Venn diagrams and two-way tables

Year 9 Mathematics

Learning Objectives

By the end of the lesson I hope that you understand and can apply the following to a range of questions from the Year 9 Mathematics course.

- Understand how to read and create a Venn Diagram.
- Know how to read and create a two way table
- Know how to convert a Venn Diagram into a two-way table and vice-versa.
 Find probability of events from Venn Diagrams and two-way tables



Recap of past learning

In the last lesson we looked to recap the work from previous years relating to Probability.

We looked mainly at the notation needed and some basic examples of finding probabilities.

Now we start to get into the fun stuff!!!



Maths meets Art: Venn Diagram

These are pretty cool and were the reason I lost 1 mark in an exam in Maths in Year 9.

[Yes. I still remember it and it still hurts!!!]

We can express the outcomes of certain events (normally two but we can have more!) in a diagram called a Venn Diagram.

It is constructed in a very definite way and, for exams, all sections must be drawn and labelled corrected.

For the most part we will look at Venn Diagrams which describe two events happening.



Examples have been extracted, with permission, from the Cambridge Essentials (Year 9) Textbook

Venn Diagrams: The important bits



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Understanding the sections of a Venn Diagram



A two-way table

We can also put this information into something which is called a **two-way table**.

The way we draw these is really, really important!

Considering we have two events called A and B, then we need fill the two-way table like this:

	Y	¥	
	А	NOT A	Totals
В			
NOT B			
Totals			



B

Ā

Α

A'

 \mathbb{B}_{1}

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A two-way table

We can also put this information into something which is called a **two-way table**.

Taking the information from the previous Venn Diagram and question, we can complete the two-way table.

So, for example if we knew that 12 people owned a Mac and PC, 62 people own a PC and 57 people own a Mac, we can express the information in a Venn Diagram.

A: Mac B: PC



Examples have been extracted, with permission, from the Cambridge Essentials (Year 9) Textbook **WWW.maffsguru.com**

Example: Finding Probabilities from a Venn Diagram

Find the following probabilities:

- Pr(*Mac*)
- Pr(only Mac)
- Pr(*Mac or PC*)
- Pr(Mac and PC)

PC Mac Pr (Mac) = 43 5031 Pr(only Mac) = 31 100 31 Pr (Mac or Pc) = 93 12 50 100 T $Pr(Mac and Pc) = \frac{12}{100} = \frac{6}{50} = \frac{3}{25}$

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Example: Finding Probabilities from a two-way table



A two-way table: Important things to note

It is important to know what the TOTALS column and row actually stand for as this tend to come up in exams over and over again!

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Example 1: Using a Venn diagram

A survey of 30 people found that 21 like AFL and 12 like soccer. Also, 7 people like both AFL and soccer and **4 like neither AFL nor soccer**. Construct a Venn diagram for the survey results.

- How many people:
- like AFL or soccer?
- do not like soccer?
- like only AFL?

If one of the 30 people was randomly selected, find:

- Pr(like AFL and soccer)
- Pr(like neither AFL nor soccer)
- Pr(like only soccer).

n(A or S) = 26

$$n(\bar{s}) = 18$$

$$n(A) = 14$$

$$Pr(A \text{ and } S) = \frac{7}{30}$$

$$Pr(\overline{A} \in \overline{S}) = \frac{4}{30} = \frac{\overline{z}}{\frac{15}{30}}$$

$$Pr(S) = \frac{5}{30} = \frac{1}{6}$$

12 30-12 = 18

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Example 2: Using a two-way table

At a car yard, 24 cars are tested for fuel used: 18 of the cars run on petrol, 8 cars run on gas and 3 cars can run on both petrol and gas. Illustrate the situation using a two-way table.

- How many of the cars:
- do not run on gas?
- run on neither petrol nor gas?

Find the probability that a randomly selected car:

- runs on gas
- runs on only gas
- runs on gas or petrol

		Р	NOT P	Totals	
	G	3,	5.	&	1
\rightarrow	NOT G	15 .	l x	16	4
	Totals	I&	6	24	
			₽	V	-

$$n(\bar{G}) = 1b$$

$$Pr(G) = \frac{5}{24}$$

$$Pr(G) = \frac{8}{24} = \frac{1}{3}$$

$$Pr(G = \frac{8}{24} = \frac{1}{3}$$

$$Pr(G = \frac{8}{24} = \frac{1}{3}$$

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Questions to complete

The following list of questions is a **minimum**. Doing these questions will achieve a good understanding of the work but might not lead to the highest scores.

You are encouraged to return and answer other questions if time permits or for revision.

Chapter 9B: Questions: 1, 3, 4, 5, 6, 8, 11, 13

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