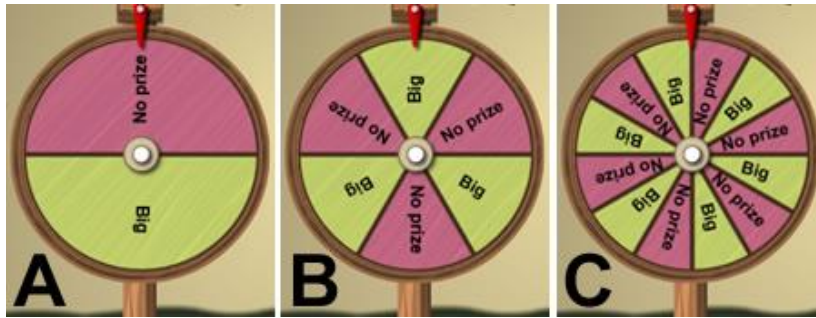
Student Exploration: Spin the Big Wheel!

Vocabulary: certain, impossible, outcome, probability, sample space, trial

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)
Walking through the fair, the carnies tempt you to try your luck at their booth. "Step right up, step right up. Spin the wheel and win a prize, there's nothing to it!"

1. Which wheel gives you the best chance of winning? _____

2. Why did you choose that wheel? _____

   _____

Gizmo Warm-up

The *Spin the Big Wheel!* Gizmo allows you to test your luck and try to win a prize. First, observe the wheel.

1. How many sections is the wheel divided into? _____

2. How many sections result in a small prize? _____

   How many sections result in a big prize? _____

3. Spin the wheel by dragging it sideways. What did you win? _____

4. Click **Clear**. Then, in the top right corner, next to **Players**, click **10** and press **Go**.

   How many players won a small prize? _____   Big prize? _____   No prize? _____

	Get the Gizmo ready:	
Activity A: **What is the most likely outcome?**	• Be sure that **Run the game** is selected at the top. • Make sure you still have the original wheel (4 sections – 2 **No prize**, 1 **Big prize**, 1 **Small prize**). If not, click **Refresh** or **Reload** in your browser.	*Sorry ... better luck next time!*

The carnies make it sound like everyone will win. But what is really the most likely outcome?

1. The **sample space** of an experiment is the set of all possible **outcomes**, or results.

   A. What is the sample space of the given wheel? _____

   _____

   B. Which outcome do you think is most likely? _____

2. What do you think will happen if you spin the wheel once? _____

   Spin the wheel. What happened? _____ Is that what you predicted? _____

3. Click **Clear**. Select **100 Players**, and click **Go**. Each spin is called a **trial**.

   A. How many players won a small prize? _____ Big prize? _____ No prize? _____

   B. Based on this, what is the most likely outcome? _____

4. Select **Design the game**. Here you can design your own wheel. First, set the number of **Sections** with the up and down arrows. Then click any section to change the prize.

   A. An outcome is **certain** if it always happens. Design a wheel on which it is certain that you will win a big prize. Sketch this to the right, on Wheel A:
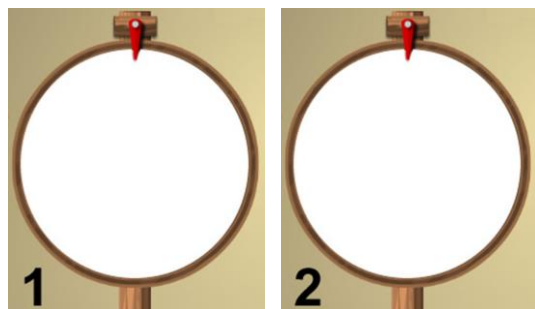
   B. An outcome is **impossible** if it cannot happen. Design a wheel on which it is impossible that you will win a big prize. Sketch this to the right, on Wheel B:
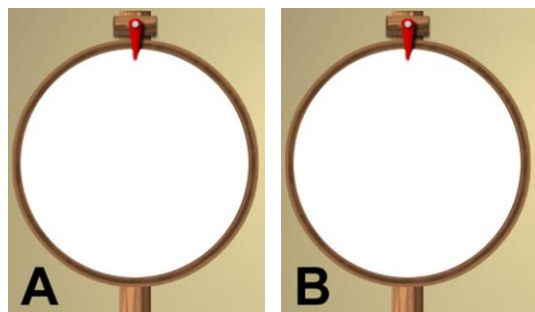
5. Design and sketch two wheels. Predict the most likely outcomes. Test each prediction with 100 spins, and record the most common outcomes.

   Wheel 1 prediction: _____ Actual: _____

   Wheel 2 prediction: _____ Actual: _____

Activity B: **Probability of winning**	<u>Get the Gizmo ready</u>: • Click **Clear**. • Select **Design the game**.	

The dancing monkey is on strike, so the fair needs a new booth. You are in charge of designing a new attraction called "Spin the Big Wheel!"

1. Design a wheel. It should have all 3 possible outcomes: **No prize**, **Big prize**, and **Small prize**. Draw your wheel to the right. (Label your sections **B** for Big prize, **S** for Small prize, or **N** for No prize.)

2. The **probability** of an outcome is a number between 0 and 1. If the probability is 0, the outcome is impossible. If the probability is 1, the outcome is certain. Look at your wheel.

   A. Which outcome do you think is most probable? _____

   B. Which outcome do you think is least probable? _____

3. Turn on **Make your own sign**. The first sign reads: "Probability of winning a prize: # / #."

   • Set the denominator of the fraction to the total number of sections.

   • Set the numerator to the number of sections that will win a prize.

   Click **Submit** to show your sign to the inspector. What is the probability of winning? _____

4. Select **Run the game**, and choose **Circle graph** to view the results.

   A. If 100 people spin your wheel, how many do you think will win something? _____

   B. Select **100 players**, and click **Go**. When they have finished spinning, add up the

      Small prize and **Big prize** winners. How many total winners were there? _____

   C. How close was your prediction? _____

   D. Look at the circle graph. How does the circle graph compare to the wheel? _____

      _____

5. Click **Go** until the **Total players** reaches 1,000. How does the circle graph compare to the

   wheel now? _____

   _____

Activity C: Making wheels	Get the Gizmo ready: • Click **Clear**. • Select **Design the game**. • Check that **Make your own sign** is turned on.	

Your spinning wheel was so successful that fairs from all over the country are ordering them! Your job now is to design wheels to fulfill your orders and satisfy your customers.

1. The Main Street Fair wants all 3 outcomes – **Big prize**, **Small prize**, and **No prize** – to have the same probability. Sketch 3 different possible wheels below. (Use the Gizmo to help.)
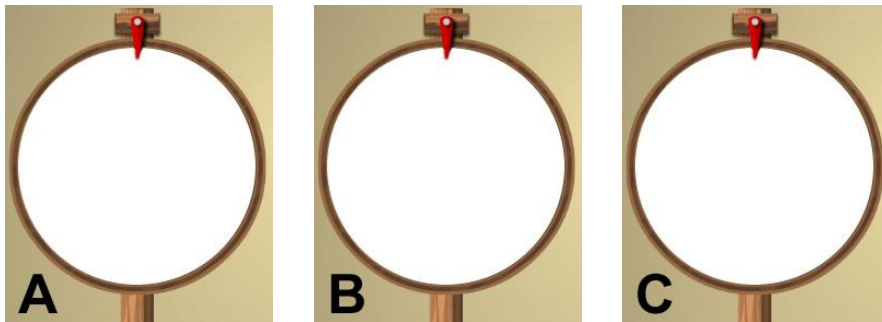
2. Design 3 different signs that describe these wheels and click **Submit**. List them below.

_____

_____

3. Select **Run the game**. Test each of your wheels with 100 players. What were the results?

	Wheel A	**Wheel B**	**Wheel C**
No Prize			
Small Prize			
Big Prize			

4. Main St. Fair thinks your wheel is broken – the 3 outcomes (**Big**, **Small**, and **No prize**) are not coming out exactly equal. Your wheel maker says that's normal – the numbers should be close to each other but probably not exactly equal. Who do you think is right? Explain.

_____

_____

_____

_____