# Venn Diagrams Set Notation

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

## 1. Worked example

**ξ = {1, 2, ..., 12}, A = even numbers, B = multiples of 3. List A ∩ B and A ∪ B.**

Step 1 · List each set

A = {2, 4, 6, 8, 10, 12}, B = {3, 6, 9, 12}

Step 2 · In both

A ∩ B = {6, 12}

Step 3 · In either (each listed once)

A ∪ B = {2, 3, 4, 6, 8, 9, 10, 12}

**Answer: A ∩ B = {6, 12}; A ∪ B = {2, 3, 4, 6, 8, 9, 10, 12}**

Check: n(A ∪ B) = n(A) + n(B) − n(A ∩ B) = 6 + 4 − 2 = 8 ✓

## 2. Now try one with the steps

**Using the same sets, a number is chosen at random from ξ. Find P(A ∪ B).**

Step 1 · 8 numbers in A ∪ B out of 12

**Answer:**

## 3. Practice

Show your working. The marks tell you how much is expected.

**1.** ξ = {1, 2, ..., 10}, A = {1, 2, 3, 4, 5} and B = {4, 5, 6}. List the elements of A ∩ B. [1]

**2.** Using the same sets, list the elements of A ∪ B. [1]

**3.** Using the same sets, list the elements of A′. [1]

**4.** Using the same sets, how many elements are in (A ∪ B)′? [1]

**5.** Using the same sets, a number is chosen at random from ξ. Find P(A ∩ B). [1]

**6.** In a class of 40, 22 play football, 15 play tennis and 8 play both. How many play neither? [2]

**7.** Using question 6, find the probability that a student chosen at random plays exactly one of the sports. [2]

**8.** In a group of 30, 18 have a dog, 10 have a cat and 5 have neither. How many have both? [3]

**9.** A Venn diagram has n(ξ) = 50. 'A only' is 2x, 'both' is x, 'B only' is 15 and 'neither' is 8. Find n(A). [3]

**10.** Using question 6, a tennis player is chosen at random. Find the probability that they also play football. [2]

**11.** Using question 6, find P(plays tennis | plays football). [2]

**12.** Describe in words the region A ∩ B′. [1]

**13.** ξ = {1, 2, …, 15}, A = multiples of 3, B = multiples of 5. List A ∩ B. [1]

**14.** Using question 13, a number is chosen at random from ξ. Find P(A ∪ B). [2]

**15.** $P(A) = 0.5$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$. Find $P(A \cup B)$. [2]

## 4. Before you hand it in

**30 like tea and 25 like coffee, so 55 like at least one**

The 12 who like both are in both totals. $n(A \cup B) = 30 + 25 - 12 = 43$.

**$A \cup B = \{1, 2, 3, 4, 5, 4, 5, 6\}$**

Each element of a set is listed once: $\{1, 2, 3, 4, 5, 6\}$.

**Putting 30 in the 'tea only' region**

30 is ALL tea-lovers. Tea only = 30 − 12 = 18. Always fill the overlap first.

**P(tea | coffee) = 12/50**

'Given coffee' restricts you to the 25 coffee-lovers: 12/25.