EUREKA MATH™ TIPS FOR PARENTS

KEY CONCEPT OVERVIEW

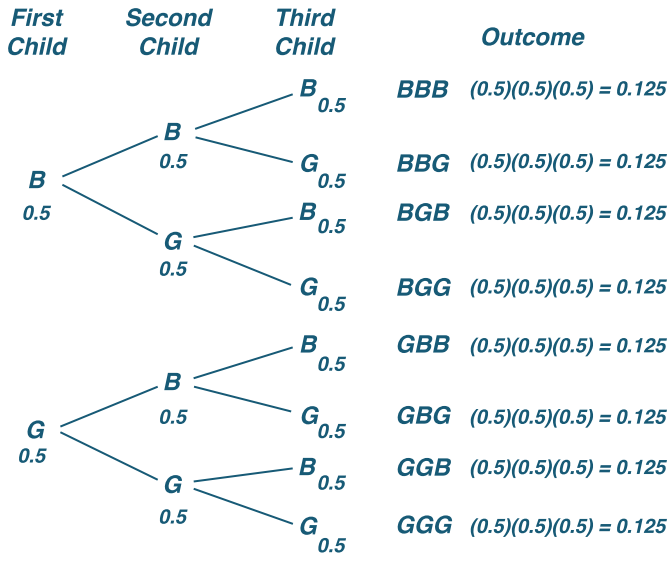
The first topic of Module 5 introduces students to **probability**. They start by using the **probability scale** to understand that the probability of an event is always a number between 0 and 1 (including 0 and 1). Throughout the topic, students collect data from various experiments, including experiments in which **outcomes** are equally likely (such as flipping a coin) and those in which outcomes are *not* equally likely (such as picking a cube from a bag containing 80 red cubes, 15 blue cubes, and 5 yellow cubes). By performing these experiments, students calculate the probability of each outcome. Later in the topic, students organize lists of possible outcomes in **tree diagrams** and then calculate the probability of **compound events**.

You can expect to see homework that asks your child to do the following:

- Decide whether events are **impossible**, **unlikely**, **equally likely to occur or not to occur**, **likely**, or **certain**.
- Perform experiments and calculate the probabilities of various outcomes that result from each experiment.
- Interpret graphs in order to calculate probabilities.
- Identify the **sample space** of an experiment.
- Draw and interpret tree diagrams.

SAMPLE PROBLEMS *(From Lesson 7)*

Draw a tree diagram showing the eight possible birth outcomes for a family with 3 children (no twins or triplets). Use the symbol *B* for the outcome of a boy and the symbol *G* for the outcome of a girl. Consider the first birth to be the first stage.



What is the **theoretical probability** of a family having 3 girls in this situation? Is that greater than or less than the probability of having exactly 2 girls in 3 births?

The probability of having 3 girls, written as P(GGG), is 0.125 because (0.5)(0.5)(0.5) = 0.125.

The probability of having exactly 2 girls, written as P(BGG) + P(GBG) + P(GGB), is 0.125 + 0.125 + 0.125, or 0.375.

The probability of having 3 girls, written as P(GGG), is less than the probability of having exactly two girls because 0.125 is less than 0.375.

What is the probability of a family with 3 children having at least 1 girl?

The probability of having at least 1 girl is found by subtracting the probability of having no girls (or all boys, P(BBB)) from 1, or 1 − 0.125 = 0.875.

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at GreatMinds.org.

TERMS

Certain: An event with a probability of 1, which means it will always occur. For example, it is certain we will pick a red cube from a bag containing only red cubes.

Compound event: A combination or series of two or more simple events. (A simple event is an event that has exactly one outcome, such as flipping a coin or rolling a die.)

Equally likely to occur or not to occur: An event with a probability of $\frac{1}{2}$.

Estimated probability: The probability calculated from an experiment. For example, if a coin is flipped 10 times and lands on heads 7 times, the estimated probability of landing on heads is $\frac{7}{10}$, even though we would expect the probability to be $\frac{1}{2}$.

Impossible: An event with a probability of 0, which means it will never occur. For example, it is impossible to pick a blue cube from a bag containing only red cubes because no blue cubes are in the bag.

Likely: An event with a probability between $\frac{1}{2}$ and 1, which means it has a good chance of occurring.

Outcome: The result of an experiment (event). For example, when someone rolls a 1 on a number cube (die), the outcome of that simple experiment is 1.

Probability: A number between 0 and 1 (including 0 and 1) that measures the chance that an event will occur. For example, when we flip a coin, the probability that it will land on heads is 1 in 2, or $\frac{1}{2}$.

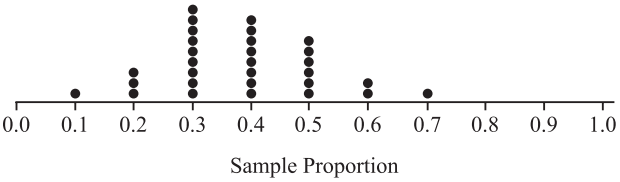
Sample space: The set of all possible outcomes. For example, the sample space when rolling a number cube is the set {1, 2, 3, 4, 5, 6}.

Theoretical probability: The probability calculated based on what we know about the sample space. For example, the theoretical probability that a flipped coin will land on heads is $\frac{1}{2}$ because the coin has one head side (numerator), and the flip has two possible outcomes (denominator). (The sample space is heads and tails.)

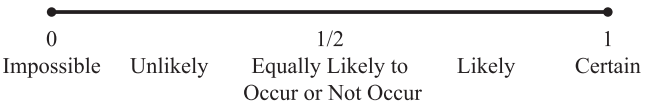
Unlikely: An event with a probability between 0 and $\frac{1}{2}$, which means it does not have a good chance of occurring. For example, it is unlikely that we would pick a blue cube from a bag containing 95 red cubes and 5 blue cubes because there are only a few blue cubes in the bag. The probability in this case is $\frac{5}{100}$, or $\frac{1}{20}$.

MODELS

Dot Plot



Probability Scale



Tree Diagram