**Unit:** Probability **Lesson:** Introduction to Probability **Date:** 4/10/2012 **Time:** 30 mins

**Grade:** 6th grade

1. **Academic Standards/Assessment Anchors**

2.7.6.A To collect data and estimate the likelihood of outcomes of an event.

M6.E.3 Understand and apply basic concepts of probability.

2.7.6.E. Find and interpret the experimental probability of an outcome of a simple event.

M6.E.3 Understand and apply basic concepts of probability.

**2. Instructional Objectives**

* Given a six-sided die, the students will determine the probability of rolling a single number on that die in one roll, with no more than 2 errors.
* Given a set of dice (5 dice), the students will determine the probability of rolling the same number on all five of the dice, with no more than 1 error.
* Given the game of Yahtzee, the students will be able to determine the probability of rolling the dice to achieve their desired outcome (i.e. 3 of a kind, large straight, yahtzee, etc) with no errors.

**3. Content (Lesson Elements)**

* **Materials:**

Yahtzee the game, pencils, game sheets, calculators, scratch paper

* **Safety Considerations:**

Students need to be careful with the dice, they should not throw them, put them near their mouths, and they should put them away when they are finished with the game.

* **Subject Content/Topics - Explanation of academic content: (Be CERTAIN to also give the background of what is happening scientifically in your lesson.)**

Probability is the likelihood of one certain outcome occurring, when there is also a chance of other outcomes occurring. To find the probability of something, you would take the amount of one outcome, and divide it by the total amount of outcomes in the experiment. For example, the probability that a 2 sided coin would land on heads would be ½, because there are only two sides. Another example would be if there were 8 marbles in a bag, 3 red, 1 yellow, and 4 blue. The probability of pulling out a blue marble would be 4/8 or 1/2. Probability helps the person doing an experiment to predict the likelihood of a specific outcome in a variety of situations. Scientifically, probability is used to help scientists make predictions for certain experiments.

* **Common *misconceptions* students may have about this topic**
  + Students may think that recent events affect the probability of an event occurring (if you have 2 sons the third will also be a son), but probability is not affected by recent events despite what students may think.
  + The probability of flipping three heads in a row with a double sided coin is the same as the probability of flipping two heads followed by tails.
  + The probability of rolling five 6’s in a row is the same as rolling 1,2,3,4,5.
* **Introductory Motivational Device (“Engage” portion of 5 E Learning Cycle)**

The students will be playing the game of Yahtzee, and rolling the dice to help them understand the concept of probability. The students will enjoy playing the game Yahtzee, and they will also be reviewing probability.

* **Learning Activities/Procedures – Step-by-Step Instructions for the 5 E learning cycle**

**Step 1:**The students will watch me demonstrate how to work a probability problem, and I will tell them the equation for probability, how to fill out the diagram that we will be using, and how to find combined probability. The equation for probability is (# of ways certain outcome can occur/total number of outcomes).

**Step 2:** After the students have listened to a short lecture from me, I will have them practice probability with a worksheet. The worksheet will focus on the probability of pulling a certain colored marble from a bag containing different colors of marbles. It will focus on basic probability, and it will help the students review what I have lectured them on. When the students have grasped the concept completely, I will break them into three groups and have them play the game Yahtzee while figuring out probabilities. I will give the students a short walk-through if they forgot how to play, or were never taught, then I will let them play with their peers while walking around and observing.

**Step 3:** The students will fill out their Yahtzee sheets after each turn, and along with the Yahtzee sheet, they will fill out a sheet about the probability of rolling their desired outcome. One group will fill out only one Yahtzee sheet however, but everyone in the group will get a chance to roll the dice. The students will roll 3 times and then they will decide what they want to do with their dice.

**Step 4:** After the students have played through some Yahtzee and further understand the concept of probability and how it applies to the game, I will have them fill out an exit slip that they will hand into me at the end of class. The exit slip that I collect will help me collect data on my students, such as who understood the concept, and where they are having troubles with it.

* **Key Discussion Questions** 
  + How do you determine probability?
  + How would you determine the probability of an experiment performed multiple times in a row?
  + How do you construct a tree diagram?
* **Questions Students May Ask**
  + How do I make a tree diagram?
  + How will I use this in real life?
  + Why do we have to know about probability?
* **Diagram(s) that help explain the concept (you MUST have at least one):**

Tree Diagram (see attached sheet) – a tree diagram is a way of representing a sequence of outcomes, and the likelihood that they will occur.

* **Closure**

The students will verbally tell me what they learned in today’s class. Then they will complete an exit slip on probability and rolling dice. The exit slip will ask the students questions relating to the key questions and misconceptions. Such as, which outcome has a greater probability rolling three 6’s on your first Yahtzee roll, or rolling 1,2,3 on your first roll. Another sample question would be “Construct a tree diagram for rolling a die.”

**4. Differentiated Learning Activities and Accommodations**

**Include *context* of the learners as a rationale for differentiation:**

* **Describe important characteristics and diversity of learners in your classroom: number of learners and gender, race/ethnicity, school socio-economic status, special needs, and language proficiency, learning styles, etc.**

The students in the class are primarily white, and the gender ratio is about 1 to 1, since we are close to Northern Pennsylvania, there has been an increased percentage of Hispanics following the gas industry however. So, a few ELL (English Language Learners) have resulted from their families move. Most of the students’ families fall in the middle class, however there is about 15% that fall in the lower class. So, they receive reduced lunch. As with every public school, there are some special needs kids, but the range of help that they need varies. There have been some very extreme cases, but there are also some cases where students are identified as special needs, but do not need much help. The students in the class are very hands on, and they love playing games that apply to math concepts. When they are allowed to play games, they put more effort into their homework, and they enjoy learning math.

* **Explain the strategies utilized to maximize success for diverse learners.**

Students in Tier One are very strong learners, and receive no help from an aid. They grasp concepts very quick, so they are usually ahead of the rest of the class. In this classroom, the students in Tier One spend a lot of their classroom time reviewing already learned concepts, and playing games to help them review while other kids are still trying to learn. Students in Tier Two are less independent, however they are not fully reliant on their aid. They have an aid that will assist them when they need it, but for the most part they tend to look for and find the answers on their own. These students are about half of the class, and they stay right with the instruction. When they fully grasp concepts they are allowed to play games with the students in Tier One. Finally, the students in Tier Three need more help than the students listed above. They are fully reliant on their aid, and they receive additional support from me as a teacher. When it comes time for exams, they receive exams tailored to their disabilities so that they can perform like regular students in a regular classroom.

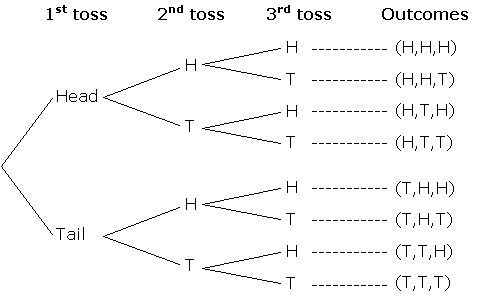
**5. Instructional Resources and Technology (i.e., multimedia, technology, lab equipment, outside expert)**

Doc camera (to show students how to roll the dice, and certain combinations of dice), calculators (to help the students add up probabilities, and find combined probabilities), and computer (for the PowerPoint, and to show students some probability questions/demonstrations).

**6. Formative Assessment**

I will measure how well the students know their content by giving them an Exit Slip that will I will look over how well they retained the information I taught them on probability. The students that have trouble with the Exit Slip will receive additional support in classes to come, while the students who understood everything review other concepts. I will also measure the students’ knowledge by walking around and observing the students doing work.

**Tree Diagram**



Graphic taken from <http://www.onlinemathlearning.com/tree-diagram.html>