1. Unit Goals

- Students will learn the meaning of the several terms related to probability. Terms include but are not limited to simple and compound probability, dependent and independent events, Fundamental Counting Principle, combinations, and permutations.

- Students will learn to calculate the number of possible outcomes to an event using the Fundamental Counting Principle.

- Students will learn how to calculate the probability of simple events.

- Students will learn to distinguish between independent and dependent events and calculate compound probabilities accordingly.

- Students who have mastered the above goals will also learn to differentiate between the list of permutations and combinations of given situation and calculate probabilities accordingly.

2. Specific ways to relate goal(s) to curriculum

- These goals relate to benchmarks and indicators listed under the Data Analysis and Probability heading of the Ohio 7th Grade Mathematics Standards. These indicators are:

  - Find all possible outcomes of simple experiments or problem situations, using methods such as lists, arrays and tree diagrams. (05-07)
  - Describe the probability of an event using ratios, including fractional notation. (05-07)
  - Compute probabilities of compound events; e.g., multiple coin tosses or multiple rolls of number cubes, using such methods as organized lists, tree diagrams and area models. (07)
Probability is also included in the Common Core Standards that are adopted by the Ohio Department of Education. This indicators are:

7.SP.5.7.SP.5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

7.SP.7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.

7.SP.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.

3. Characteristics of the students for whom this unit is intended

This unit will be for 7th grade students. There is approximately 130 students in six different classes. There are two different classes: regular mathematics and advanced mathematics. There are about 10 students that are identified as ESL students. There are also approximately 15 students who are on an Individualized Education Plan (IEP) or a section 504 plan who need require a few specific of general accommodations on assignments and/or instruction.

4. Student’s Present Level of Performance and Knowledge

The students will have successfully completed lessons dealing with concepts involving fractions and the arithmetic processes that contain them. Since fractions are one of the most common ways of writing probabilities, a strong foundation in the use of fractions is necessary. Students will also likely want to use calculators in their assignments and assessments. Thus, knowing how to input fractions into their calculators will be a required technology skill. Many lessons will be given on a SMART Board as well, so students will need a basic understanding of using an interactive whiteboard.
5. Classroom Layout and grouping of students

Students will be grouped in a variety of ways throughout the unit. Most instruction will be given as a whole class lecture. Other learning activities can include, but not limited to, individual work (homework or classwork), partnered activities (homework or classwork) or small group activities where students work with probability experiments in different stations and recording results.

6. Introductory procedures

Students will begin with a pre-assessment that includes vocabulary and procedures so that the teacher can assess their current level of knowledge. Students also will complete an anticipation guide on SMART Response remotes. Anticipation guide consists of 10 statements, and the students either disagree or agree with that statement based on what they know about probability.

7. Materials and media

Math Connects: Concepts, Skills and Problem Solving Course II

This is the textbook that was purchased for use by seventh grade students in the school district of the teacher. The text contains many examples and practice problems for student use. Its teacher resources contain more practice and enrichment activities. Glencoe/McGraw Hill also offers a copy of this textbook online for students to access in the event they leave their text at school.

TI-30XIIS calculator by Texas Instruments

This is the calculator that is provided for use during class by the school district of the teacher. It is also the recommended calculator by the Ohio Department of Education for use on the Ohio Achievement Assessment.

SMART Interactive whiteboard and SMART Response remote input devices

The SMART Board will be the main lesson and presentation device used by the teacher. It will also be used for student illustrations of concepts. SMART Response units will be used to gather data and track assessment results. These are contained in the teacher’s classroom to use on an as-needed basis.
Various items to use for the demonstration of probability. This will include but is not limited to dice, decks of cards, coins, spinners, marbles and letter tiles.

These can be used to perform probability experiments and trials.

Probability website located [here](#)

This website is divided into different lessons that utilize the images explained below. Each page briefly discusses each probability concept in a condensed manner.

Pre-made presentations on Probability

PowerPoint presentations can be prior to lessons by teacher or teacher may use the ones from CD provided by Glencoe/McGraw-Hill Interactive Classroom. This software is provided free with Math Connects textbook

SMART Notebook software presentations made be pre-made or downloaded from the Internet.

Other instructional materials that the teacher decides to utilize

While the above list includes many of the resources to be used, the teacher reserves the right to use other items they find on a later date that contain educational value to the lessons they present including videos, computer software, webpages, or games.

8. Visuals

Teacher will utilize a variety images to aid in the learning of probability. Images to be created will be used to illustrate:

Simple Probability

This image will give a few common examples of simple events.

Disjoint Events

This image will show an example of a disjoint event and explain how to calculate the probability of it.

Fundamental Counting Principle

The image will show how multiplication is used to find the size of a sample space.
Compound Probability
This image will show an example how a spinner and coin can illustrate a compound event and how to calculate the probability of an outcome to that event.

Independent Events
This image will show examples of how compound events that are independent and thus do not affect one another.

Dependent Events
This image shows a contrast to independent events and how the first event affects the probability of the second event.

Permutations
This image gives a few examples of sample spaces that would be considered permutations.

Combinations
This image gives an example of a situation where different arrangements are not different outcomes in a sample space. It also details how to calculate the number of combinations to the given situations.

TI-30XIIS
This image emphasizes important buttons that are used when calculating with fractions—a skill that is essential to calculating probabilities.

9. Assessment and evaluation of learner understanding

Pre-test
This will be used prior to the start of the unit in order to gauge prior knowledge of students and current level of expertise. This helps teacher know concepts that can be briefly reviewed and concepts that will need to focused on for longer periods of time.

Anticipation Guide
This will be used in conjunction with the pre-test to assess current level of knowledge.
Homework

Homework will be assigned on an as-needed basis when teacher covers a newer concept. This will be checked the next day for accuracy. This helps teacher determine whether to move on with next concept or if re-teaching is needed. The need for homework on individual lessons will be determined by accuracy of pre-test and anticipation guide as well as formative assessments during the lessons.

Mid-Unit Quiz

This will be used to assess students understanding of probability basics. Concepts included are simple probability, sample space, and Fundamental Counting Principle. Mid-Unit Quiz will be composed of multiple choice, short answer and extended response questions and formatted similar to the Ohio Achievement Assessment to familiarize students to this formatting.

End-Unit Quiz

This will be used to assess students on higher level probability concepts. Concepts will include compound events (independent and dependent), permutations (if covered), and combinations (if covered). End-Unit Quiz will be composed of multiple choice, short answer and extended response questions and formatted similar to the Ohio Achievement Assessment to familiarize students to this formatting.

End of Unit Test

This will be used to assess student understanding of all probability concepts that were covered during the unit. It will be given at the conclusion of all remediation and enrichment activities. End-Unit Test will be composed of multiple choice, short answer and extended response questions and formatted similar to the Ohio Achievement Assessment to familiarize students to this formatting.

10. Relate assessment instruments to the outcomes stated in the goals.

Each assessment will consist of questions, statements, or problems that test the students’ understanding of the probability concepts that are included in the stated goals. The outcomes of these assessments will determine the necessity for remedial or enrichment activities in order to gain better understanding the concept of probability.

* Adapted from Unit Plan at [http://edtech.tennessee.edu/~bobannon/unit_plans.html](http://edtech.tennessee.edu/~bobannon/unit_plans.html)