Probability Intro

Content Standards:

- **CCSS.Math.Content.HSS-CP.A.1** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").
- **CCSS.Math.Content.HSS-CP.A.2** Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
- **CCSS.Math.Content.HSS-CP.A.3** Understand the conditional probability of *A* given *B* as *P*(*A* and *B*)/*P*(*B*), and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*.

Learner Background:

Students have just completed a unit on quadratic equations including parabolas, velocities, and graphing. They have learned how to solve quadratic equations. Students will transfer their prior knowledge of the meaning of a problem and look for entry points to its solution.

Learning Objectives:

1. Students will define probability
2. Students will define independent and dependent probability
3. Students will determine whether events are independent or dependent

Student Friendly Targets:

1. I can define probability, independent probability, and conditional (dependent) probability.
2. I can determine whether events are independent or dependent.

Criteria For Success:

1. I define probability, independent probability, and conditional probability in my own words without the aide of notes.
2. I can determine whether a probability statement is true or false and give a reasonable explanation for why.

Assessment: Calling upon students to check for understanding (L.O. #1 - 4), Dependent Probability worksheet (L.O. #3), Probability Independence Examples (L.O. #3), End of Probability Class Assessment (L.O. #1-3)

Materials: Which event is more likely opener, Dependent Probability Worksheet (L.O. #3), Probability Independence Examples (L.O. #3), End of Probability Class Assessment (L.O. #1-3), Guided Note Sheet

Lesson Activities:

Initiation:

- Students will enter the room and begin the "Which is more likely" Probability Opener:

Which event is more likely:

1. Two coins are tossed…

   A: they both land on heads B: they both land on tails
   C: Both events are equally likely

Answer: They are equally likely

2. Two coins are tossed…

   A: they both land on heads B: one coin shows head, one shows tails
   C: Both events are equally likely

Answer: B, discuss listing HH, TH, HT, TT

3. A 6-sided die is rolled…

   A: the die shows an even number B: the die shows a number greater than 4
   C: Both events are equally likely

Answer: A, discuss greater than meaning, talk about possibilities.

4. Two 6-sdied dice are rolled…

   A: the sum of the dice is 4 B: the sum of the dice is 11
   C: Both events are equally likely

Answer: A, discuss the number of ways to get a 4 or an 11

5. A card is drawn from a standard deck of cards…

   A: the card is a spade B: the card is an ace

C: Both events are equally likely

Answer: A, there are 13 spades and only 4 aces

6. A married couple with 2 girls has another baby…

A: The baby is a boy B: The baby is a girl
C: Both events are equally likely

Answer: C, assuming the sex of the baby is random, it's a 50-50 chance regardless of the past.

Students will spend 5 minutes completing this, then as a class we will discuss it for another 10 minutes. (**Total time: 15 minutes**)

Development:

- Students will be handed guided note sheet:
- Student will follow PowerPoint as they complete guided note sheet: (time for first four slides of PowerPoint: 10 minutes, **total time: 10 minutes**)
- Students will complete coin toss experiment, share with class and discuss results (10 minutes, **total time: 30 minutes**)
- Students will continue with the PowerPoint slides 5 through 16 (time: 20 minutes, **total time: 50 minutes**)
- Students will try example on slide 17 with a **partner** (time: 10 minutes, **total time: 60 minutes**)
- We will review slide 17 (by showing 18) (time: 5 minutes, **total time: 65 minutes**)
- Students will work on examples to determine independence (time: 15 minutes, **total time: 80 minutes**)
- We will review (time: 5 minutes, **total time: 85 minutes**)

Closure:

- Students will complete "End of class probability assessment" and fill out reflection (time: 10 minutes, **total time: 95 minutes**)

Differentiation:

Process:

- Students will work with a partner (cooperative learning)
- Students will take notes on a guided note sheet (tactile)
- Students will follow the PowerPoint (visual)
- Students will listen to the instructor (auditory)

Product, Content: None today