Carnival Assessment for Probability

In order to help students interact with probability in a meaningful way, I have the students design an interactive carnival with games to show their knowledge and understanding of the content. As motivation, I show them the book Magical Big Top Counting Book by Pockets of Learning. It is a counting book for pre-school age children that unfolds into a circus tent. It has interactive pages where a child can move objects.

To help students design their games appropriately, I provide a carnival planning sheet (see figure 1). If students are working in partners, I provide scattered minutes of class time for them to meet and review their planning sheet together. On the day that the carnival is due, the students must set up their carnival in the classroom. Students must assess two other carnivals using the carnival assessment sheet (see figure 2). At the same time, I walk around and assess the carnivals too on the teacher assessment sheet (see figure 3). If I have questions, I can ask the student directly and provide feedback. Each of the nine topics is worth 5 points. I write on the form exactly what is done incorrectly after each topic.

Sometimes it is difficult for students to understand what I mean by setting up a carnival game, so I draw a picture on the board like the following and title it PING PONG BALL TOSS to illustrate independent events:

1	1	1	1	1
1	2	2	2	1
1	2	3	2	1
1	2	2	2	1
1	1	1	1	1

You get two tosses of a ping pong ball. If you land in the box with the 3 two times in a row, then you win a teddy bear. The tosses are independent because they do not affect one another. The probability of winning is (1/25)x (1/25) = 1/625.

I also brainstorm ways that we could make this particular game interactive. I get simple solutions from just making a felt ping pong ball that you can throw at a piece of paper labeled like the grid to actually making a wooden container and bringing a ping pong ball so that people can play the game. The most important thing for students to understand is that they have to describe their game/example and why it illustrated the vocabulary word (The tosses are independent because they do not affect one another) and show an example worked out (The probability of winning is (1/25)x (1/25) = 1/625).

While some topics lend themselves to games, I also encourage students to use other methods for illustrating more difficult topics, such as using a hot dog stand for fundamental counting principle or a ferris wheel for circular permutation.

It's Carnival Time!
45 points

Partners or alone
Due: _____

Step right up, it's time to design 9 carnival games (or borrow those already in existence). You are to create an **interactive** carnival diorama (either a circular one with 9 parts or a huge interactive poster-board or whatever your creative mind can design). Each diorama scene should illustrate one of the terms listed below with an example (or game). It needs to be interactive, creative, explain how it demonstrates the vocabulary, and have the math calculated for that term. Other students will be assessing your carnival as well as me.

The nine terms to be illustrated are the following (please number your games in the order that you see them here):

1) Combinations
2) Permutations
3) Circular Permutation
4) Fundamental counting principle
5) Experimental prob vs. Theoretical
6) Independent events
7) Dependent events
8) Conditional Probability
9) Simulation

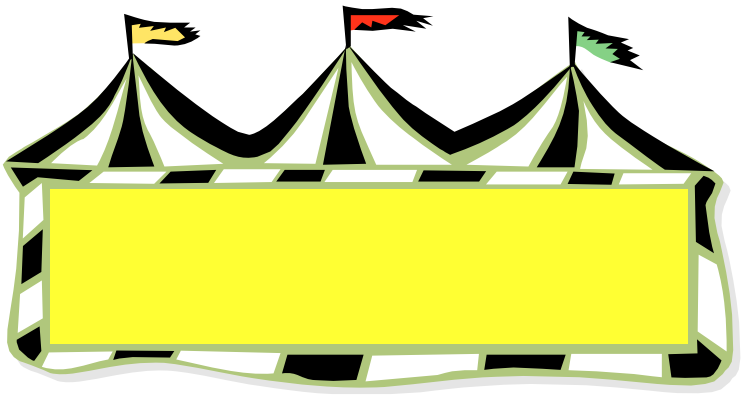

Figure 1

Carnival Planning Sheet
Name(s): _____

** Remember, each game needs to be accompanied with an explanation describing your game and how it illustrates the given math content. For each game (example) you need to work out a math example to show that you understand the concept.**

1) Combinations:
    a) In your example/game why is order not important?
    b) In your example/game, what is the total number of objects?
    c) In your example/game, what is the sub-group (r)?
    d) Did you show a combination calculation?

2) Permutations:
    a) In your example/game why is order important?
    b) In your example/game, what is the total number of objects?
    c) In your example/game, what is the sub-group (r)?
    d) Did you show a permutation calculation?

3) Circular permutations:
    A) Did you explain how your example/game is done correctly and why it would use a circular permuation:
    B) Did you show your circular permutation calculation?

4) Fundamental counting principal:
    a) Did you explain how your example/game uses the fundamental counting principle:
    b) Did you show the total possibilities calculated out?

5) Theoretical vs. Experimental
    a) How is your experimental probability different than your theoretical probability?
    b) Did you show a possible experimental probability calculated and then give the theoretical probability?

6) Independent
    a) What are the two (or more) events?

b) Did you show the multiplication to calculate the probability?

7) Dependent events
   a) How is the sample space shrinking?
   b) Did you show the probabilty of your event calculated out?

8) Conditional probability
   a) Did you describe how the sample space is changing?
   b) Did you show how to calculate your game/event?

9) Simulation
   a) How does your experiment and probability represent another experiment that can't be done?
   b) Did you show how you calculated your experimental probability?

Figure 2

Carnival Assessment
Name: _____

Names of people that made the carnival you are assessing: _____

Questions:

1) Combinations:
   a) In their example/game why is order not important?

   b) In their example/game, what is the total number of objects?
   c) In their example/game, what is the sub-group (r)?

   d) comments/problems with their example game?

2) Permutations:
   a) In their example/game why is order important?

   b) In their example/game, what is the total number of objects?
   c) In their example/game, what is the sub-group (r)?

   d) comments/problems with their example game?

3) Circular permutations:
   A) explain how their example/game is/is not done or calculated correctly:

4) Fundamental counting principal:
   a) explain how their example/game is/is not done or calculated correctly:

5) Theoretical vs. Experimental
   a) How is their experimental probability different than their theoretical probability

Figure 2

6) Independent
    a) What were the two (or more) events?

    b) Did they multiply to calculate the probability?

    c) comments/problems with their example/game:

7) Dependent events
    a) How is the sample space shrinking?

    b) comments/problems with their example/game:

8) Conditional probability
    a) Describe how the sample space is changing?

    b) comments/problems with their example/game:

9) Simulation
    a) How is their experiment and probability representing another experiment that isn't done?

Figure 3

Teacher Assessment of Carnival
Name: _____ ____/45 points

1) Combinations
2) Permutations
3) Circular Permutation
4) Fundamental counting principle
5) Experimental prob vs. Theoretical
6) Independent events
7) Dependent events
8) Conditional Probability
9) Simulation

Teacher Assessment of Carnival
Name: _____ ____/45 points

1) Combinations
2) Permutations
3) Circular Permutation
4) Fundamental counting principle
5) Experimental prob vs. Theoretical
6) Independent events
7) Dependent events
8) Conditional Probability
9) Simulation