

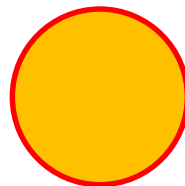
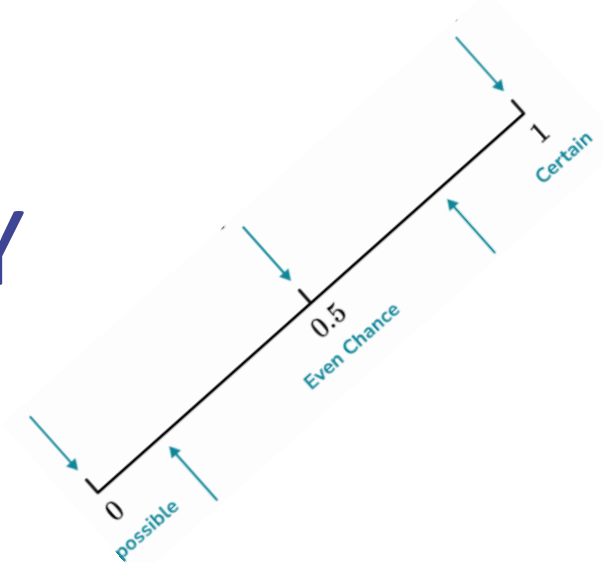


# THEME: DATA AND PROBABILITY



## TOPIC: PROBABILITY

KAZIBA STEPHEN



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# Competency

- The learner applies their understanding of probability to solve a wide range of problems.

# LEARNING OUTCOMES

- By the end of this lesson you should be able to
  - Understand the terms random, experiment, outcome, sample space, event and probability.
  - Construct the probability space.

# KEY WORDS

- Random
- Experiment
- Outcome,
- Sample space,
- Event
- Probability

# Have you ever used these words in daily life?

- Likely
- Probably
- Maybe
- Hopefully
- By chance
- Certainly
- Surely
- Random

## **Discussion Question:**

Under what circumstances have you used these words? Think about a situation and share with us or type in the chat

# Scenario

You are at a school sports day, and the final 100-metre race is about to begin. One of the participants, Alex, is a well-known sprinter and has won all his previous races this year. Based on his performance, many believe Alex is almost guaranteed to win this race.

However, there is still a small chance (about 5%) that Alex might lose due to a false start, an injury, or another unexpected factor.

## Task:

- Would you place your bet on Alex winning, or would you bet on the unlikely chance of someone else winning?



# Scenario

- In a football match, Team A has been dominating possession and creating numerous chances. By the 85th minute, they are leading 3-0 against Team B. Statistically, Team A has a **95% chance of winning**, while Team B has only a **5% chance** of making a comeback and either drawing or winning the match.
- **Question:**  
As a fan of Team B, would you still believe in the possibility of a comeback, or would you accept that the match is essentially decided?





## Activity

Cydney is a poultry farmer who raises local chicken but has observed that **8 out of every 10 customers** to her farm ask for broilers. Advice Cydney on what to do



why is probability essential:

# Activity :Tossing a Coin

- Get a coin of either 100, 500, 200, 1000 or 50 shillings.
- Toss the coin and let it land on a flat surface.
- Observe which side the coin lands on (heads or tails).
- Toss the coin again and take note of the side it lands on.
- Repeat the experiment several times and record your observations in a table.

- **Task**

- What are the possible sides a coin can land on?
- What are the chances of the coin landing on each side?
- Do the results of your coin tosses reflect the expected chances for each side? Why or why not?
- How does increasing the number of tosses affect the chances you observe for each side?



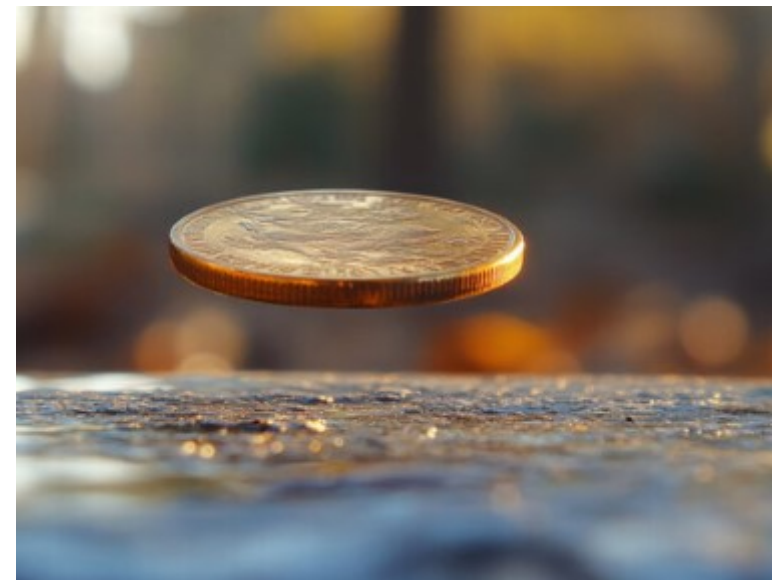
Toss Number	Side the Coin Landed On

# KEY TERMS

- **Probability** is the study of chance, or the likelihood of an event occurring.
- While probability provides a theoretical prediction, it doesn't always reflect what happens in practice due to the element of chance.
- **Random** refers to an event or process that occurs without any predictable pattern or cause. In a random process, the outcome is uncertain and can vary each time the process is repeated.
- An experiment is a process or action performed to observe one or more outcomes.  
*Example:*
  - Tossing a coin
  - Rolling a dice.
  - Picking a card from a deck



# GENERATING SAMPLE SPACES

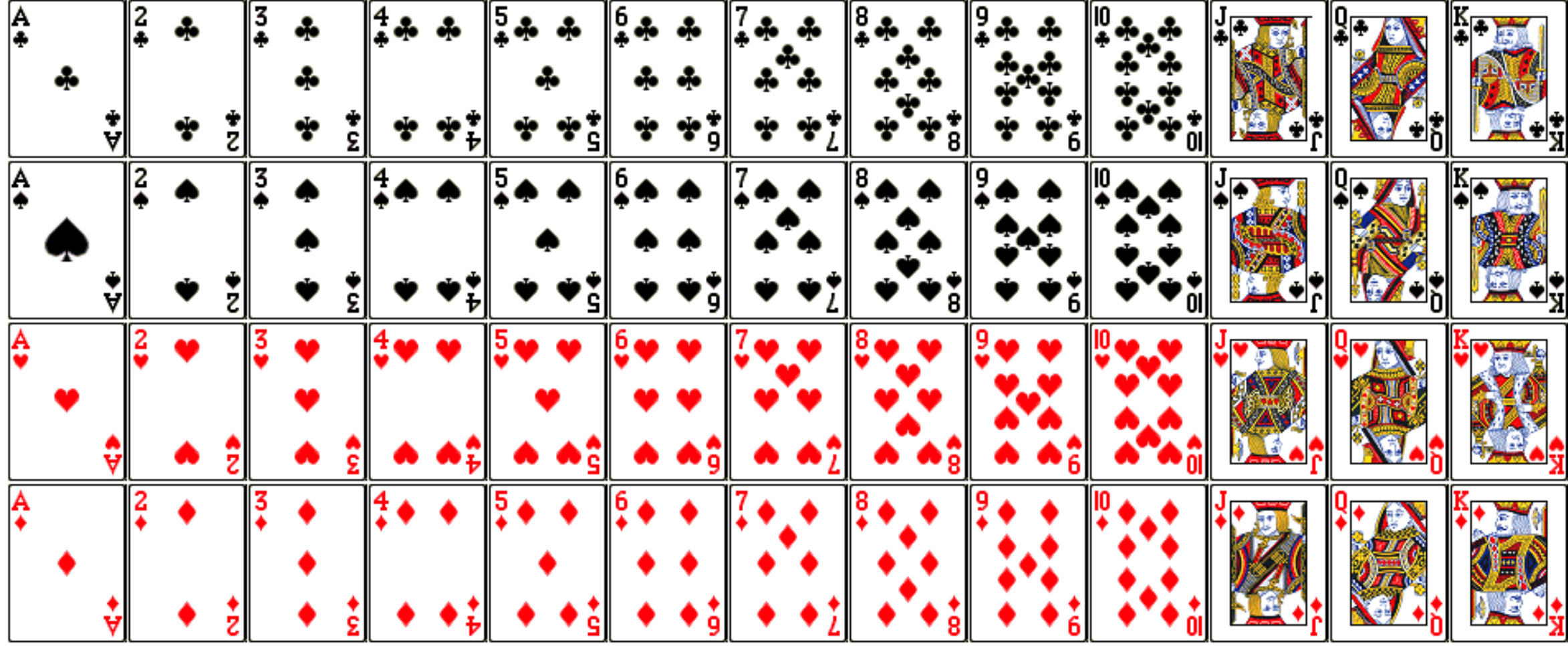












### NUMBERS

1	3	13	0	35	3
2	6	14	3	36	4
3	10	15	1	27	5
4	3	16	3	28	0
5	10	17	3	29	1
6	10	18	5	30	5
7	4	19	2	31	2
8	1	20	1	32	5
9	1	21	6	33	2
10	3	22	2	34	6
11	6	23	6	35	1
12	6	24	10	36	3

### PAY TABLE

NUMBERS: (EXACT NUMBER)	x36
ODD - EVEN: (ODD / EVEN)	x2
THIRDS: (11 & 20 & 30)	x12
MIRORS: (13 & 21 / 19 & 27 / 28 & 35)	x18
SECTORS: (A & B / C & D / E & F)	x6
LOW/HIGH: (1-18 / 19-36)	x2
LOW/HIGH COLOR: (1-18 / 19-36)	x4
BOXING: (1-12 / 13-24 / 25-36)	x3
COLOR:	x2

TOTAL BET: 3989



### HISTORY

#2357	11	#2352	12
#2356	6	#2351	19
#2355	31	#2350	7
#2354	17	#2349	30
#2353	4	#2348	24

### STATISTICS

SECTOR		
A: 23	B: 18	C: 24
D: 20	E: 14	F: 16
THIRD		
11: 6	22: 2	30: 2
NUMBER		
ZERO: 5	HIGH: 64	LOW: 51
BOXING		
1-12: 36	13-24: 42	25-36: 37
MIRROR		
13 & 21: 12	10 & 31: 2	23 & 32: 11
COLOR		
GREEN: 5	RED: 68	BLACK: 47

# Sample space

- A set of all possible outcomes of a statistical experiment is called a **sample space ,S or possibility space**
- **An event is a single result of an experiment . It is any subset of the sample space**

- $$\text{PROBABILITY} = \frac{\text{Number of events}}{\text{Number of sample spaces}}$$

- $$\text{PROBABILITY} = \frac{\text{number of favourable outcomes}}{\text{total number of equally likely outcomes}}$$

- A favourable outcome refers to the event in question actually happening.
- **Outcome** is a possible result in a probability experiment.
- The total number of possible outcomes refers to all the different types of outcome one can get in a particular situation.

Decreasingly likely

Increasingly likely

Impossible

Unlikely

Equal  
chance

Likely

Certain

0

$\frac{1}{4}$

$\frac{1}{2}$

$\frac{3}{4}$

1

(= 0.25)

(= 0.5)

(= 0.75)

# Activity

- Two coins are tossed .Obtain the sample space by using a table and a tree diagram.





# Activity

- Two dices are tossed . Use a table to come up with a sample space of the numbers that show up.

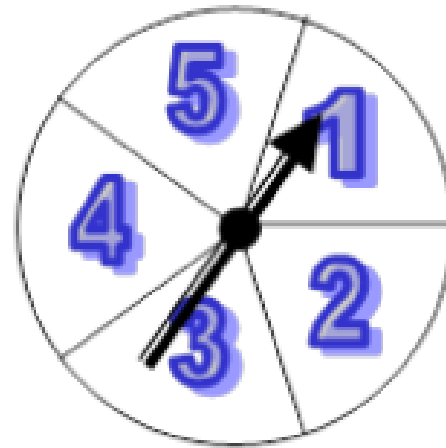






# Activity

When the two spinners are spun ,Write down the sample space



# Exercise

**1. A die and a coin are tossed together.**

- a) Obtain the sample space by using a table.
- b) Let  $E$  be the event that a head and a 1 show up. Identify the subset corresponding to  $E$  and calculate  $P(E)$

**2. Two coins are tossed together.**

- a) Write down the sample space for the two coins.
- b) Let  $A$  be the event that at least one head shows up. Identify the subset corresponding to  $A$  and find  $P(A)$ .

**3. A die is rolled, and a spinner with four equal sections labeled 1, 2, 3, and 4 is spun.**

- a) Write down the sample space for the die roll and spinner outcome.
- b) Let  $G$  be the event that the sum of the die roll and spinner result is 5. Identify  $G$

**4. Three coins are tossed together.**

- a) Write down the sample space for the three coins.
- b) Let  $H$  be the event that all three coins show heads. Identify  $H$

Suggest suitable sample spaces, and identify the subset corresponding to the event  $E$ , for the following situations:

1. A coin, which can show heads (H) or tails (T), is tossed three times;  $E$  is the event that the coin shows heads twice.
2. A game of football is played;  $E$  is the event that the match is drawn.
3. A couple has two children;  $E$  is the event that both are girls.