Learning Objective: To review probability techniques including venn diagrams and two-way tables.

Conditional probability using Venn diagrams

Conditional probability refers to the chances that some outcome occurs given that another event has also occurred.

The notation for conditional probability is *P (B\A)*. This reads 'the probability of B given A'.

This is calculated as:

P (B\A) = number of elements in B and A ÷ number of elements in A

Example:
The following Venn diagram shows the number of students in year 10, where:

C = the number of students in the Chess club.
M = the number of students in the Maths club.

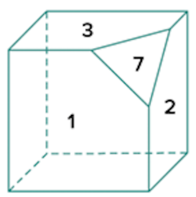
One student is chosen at random. Find the probability that the student is in the Chess club, given that they are also in the Maths club.

$$P(C\backslash M) = \frac{\text{number of elements in C and M}}{\text{number of elements in M}}$$

$$= \frac{7}{13}$$

The tree diagram below shows the outcomes at each stage of an experiment tossing a coin three times.

An ordinary die with faces labelled 1 to 6 has had one corner sliced off, thus creating a seventh face labelled 7. The results of throwing the die 60 times are shown below:

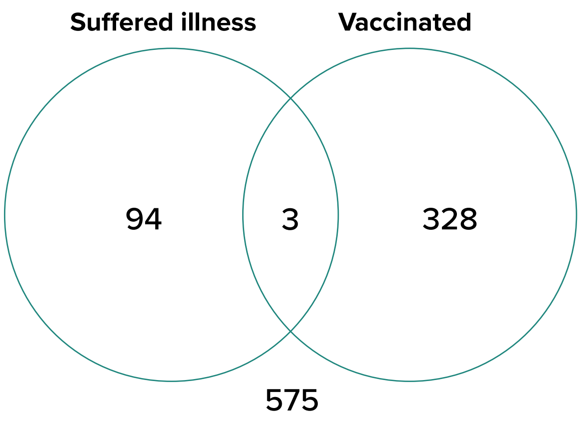


Number	Frequency
1	6
2	8
3	9
4	10
5	11
6	10
7	6

Find the probability, in simplified fraction form, that the number rolled is:

A multiple of two.	
A factor of 20.	
An odd number.	

A medical researcher studies 1000 people to see whether they contracted an illness and whether they were vaccinated against it. Find the probability:



A randomly selected person got the illness.	
A randomly selected person suffered the illness, find the probability that they were vaccinated.	
A randomly selected person did get ill, find the probability that they were not vaccinated.	

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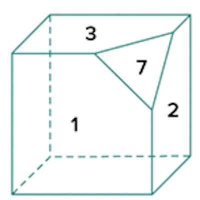
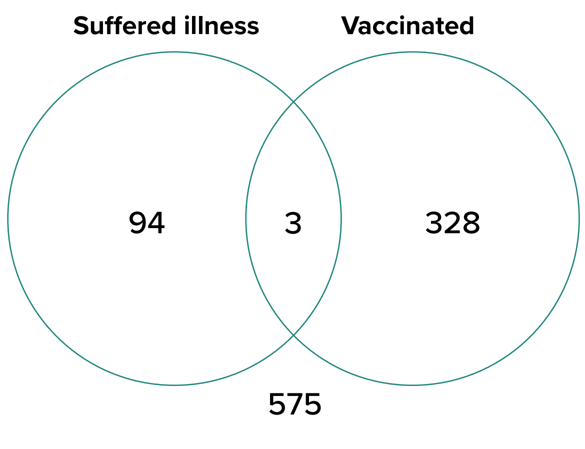


Number	Frequency
1	6
2	8
3	9
4	10
5	11
6	10
7	6

Find the probability, in simplified fraction form, that the number rolled is:

A multiple of two.	$P(\text{multiple of } 2) = \frac{8 + 10 + 10}{60} = 28/60 = 7/15$
A factor of 20.	$P(\text{factor of } 20) = \frac{6 + 8 + 11}{60} = 25/60 = 5/12$
An odd number.	$P(\text{even}) = \frac{6 + 9 + 11 + 6}{60} = 32/60 = 8/15$

A medical researcher studies 1000 people to see whether they contracted an illness and whether they were vaccinated against it. Find the probability:



A randomly selected person got the illness.	$P(I') = \frac{94}{94 + 3 + 328 + 575} = \frac{94}{1000} = \frac{47}{500}$
A randomly selected person suffered the illness, find the probability that they were vaccinated.	$P(V \backslash I) = \frac{3}{94}$
A randomly selected person did get ill, find the probability that they were not vaccinated.	$P(V' \backslash I') = \frac{93}{3 + 94} = \frac{93}{97}$