# Friday Term 4 Week 3



## Chance

### WALT:

- Compare observed frequencies across experiments with expected frequencies



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 <b>-</b> fifty) even chance	likely	certain
Numbers:	0% or $0$	between 0 and $\frac{1}{2}$	50%, $\frac{1}{2}$ or 0.5	between $\frac{1}{2}$ and 1	$100\%~{\rm or}~1$

# 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?































P1 P2	ROCK	PAPER	SCISSORS
ROCK	DRAW	WIN P1	WIN P2
PAPER	WIN P2	DRAW	WIN P1
SCISSORS	WIN P1	WIN P2	DRAW

P1 P2	ROCK	PAPER	SCISSORS
ROCK	DRAW	WIN P1	WIN P2
ERAW S in S or 1 PAPER	WIN P2	DRAW	WIN P1
SCISSORS	WIN P1	WIN P2	DRAW

DRAW 3 in 9 or <u>1</u>

P1 P2	ROCK	PAPER	SCISSORS
ROCK	DRAW	WIN P1	WIN P2
PAPER	WIN P2	DRAW	WIN P1
SCISSORS	WIN P1	WIN P2	DRAW

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

P1 P2	ROCK	PAPER	SCISSORS
ROCK	DRAW	WIN P1	WIN P2
PAPER	WIN P2	DRAW	WIN P1
SCISSORS	WIN P1	WIN P2	DRAW

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

P1 P2	ROCK	PAPER	SCISSORS
ROCK	DRAW	WIN P1	WIN P2
PAPER	WIN P2	DRAW	WIN P1
SCISSORS	WIN P1	WIN P2	DRAW

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



### IF YOU LOSE THE GAME

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



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. <u>Shape</u> <u>Triangle</u> <u>Circle</u> <u>Square</u> <u>Hexagon</u> 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?	<ul> <li>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.</li> <li>a) 80 white jelly beans</li> <li>b) 70 white jelly beans</li> <li>c) 7 white jelly beans</li> <li>d) 40 white jelly beans</li> <li>e) 75 white jelly beans</li> <li>f) 8 white jelly beans</li> </ul>	
There are 3 red marbles and 7 green marbles in a bag. Answers must be displayed in a percentage. What's the chance of picking a red marble from the bag? What's the chance of picking a white marble? What's the chance of not picking a red marble?	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 red marble that has a green stripe?	<ul> <li>Amy has to choose a bead without looking. Colour the beads so that she has:</li> <li>1/6 probability of choosing a red bead</li> <li>331/3% chance choosing a yellow bead</li> <li>0.5 chance of choose a blue bead</li> </ul>	
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? $\frac{7 + y + z}{k + p + s} = 7 + y + y + y + y + y + y + y + y + y + $	Which of these does <b>not</b> show the chance of the spinner landing on blue? 1/4, 4/10, 25%, 0.25	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:         a       11:         b       10:       c       9:         d       8:       e       7:       f       6:         g       5:       h       4:       i       3:         j       2:       k       1:	

## 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 of the experiment.

Dice	Number of times it will land like that			
lands on:	Probability	Actual number		
1				
2				
3				
4				
5				
6				

## 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.



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

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:

My Win–Lose Table				
Starting	balance:			10 counters
1st turn	1 counter			
2nd turn	1 counter			
etc.				

Each player guesses the number the spinner will land on by placing a card with that number on it in front of themselves.

- 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.
- 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).