Two step experiments

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Experimental prob → 100

Theoretical prob

50 Heads
50 Tails

1 Head

$P(H) = \frac{1}{2}$

$P(T) = \frac{1}{2}$

We have looked at rolling **one** dice, picking **one** letter, picking **one** playing card, tossing **one** coin

When we only have one thing we roll, throw, choose etc, these are **single step experiments**.

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What have we looked at so far:

What would happen if we had two things happening?
Well, this is called two-step experiments.
This simply means we are doing two things.

Listing possible outcomes from a two-step experiment

We remember that possible outcomes are just a list of the things which might happen.

Example: Heads, Tails from the tossing of a coin

Example: The numbers 1, 2, 3, 4, 5, 6 from rolling a fair dice.

Example: Red, While, Blue which might be the colours from the French Flag.

Throwing two coins

We can try and guess all the outcomes from throwing two coins.

Head, Head
Head, Tail
Tail, Head
Tail, Tail

I'm old and, as such, have learnt them. Which isn't hard as there are only 4!!!
But what would happen if we tossed three coins??
What about 4? Or 10?
It gets harder.

What if I roll a dice and a throw a coin?

We can actually make a table to show the results from two-step experiments:

4 outcomes

①	②
H	H
H	T
T	H
T	T

← Table!

coin H.T ②
Die 1,2,3,4,5,6 ⑥   × = 12

3 coins = 8 outcomes
4 coins = 16 outcomes
5   = 32
6   = 64

7 possible
9 possible
63 possible outcomes

① H.T
② H.T

①

	H	T
H	HH	HT
T	TH	TT

②

nice !

1	2	3
2	4	8

② × 2 × 2 × 2 × 2
8   16   32 ....

Rolling a dice and tossing a coin

To be able to draw a table properly we need to think of the possible outcomes from each event.

E.g.
Possible outcomes from rolling a dice: Head, Tail   ② × 12
Possible outcomes from throwing a coin: 1, 2, 3, 4, 5, 6   ⑥

These help us make a table of outcomes (and results) which will then help us find probabilities.

Better ∞

EASY!

Dice						
	1	2	3	4	5	6
Coin H	H1	H2	H3	H4	H5	H6
T	T1	T2	T3	T4	T5	T6

12 outcomes!

(T, 3)   3T or T3

Find:
• Pr(Head, 1) $\frac{1}{12}$
• Pr(Head, any number) $\frac{6}{12} = \frac{1}{2}$
• Pr(Tail, 5)
• Pr(Tail, 7) $\frac{1}{12}$
• Pr(Head, Tail)   0
• Pr(Tail, odd number)

0                                $\frac{3}{12} = \frac{1}{4}$

Example from the text book:

A spinner with the numbers **1, 2,** and **3** is spun, and then a card is chosen at random from the letters ATHS.

a Draw a table to list the sample space of this experiment.

b How many outcomes does the experiment have?   12

c Find the probability of the combination 2S.   = S2 $\frac{1}{12}$

d Find the probability of an odd number being spun and the letter H being chosen. $\frac{2}{12} = \frac{1}{6}$ Cancel Down

Spin : 1,2,3   ③)   12 outcomes!

ATHS : A,T,H,S   ④

{ A1, T1, H , S1 .... }

	A	T	H	S
1	A1	T1	H1	S1
2	A2	T2	H2	S2
3	A3	T3	H3	S3

⑫ ✓

	1	2	3	4	5	6
1	1,1	1,2	1,3	1,4	1,5	1,6
2						
3						
4						
5						
6						