

PROBABILITY MATTERS (LEVEL 1)

Description	The learner will explore the concept of chances and probability and learn how to calculate probability.
Leading Question	Can you design a game using probability?
Total Time Required	5 hours over 4 days
Supplies Required	A4 papers, Cardboard, pencil, colors, ruler, households any dish or tray in shape of medium or big circle, glass, 4 buckets, scissors, color balls.
Learning Outcomes	<ol style="list-style-type: none"> 1. Calculate the probabilities of tossing a coin. 2. Calculate the probabilities of spinning a spinner. 3. Collect data on the chances of an outcome. 4. Understand the types of animals (that live on sea or on land) 5. Understand the difference between equal and unequal outcomes. 6. Understanding the difference between likely and unlikely outcomes. 7. Write some words related to probability (likely, unlikely)
Previous Learning	<ul style="list-style-type: none"> • Read and write numbers up 50. • Draw using household items. • Determine the appearance of different animals.

DAY 1

Today you will learn about what chances and probability are.

Suggested Duration	Activity and Description
10 minutes	<ul style="list-style-type: none"> • Introduce the concept of chances and probability • Here are some questions to learn about probability. Note that: <ul style="list-style-type: none"> - Some of the questions have one answer - Some answers are either true or false - Some questions have multiple choices that means you must choose the correct answer.

EAA welcomes feedback on its projects in order to improve, please use this link:

<https://forms.gle/LGAP9K17fMyJrKJN7>

- Some have no right or wrong answers.
- Questions:
 - 1- What is your name?
 - 2- How many sisters/brother do you have?
 - 3- How many wings does a bird have?
 - 4- How many tails does a cat have?
 - 5- Do fish live in the desert? True or False
 - 6- Can snakes run? True or False
 - 7- Does an elephant have a trunk? True or False
 - 8- Do airplanes need railways to travel on? True or False
 - 9- Choose the correct answer: Falcons can (fly walk swim)
 - 10- Choose the correct answer: A football team has (3 11 14) players.
 - 11- If I have two pencils, one is red and one is green, which one would you choose?
 - 12- If there are three pieces of biscuits with the same taste but different shapes: one is shaped like a circle, one is shaped like a car, one is shaped like a flower, which one will you choose?
 - 13- If there are two storybooks one about batman (or any hero that the learner is familiar with) and one about traveling around the world which one would you choose?
- Reflect on questions 11, 12, and 13.
 - There are outcomes in life that there are no rights or wrongs.
 - By the end of this project you will learn how to calculate possibilities or probability for each outcome.

15 minutes

- Design your own two coins:
 - Find any household shaped like a small circle then use it to draw two circles on cardboard. Cut out those two circles.
 - Draw two animals: one lives in sea (dolphin, shark, etc.) and the other animal lives on land (sheep, cow, fox, etc.)
 - On one side draw the head of the animal and on the other side draw the tail of the same animal for each coin.
 - Color the animals as well, because you are going to play some games with those coins

15 minutes

- Draw 2 columns and write numbers from 1-6 in the first column (number of tosses of the coin)
- Choose one of the two coins to toss 6 times and each time write which side it landed on: heads or tails.
- Count how many times the coin landed on heads or tails out of the six times.
- Example if you get heads 4 times out 6, explain how we calculate the probability or chances of heads falling 4 out of 6. Older learners with knowledge of writing fractions can write:
- $P(H) = \frac{4}{6}$ or P (H) is 4 out of 6 times.

1	H
2	T
3	H
4	H
5	H
6	T

- Repeat the same activity with two coins by tossing the two coins and on a table of three columns write what the outcomes are each time you toss the coin. For example:

	Dolphin	Rabbit
1	H	T
2	H	H
3	T	H
4	H	H
5	T	T
6	H	H

- How many times did both coins land on heads (HH)? How many times did both coins land on tails (TT)? How many times did the coins land heads and tails (HT) or (TH)?
- In the above table above table $P(HH)=3$ $P(TT)=1$ $P(HT)=2$
- So this is how we calculate the probability $P(HH)=\frac{3}{6}$ $P(TT)=\frac{1}{6}$
 $P(HT)=\frac{2}{6}$
 - Add the probability of HH, TT, HT
 - Explain that when we add the probabilities of the 6 tosses, it will equal $\frac{6}{6}$ and this is for all outcomes when we add all the probabilities the numerator will be equal to dominator which equal 1.

20 minutes

- Teach your siblings and friends!
- Teach them to design creative coins and compete tossing the two coins for 8, 10, and 12 times and record those outcomes in their own tables.
- Whichever player gets the most HH in the first round can be declared the winner.
- In different rounds, you can choose which outcomes will be the winner.

DAY 2

Today you will build a spinner and play a probability game.

Suggested Duration

25 minutes

Activity and Description

- Draw a circle on cardboard and cut out this circle.
 - Divide the circle into four equal parts by drawing two lines that intersect in the center of the circle. Color each part with a different color (red, green, blue, yellow, etc.)
 - Draw a line and cut it out to use as a pointer.
 - In the center of the circle, make a hole with a pencil and use a thread to locate this pointer to the center of the circle. It should not be too tight and not too loose but easy to spin it. (Use a pin instead of thread if that does not work.)
 - Develop a table for this experiment. Spin the pointer and write down the color the learner got each time.
 - Find out what the chances are for each color if they repeat it for 10 and 20 times

● 1	● Red
● 2	● Green
● 3	● Blue
●	●

- For example: let's say out of 10 times the pointer landed on green 3 times so $P(G) = \frac{3}{10}$ and so on.
- If the pointer landed on red 6 times out of 20 times $P(R) = \frac{6}{20}$
- Reflect on and find out that the addition of probability of all the four colors in each experiment will be $\frac{10}{10}$ in the first one and $\frac{20}{20}$ in second one.



- Challenge Question: What is the probability the pointer will land on yellow? $P(y)=0$
 - When an outcome cannot happen because there is no probability that it will happen then:
 - Probability = 0. It is unlikely to happen.

25 minutes

- Teach and guide your friends and family members to build their own spinners and play.
 - Players need to have the same colors so they can record and count who got highest number of the same colors when they spin the pointer for 10 times, 20 times, etc... They can do many rounds and whoever gets highest number of a specific color in each round wins
- OR
- Develop your own spinner examples (that means circle shape, but it has more than 4 equal parts (draw 6 or 8 equal parts) and instead of colors he/she could draw different items like a flower, ball, car, etc.)
 - Develop a poster that presents the tables and probability calculations.

DAY 3

Today you will learn about likely and unlikely outcomes

Suggested Duration	Activity and Description												
5 minutes	<ul style="list-style-type: none"> ● Revision: <ul style="list-style-type: none"> - Use one coin for an experiment. What are the possible outcomes that can happen? - There are only two possible outcomes. In this case the probabilities of outcomes are equal 												
10 minutes	<ul style="list-style-type: none"> ● Are the following outcomes 'likely' to happen or 'unlikely' to happen? <table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="padding-left: 20px;">1. Fish can walk.</td> <td style="text-align: right;">Unlikely</td> </tr> <tr> <td style="padding-left: 20px;">2. Train flies.</td> <td style="text-align: right;">Unlikely</td> </tr> <tr> <td style="padding-left: 20px;">3. Cats have 4 legs</td> <td style="text-align: right;">Likely</td> </tr> <tr> <td style="padding-left: 20px;">4. Lion lays eggs</td> <td style="text-align: right;">Unlikely</td> </tr> <tr> <td style="padding-left: 20px;">5. Human has two eyes</td> <td style="text-align: right;">Likely</td> </tr> <tr> <td style="padding-left: 20px;">6. Square has 5 sides.</td> <td style="text-align: right;">Unlikely</td> </tr> </tbody> </table> 	1. Fish can walk.	Unlikely	2. Train flies.	Unlikely	3. Cats have 4 legs	Likely	4. Lion lays eggs	Unlikely	5. Human has two eyes	Likely	6. Square has 5 sides.	Unlikely
1. Fish can walk.	Unlikely												
2. Train flies.	Unlikely												
3. Cats have 4 legs	Likely												
4. Lion lays eggs	Unlikely												
5. Human has two eyes	Likely												
6. Square has 5 sides.	Unlikely												

**10-20
minutes**

- Draw two circles. Label on circle 'likely' and the other circle 'unlikely'.
 - Inside the 'likely' circle, draw outcome/s that are likely to happen, e.g. a bird with two wings.
 - Inside the 'unlikely' circle, draw outcome/s unlikely to happen, e.g. a bird with three wings.
- OR
- Play a game with a friend or sibling. Draw two big circles on floor:
 - On one circle write 'Yes' and on the other circle write 'No'
 - Ask one of the players to shout one letter of the alphabet.
 - If:
 - It is one of the letters in the word 'likely', players should jump into the 'yes' circle
 - It is not one of the letters in the word 'likely', players should jump into the 'no' circle.

10 minutes

- Draw 6 circles and color them 3 different colors (for example: 3 red, 2 blue and 1 green) or if you have 6 different colored balls, place them in a bag.
- Close your eyes and pull out one circle or ball out of the bag.
 - Which ball is most likely to be withdrawn?
In this example: pulling out a red ball is a likely outcome because there are more red balls in the bag.
 - Which ball is least likely to be withdrawn the least?
In this example: pulling out a green ball is an 'unlikely' outcome because there is only 1 green ball.
 - In this game, the outcomes are unequal because there are 3 reds, 2 blues and 1 green.

20 minutes

- Line up some household items (for example: 4 buckets, 3 large and 1 small). Place the buckets in a 3 meter line.
- Each player should throw a ball 5 times while recording the targeted bucket.
- Whoever targets the small bucket most, wins.
- Develop a game that you can use likely/unlikely outcomes

DAY 4

Today you will create a game club with your new games!

Suggested Duration	Activity and Description
20 minutes	<ul style="list-style-type: none"> Think about the 4-5 games you have played and created in the last 3 days that you use all the concepts you have learned.
40 minutes	<ul style="list-style-type: none"> Design and build a 'game club' to put all the games that you have developed. <ul style="list-style-type: none"> Invite friends/siblings to visit the club and play the games. Put a price on each game that you want to play so you can gain skills of how to start a business.

ASSESSMENT CRITERIA

- Creativity in designing the coins and using drawings of 2 animals' for heads and tails.
- Creativity in designing their spinner and poster.
- Calculate accurately the probabilities of different basic outcomes in different experiments or games.
- Creativity in designing the "game club".

ADDITIONAL ENRICHMENT ACTIVITIES

- If students have internet they can play this game online:
<http://www.scootle.edu.au/ec/viewing/L2384/index.html#>