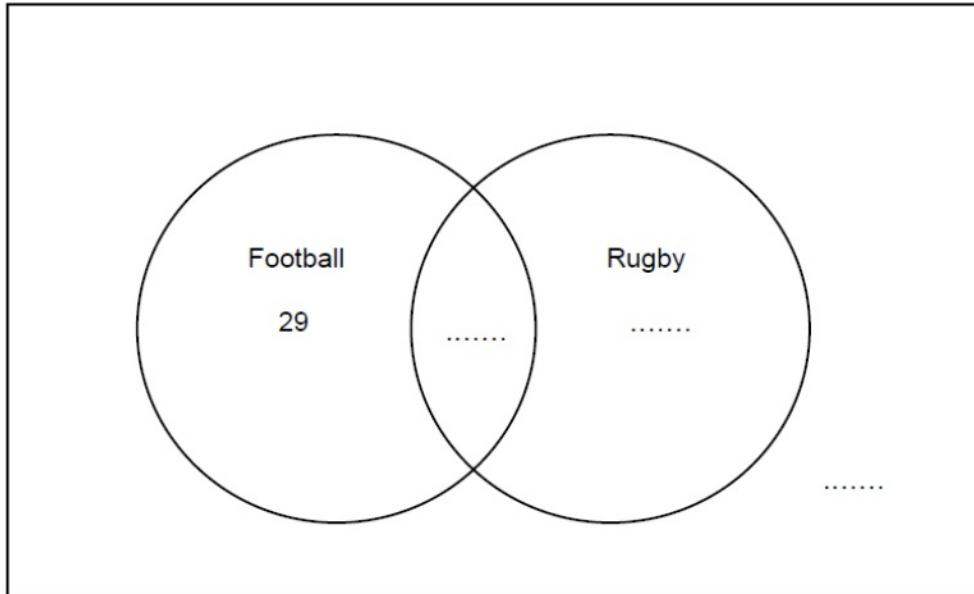


## P28/P29- Venn Diagrams

OCR

3 Here is a Venn diagram.

8



80 people were asked if they watch football or rugby.

[3]

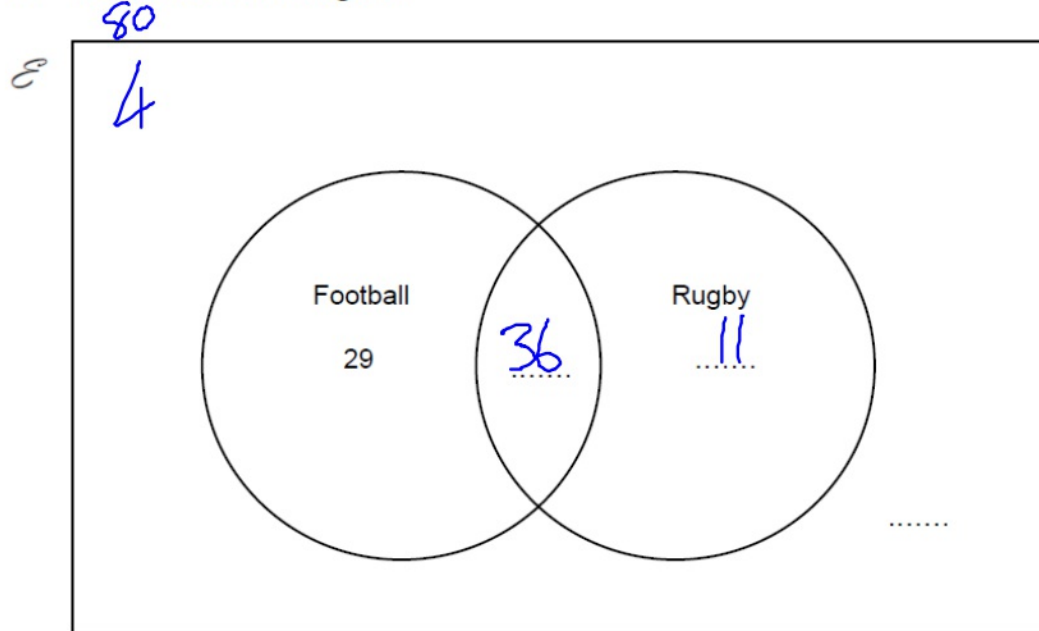
- 29 said they watch football, but not rugby.
- 65 said they watch football.
- 47 said they watch rugby.

(a) Complete the Venn diagram.

(b) What percentage of the people asked do **not** watch football or rugby?

(b).....% [2]

3 Here is a Venn diagram.



80 people were asked if they watch football or rugby.

- 29 said they watch football, but not rugby.
- 65 said they watch football. 76
- 47 said they watch rugby.

(a) Complete the Venn diagram.

(b) What percentage of the people asked do **not** watch football or rugby?

[3]

$$\frac{4}{80} = 0.05 \quad \downarrow \times 100$$

5%

(b).....5%.....% [2]

- 19 In a class of 34 students
- 12 study German
  - 25 study Spanish
  - 6 do not study either language.

One student in the class is selected at random.

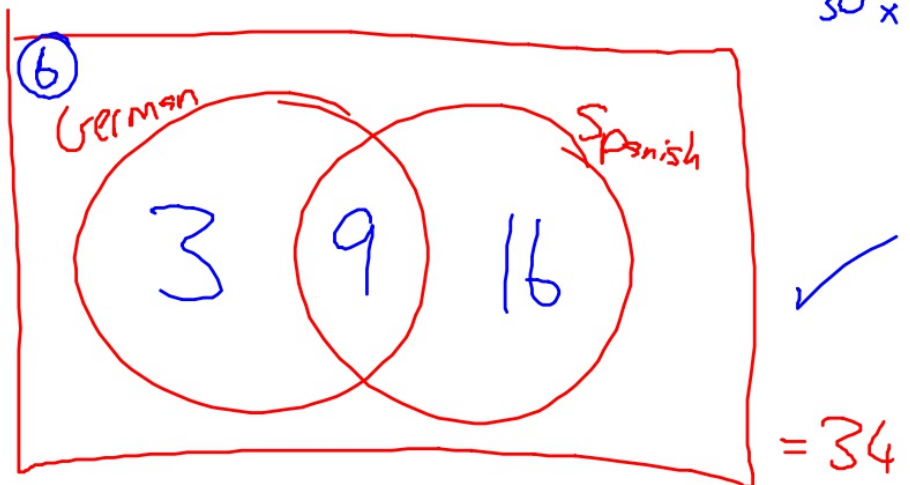
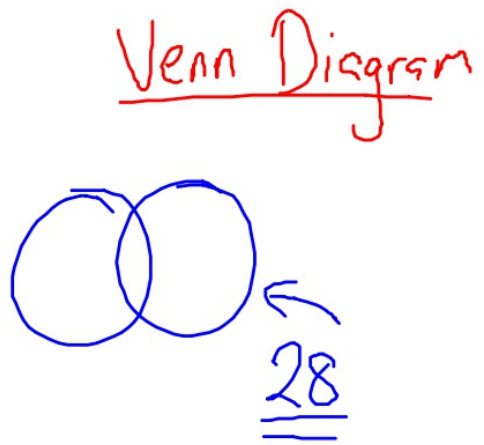
Find the probability that this student studies **both** languages.

..... [4]

- 19 In a class of 34 students
- 12 study German
  - 25 study Spanish
  - 6 do not study either language.

One student in the class is selected at random.

Find the probability that this student studies **both** languages.



32 x  
30 x

$$\frac{9}{34}$$

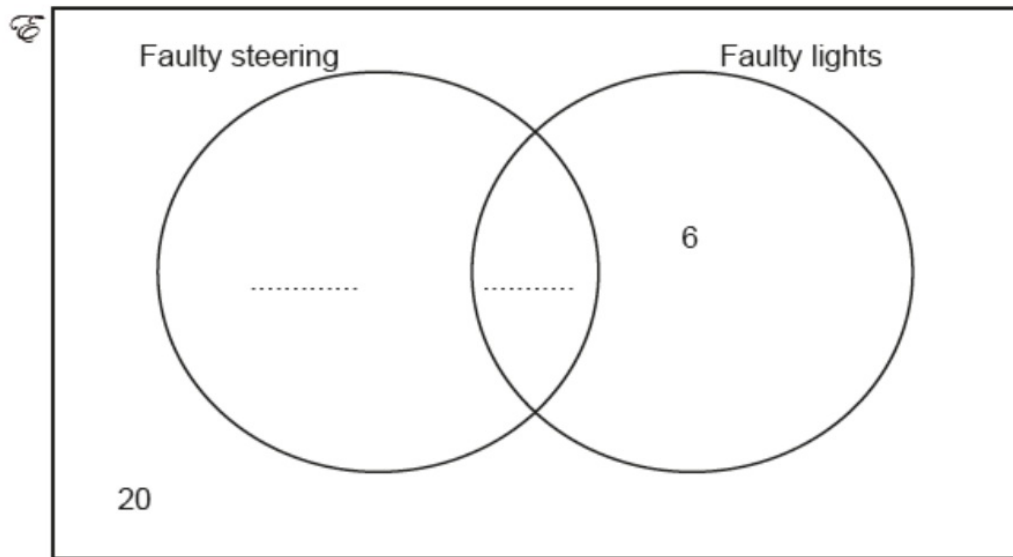
..... [4]

17 A mechanic tested the steering and lights of 50 cars.

Created by W Neill

- 20 cars did not have a fault.
- 6 cars had **only** faulty lights.
- 8 cars had both faults.

(a) Using this information, complete the Venn diagram below.



[2]

(b) A car is chosen at random from the cars that had faulty lights.

What is the probability that this car also had faulty steering?

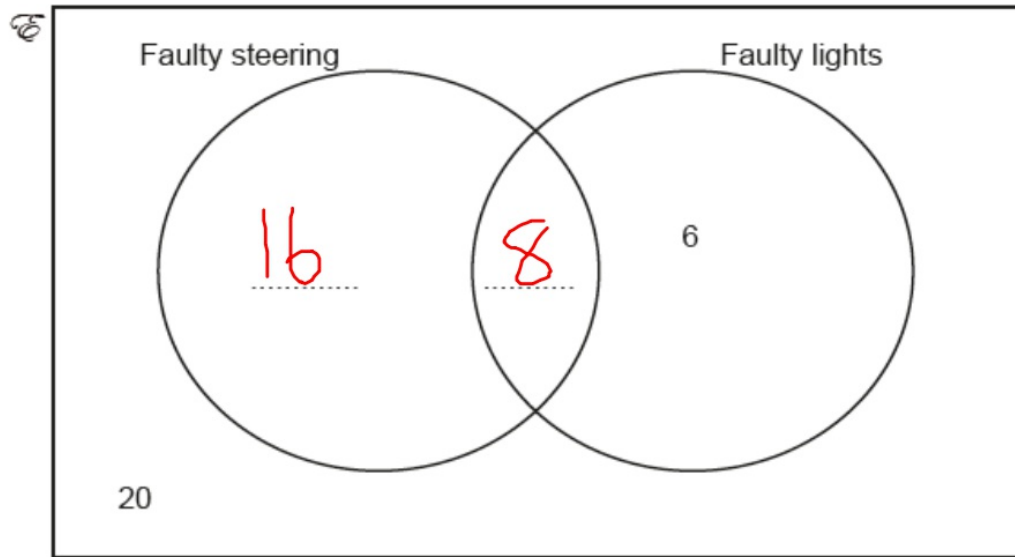
(b) ..... [2]

17 A mechanic tested the steering and lights of 50 cars.

Created by W Neill

- 20 cars did not have a fault.
- 6 cars had **only** faulty lights.
- 8 cars had both faults.

(a) Using this information, complete the Venn diagram below.



= 50

[2]

(b) A car is chosen at random from the cars that had faulty lights.

What is the probability that this car also had faulty steering?

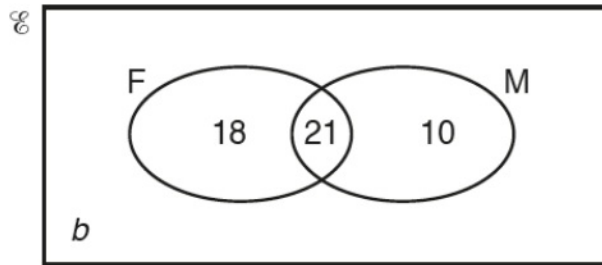
$$\frac{8}{14}$$

(b) ..... [2]



- (b) The Venn diagram shows the number of students who passed their examination in French (F) and those who passed their examination in Mathematics (M). The number of students who did not pass either examination is  $b$ .

Video created by W Neill



- (i) Find the value of  $b$  if the total number of students is 55.

(b)(i)  $b = \dots\dots\dots$  [1]

One of the 55 students is selected at random.

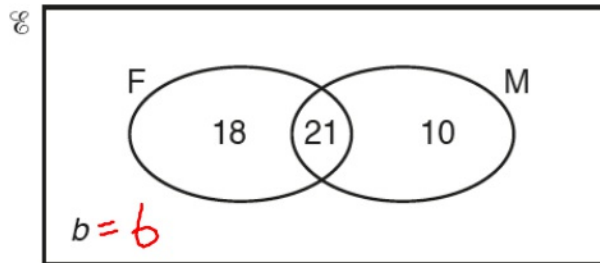
What is the probability that this student

- (ii) passed both French and Mathematics,

- (iii) passed exactly one of these two subjects?

- (b) The Venn diagram shows the number of students who passed their examination in French (F) and those who passed their examination in Mathematics (M). The number of students who did not pass either examination is  $b$ .

Video created by W Neill



$$\begin{array}{r} 21 \\ 18 \\ + 10 \\ \hline 49 \end{array}$$

- (i) Find the value of  $b$  if the total number of students is 55.

(b)(i)  $b = \dots\dots\dots 6 \dots\dots\dots$  [1]

One of the 55 students is selected at random.

What is the probability that this student

- (ii) passed both French and Mathematics,

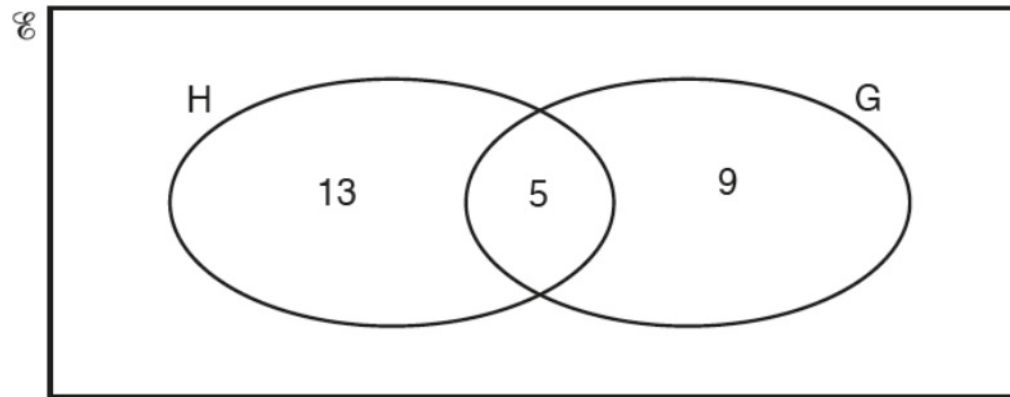
$$\frac{21}{55}$$

- (iii) passed exactly one of these two subjects?

$$\frac{28}{55}$$

10 (a) This Venn diagram shows the number of students in a Year 10 tutor group who study History (H) and Geography (G).

P28



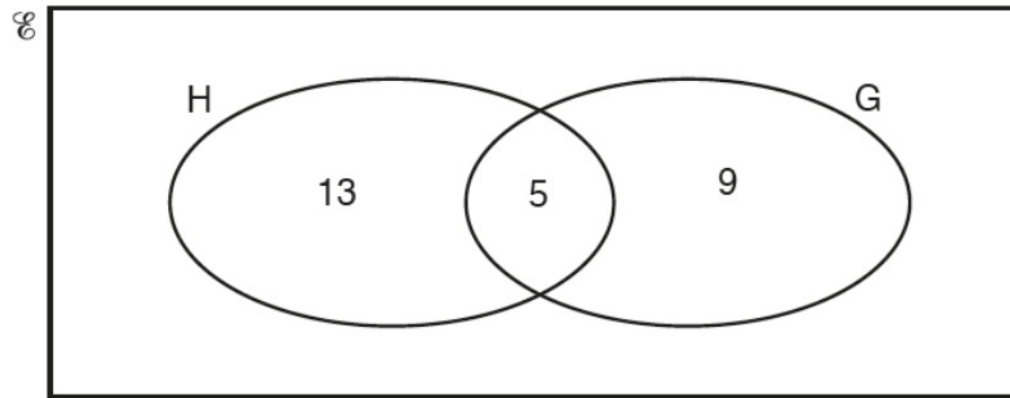
There are 29 students in the tutor group.

(i) How many students in the tutor group do not study History or Geography?

(a)(i) ..... [2]

10 (a) This Venn diagram shows the number of students in a Year 10 tutor group who study History (H) and Geography (G).

P28



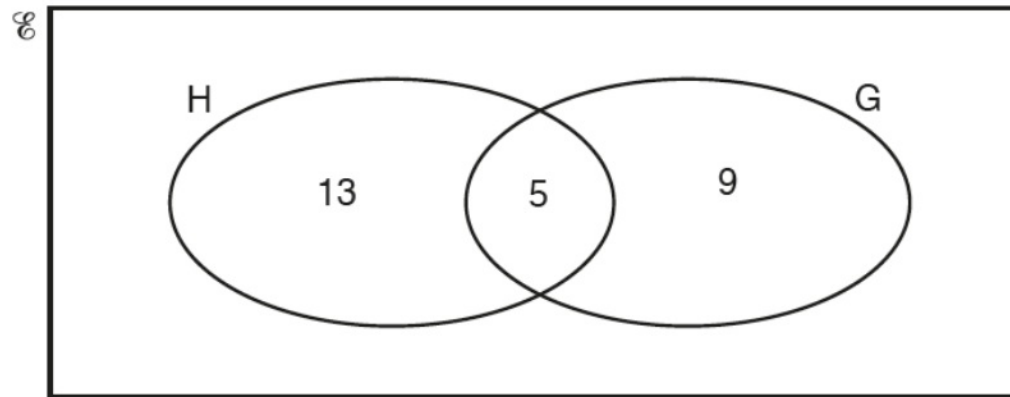
27

There are 29 students in the tutor group.

(i) How many students in the tutor group do not study History or Geography?

(a)(i) ..... 2 ..... [2]

10 (a) This Venn diagram shows the number of students in a Year 10 tutor group who study History (H) and Geography (G).

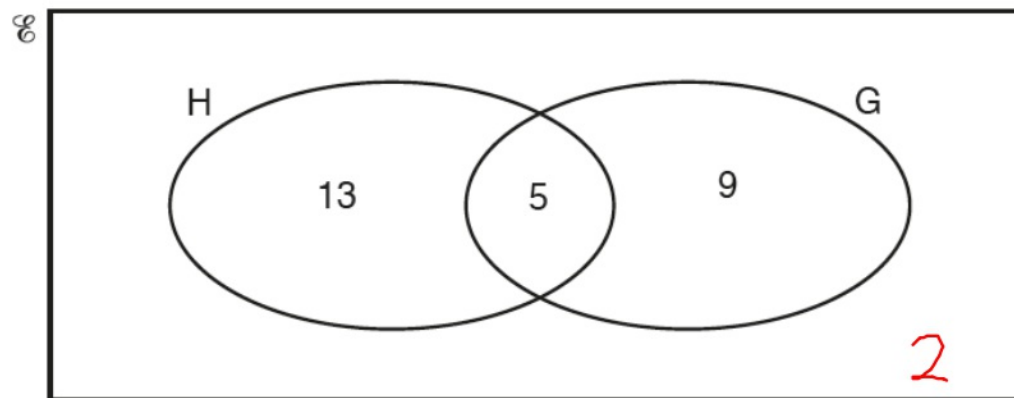


(ii) How many students in the tutor group study History?

P28

(ii) ..... [1]

- 10 (a) This Venn diagram shows the number of students in a Year 10 tutor group who study History (H) and Geography (G).



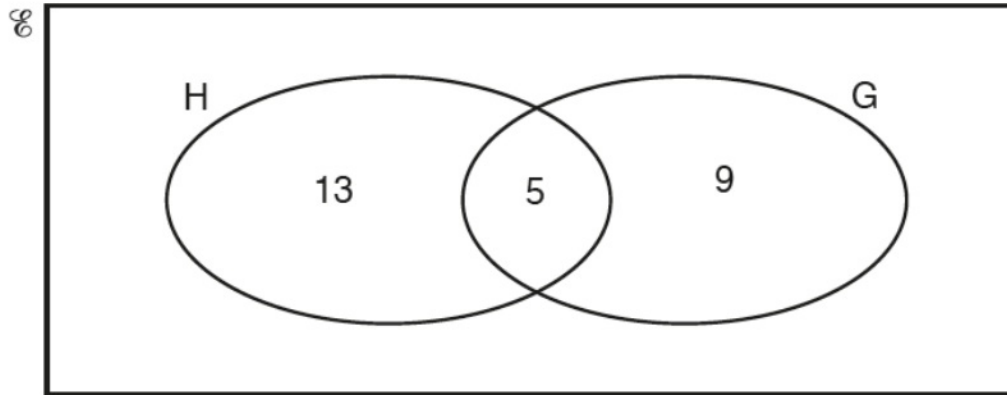
$$13 + 5 = 18$$

- (ii) How many students in the tutor group study History?

P28

(ii) ..... 18 ..... [1]

10 (a) This Venn diagram shows the number of students in a Year 10 tutor group who study History (H) and Geography (G).



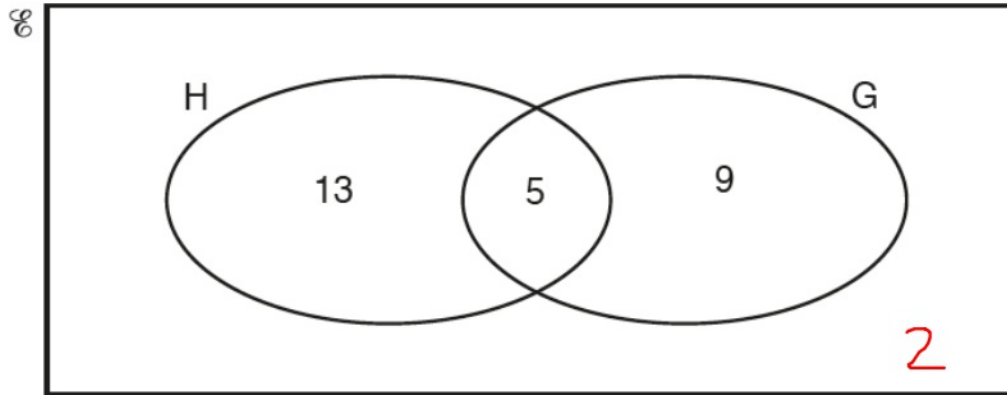
(iii) One of the 29 students is selected at random.

p28

What is the probability that they study Geography but do not study History?

(iii) ..... [1]

10 (a) This Venn diagram shows the number of students in a Year 10 tutor group who study History (H) and Geography (G).



(iii) One of the 29 students is selected at random.

p28 What is the probability that they study Geography but do not study History?

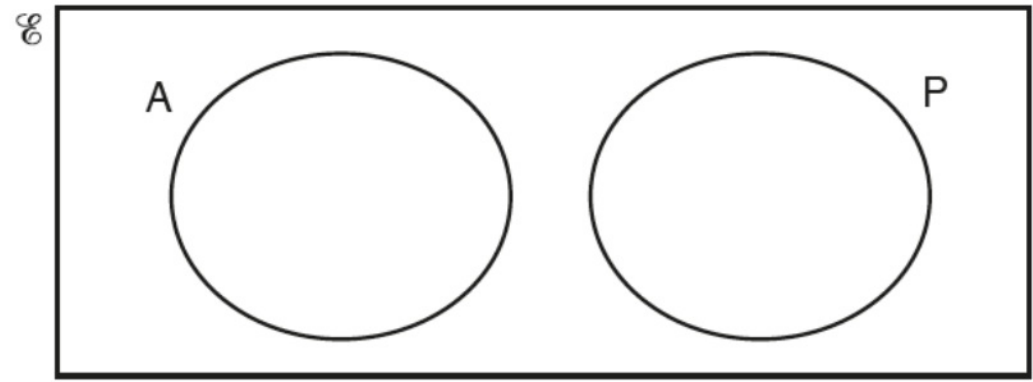
$$\frac{9}{29}$$

(iii) ..... [1]



(b) This diagram represents students in a tutor group who study Art (A) and Physics (P).

p28

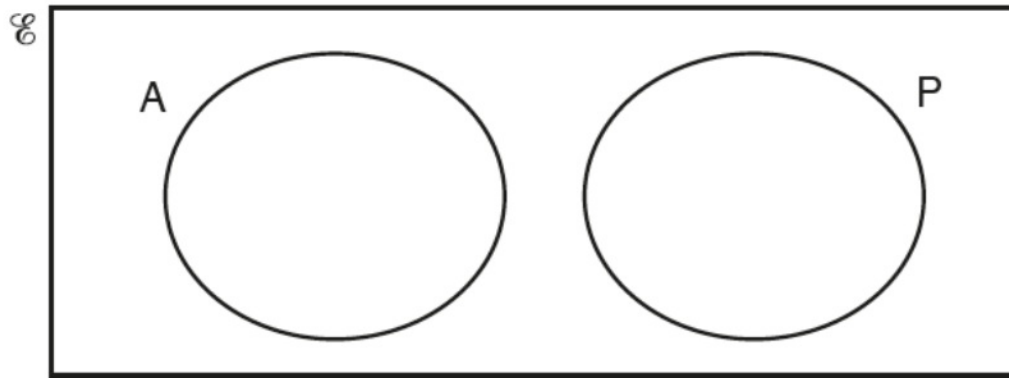


How many students study both Art and Physics?

(b) ..... [1]

(b) This diagram represents students in a tutor group who study Art (A) and Physics (P).

p28



How many students study both Art and Physics?

(b) ..... [1]

because they don't overlap

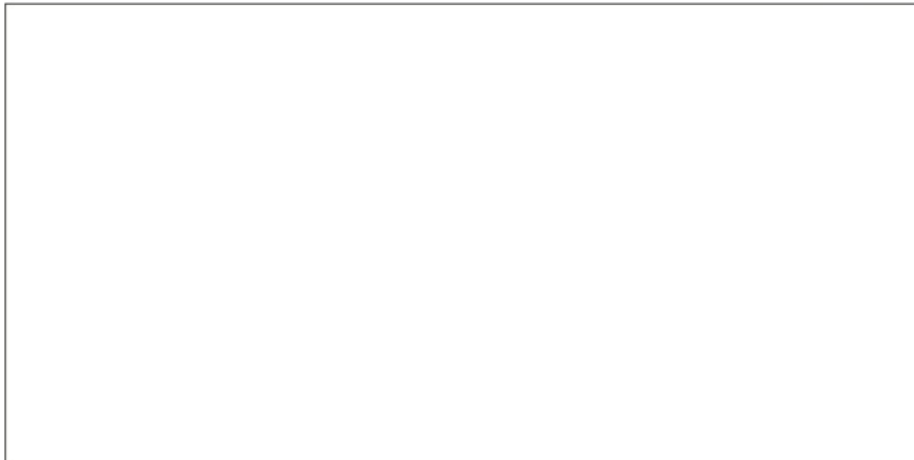
**27** 72 children are asked whether they have a laptop or an iPad.

**P28**

- 31 have a laptop.
- 48 have an iPad.
- 12 have both.
- 5 have neither.

**(a)** Represent this information on a Venn diagram. **[3]**

∅



**(b)** One of the children is chosen at random.

Write down the probability that they have an iPad but not a laptop.

**(b)** ..... **[2]**

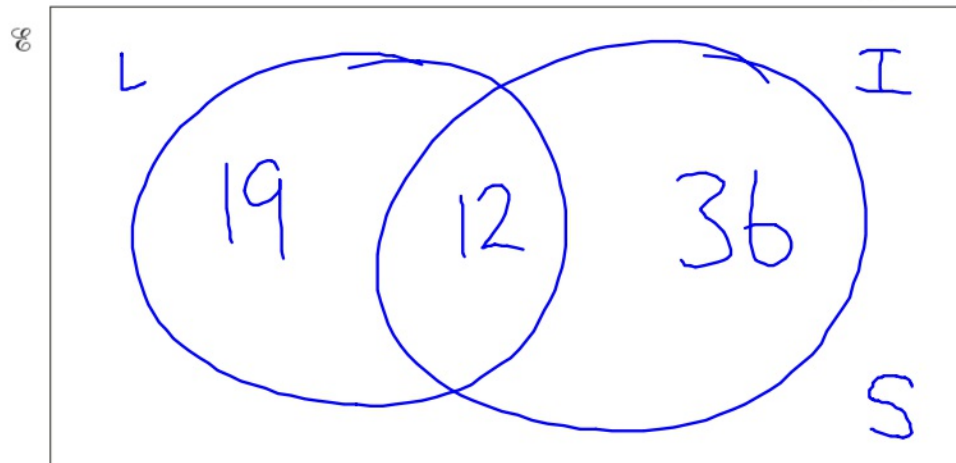
27 72 children are asked whether they have a laptop or an iPad.

P28

- 31 have a laptop. ✓
- 48 have an iPad. ✓
- 12 have both. ✓
- 5 have neither. ✓

Laptop only  $31 - 12$   
 Ipsd only  $48 - 12$

(a) Represent this information on a Venn diagram. [3]



(b) One of the children is chosen at random.

Write down the probability that they have an iPad but not a laptop.

$$\frac{36}{72}$$

(b) ..... [2]

Video created by W Neill

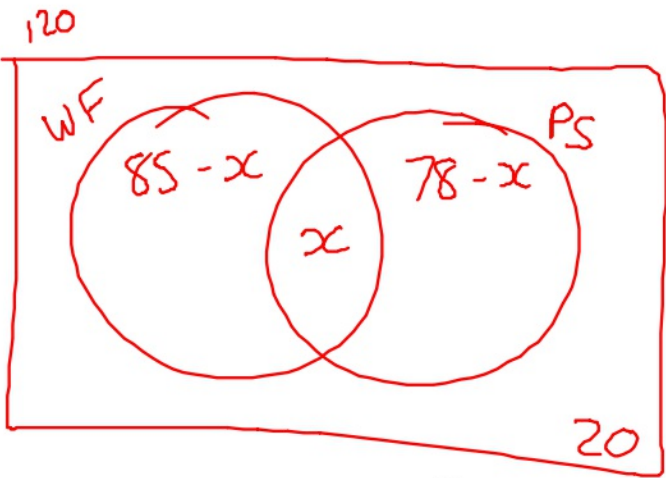
**18** In a group of 120 adults, 85 watch football, 78 play a sport and 20 do neither.

Find the probability that an adult chosen at random from those who watch football does not play a sport.

..... [5]

18 In a group of 120 adults, 85 watch football, 78 play a sport and 20 do neither.

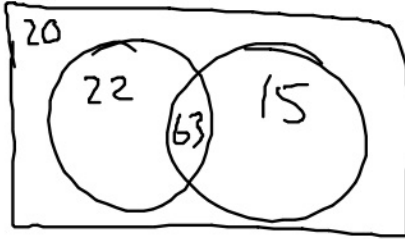
P28 Find the probability that an adult chosen at random from those who watch football does not play a sport.



$$\begin{array}{r} 85 \\ + 78 \\ \hline 163 \end{array}$$

$$\begin{aligned} 85 - x + x + 78 - x &= 100 \\ 163 - x &= 100 \end{aligned}$$

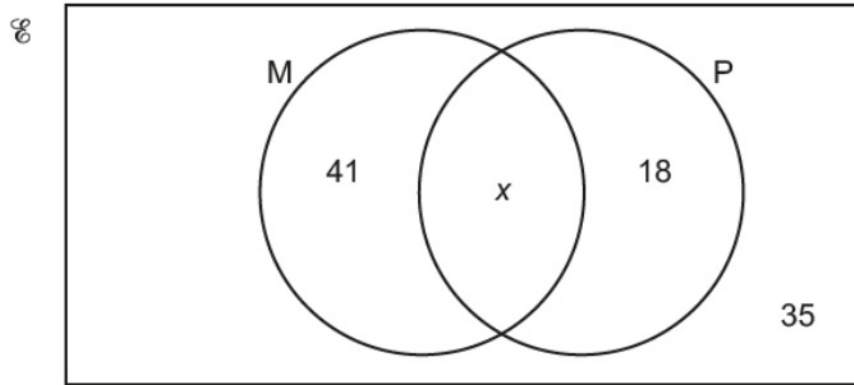
$$x = 63$$



$$\begin{array}{r} 22 \\ \hline 85 \end{array}$$

[5]

- 14 The Venn diagram shows the number of students studying Mathematics (M) and the number of students studying Physics (P) in a college. 35 students do not study either subject. Created by W Neill



- (a) The total number of students is 121.

Find the value of  $x$ .

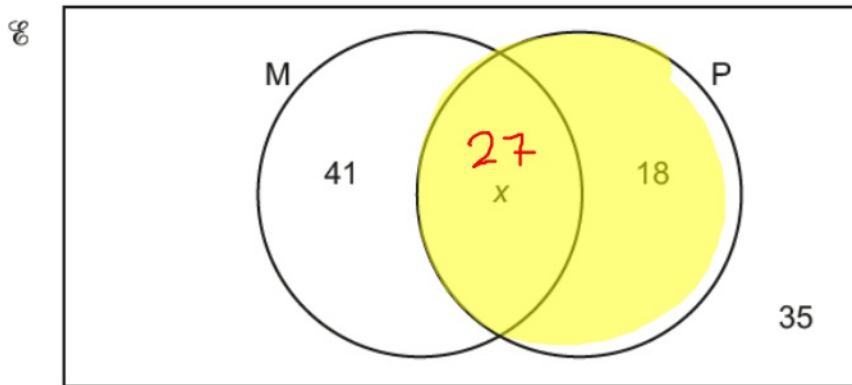
(a)  $x = \dots\dots\dots$  [1]

- (b) One of the 121 students is selected at random.

Find the probability that this student studies Mathematics, given that they study Physics.

- 14 The Venn diagram shows the number of students studying Mathematics (M) and the number of students studying Physics (P) in a college.  
35 students do not study either subject.

Created by W Neill



- (a) The total number of students is 121.

$$121 -$$

Find the value of  $x$ .

(a)  $x = \dots\dots\dots 27 \dots\dots\dots [1]$

- (b) One of the 121 students is selected at random.

Find the probability that this student studies Mathematics, given that they study Physics.

$$27 + 18 = 45$$

$$\frac{27}{45}$$

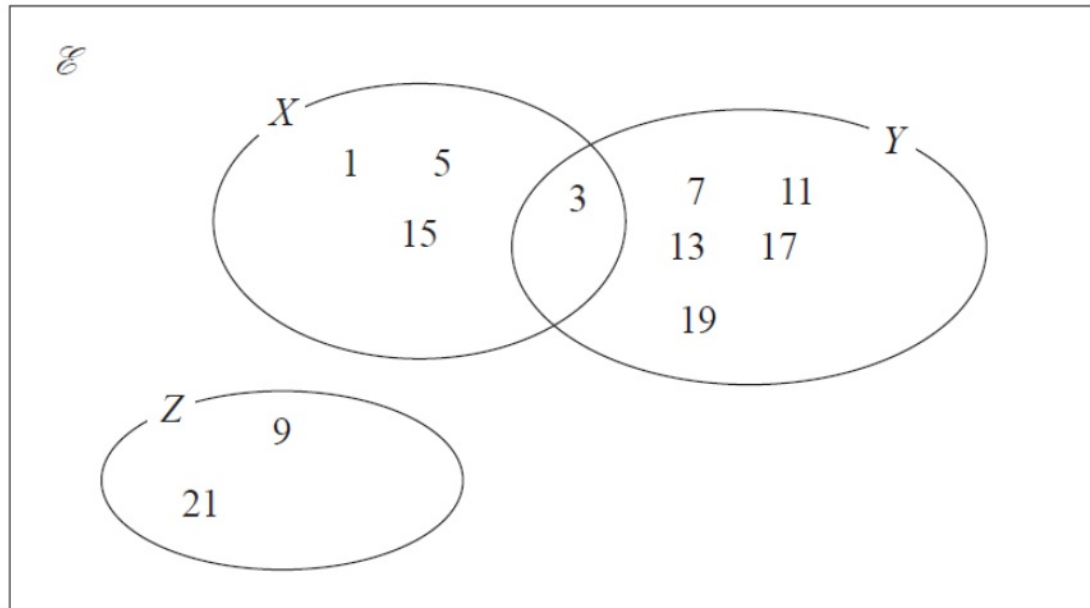


Edexcel

20 Here is a Venn diagram.

Video created by W Neill

P28/29



(a) List the members of

(i)  $X$

(ii)  $X \cap Y$

(iii)  $X \cup Z$

.....  
(1)

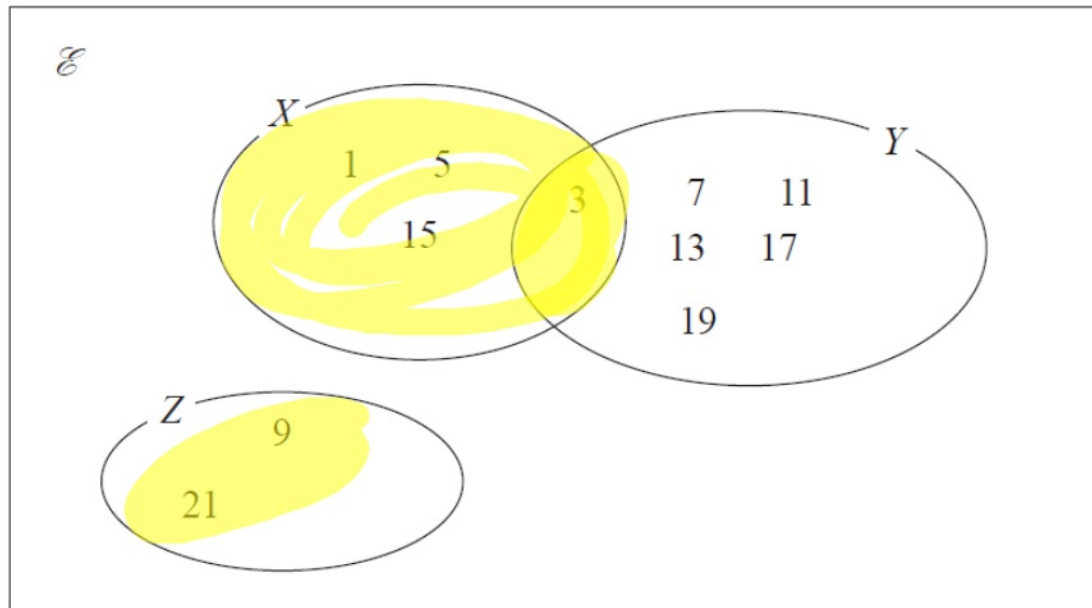
.....  
(1)

.....  
(1)

20 Here is a Venn diagram.

Video created by W Neill

P28/29



(a) List the members of

(i)  $X$

1, 5, 15, 3  
-----  
(1)

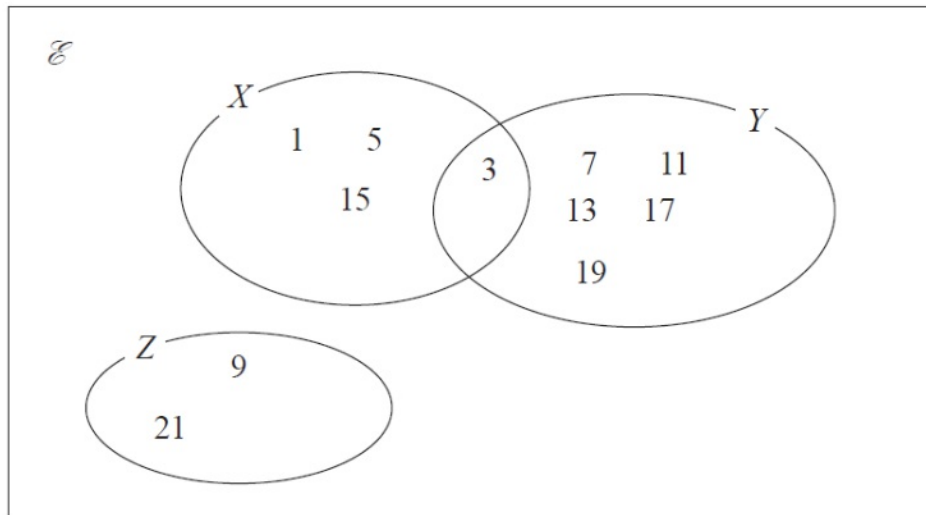
(ii)  $X \cap Y$

3  
-----  
(1)

(iii)  $X \cup Z$

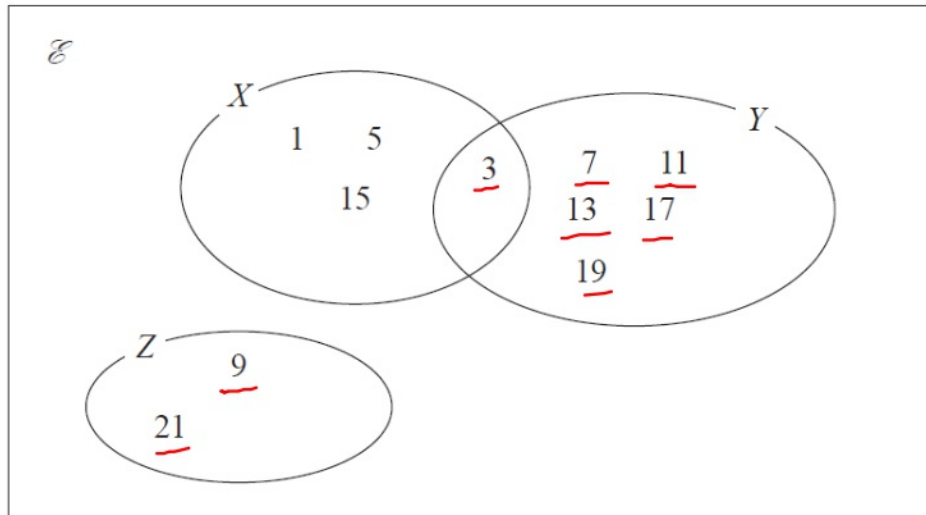
with (union)

1, 5, 3, 15, 9, 21  
-----  
(1)



A number is chosen at random from  $\mathcal{E}$ .

(b) Find the probability that this number is in  $Y \cup Z$ .



A number is chosen at random from  $\mathcal{E}$ .

(b) Find the probability that this number is in  $Y \cup Z$ .

$Y \cup Z \leftarrow$

$\frac{8}{11}$

Total  $\leftarrow$   $\frac{8}{11}$  ✓

(2)

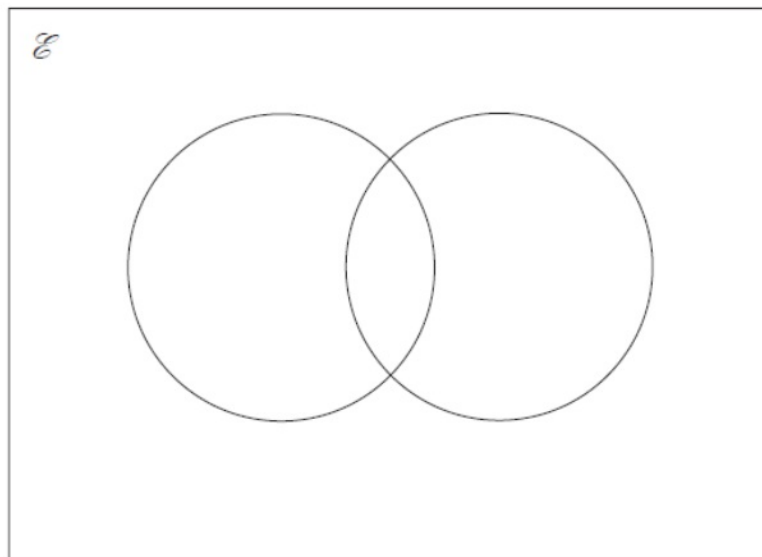
15  $\mathcal{E} = \{\text{odd numbers less than 30}\}$

$A = \{3, 9, 15, 21, 27\}$

$B = \{5, 15, 25\}$

Video created by W Neill

(a) Complete the Venn diagram to represent this information.



A number is chosen at random from the universal set,  $\mathcal{E}$ .

(b) What is the probability that the number is in the set  $A \cup B$ ?

15  $\mathcal{E} = \{\text{odd numbers less than 30}\}$

$A = \{3, 9, 15, 21, 27\}$  ✓

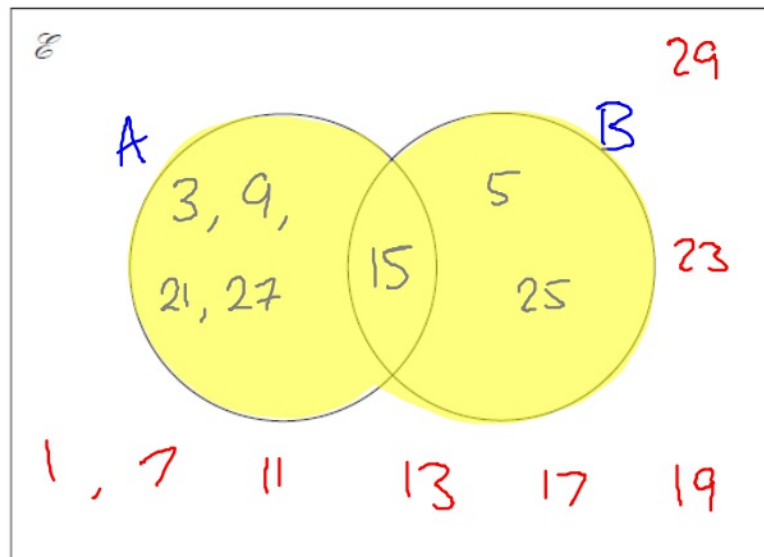
$B = \{5, 15, 25\}$

1 ~~3~~ ~~5~~ 7 ~~9~~ 11 13 ~~15~~ 17 19 ~~21~~

Video created by W Neill

23 ~~25~~ ~~27~~ 29

(a) Complete the Venn diagram to represent this information.



A number is chosen at random from the universal set,  $\mathcal{E}$ .

(b) What is the probability that the number is in the set  $A \cup B$ ?

all of A and B

$$\frac{7}{15} \checkmark$$

**18**  $A = \{\text{multiples of 5 between 14 and 26}\}$

P29  $B = \{\text{odd numbers between 14 and 26}\}$

(a) List the members of  $A \cup B$

.....  
(2)

(b) Describe the members of  $A \cap B$

.....  
(1)



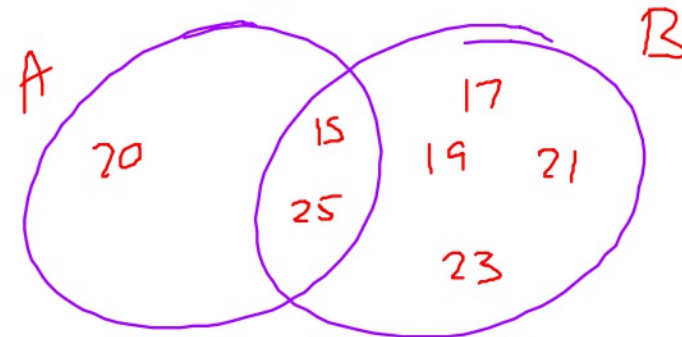
18  $A = \{\text{multiples of 5 between 14 and 26}\}$

15, 20, 25

P29  $B = \{\text{odd numbers between 14 and 26}\}$

15, 17, 19, 21, 23, 25

(a) List the members of  $A \cup B$



15, 17, 19, 21, 23, 25, 20

(2)

(b) Describe the members of  $A \cap B$

Numbers that are in both sets

15 and 25

(1)

20  $\mathcal{E} = \{\text{even numbers between 1 and 25}\}$

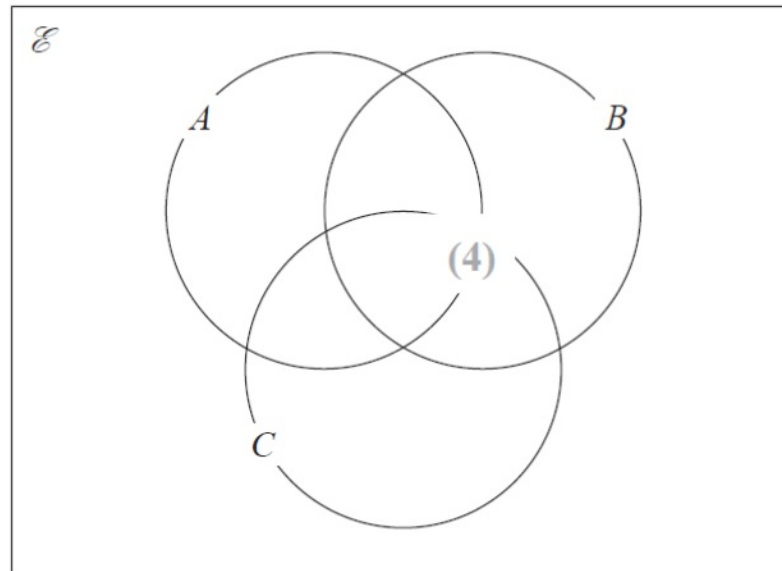
$A = \{2, 8, 10, 14\}$

$B = \{6, 8, 20\}$

$C = \{8, 18, 20, 22\}$

(a) Complete the Venn diagram for this information.

P28



A number is chosen at random from  $\mathcal{E}$ .

(b) Find the probability that the number is a member of  $A \cap B$ .

.....

(2)

P29

20  $\mathcal{E} = \{\text{even numbers between 1 and 25}\}$

$A = \{2, 8, 10, 14\}$

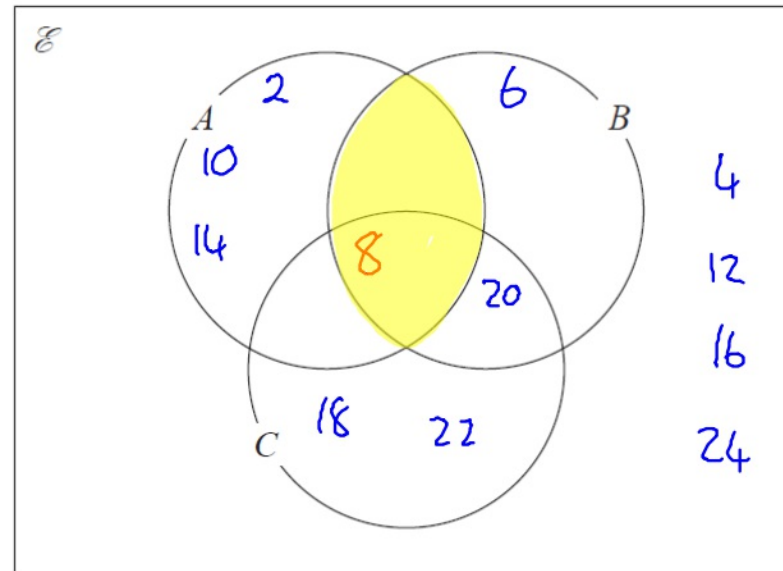
$B = \{6, 8, 20\}$

$C = \{8, 18, 20, 22\}$

~~2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24~~

(a) Complete the Venn diagram for this information. (4)

P28



A number is chosen at random from  $\mathcal{E}$ .

(b) Find the probability that the number is a member of  $A \cap B$ .

P29

$$\frac{1}{12} \checkmark$$

(2)

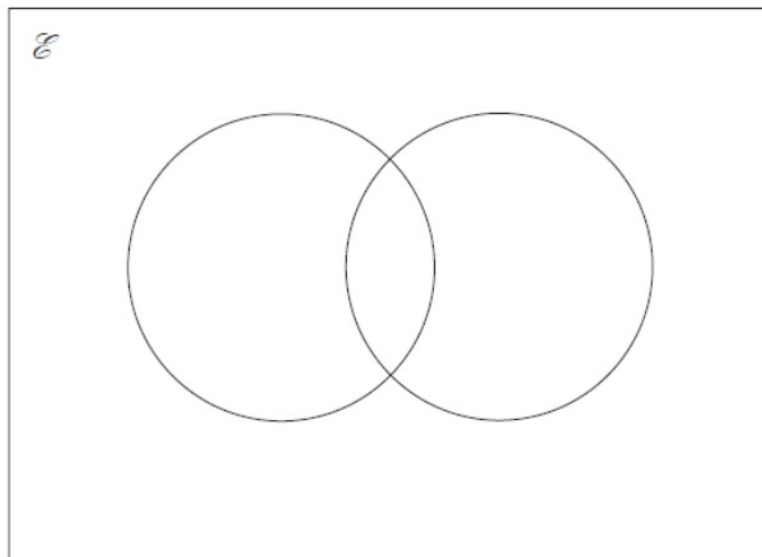
1  $\mathcal{E} = \{\text{odd numbers less than 30}\}$

$A = \{3, 9, 15, 21, 27\}$

$B = \{5, 15, 25\}$

Video created by W Neill

(a) Complete the Venn diagram to represent this information.



A number is chosen at random from the universal set,  $\mathcal{E}$ .

(b) What is the probability that the number is in the set  $A \cup B$ ?

Video created by W Neill

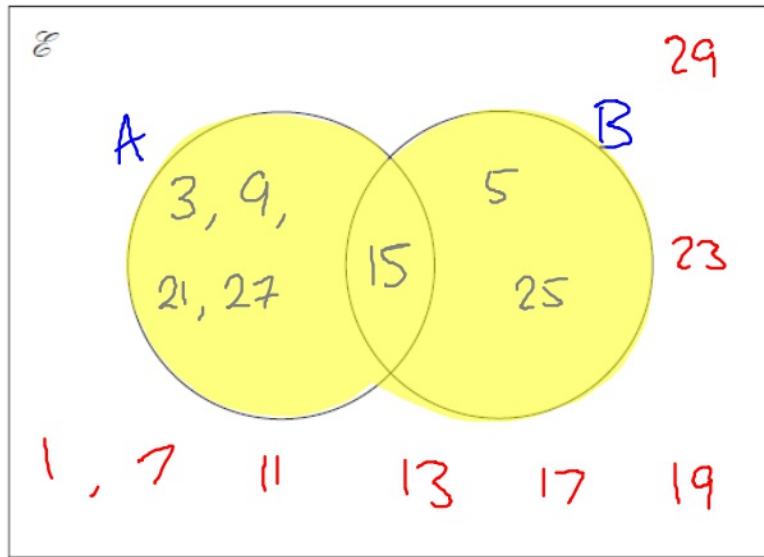
1  $\mathcal{E} = \{\text{odd numbers less than 30}\}$

$A = \{3, 9, 15, 21, 27\}$  ✓

$B = \{5, 15, 25\}$

1 ~~3~~ ~~5~~ 7 ~~9~~ 11 13 ~~15~~ 17 19 ~~21~~ 23 ~~25~~ ~~27~~ 29

(a) Complete the Venn diagram to represent this information.



A number is chosen at random from the universal set,  $\mathcal{E}$ .

(b) What is the probability that the number is in the set  $A \cup B$ ?

all of A and B

$\frac{7}{15}$  ✓

20 50 people were asked if they speak French or German or Spanish.

Of these people,

- P28 31 speak French
- 2 speak French, German and Spanish
- P31 4 speak French and Spanish but not German
- 7 speak German and Spanish
- 8 do not speak any of the languages
- all 10 people who speak German speak at least one other language

Two of the 50 people are chosen at random.

Work out the probability that they both only speak Spanish.

.....  
**(Total for Question 20 is 5 marks)**

20 50 people were asked if they speak French or German or Spanish.

Video created by W Neill

Of these people,

31 speak French

P28 ~~2 speak French, German and Spanish~~ ✓

~~4 speak French and Spanish but not German~~ ✓

P31 ~~7 speak German and Spanish~~ ✓

~~8 do not speak any of the languages~~

~~all 10 people who speak German speak at least one other language~~

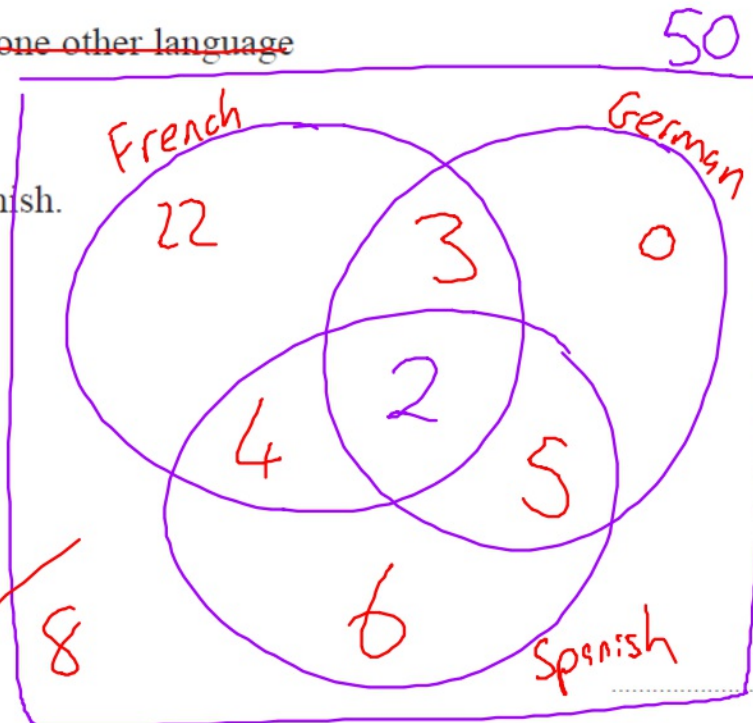
$$31 - 9 = 22$$

Two of the 50 people are chosen at random.

Work out the probability that they both only speak Spanish.

Pick 1 and Pick 2nd

$$\frac{6}{50} \times \frac{5}{49} = \frac{3}{245}$$



(Total for Question 20 is 5 marks)

AQA



20

In a tennis tournament,

Video created by W Neill

P28

98 players took part in the singles only

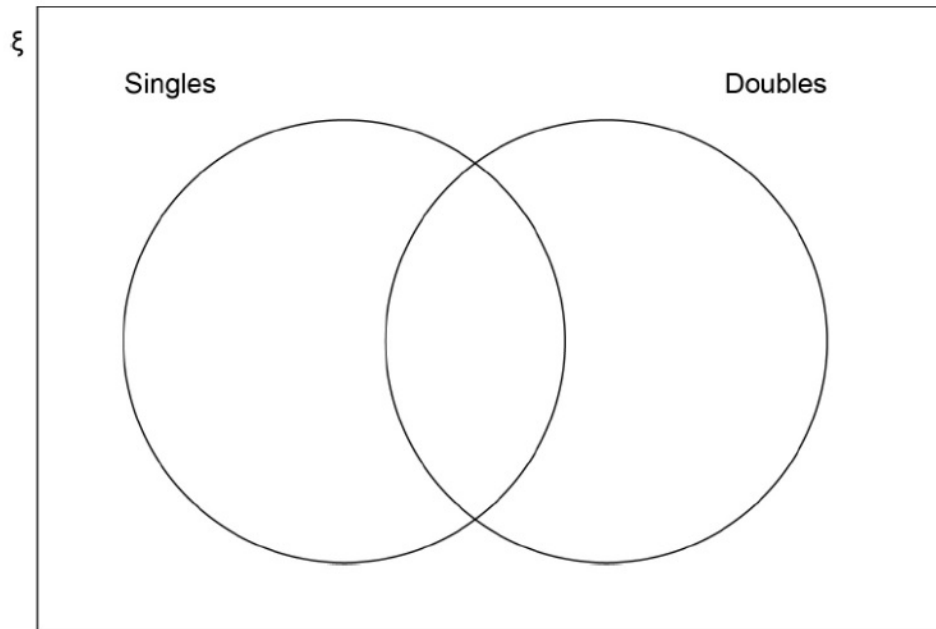
34 players took part in the doubles only

twice as many players took part in the singles as took part in the doubles.

How many players took part in both the singles **and** the doubles?

You may use the Venn diagram to help you.

**[4 marks]**



Answer \_\_\_\_\_

20

In a tennis tournament,

Video created by W Neill

P28

98 players took part in the singles only

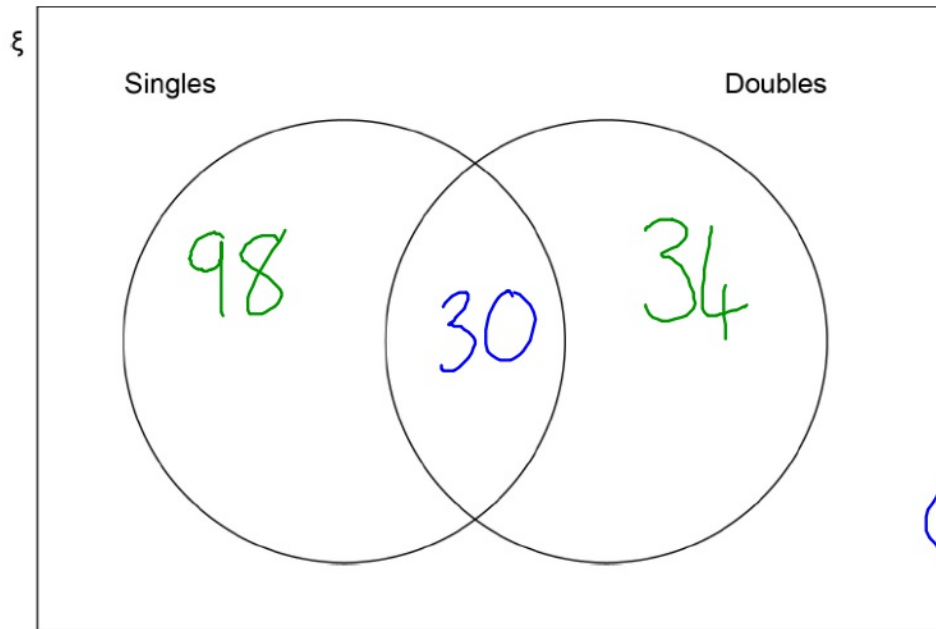
34 players took part in the doubles only

twice as many players took part in the singles as took part in the doubles.

9

How many players took part in both the singles **and** the doubles?

You may use the Venn diagram to help you.



[4 marks]

Singles 30 Doubles

98  $34 \times 2 = 68$

+10 108  $46 \times 2 = 88$

+20 118  $54 \times 2 = 108$

(+30) 128  $64 \times 2 = 128$

Answer

30 ✓

23

In a group of 20 people

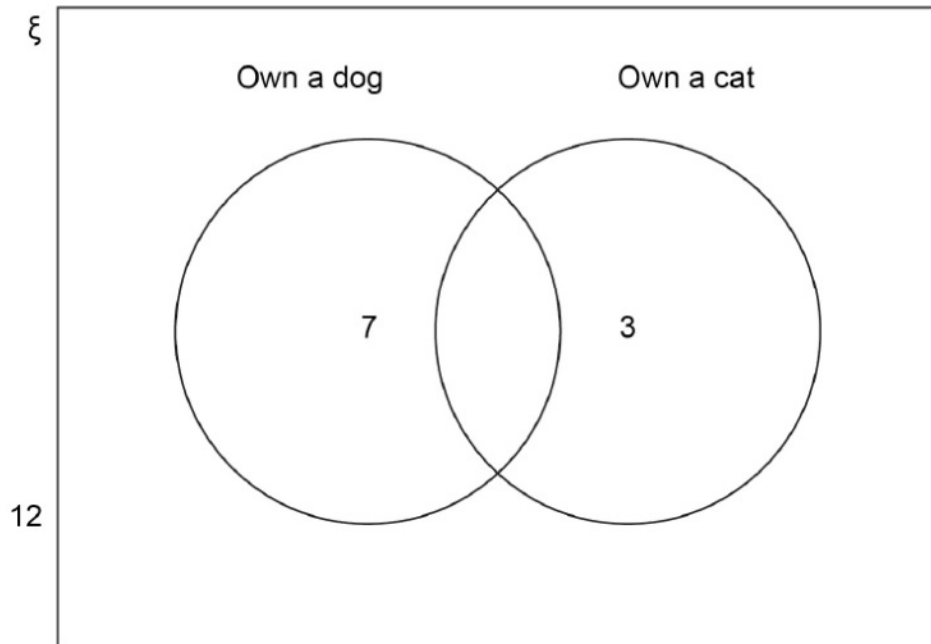
P28

7 own a dog

3 own a cat

12 do not own a dog or a cat.

Aidan shows this information on a Venn diagram.



Make **two** criticisms of his Venn diagram.

Criticism 1 \_\_\_\_\_  
\_\_\_\_\_

Criticism 2 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

23

In a group of 20 people

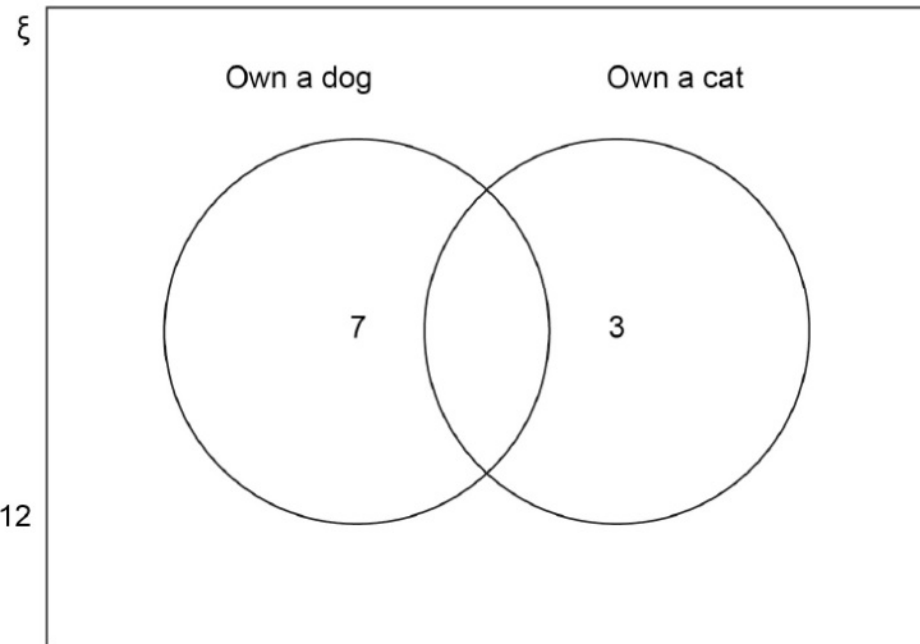
P28

7 own a dog

3 own a cat

12 do not own a dog or a cat.

Aidan shows this information on a Venn diagram.



Make **two** criticisms of his Venn diagram.

Criticism 1 12 should be outside  
circles but not outside  
the box

Criticism 2  $7 + 3 + 12 \neq 20$

18

Here are five shapes, A to E.

Video created by W Neill

G2

P28

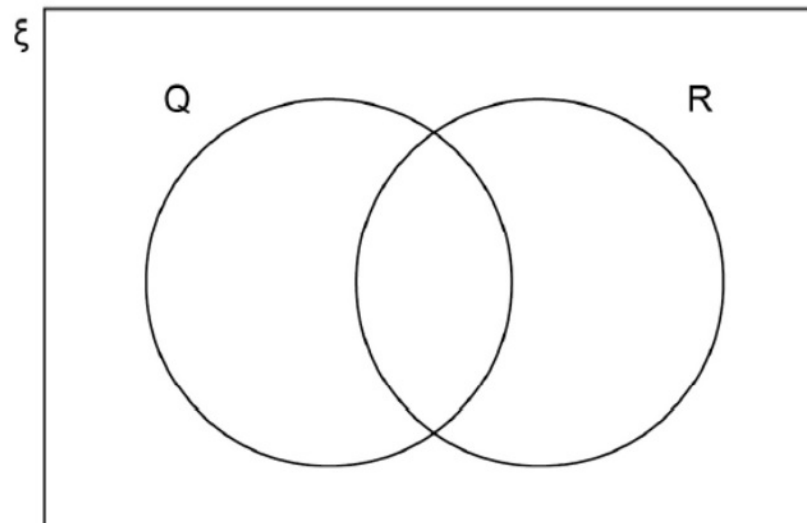
A	Parallelogram
B	Regular pentagon
C	Rhombus
D	Scalene triangle
E	Trapezium

In the Venn diagram,

$\xi$  is the set of all shapes

Q is the set of quadrilaterals

R is the set of shapes which **always** have rotational symmetry.



Complete the Venn diagram with the letters A to E.

**[3 marks]**

18

Here are five shapes, A to E.

Video created by W Neill

G2

P28

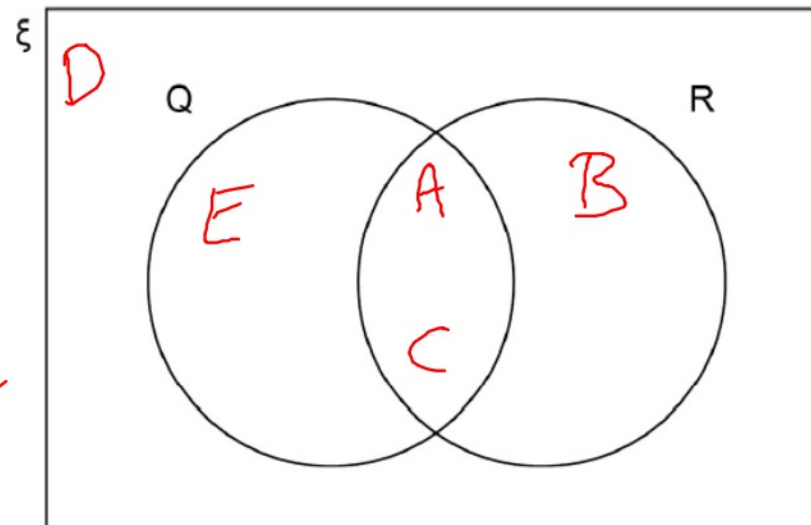
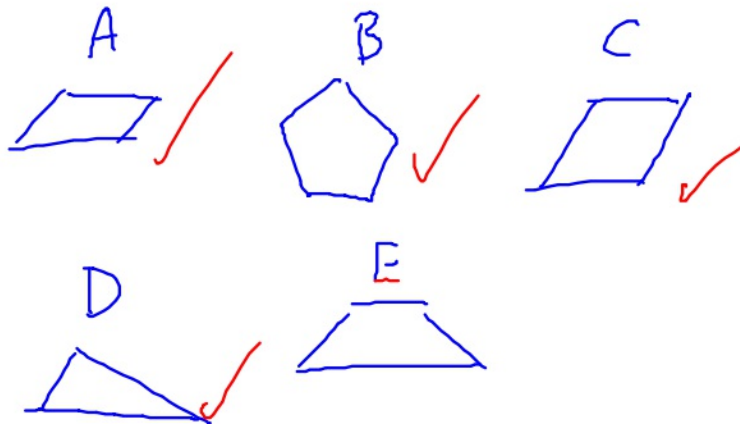
In the Venn diagram,

$\xi$  is the set of all shapes

Q is the set of quadrilaterals

R is the set of shapes which **always** have rotational symmetry.

A	Parallelogram
B	Regular pentagon
C	Rhombus
D	Scalene triangle
E	Trapezium



Complete the Venn diagram with the letters A to E.

[3 marks]

**16** What does  $(A \cap B)$  represent in  $P(A \cap B)$  ?

Circle your answer.

**P29**

**[1 mark]**

A or B or both

A but not B

not A and not B

A and B

16 What does  $(A \cap B)$  represent in  $P(A \cap B)$  ?

Circle your answer.

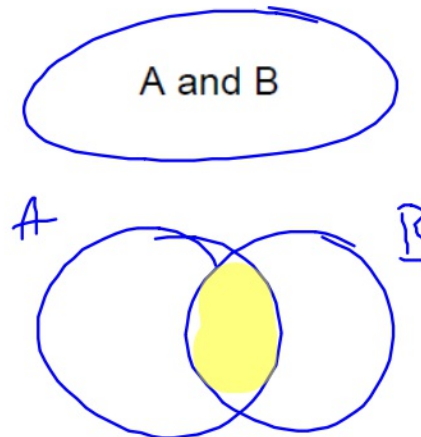
P29

[1 mark]

A or B or both

A but not B

not A and not B





18 A school has 86 teachers.

P28

42 are male and 44 are female.

$\frac{1}{3}$  of the male teachers have blue eyes.

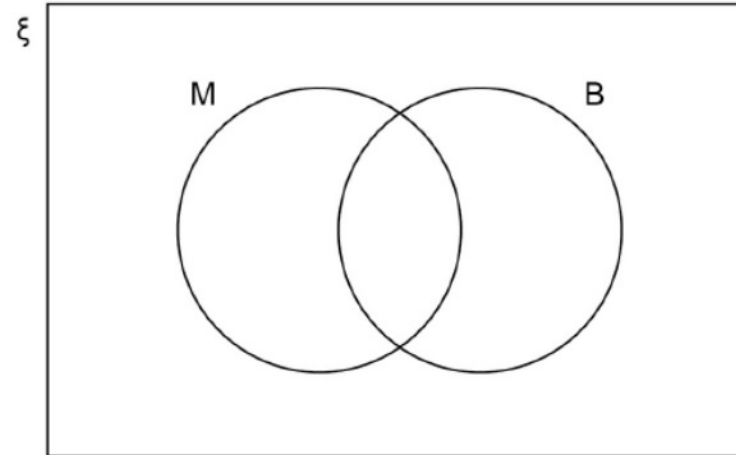
$\frac{1}{4}$  of the female teachers have blue eyes.

18 (a)  $\xi$  = teachers in the school

M = male teachers

B = teachers who have blue eyes

Complete the Venn diagram. [3 marks]



18 A school has 86 teachers.

P28

42 are male and 44 are female.

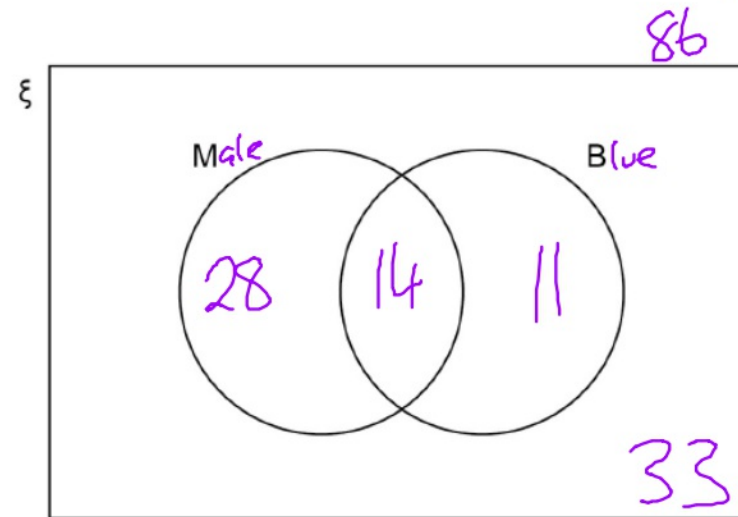
$\frac{1}{3}$  of the male teachers have blue eyes.

$\frac{1}{4}$  of the female teachers have blue eyes.

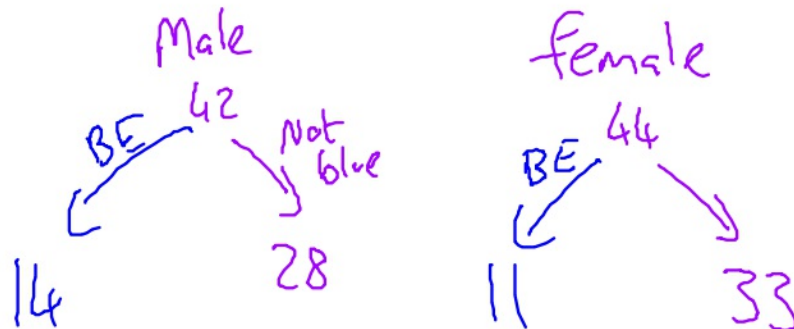
18 (a)  $\xi$  = teachers in the school

M = male teachers

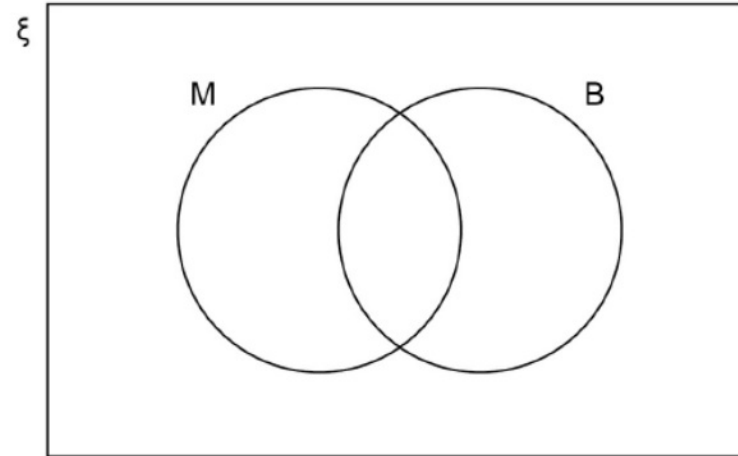
B = teachers who have blue eyes



Complete the Venn diagram. [3 marks]



Video created by W Neill



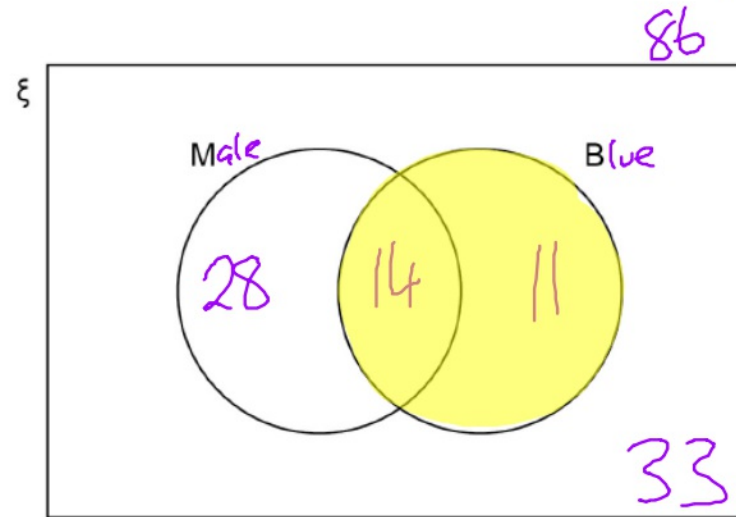
**18 (b)** One teacher who has blue eyes is chosen at random.

Work out the probability that the teacher is male.

**[1 mark]**

Answer \_\_\_\_\_

Video created by W Neill



**18 (b)** One teacher who has blue eyes is chosen at random.

Work out the probability that the teacher is male.

[1 mark]

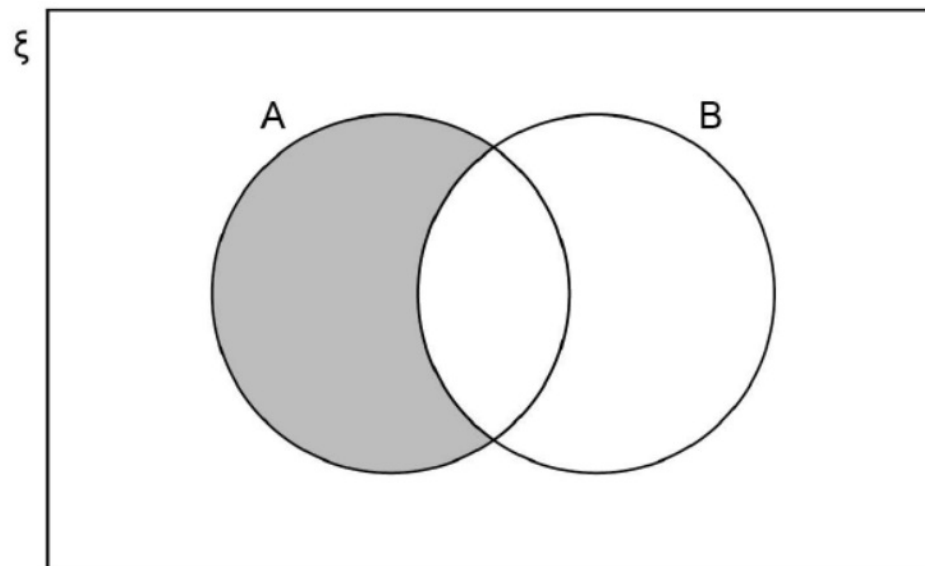
Answer \_\_\_\_\_

$$\frac{14}{25} \checkmark$$

18 (a)

Video created by W Neill

P29



Which of these represents the shaded region?

Circle your answer.

[1 mark]

A

$B'$

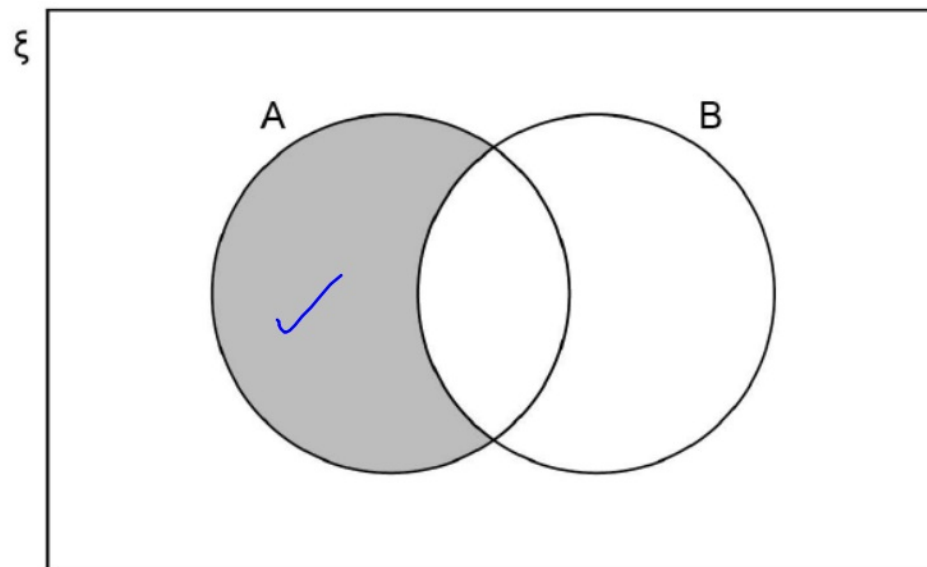
$A \cap B'$

$A \cup B'$

18 (a)

Video created by W Neill

P29



Which of these represents the shaded region?

Circle your answer.

[1 mark]

~~A~~

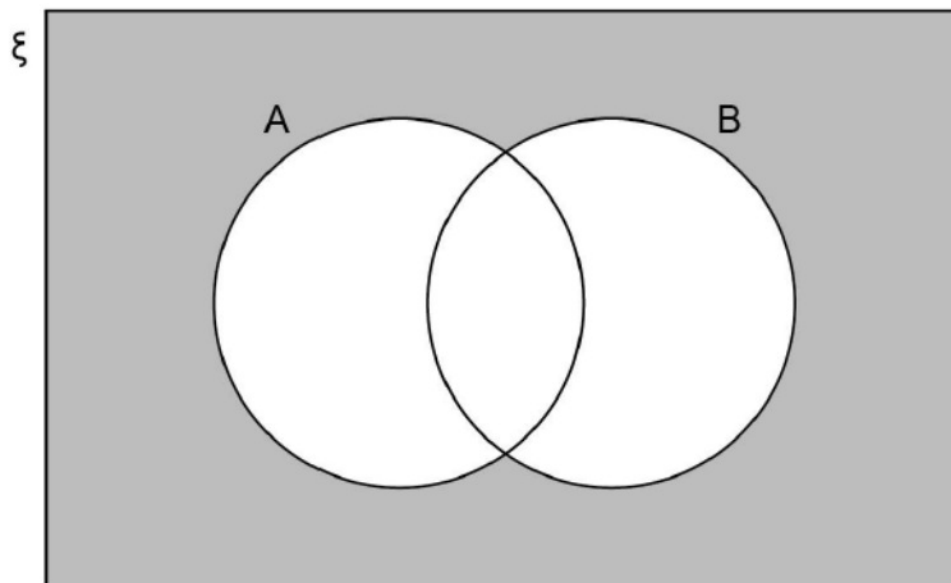
~~B'~~

$A \cap B'$

$A \cup B'$

18 (b)

P29



Which of these represents the shaded region?

Circle your answer.

[1 mark]

$(A \cup B)'$

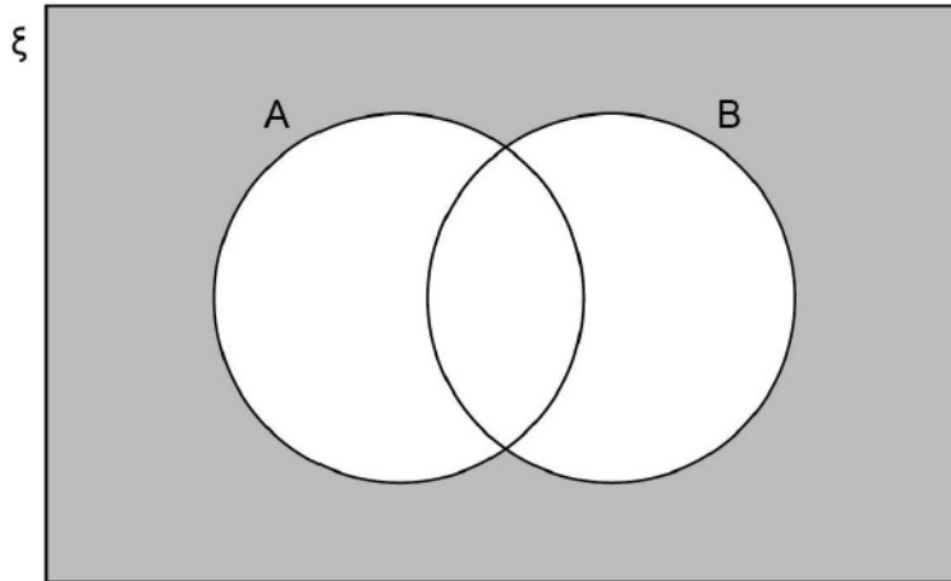
$(A \cap B)'$

$A' \cap B$

$A' \cup B'$

18 (b)

P29



Which of these represents the shaded region?

Circle your answer.

[1 mark]

$(A \cup B)'$

$(A \cap B)'$

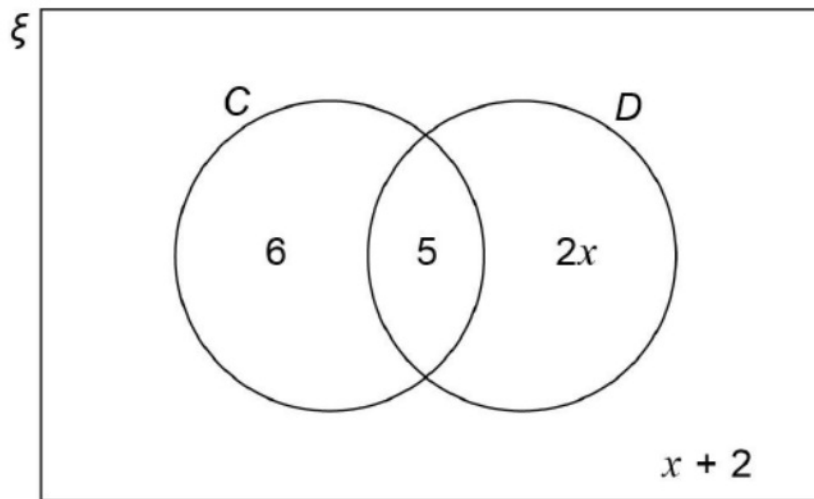
$A' \cap B$

$A' \cup B'$



14 In the Venn diagram

- P28  $\xi$  represents 31 students in a class  
A16 C is students who have a cat  
D is students who have a dog



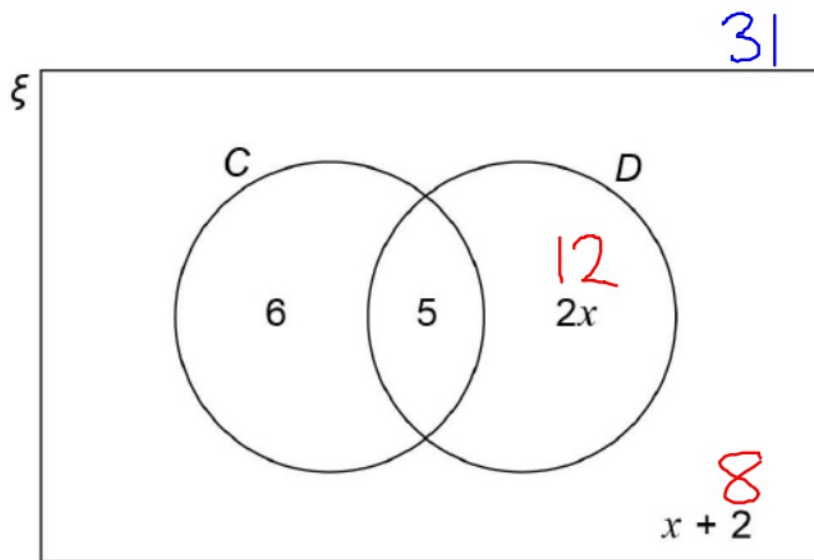
14 (a) One student from the class is picked at random.

Work out the probability that the student has a dog. [3 marks]

Answer \_\_\_\_\_

14 In the Venn diagram

- P28  $\xi$  represents 31 students in a class  
A16 C is students who have a cat  
D is students who have a dog



14 (a) One student from the class is picked at random.

Work out the probability that the student has a dog.

$$6 + 5 + 2x + x + 2 = 31$$

$$3x + 13 = 31$$

$$3x = 18$$

$$x = 6$$

Answer

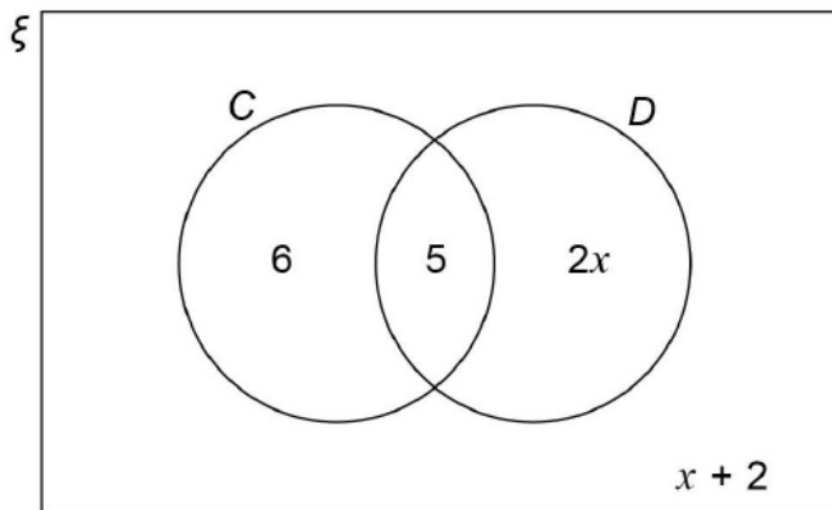
$$\frac{17}{31}$$

14 In the Venn diagram

$\xi$  represents 31 students in a class

$C$  is students who have a cat

$D$  is students who have a dog



14 (b) One of the students who has a cat is picked at random.

Work out the probability that this student has a dog. [1 mark]

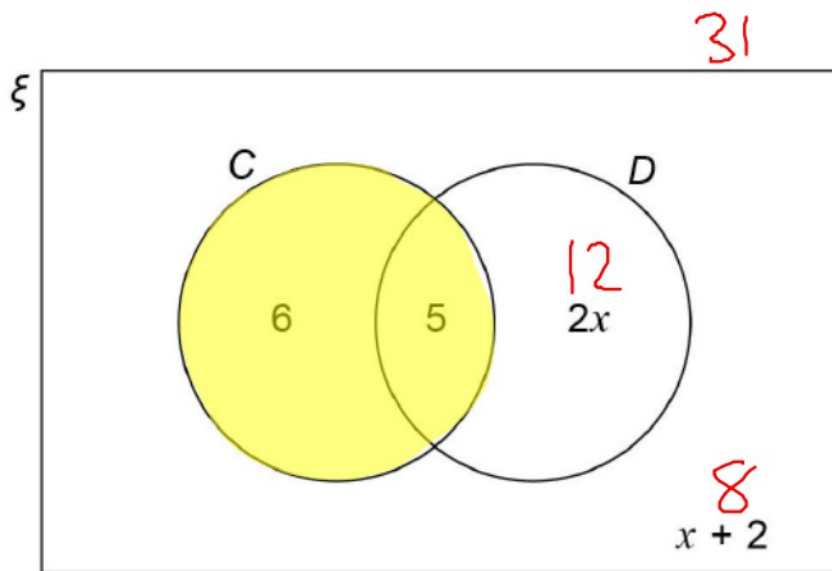
Answer \_\_\_\_\_

14 In the Venn diagram

$\xi$  represents 31 students in a class

$C$  is students who have a cat

$D$  is students who have a dog



14 (b) One of the students who has a cat is picked at random.

Work out the probability that this student has a dog. [1 mark]

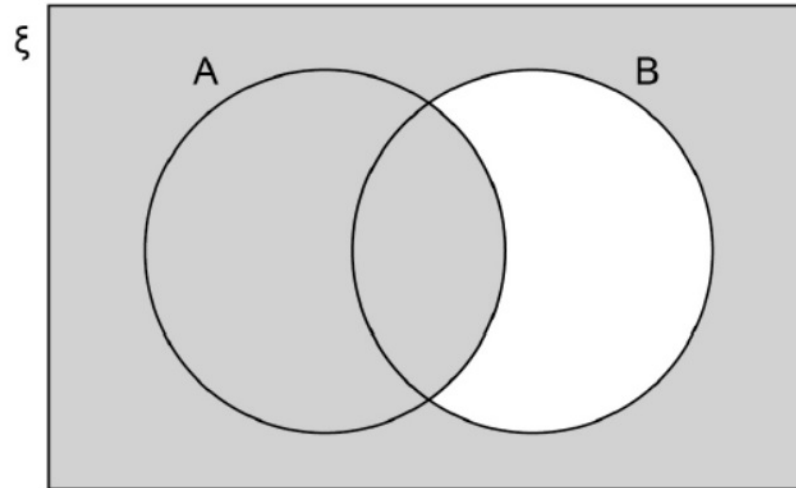
Answer \_\_\_\_\_

$$\frac{5}{11}$$

✓

22

P29



Which of these represents the shaded region?

Circle your answer.

[1 mark]

$A \cap B'$

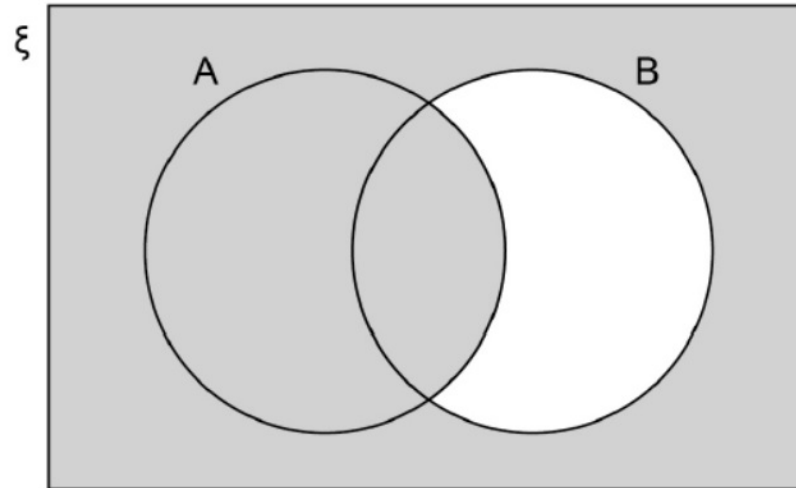
$B'$

$A \cup B'$

$A' \cup B'$

22

P29



Which of these represents the shaded region?

Circle your answer.

[1 mark]

$A \cap B'$   
✗

$B'$   
✗

$A \cup B'$

$A' \cup B'$

25

The Venn diagram shows some information about 150 students.

Video created by W Neill

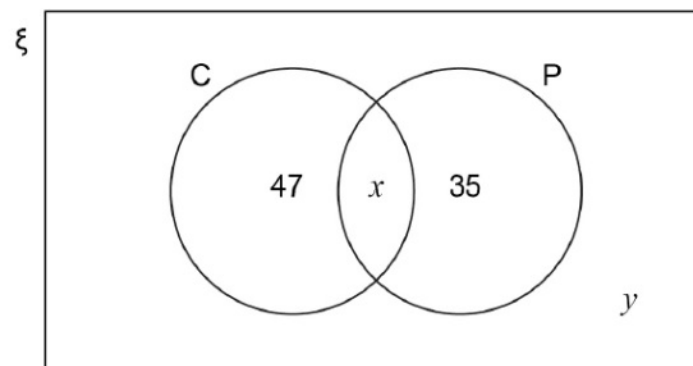
P28

R4b

$\xi = 150$  students

C = students who study Chemistry

P = students who study Physics



The probability that a Physics student, chosen at random, also studies Chemistry is  $\frac{5}{12}$

One of the 150 students is chosen at random.

Work out the probability that the student does **not** study either Chemistry or Physics.

**[4 marks]**

Answer \_\_\_\_\_

25

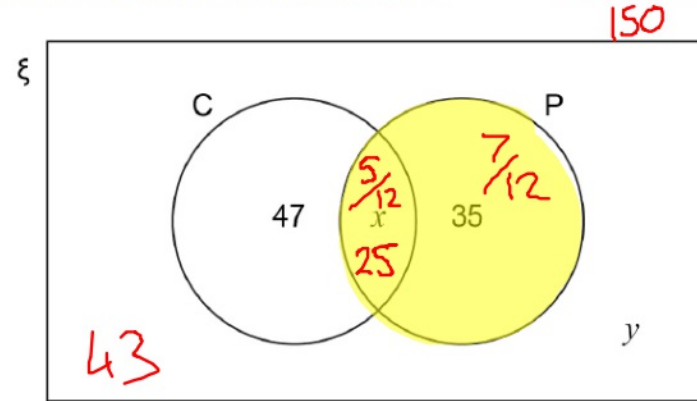
The Venn diagram shows some information about 150 students.

Video created by W Neill

$\xi = 150$  students

C = students who study Chemistry

P = students who study Physics



P28

R4b

150

$$\frac{7}{12} = 35$$

$$\frac{1}{12} = 5$$

$$\frac{12}{12} = 60$$

The probability that a Physics student, chosen at random, also studies Chemistry is  $\frac{5}{12}$

One of the 150 students is chosen at random.

Work out the probability that the student does **not** study either Chemistry or Physics.

[4 marks]

Answer  $\frac{43}{150} \checkmark$



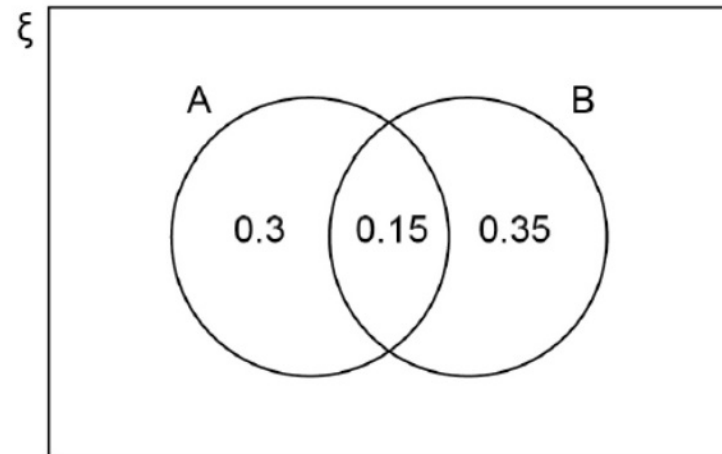
14

A and B are two events.

Some probabilities are shown on the Venn diagram.

P28

P29



Work out  $P(A' \cup B)$

[2 marks]

Answer \_\_\_\_\_

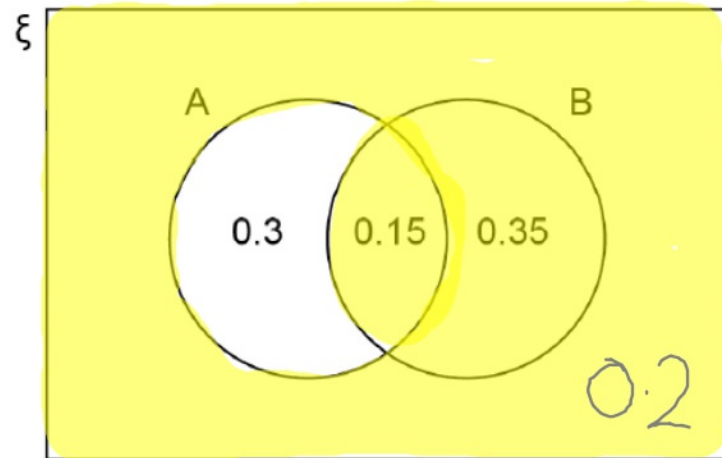
14

A and B are two events.

Some probabilities are shown on the Venn diagram.

P28

P29



$$\begin{array}{r} 0.3 \\ 0.15 \\ 0.35 \\ \hline 0.80 \end{array}$$

Work out  $P(A' \cup B)$

$$\begin{array}{r} 0.15 \\ 0.35 \\ + 0.2 \\ \hline \end{array}$$

[2 marks]

Answer

0.7 ✓