

Worksheet 15: Probability

- Probability is a fraction. It is the fraction of time something happens.
- The expected frequency of an event is the probability times the number of goes
- You can describe the likelihood of an event using the words impossible, unlikely, evens, likely and certain
- Mutually exclusive events – the probabilities add to 1
- Independent events – multiply the probabilities
- A sample space diagram is a table showing the outcomes of two events
- On a tree diagram, the probabilities on each branch add to 1 and you multiply the probabilities along a branch to calculate the probability of the combined outcome

Simple probabilities and likelihoods

Fill in the table below...

Event	Probability	Likelihood
Toss a fair coin and get a tail		
Roll a fair dice and get a score larger than 1		
Pick a letter at random from the word MATHEMATICS and get a consonant		
Pick a blue counter from a bag that contains three green and five yellow counters		
Pick a black counter from a bag that contains 4 black and 5 red counters		
Pick a consonant or a vowel from the word HYPOTHESIS		
Toss a fair coin twice and get 2 heads		
Roll a fair dice and get a score of 5		

Expected frequency

- 1) Freda rolls a fair dice 900 times.
How many times should she expect to see a square number?

- 2) Algernon tosses a fair coin 1 000 times.
How many times should he expect to see a head?

- 3) A smoke alarm has a 0.0002 probability of going off each hour it is switched on.
How many times would you expect the smoke alarm to go off in a year (365 days of 24 hours)?

- 4) Algernon tosses two fair coins.
 - a) List all the possible outcomes of the two coins (HH, ..)
 - b) Write down the probability of seeing at least one tailAlgernon tosses his two fair coins 500 times
 - c) How often should he expect to see two heads?

- 5) A photocopier jams with relative frequency 0.05
How many times would you expect the copier to jam when making 500 copies?

- 6) A bag contains 3 white counters, 4 red counters and 9 blue counters.
You pick a counter from the bag, note the colour and replace the counter and repeat for a total of 80 picks.
How many times would you expect to see a counter that was not red?

- 7) You roll a fair dice 300 times. How often would you expect to see the number 5?

Mutually exclusive events

1) The probability that a car starts first time on a cold morning is 0.85
What is the probability of the car not starting first time?

2) A bag contains red, green and blue counters.

The probability of picking a red counter is $\frac{3}{8}$

The probability of picking a blue counter is $\frac{1}{3}$

Calculate the probability of picking a green counter.

3) A bag contains yellow, red and blue counters.

The probability of picking a yellow counter is $\frac{1}{4}$

Red and blue counters are present in the bag in the ratio 2:3

Work out the probability of picking a blue counter.

4) A biased dice has the relative frequencies (experimentally determined probabilities) of each score shown below in the table...

Score	1	2	3	4	5	6
Rel Freq	0.08	0.17	0.17	0.17	0.17	x

a) Work out the probability of rolling a 6 on this dice

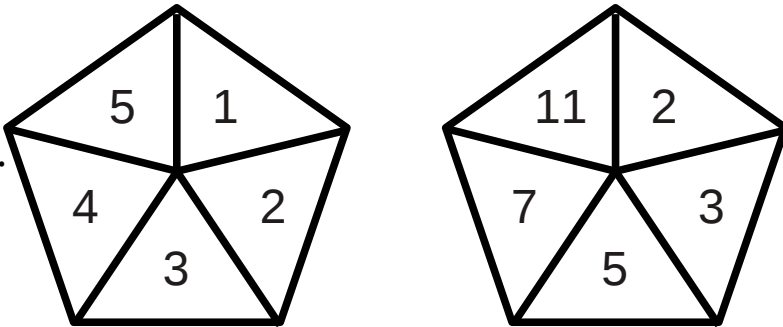
b) You roll this dice 1 200 times.

How many times would you expect to see a score of 6?

Combined events

Question 1

The two spinners shown below are spun and the numbers on each added together to give a score



a) Complete the sample space diagram below to show the 25 equally likely scores...

+	2	3	5	7	11
1					
2					
3					
4					
5					

b) Write down the probability of getting a score that is a square number

Question 2

Fred puts 3 green and 4 red counters in a bag.

He picks one counter from the bag and notes the colour but does not replace the counter.

He then picks another counter from the bag and notes the colour.

a) Draw a tree diagram to represent all four possible outcomes

b) Work out the probability of getting at least one green counter.