

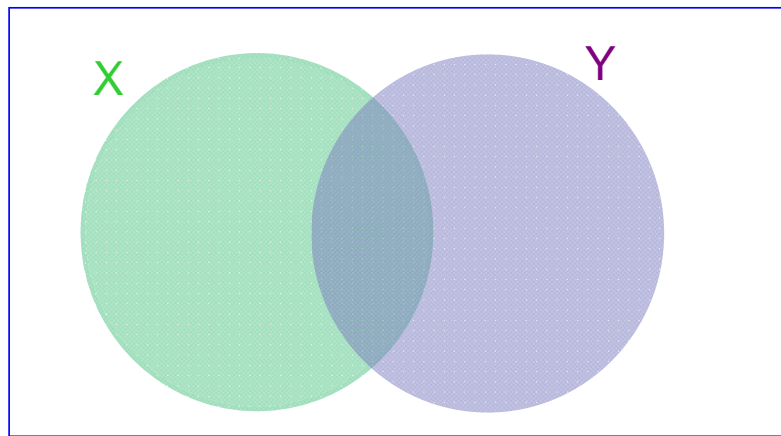
A **set** is a collection of numbers or objects.

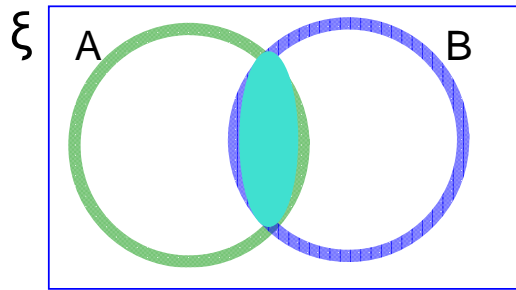
The objects in the set are called the **members** or **elements** of the set.

If the set **X** is 'the factors of 6', what are the elements of this set?

If the set **Y** is 'the even numbers between 2 and 12', what are the elements of this set?

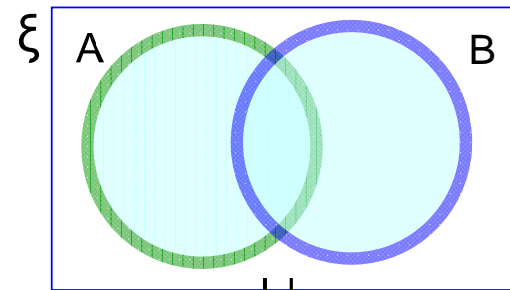
Can you now draw a venn diagram to show the combination of these two sets?





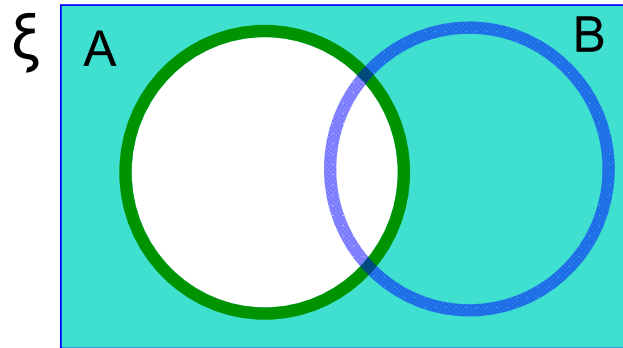
$$A \cap B$$

The intersection of two sets consists of the elements common to both sets



$$A \cup B$$

The union of two sets consists of the elements which appear in at least one of the sets



$$A'$$

The complement of a set,  $A'$ , consists of the elements which are not in  $A$

$\xi$  The universal set that contains all of the elements

$\emptyset$  The empty set with no elements

Example:

$$\xi = \{1, 2, \dots, 11, 12\}$$

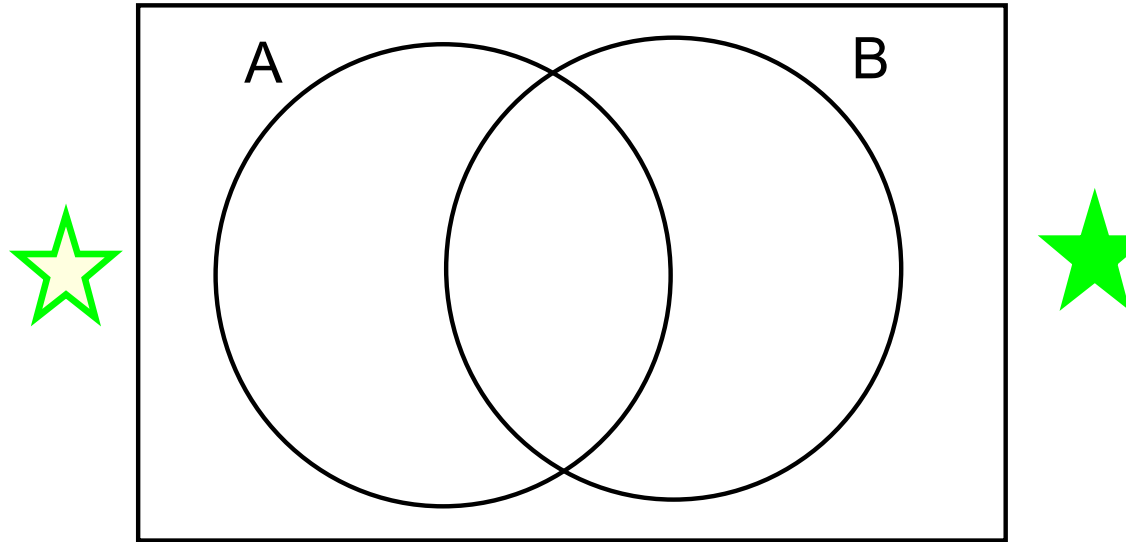
$$A = \{\text{factors of } 12\}$$

$$B = \{2, 3, 5, 6, 11\}$$

Find  $A \cap B$

$A \cup B$

$(A \cup B)'$



$\xi = \{ \text{first ten positive integers} \}$

$B = \{ \text{single digit odd numbers} \}$

$C = \{ \text{single digit prime numbers} \}$

$D = \{ \text{single digit square numbers} \}$

Give the sets

$B \cap C$      $C \cup D$

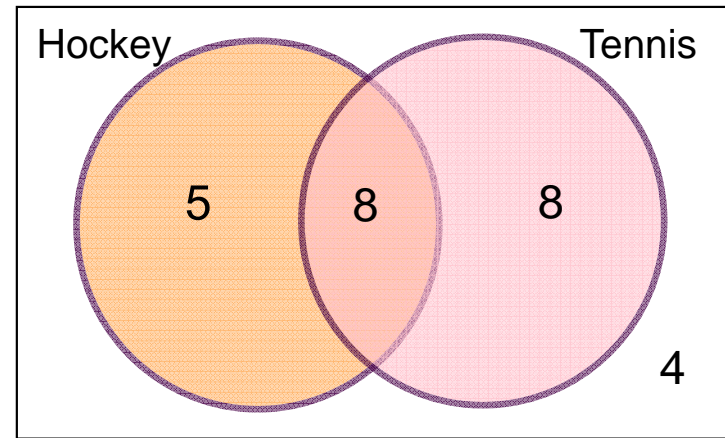
$B \cap D$      $B \cup D$

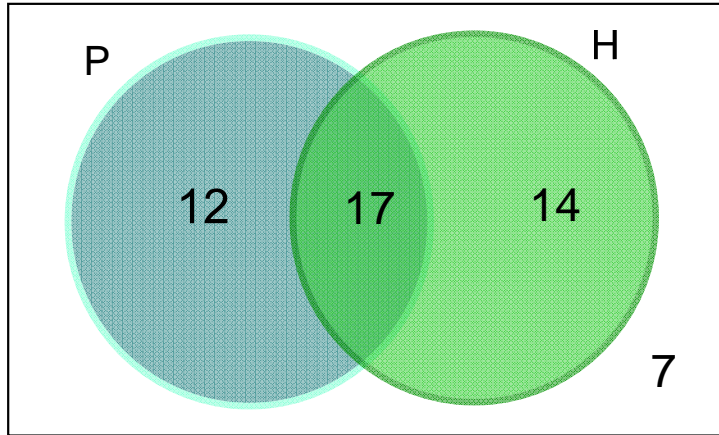
How many students play hockey and tennis?

How many play hockey?

How many play tennis?

How many students do not play hockey or tennis?





An insurance company surveys 50 customers. The customers are sorted into

$P = \{\text{pet insurance}\}$

$H = \{\text{home insurance}\}$

The results are shown in the venn diagram.

A customer is chosen at random. Find

(i)  $P(P)$

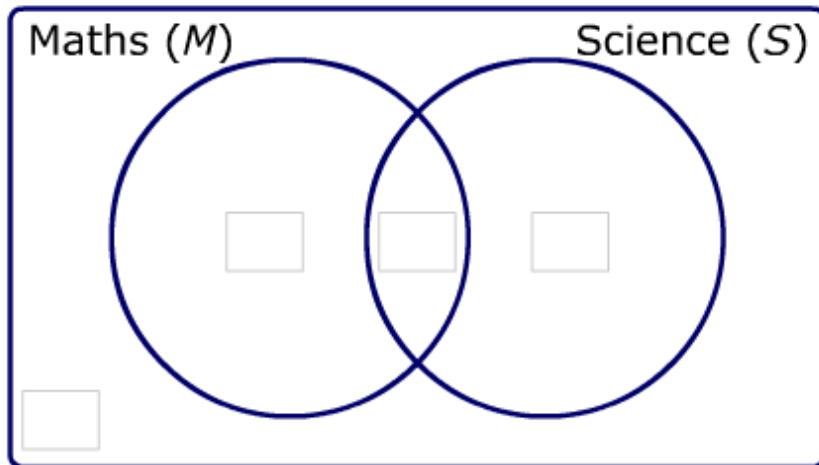
(ii)  $P(H')$

(iii)  $P(P \cap H)$

(iv)  $P(P \cup H)$

Some students are asked whether they like maths and science.

84 like maths, 39 like science, 27 like both and 25 like neither.



What is the probability that a student likes both?

$$P(M \cap S) = \frac{\quad}{\quad}$$

What is the probability that a student likes maths or science?

$$P(M \cup S) = \frac{\quad}{\quad}$$

What is the probability that a student likes maths?

$$P(M) = \frac{\quad}{\quad}$$

A cafe records how people like their chips.

Altogether 43 take salt and 32 vinegar.  
11 take both and 19 take neither.

Complete the Venn diagram.

How many people were surveyed?

What is the probability that  
a customer chosen at random:

a) takes vinegar?

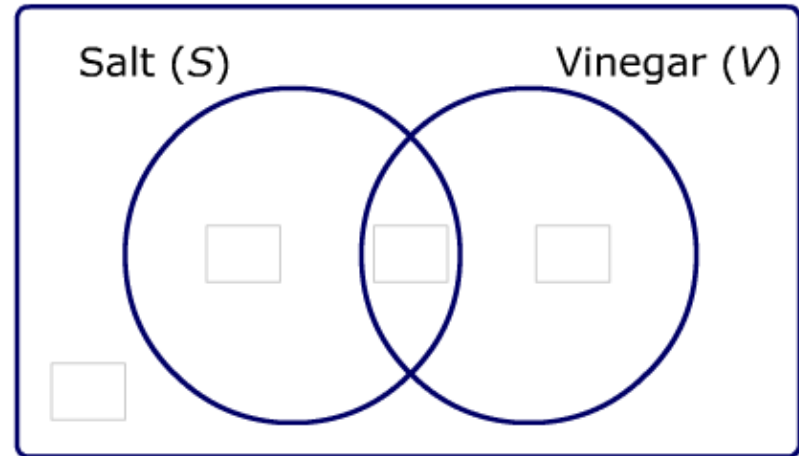
$$P(V) = \frac{\quad}{\quad} \quad [2]$$

b) takes both salt and vinegar?

$$P(S \cap V) = \frac{\quad}{\quad} \quad [2]$$

c) takes salt or vinegar or both?

$$P(S \cup V) = \frac{\quad}{\quad} \quad [2]$$



[2]

[2]



## Starter:

100 pet owners were asked if they owned a cat or a dog.

45 of them owned a cat altogether.  
68 of them owned a cat or a dog or both.  
15 of them owned a cat and a dog.

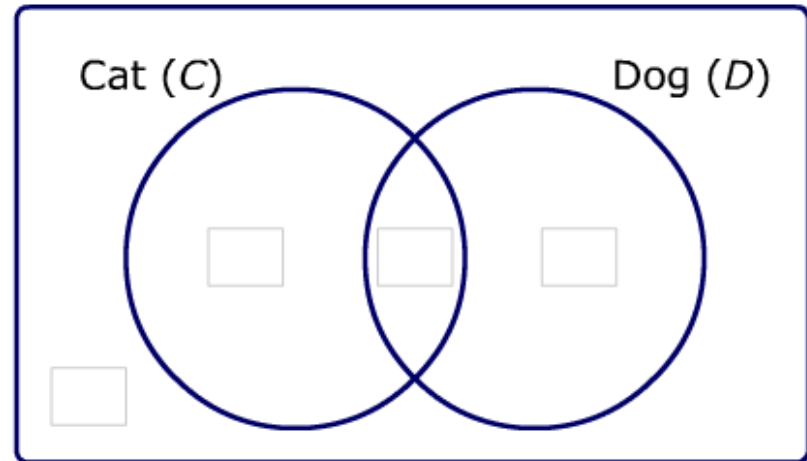
Fill in the numbers in the Venn diagram.

Find the probability that a pet owner chosen at random owns:

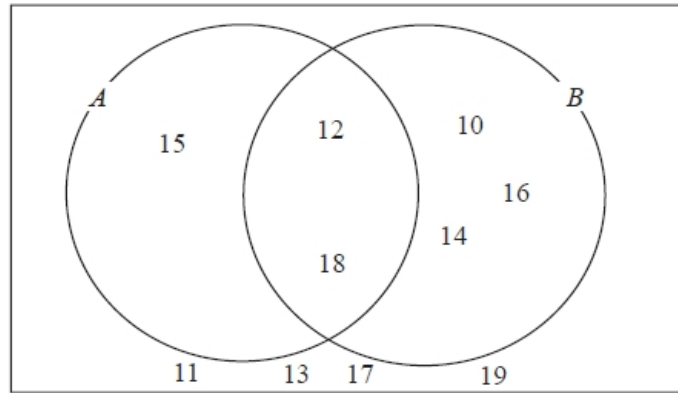
a) neither a cat nor a dog =

b) a dog =

c) a dog but not a cat =



Here is a Venn diagram.



(a) Write down the numbers that are in set

(i)  $A \cup B$

(ii)  $A \cap B$

.....

.....

(2)

One of the numbers in the diagram is chosen at random.

(b) Find the probability that the number is in set  $A'$

.....

(2)

**(Total for question = 4 marks)**

There are 80 students at a language school.

All 80 students speak at least one language from French, German and Spanish.

9 of the students speak French, German and Spanish.

19 of the students speak French and German.

28 of the students speak French and Spanish.

17 of the students speak Spanish and German.

45 students speak French.

50 students speak Spanish.

(a) Draw a Venn diagram to show this information.

(3)

One of the 80 students is selected at random.

(b) Find the probability that this student speaks German but not Spanish.

(1)

Given that the student speaks German,

(c) find the probability that this student also speaks French.

(2)

**(Total for question = 6 marks)**