

Year 8 - Unit 8: Venn Diagrams

Learning Journey:

Prior Learning

- Find the HCF and LCM of numbers using prime factorisation.
- Understand basic probability and calculate simple probabilities.



Next Steps

- Solve more complex probability problems involving tree diagrams and conditional probability.
- Apply Venn diagrams to set notation and GCSE problem-solving.

By the end of this unit, you should be able to:

- Construct and interpret Venn diagrams to organise information and solve problems.
- Calculate probabilities using Venn diagrams, including intersections and unions.

Keywords:

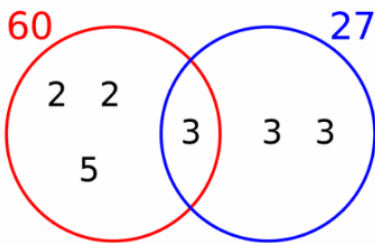
- Venn diagram** – A diagram used to show relationships between sets.
- Set** – A collection of objects or values.
- Intersection** – The values common to two or more sets.
- Union** – All values in one or more sets.
- Probability** – The chance of an event happening.
- Complement** – All outcomes not in a given set or event.

HCF & LCM From Venn Diagrams

Example: Find the HCF and LCM of 60 and 27.

Step 1: We first need the prime factorisation of both numbers, in which we would use factor trees. However we already have the prime factorisation of 60, which is

$$60 = 2 \times 2 \times 3 \times 5 = 2^2 \times 3 \times 5 \quad \text{and} \quad 27 = 3 \times 3 \times 3 = 3^3$$



Step 2: Now, we draw a Venn diagram where one circle is for prime factors of 60 and one circle is for prime factors of 27.

Step 3: Looking at the list of factors, if one is shared by both numbers, then we will put it in the intersection and cross it off both lists.

$$60 = 2 \times 2 \times \cancel{3} \times 5 \quad \text{and} \quad 27 = \cancel{3} \times 3 \times 3$$

Step 4: Any factors that are not shared and haven't been crossed out, we put in their respective circles.

Step 5: To find the HCF, we multiply the numbers in the intersection (these are the factors that are common between both numbers). Here there is only one number, so

$$\text{HCF} = 3$$

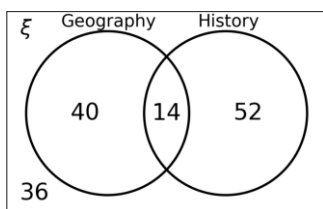
Step 6: To find the LCM, we multiply all of the numbers in the Venn diagram together. So

$$\text{LCM} = 2 \times 2 \times 5 \times 3 \times 3 \times 3$$

Probability with Venn Diagrams

All the students in year 10 were asked if they study geography or history.

The results are shown in the Venn Diagram below:



- How many students are in year 10?
- A student is selected at random. What is the probability that this student studies both history and geography?
- Given that the student selected does not study geography, what is the probability that the student does not study history?

a) $40 + 52 + 14 + 36 = 142$ students

b) We know that there are 142 students in total and, of these, 14 study both history and geography. We can express this as the following fraction: $\frac{14}{142}$

c) The phrase 'given that the student selected does not study geography' tells us that we need to work out how many students do not study geography. The total that do not study geography is therefore $52 + 36 = 88$ students.

Of these 88 students, we need to find how many do not study history which is 36 so answer is $\frac{36}{88}$