NOTES: Probability of OUTCOMES

RANDOM: Something that depends TOTALLY (100%) on chance

SET OF POSSIBLE OUTCOMES: All possible outcomes in a random experiment

EXAMPLE

Flipping a coin

$$\Omega \; : \; \{heads, tails\}$$

Rolling a die

$$\Omega \; : \; \{1, 2, 3, 4, 5, 6\}$$

THERE IS NO REPEATING HERE!!

2 TYPES OF EXPERIMENTS

SIMPLE

(1 STEP)

ex: Choosing a card from a deck

COMPOUND

(2 OR + STEPS)

ex: Tossing a coin and rolling a die

TOTAL COMBINATION OF OUTCOMES

→ You multiply the # of possible outcomes for each step together ←

EX: Tossing a coin THEN rolling a die

$$\Omega : \{H, T\} \qquad X \qquad \Omega : \{1, 2, 3, 4, 5, 6\}$$

2 outcomes   X   6 outcomes

= 12 total possible outcomes:

$$\Omega : \begin{cases} H1 \ H2 \ H3 \ H4 \ H5 \ H6 \\ T1 \ T2 \ T3 \ T4 \ T5 \ T6 \end{cases}$$
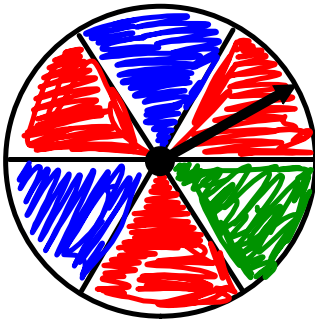
Total set of
outcomes

MEASURING THE PROBABILITY OF AN OUTCOME

The probability of an outcome can be a fraction:

$$= \frac{\text{FAVOURABLE OUTCOMES}}{\text{TOTAL OUTCOMES}}$$
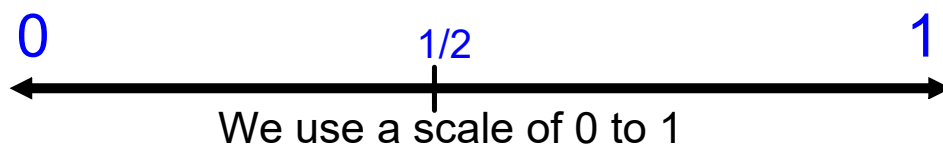
OR it can be a decimal or %

EXAMPLE

Probability of getting **red:** $\dfrac{3 \text{ sections}}{6 \text{ sections}}$ = **1/2 or .5 or 50%**

Probability of getting **blue**: $\dfrac{2 \text{ sections}}{6 \text{ sections}}$ = **1/3 or .3333 or 33.333%**

Probabilty of getting **green:** $\dfrac{1 \text{ section}}{6 \text{ section}}$ = **1/6 or .166666 or 16.666%**

WHICH PROBABILITY IS HIGHEST   OR LOWEST??

0   1/2   1

We use a scale of 0 to 1

0= impossible! It will not happen

1= It will certainly happen

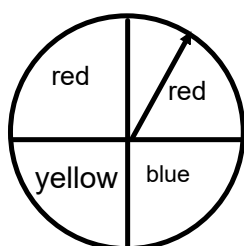**# close to 0= less likely to happen, low chances**

 # close to 1= very likely to happen, high chances

.5 or 1/2 or 50% = It may or may not happen.

The chances are even.

PROBABILITY OF A COMPOUND OUTCOME

In brackets, just X the probability

of each step

EX: **P (yellow ,   tails)**

1/4   X   1/2

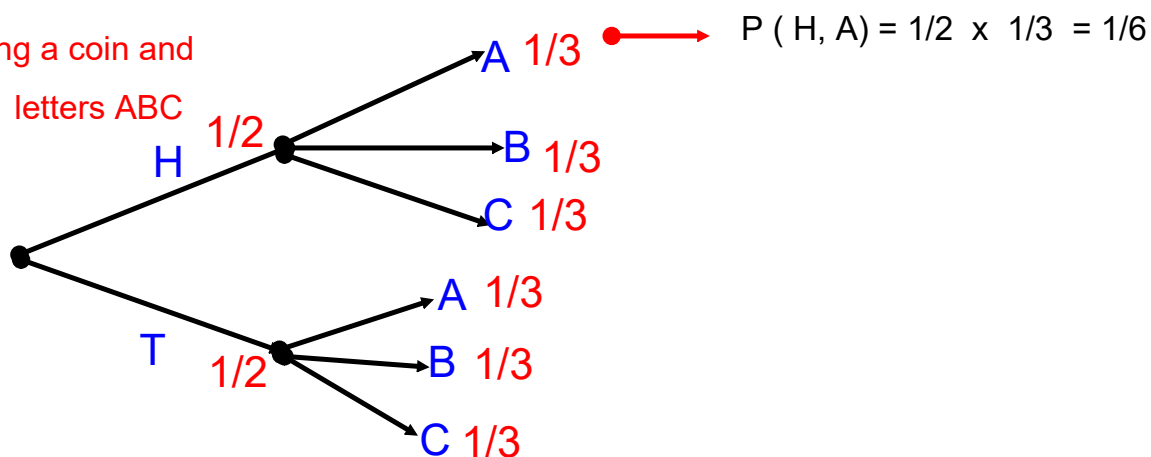**= 1/8 or 12.5% chances this will occur**

PROBABILITY OF A COMPOUND OUTCOME

FROM A TREE: Multiply # <u>ACROSS</u> the tree diagram

following your branch to the end

EX: flipping a coin and

choosing letters ABC

P (H, A) = 1/2 x 1/3 = 1/6

H   1/2

A 1/3

B 1/3

C 1/3

T   1/2

A 1/3

B 1/3

C 1/3

INDEPENDANT /DEPENDANT EXPERIMENTS

INDEPENDANT:

(aka REPLACING)

What happens before HAS NO EFFECT on what happens later on.

ex: rolling dice one after another

DEPENDANT:

(aka NOT REPLACING)

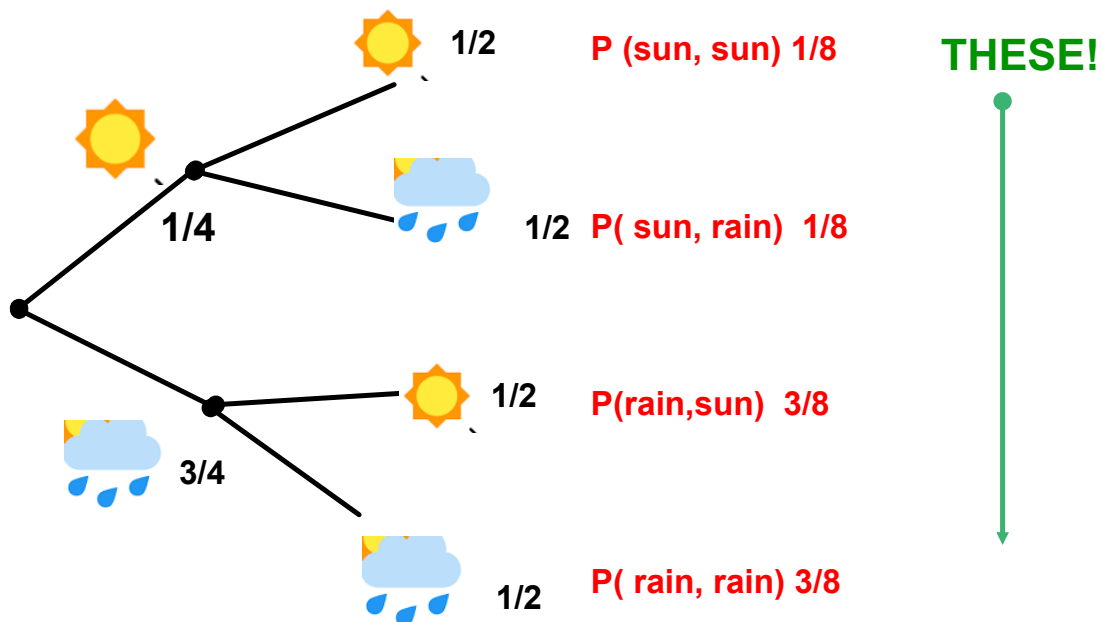What happened before affects OR changes what will happen later on. **THE DENOMINATOR CHANGES!!**

ex: Taking a card out of a deck, not replacing it, and taking out another card

Probability of an event

An event is made up of one or many added outcomes from an experiment.

ex: Sat and Sunday weather

ADD

THESE!

1/2   **P (sun, sun) 1/8**

1/4   1/2 **P(sun, rain) 1/8**

1/2 **P(rain,sun) 3/8**

3/4   1/2 **P(rain, rain) 3/8**

P (1 day of rain out of 2)   so add 1/8 +3/8 = 4/8 = 1/2