## Friday

Term 4 Week 3


## Chance

## WALT:

- Compare observed frequencies across experiments with expected frequencies


## Expected vs Observed Frequencies

What do you expect the chance of
flipping a heads or tails on a coin is?


If you were to try it out, what could happen?


Chance is not always predictable! There is often a difference between the frequency we expect and the frequency we observe.

If we were to flip the coin 100 or 1000 times, this difference would become less and less.

## Let's revise the vocabulary

We can describe the chance of something happening using either words or numbers.
Words:
impossible unlikely (fifty-fifty)
even chance likely certain

Numbers: $0 \%$ or $0 \quad$ between 0 and $\frac{1}{2} \quad 50 \%, \frac{1}{2}$ or $0 \cdot 5$ between $\frac{1}{2}$ and $1 \quad 100 \%$ or 1

## Frequency vs Probability

Frequency is a measure of how often an event occurs on average during a unit of time (how many times an engine supposed to start every morning fails to start per year). ... Probability is by definition a number between nil and one, measuring the chances some event may or may not happen.

## Fairness of frequency

Is the frequency of this chance experiment equal? Why/ why not?

How could this be deemed 'fair'?

Observed vs expected frequencies


## What is the chance of winning?




PLAYER 1

PLAYER 2


> DRAW
> 3 in 9 or $\frac{1}{3}$


PLAYER 1

PLAYER 2


WIN P2
3 in 9 or $\frac{1}{3}$


| P2 | P1 | ROCK | PAPER |  |
| :--- | :---: | :---: | :---: | :---: |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |


|  |  |  |  |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |


|  |  |  |  |
| :---: | :---: | :---: | :---: |
|  | DRAW | WIN P1 | WIN P2 |
|  | WIN P2 | DRAW | WIN P1 |
|  | WIN P1 | WIN P2 | DRAW |



> DRAW 3 in 9 or $\frac{1}{3}$

|  |  |  |  |
| :---: | :---: | :---: | :---: |
|  | DRAW | WIN P1 | WIN P2 |
|  | WIN P2 | DRAW | WIN P1 |
|  | WIN P1 | WIN P2 | DRAW |

$$
\begin{aligned}
& \text { PLAYER } 1 \text { WINS } \\
& 3 \text { in } 9 \text { or } \frac{1}{3}
\end{aligned}
$$

|  |  |  |  |
| :---: | :---: | :---: | :---: |
|  | DRAW | WIN P1 | WIN P2 |
|  | WIN P2 | DRAW | WIN P1 |
|  | WIN P1 | WIN P2 | DRAW |

$$
\begin{aligned}
& \text { PLAYER } 2 \text { WINS } \\
& 3 \text { in } 9 \text { or } \frac{1}{3}
\end{aligned}
$$




PLAYER 2 WINS 3 in 9 or $\frac{1}{3}$

## Is it really random?



When a person wins, they tend to make the same move again.


If your opponent wins with SCISSORS, what would be your best move in the next game?

If your opponent wins with ROCK, what would be your best move in the next game?

When a person loses, they tend to change their play in the next game.


If your opponent loses with PAPER, what would be your best move in the next game?

If your opponent loses with SCISSORS, what would be your best move in the next game?

## IF YOU WIN THE GAME

On your next move, play what your opponent played; for example:


Your opponent plays...


YOU
WIN!

Next time, you should


## IF YOU LOSE THE GAME

On your next move, play what was not played; for example:


Your opponent plays..


Next time, you should

BLUE

## RED

GREEN

If I picked a number between 1 and 100, what is the chance of guessing the number within 10 attempts?

There are 1 million raffle tickets in a raffle. I have 2 . What are my chances of winning?

Rolling a dice once, what is the chance of getting an even number?

A box contains four beads. Each bead is a different shape. A bead is picked from the box at random, then returned. What is the probability of selecting each bead? Complete the table.


You pick a bead, record the shape and return it to the box. How many times would you expect to pick each shape if you repeated this process:

## a. 20 times?

b. 64 times?
c. 80 times?

There are 1000 marbles in a backet. Half are red. Half the red ones have a green stripe. The rest are blue.

What's the chance of picking a blue marble from the bag?
What's the chance of picking a white marble?
What's the chance of not picking a red marble?

Estimate your chance of winning rock, Paper, scissors. Use the following table to record your results. At the end of 20 games, analyse your results.

Were they similar or different to your expected results?

Why or why not were they different?


What's the chance of picking a red marble that has a green stripe?

Which of these does not show the chance of the spinner landing on blue?

$$
1 / 4,4 / 10,25 \%, 0.25
$$

Each jar contains 100 jelly beans. Write a value to show the probability of choosing (without looking) a white jelly bean from each jar. Choose from this list: 0.07, 4/10, 8\%, $3 / 4,0.8$ and $7 / 10$.
a) 80 white jelly beans
b) 70 white jelly beans
c) 7 white jelly beans
d) 40 white jelly beans
e) 75 white jelly beans
f) 8 white jelly beans

Amy has to choose a bead without looking. Colour the beads so that she has:

- $1 / 6$ probability of choosing a red bead
- $331 / 3 \%$ chance choosing a yellow bead
- 0.5 chance of choose a blue bead



## There is a 1 out of 36 chance of getting a total of 12 with two dice.

What are the chances of a total of:
d 8 : $\qquad$
g 5 : $\qquad$
2: $\qquad$
b 10 $\qquad$

$$
\text { e } \quad 7:
$$

k 1 : $\qquad$
c 9 : $\qquad$

$$
6:
$$

3: $\qquad$

## Extension

Complete the table to show the number of times the dice should land on each number if it is rolled 36 times.

Roll the dice 36 times and record the results.

Write a sentence or two commenting on the results

| Dice <br> lands on: | Number of times it will land like that |
| :--- | :--- | :--- | of the experiment.

## Challenge/ Additional Task

## Play Tran's game: Part 2

## You will need

- A 7-sided spinner (Trace it and glue onto card)
- Seven players with 10 counters each
- A "banker" with a bank of 50 counters
- Seven cards numbered 0-6 for each player

(1) The "banker" needs to find out the chances of someone winning
a What is the chance of the spinner landing on any particular number?
b The person guessing the correct number receives six counters. If seven people choose a different number each and the spinner lands on six, how much does the "banker" put in the bank?


## How to play the game

2 The "banker" writes, "My starting balance is 50 counters" on a sheet of paper. Each player draws a Win-Lose table with 13 rows and 5 columns similar to this:


Each player guesses the number the spinner will land on by placing a card with that number on it in front of themselves.
a Each player puts one counter in the middle and writes this in the "guess" column.
b Somebody spins the spinner
c The person with the winning number gets six counters. The "banker" gets whatever is left over
d Players complete the row on their Win-Lose table. The "banker" writes their own new balance.
O
e Repeat Steps 2 to 7 until the end of the tenth turn
Complete the sentences.

- My final balance was ___ counters
- The balance for ___ players had decreased by the end of the game
- The balance for the "banker" increased/decreased (underline one)

