

Directed Learning Activity

Introduction to Probability

In this activity, we will learn how to calculate the probability of an event from occurring. Let us first define some basic terms in Probability.

Probability experiments – chance process that leads to well-defined results called outcomes.

For example, flipping a coin or rolling a die are called probability experiments.

Outcome – result of a single trial of a probability experiment.

Sample space – the set of all possible outcomes of a probability experiment.

Example:

List the **sample space** of the following probability experiment.

1. Tossing one coin

Solution: Head, Tail (*two possible outcomes*)

2. Roll a die

Solution: 1, 2, 3, 4, 5, 6 (*6 possible outcomes*)

Exercises:

List the sample space of the following probability experiment.

1. Answering a true/false question

2. Tossing two coins

Using a Table to list Sample Space

Sometimes the number of possible outcomes in the sample space is long. We can use a table to organize the sample space using a table.

Exercise:

3.

a. List the sample space of the sum of rolling two dice by completing the table below.

		Die 1					
		1	2	3	4	5	6
Die 2	1	2					
	2			5			
	3					8	
	4						
	5		7		9		
	6	7					12

b. How many total possible outcomes? _____

c. How many outcomes give a sum of 7 or less? _____

d. How many outcomes give a sum of 5 or more? _____

Using a Tree Diagram to list Sample Space

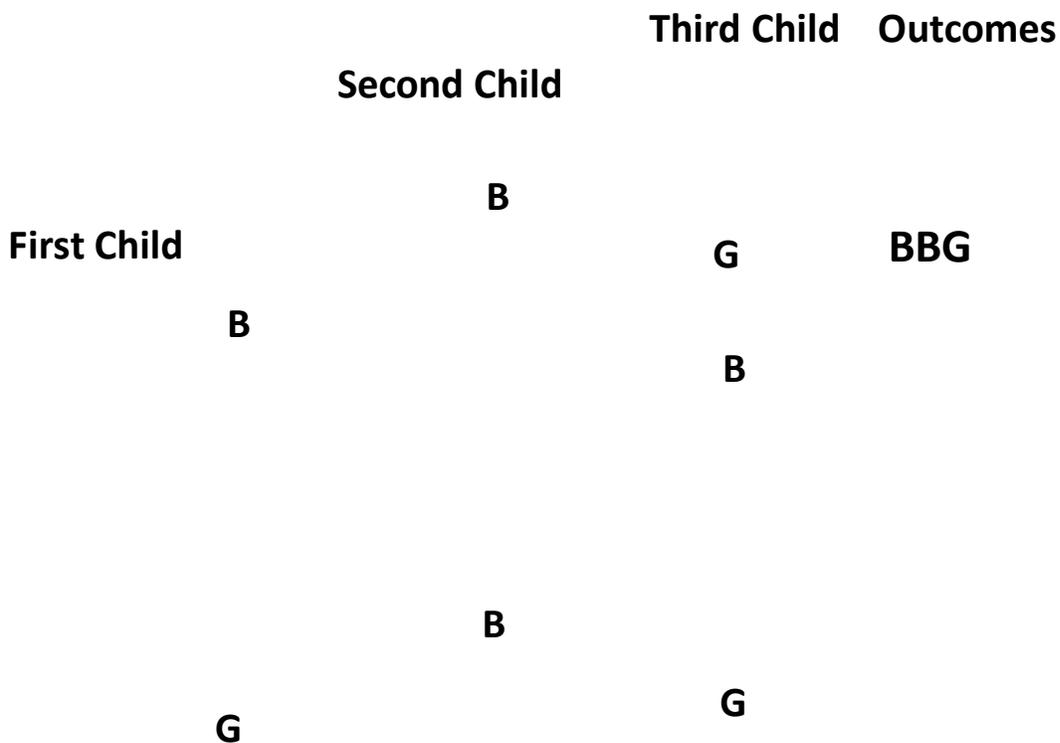
Another technique we can use to list the sample space is to create a tree diagram.

Exercise:

4.

a. List the sample space for the gender of a three children family by filling in the boxes in tree diagram.

Let **B** = Boy and **G** = Girl



b. How many total possible outcomes? _____

c. How many outcomes have exactly 2 girls? _____

Calculating Probability

An **event** consists of a set of outcomes of a probability experiment. The formula for calculating the probability of an event is given by:

$$P(\text{event}) = \frac{\text{number of outcomes in the event}}{\text{total number of outcomes in sample space}}$$

Example:

Find the probability of getting a sum of 5 or less when rolling two dice. (Use the dice table from page 2)

Solution: The event is *getting a sum of 5 or less*.

total number of outcomes in the sample space is **36**

number of outcomes of rolling a sum of 5 or less is **10**

$$P(\text{rolling a sum of 5 or less}) = \frac{\text{number of outcomes of rolling a sum 5 or less}}{\text{total number of outcomes in sample space}} = \frac{10}{36} = \frac{5}{18} \approx \mathbf{0.278}$$

Exercises:

Find the probability of the given event. Write final answer in reduced fraction and decimal (round to three decimal places).

5. Find the probability of getting a sum of exactly 10 when rolling two dice.

6. Find the probability of getting a sum of 8 or more when rolling two dice.

7. Find the probability that all 3 children are of the same gender? (Refer to the tree diagram in page 3)

8. Find the probability of exactly two boys in a 3 children family?