Introduction to Venn Diagrams

Prior Knowledge:

Before attempting this sheet, students need to be able to calculate the probabilities of independent events.

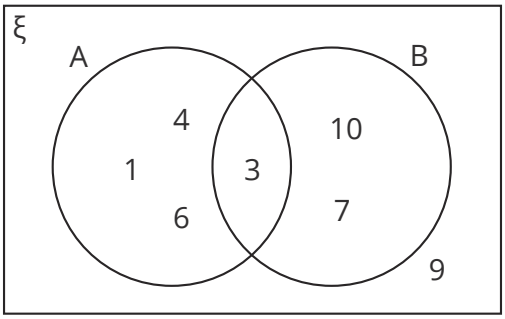
A Venn diagram is a way of grouping data. The groups are called sets and the set that includes everything is called the universal set. This is sometimes represented with the Greek letter ξ.

We can use squiggly brackets { } to represent everything in a given set.

For example, A = {1, 2, 3} means that set A contains the numbers 1, 2 and 3.

Example 1:

The Venn diagram shows some information about sets A and B.



Write down the elements in set A.

The elements in set A are all the numbers inside that circle: 1, 3, 4 and 6. We can write this in set notation as:

A = {1, 3, 4, 6}

Notice that we prefer to write these in ascending order.

Venn diagrams can also be used to show the **number of elements** in a set.

Example 2:

There are 40 students in a class. 18 of the students study French, 15 study English and 12 study neither subject. Draw a Venn diagram representing this information and use it to work out how many students study just French or just English.

To answer this question, we will draw a Venn diagram. Before we do, we add the numbers given:

18 + 15 + 12 = 45

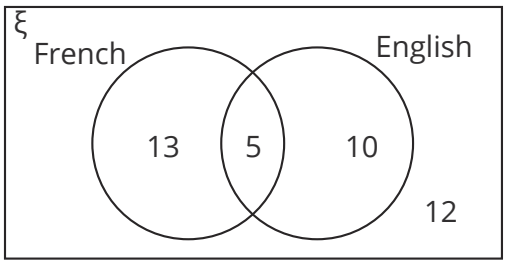
Notice that 45 is greater than the total number of students.

45 – 40 = 5

Therefore, there must be 5 students in the overlap between the two circles.

This means the number of students that study French and not English is 18 – 5 = 13.

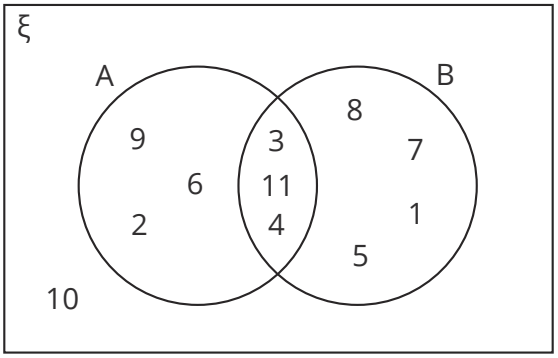
The number of students that study English and not French is 15 – 5 = 10.



The number of students that study just French or just English is 13 + 10 = 23.

Your Turn

1. The diagram shows a Venn diagram.

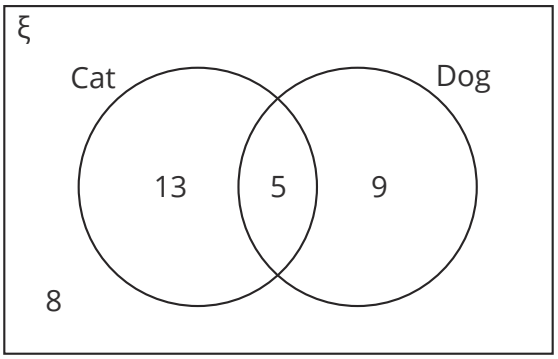


a. List the elements in set A. Use set notation.

b. How many elements are in set B?

c. Write down the elements that are in both set A and B.

2. The Venn diagram gives information about the pets owned by a number of people.

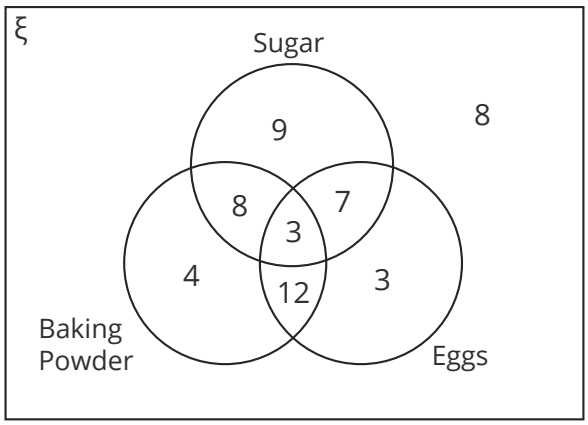


a. How many people own a cat?

b. How many people were asked in total?

c. A person is chosen at random. What is the probability that the person owns a cat and a dog?

3. The ingredients required in a number of recipes were recorded.



a. How many recipes needed sugar?

b. How many recipes needed eggs but not baking powder?

c. How many recipes were included altogether?

d. A recipe is chosen at random. What is the probability that it requires baking powder but no sugar?

4. A group of 30 children were asked whether they like ice cream, chocolate or both.

   10 children like ice cream.

   14 children like chocolate.

   6 children like both.

   Draw a Venn diagram representing this information.

5. 100 people were asked if they cycle or run for exercise.

   53 people cycle.

   64 people run.

   19 people do neither.

   Draw a Venn diagram representing this information.

6. 80 people were asked whether they could speak French, German or Spanish.

   35 people can speak French.

   40 people can speak German.

   26 people can speak Spanish.

   7 people can speak Spanish and German.

   10 people can speak German and French.

   8 people can speak Spanish and French.

   2 people can speak all three languages.

   Draw a Venn diagram representing this information.