

Relative frequency

Shay tested a coin to see whether it was biased. Here are the results of the experiment:

Heads	Tails
36	44

a) What is the relative frequency of the coin landing on heads? $= \frac{9}{20}$

b) Do you think this coin is biased? Explain your answer.

Theoretical probability of heads is $\frac{1}{2}$
 $\frac{9}{20} = \frac{18}{40}$ and $\frac{1}{2} = \frac{20}{40}$ so not biased, and a larger number of trials may tend towards the theoretical probability further.

Listing outcomes

A dessert is accompanied by two scoops of ice cream. You can choose from vanilla, banana, chocolate or mint. Show that there are 10 ways of choosing your ice cream.

Mint and mint
 Mint and vanilla
 Mint and chocolate
 Mint and banana
 Vanilla and vanilla
 Vanilla and chocolate
 Vanilla and banana
 Chocolate and chocolate
 Chocolate and banana
 Banana and banana

Sample space

A 6-sided dice and a 4-sided dice are rolled, and the positive difference between the numbers recorded.

- a) Complete the sample space diagram
 b) When the two dice are rolled, what is the probability of obtaining a score that is greater than one? $= \frac{13}{24}$

+	1	2	3	4	5	6
1	0	1	2	3	4	5
2	1	0	1	2	3	4
3	2	1	0	1	2	3
4	3	2	1	0	1	2

Tree diagrams

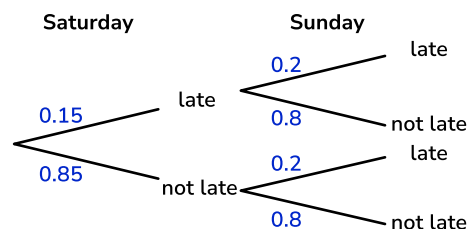
Sil works on Saturday and Sunday.
 The probability of Sil being late for work on Saturday is 0.15

The probability of Sil being late for work on Sunday is 0.2

Complete the probability tree and calculate,

a) $P(\text{late at least once}) = 0.32$

b) $P(\text{late only once}) = 0.29$



Expectation

The probability of getting heads when flipping a biased coin is 0.65.

- a) What is the probability of getting tails?
 $= 0.35$
 b) If the coin is flipped 160 times, how many heads would you expect to get?
 $= 104$

Mutually exclusive events

A bag contains red, blue, green and yellow marbles. A marble is picked at random from the bag. The table shows the probability of picking a red or green marble.

Colour	Red	Blue	Green	Yellow
Probability	0.17	0.16	0.19	0.48

Given that there are three times as many yellow marbles as blue marbles, complete the table.

Conditional probability

Survey information is given in this table.

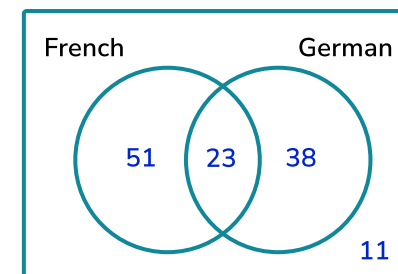
	Left handed	Right handed
Female	11	95
Male	13	91

- a) What is the probability that a student is right-handed? $= \frac{31}{35}$
 b) What is the probability that a student is left-handed, given that they are male? $= \frac{1}{8}$

Venn diagrams

From a school's Year 10 cohort of 123 students,
 74 students learn French
 61 students learn German
 11 students do not learn French or German

Complete the Venn Diagram



Algebra and probability

There are n sweets in a bag. 3 of the sweets are red and the rest are green.

I take a sweet at random and eat it. I take another sweet at random and eat it. The probability that I eat two red sweets is $\frac{1}{5}$.

a) Show that $n^2 - n - 30 = 0$

$$P(\text{first red}) = \frac{3}{n}, P(\text{second red}) = \frac{2}{n-1}$$

$$\frac{3}{n} \times \frac{2}{n-1} = \frac{1}{5}$$

$$\frac{6}{n(n-1)} = \frac{1}{5}$$

$$n(n-1) = 30$$

$$n^2 - n = 30$$

$$n^2 - n - 30 = 0$$

b) How many sweets were in the bag to begin with? $= 6$