



# ACHIEVE ACADEMY

## GCSE Maths — Higher Tier

Venn Diagrams & Set Notation · Practice Booklet

NAME: \_\_\_\_\_

CLASS: \_\_\_\_\_

DATE: \_\_\_\_\_

☐ Developing

☐ Secure

☒ Greater Depth

Answer every question in the working space provided. Method marks are available for correct working even if the final answer is wrong. Check the time allowed with your tutor before you start.

### Venn Diagrams & Set Notation

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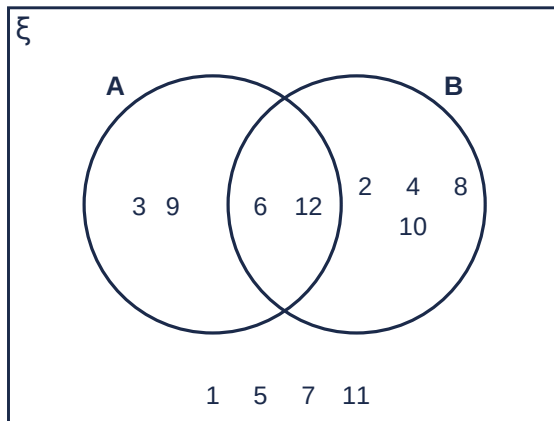
Total marks available: 86

## ● Venn Diagrams & Set Notation

Q1

[2 marks]

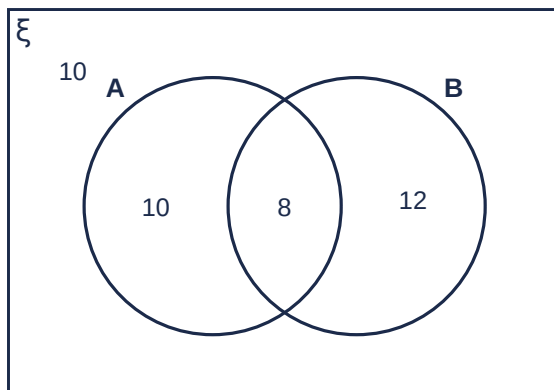
$\xi = \{\text{whole numbers from 1 to 12}\}$ . A = multiples of 3, B = even numbers.  
List the members of  $A \cup B'$ .



Q2

[1 mark]

The Venn diagram shows the number of elements in sets A and B, and in  $\xi$ .  
Find  $n(A' \cap B)$ .

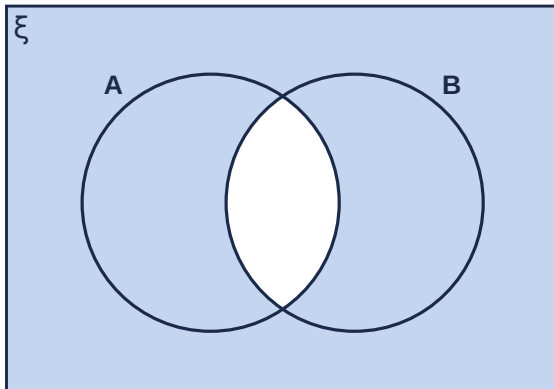


Q3

[1 mark]

Which of these describes the shaded region of the Venn diagram?

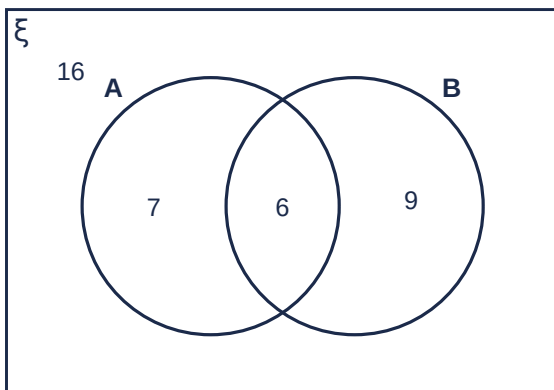
$A \cup B'$     $(A \cap B)'$     $(A \cup B)'$     $A \cap B'$



Q4

[2 marks]

The Venn diagram shows the number of elements in sets A and B, and in  $\xi$ .  
Find  $n(B')$ .

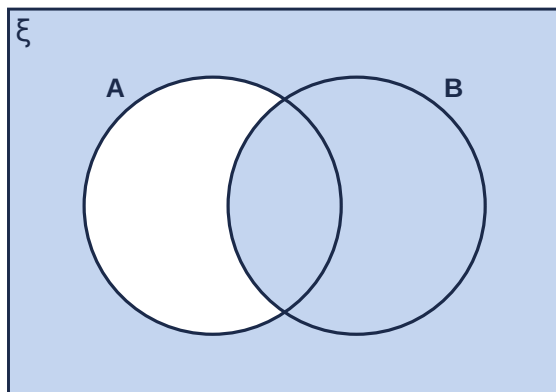


Q5

[1 mark]

Which of these describes the shaded region of the Venn diagram?

$(A \cap B)'$     $A \cup B$     $A' \cap B$     $A' \cup B$

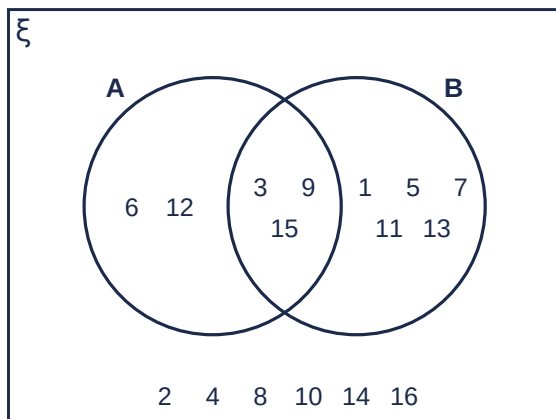


Q6

[2 marks]

$\xi = \{\text{whole numbers from 1 to 16}\}$ . A = multiples of 3, B = odd numbers.

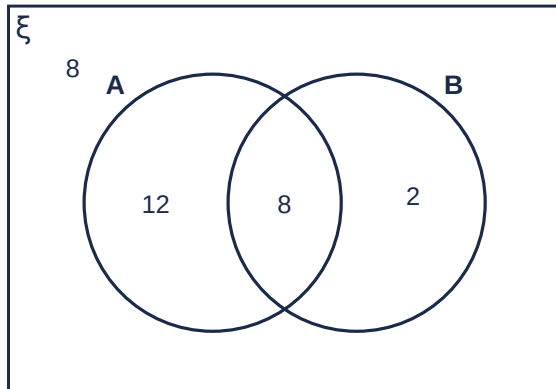
List the members of  $A' \cap B$ .



Q7

[1 mark]

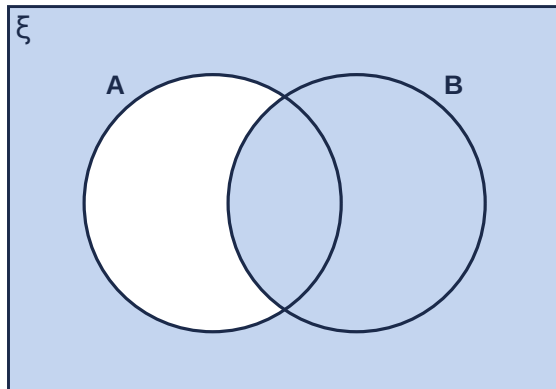
The Venn diagram shows the number of elements in sets A and B, and in  $\xi$ .  
Find  $n(A \cap B')$ .



Q8

[1 mark]

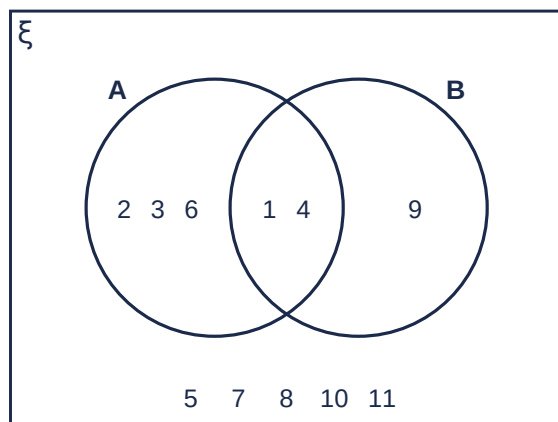
Which of these describes the shaded region of the Venn diagram?  
 $A' \cap B$     $A \cap B'$     $A' \cup B$     $A \cap B$



Q9

[2 marks]

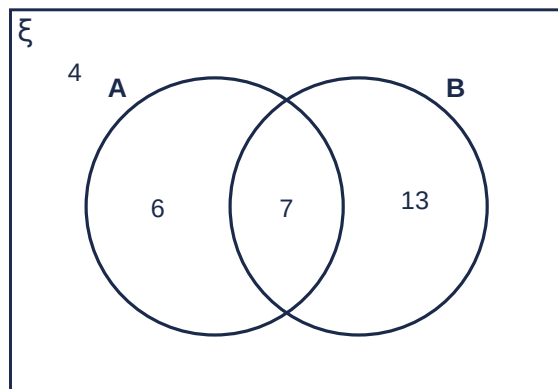
$\xi = \{\text{whole numbers from 1 to 11}\}$ .  $A = \text{factors of 12}$ ,  $B = \text{square numbers}$ .  
List the members of  $(A \cup B)'$ .



Q10

[1 mark]

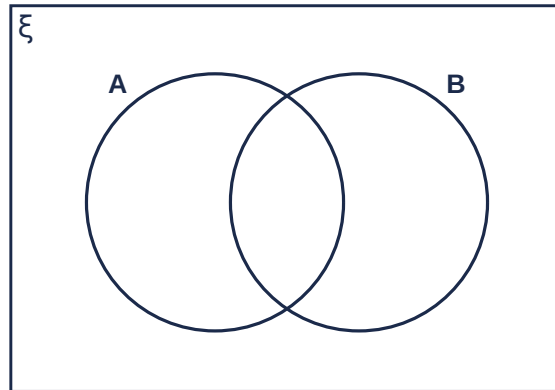
The Venn diagram shows the number of elements in sets  $A$  and  $B$ , and in  $\xi$ .  
Find  $n(A' \cap B)$ .



Q11

[2 marks]

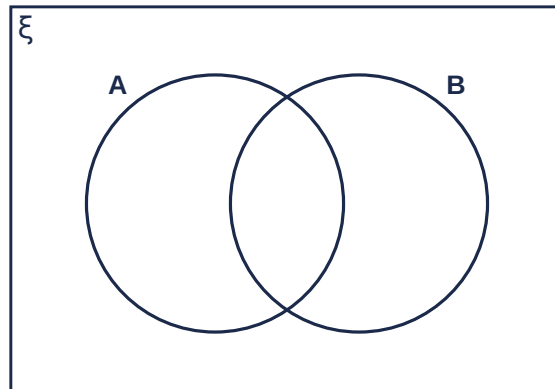
On the Venn diagram, shade the region  $A' \cup B$ .



Q12

[2 marks]

On the Venn diagram, shade the region  $(A \cup B)'$ .

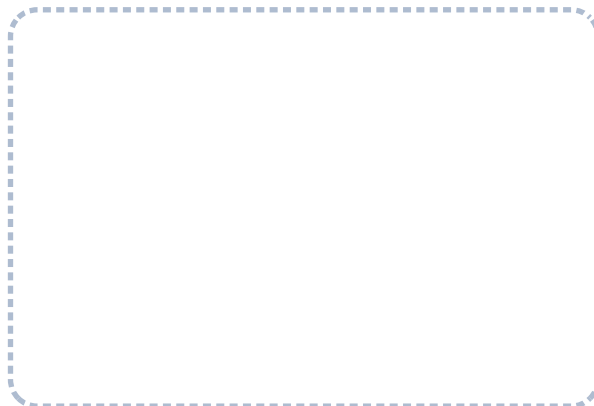
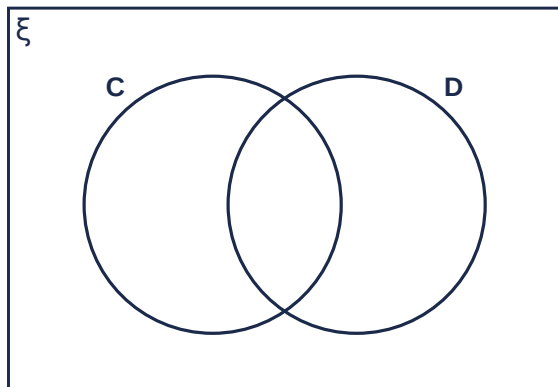


Q13

[4 marks]

There are 50 people in a group. 15 have a cat, 29 have a dog and 10 have a cat and a dog.

- (a) Complete the Venn diagram, where  $C$  = people who have a cat and  $D$  = people who have a dog.  
(b) One of the people is chosen at random. Given that they have a dog, work out the probability that they also have a cat.

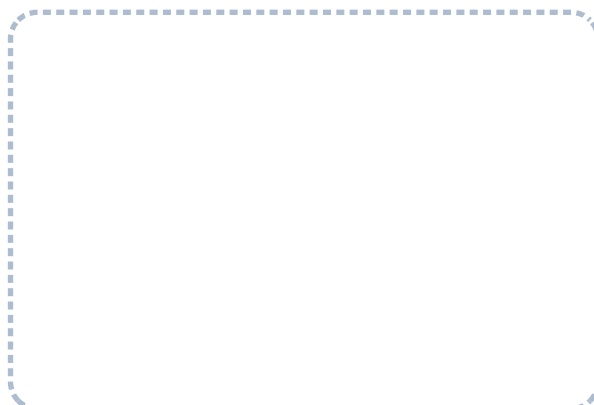
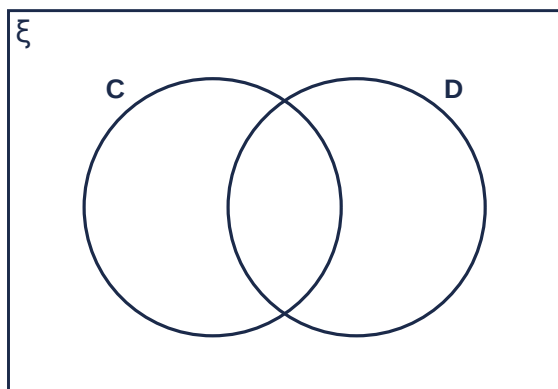


Q14

[4 marks]

There are 26 people in a group. 14 have a cat, 19 have a dog and 11 have a cat and a dog.

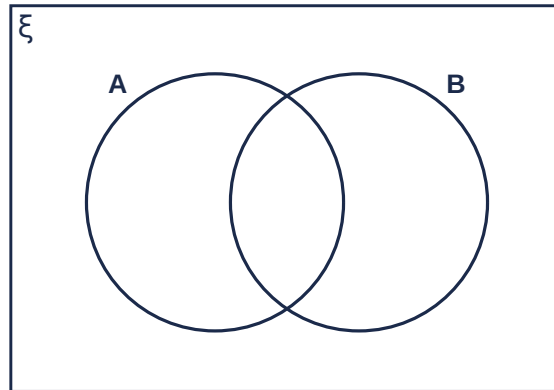
- (a) Complete the Venn diagram, where  $C$  = people who have a cat and  $D$  = people who have a dog.  
(b) One of the people is chosen at random. Given that they do not have a cat, work out the probability that they have a dog.



Q15

[2 marks]

On the Venn diagram, shade the region  $(A \cap B)'$ .



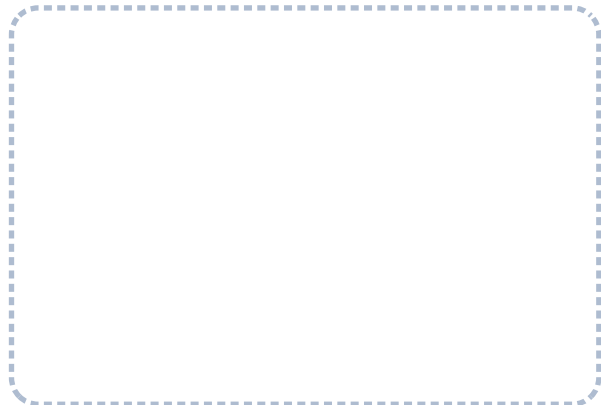
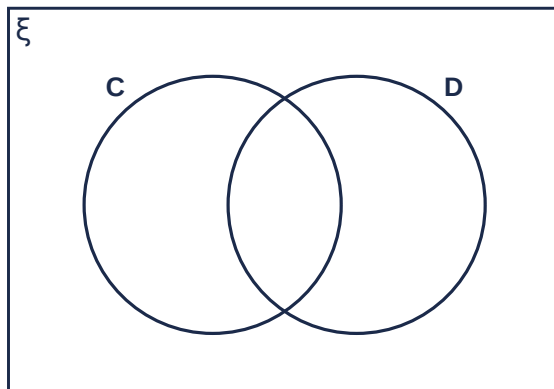
Q16

[4 marks]

There are 35 people in a group. 19 have a cat, 24 have a dog and 11 have a cat and a dog.

(a) Complete the Venn diagram, where C = people who have a cat and D = people who have a dog.

(b) One of the people is chosen at random. Given that they do not have a cat, work out the probability that they have a dog.



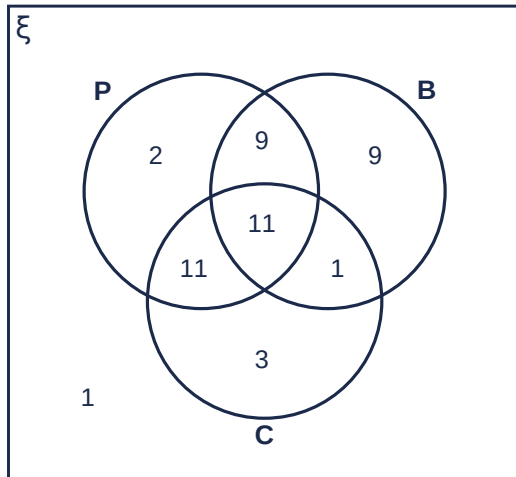
Q17

[2 marks]

47 people were asked whether they like pizza, burgers and curry. The Venn diagram shows the results.

P = pizza B = burgers C = curry

One of the people is chosen at random. Work out the probability that they like exactly two of these.



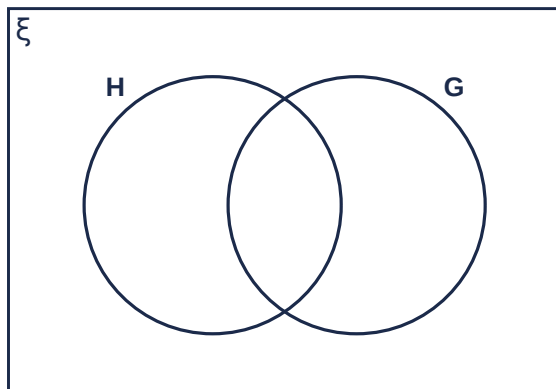
Q18

[4 marks]

There are 39 students in a group. 12 study History, 27 study Geography and 8 study History and Geography.

(a) Complete the Venn diagram, where H = students who study History and G = students who study Geography.

(b) One of the students is chosen at random. Given that they do not study History, work out the probability that they study Geography.



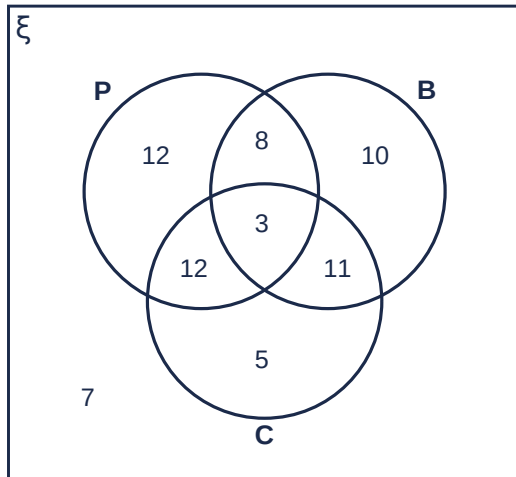
Q19

[2 marks]

68 people were asked whether they like pizza, burgers and curry. The Venn diagram shows the results.

P = pizza B = burgers C = curry

One of the people is chosen at random. Work out  $P((P \cup B \cup C)')$ .



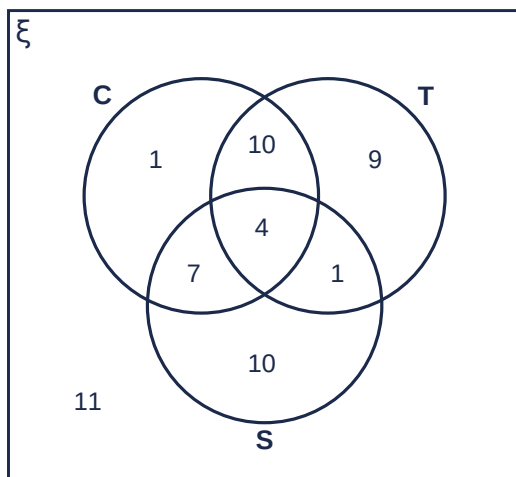
Q20

[2 marks]

53 club members were asked whether they do cricket, tennis and swimming. The Venn diagram shows the results.

C = cricket T = tennis S = swimming

One of the club members is chosen at random. Work out the probability that they do exactly two of these.



Q21

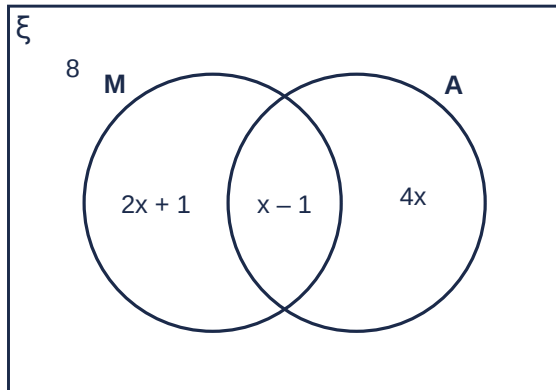
[5 marks]

The Venn diagram shows information about 29 students.

M = students who study Music    A = students who study Art

(a) Work out the value of  $x$ .

(b) One of the students who study Art is chosen at random. Work out the probability that they also study Music.



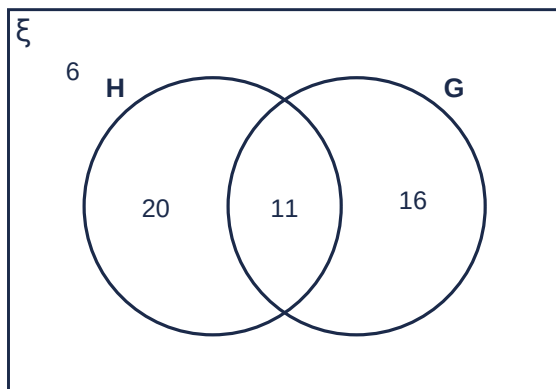
Q22

[3 marks]

The Venn diagram shows information about 53 students.

H = students who study History    G = students who study Geography

One of the students is chosen at random. Given that they study History or Geography (or both), work out the probability that they study History and Geography.



Q23

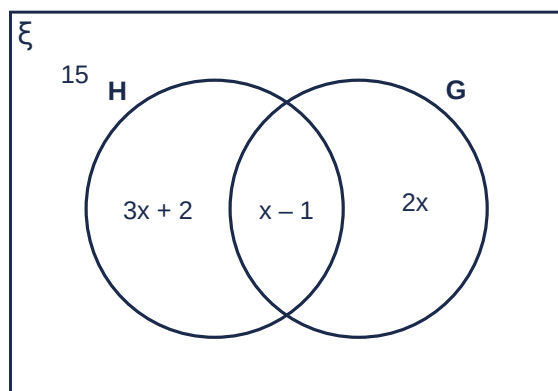
[5 marks]

The Venn diagram shows information about 40 students.

H = students who study History   G = students who study Geography

(a) Work out the value of  $x$ .

(b) One of the students who study Geography is chosen at random. Work out the probability that they also study History.



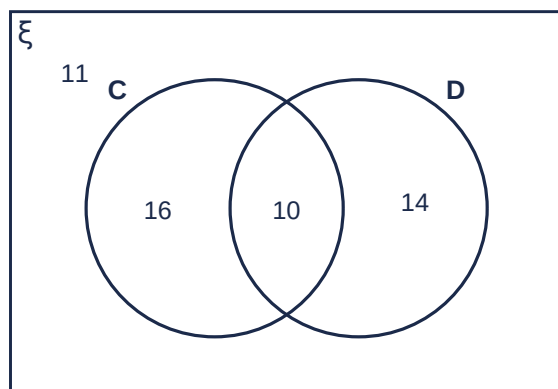
Q24

[3 marks]

The Venn diagram shows information about 51 people.

C = people who have a cat   D = people who have a dog

One of the people is chosen at random. Given that they do not have a cat, work out the probability that they have a dog.



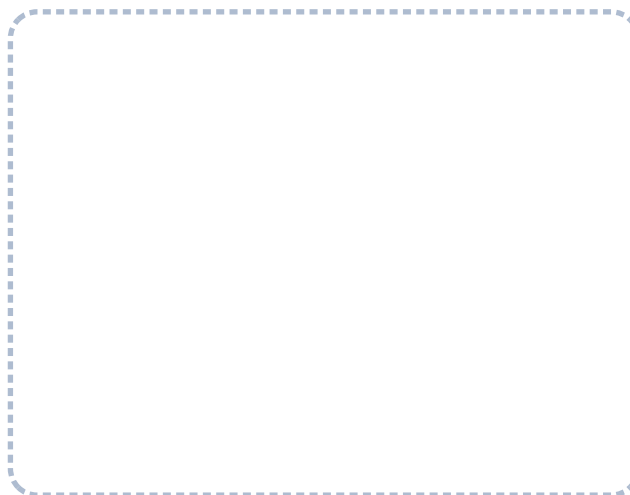
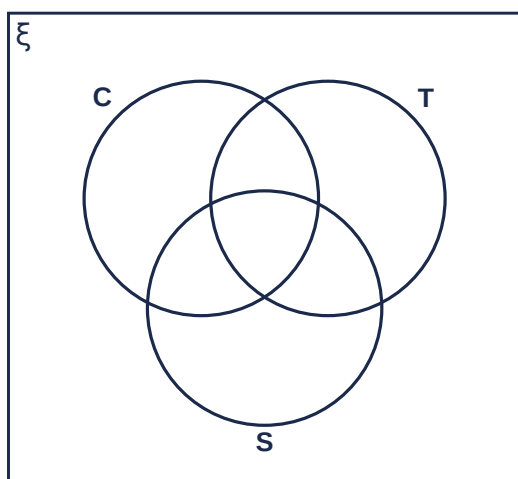
Q25

[5 marks]

41 club members were asked whether they do cricket (C), tennis (T) and swimming (S).  
 5 do all three. 9 do cricket and tennis. 9 do cricket and swimming. 10 do tennis and swimming.  
 (Each of these numbers includes the 5 who do all three.)  
 21 do cricket. 16 do tennis. 22 do swimming.

(a) Complete the Venn diagram.

(b) One of the club members is chosen at random. Work out the probability that they do exactly one of these.



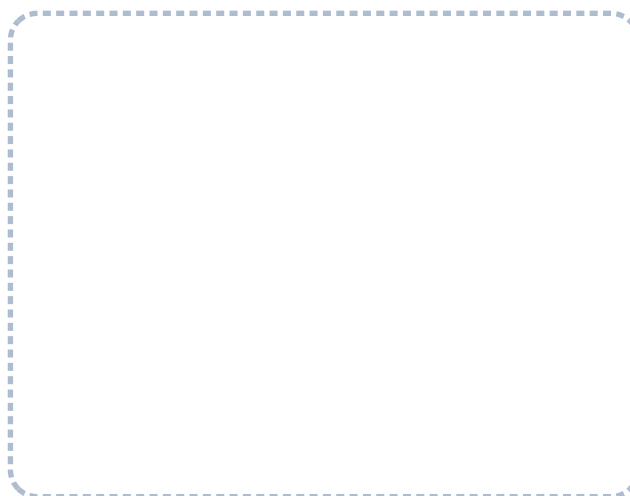
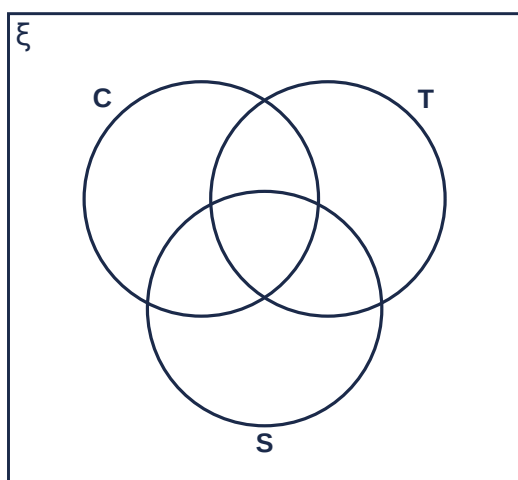
Q26

[5 marks]

41 club members were asked whether they do cricket (C), tennis (T) and swimming (S).  
 8 do all three. 16 do cricket and tennis. 16 do cricket and swimming. 14 do tennis and swimming.  
 (Each of these numbers includes the 8 who do all three.)  
 26 do cricket. 25 do tennis. 24 do swimming.

(a) Complete the Venn diagram.

(b) One of the club members is chosen at random. Work out the probability that they do none of these.



Q27

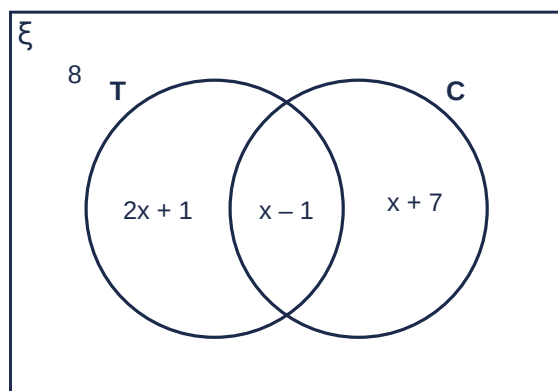
[5 marks]

The Venn diagram shows information about 47 office workers.

T = office workers who drink tea C = office workers who drink coffee

(a) Work out the value of  $x$ .

(b) One of the office workers who drink coffee is chosen at random. Work out the probability that they also drink tea.



Q28

[5 marks]

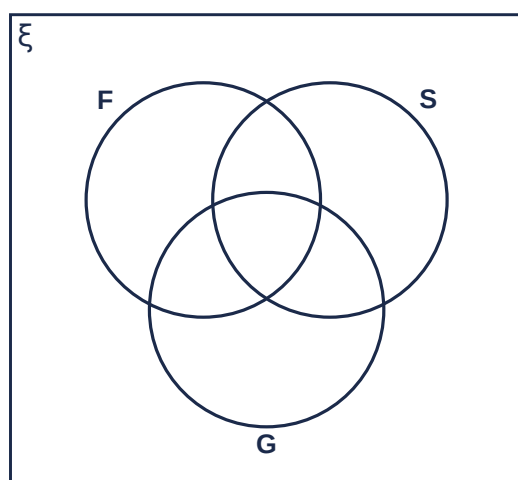
47 students were asked whether they study French (F), Spanish (S) and German (G).

9 study all three. 15 study French and Spanish. 16 study French and German. 16 study Spanish and German. (Each of these numbers includes the 9 who study all three.)

28 study French. 24 study Spanish. 27 study German.

(a) Complete the Venn diagram.

(b) One of the students is chosen at random. Work out the probability that they study exactly one of these.



Q29

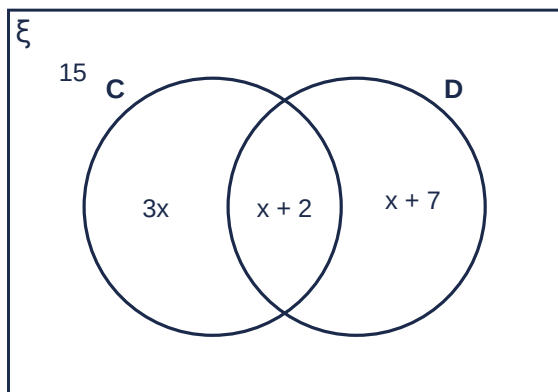
[5 marks]

The Venn diagram shows information about 69 people.

C = people who have a cat    D = people who have a dog

(a) Work out the value of  $x$ .

(b) One of the people who have a dog is chosen at random. Work out the probability that they also have a cat.



Q30

[3 marks]

The Venn diagram shows information about 30 people.

C = people who have a cat    D = people who have a dog

One of the people is chosen at random. Given that they have a cat or a dog (or both), work out the probability that they have a cat and a dog.

