2) Conditional probability

2.1) Set notation

Chapter CONTENTS

Worked example	Your turn
A card is selected at random from a pack of 52 playing cards. Let R be the event that the card is a royal (king, queen or jack). Let S be the event that the card is a spade. Find: a) $P(R \cap S)$ b) $P(R \cup S)$ c) $P(R')$ d) $P(R' \cap S)$	A card is selected at random from a pack of 52 playing cards. Let A be the event that the card is an ace. Let D be the event that the card is a diamond. Find: a) $P(A \cap D)$ b) $P(A \cup D)$ c) $P(A')$ d) $P(A' \cap D)$ a) $\frac{1}{52}$ b) $\frac{16}{52}$ c) $\frac{48}{52}$ d) $\frac{12}{52}$

Worked example	Your turn
Given that: $$P(A) = 0.5$$ $$P(B) = 0.2$$ $$P(A \cap B) = 0.1$$ Explain why events A and B are independent	Given that: $$P(A) = 0.3$$ $$P(B) = 0.4$$ $$P(A \cap B) = 0.25$$ Explain why events A and B are not independent. If independent $P(A) \times P(B) = P(A \cap B)$ $$0.3 \times 0.4 = 0.12 \neq 0.25$$ $\therefore$ A and B are not independent.

Worked example

Given that:

$$P(A) = 0.5$$
$$P(B) = 0.34$$
$$P(A \cap B) = 0.25$$
$$P(C) = 0.15$$

A and C are mutually exclusive.
Events B and C are independent.

a) Draw a Venn diagram to illustrate the events
A, B and C, showing the probabilities for each region.

b) Find $P\big((C \cap B') \cup A\big)$

Your turn

Given that:

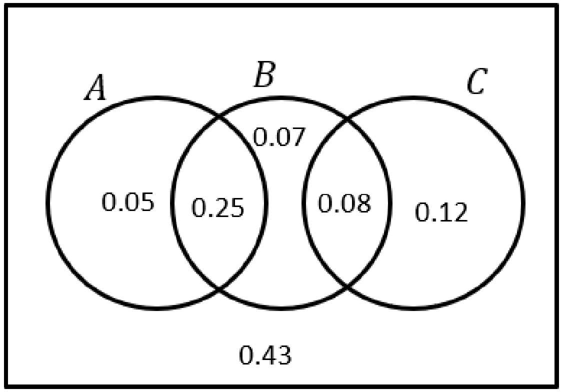
$$P(A) = 0.3$$
$$P(B) = 0.4$$
$$P(A \cap B) = 0.25$$
$$P(C) = 0.2$$

A and C are mutually exclusive.
Events B and C are independent.

a) Draw a Venn diagram to illustrate the events
A, B and C, showing the probabilities for each region.

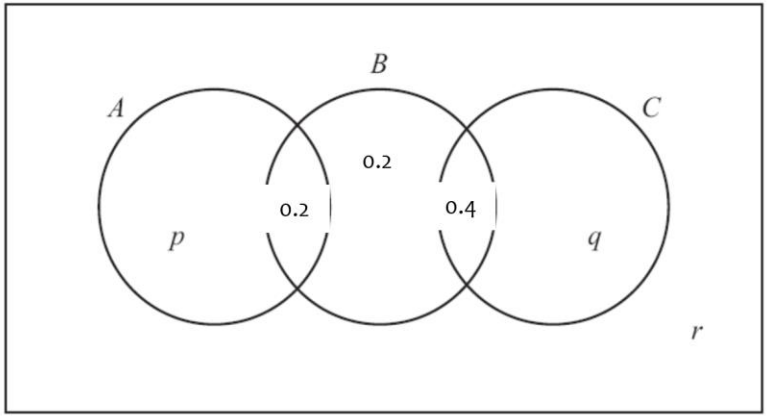
b) Find $P\big((A \cap B') \cup C\big)$

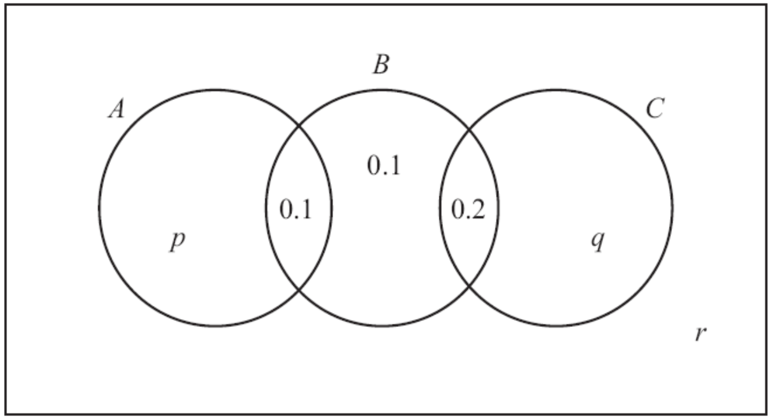
a)



b) 0.25

Worked example	Your turn
The events *A* and *B* are independent. Find the value of *p*.	The events *A* and *B* are independent. Find the value of *p*.





$p = 0.15$

Worked example

Events A and B are independent.

$$P(A) = x$$
$$P(B) = y$$

Find:

a) $P(A \cup B)$

b) $P(A' \cup B)$

Your turn

Events A and B are independent.

$$P(A) = x$$
$$P(B) = y$$

Find:

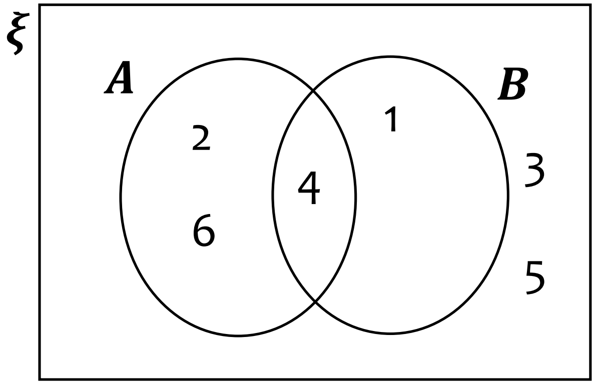
a) $P(A \cap B)$

b) $P(A \cup B')$

a) xy

b) $1 - y + xy$

Worked example

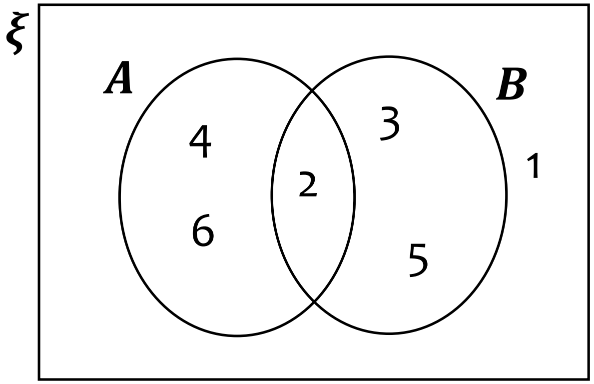


ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = square number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$A'$$

Your turn



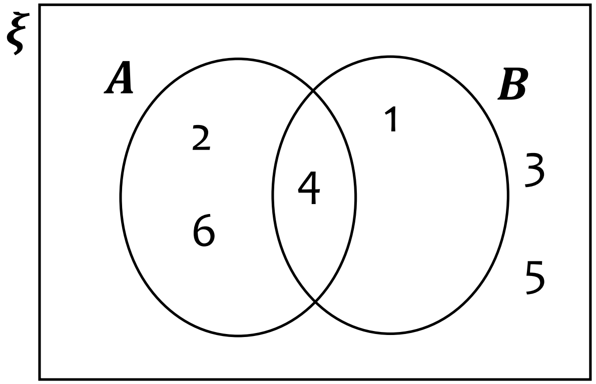
ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = prime number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$A'$$

Not A (the complement of A)
Not rolling an even number
$\{1, 3, 5\}$

Worked example



ξ = the whole sample space (1 to 6)

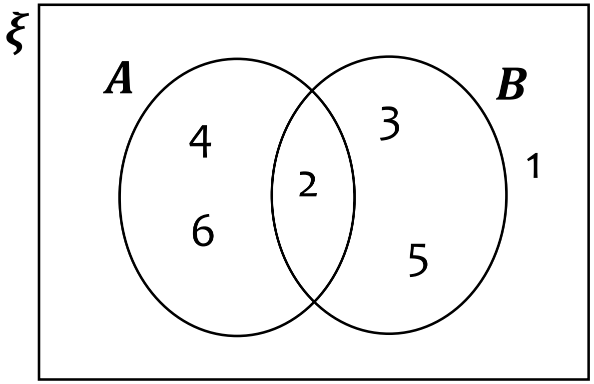
A = even number on a die thrown

B = square number on a die thrown

State what it means in this context, and the resulting set of outcomes:

B'

Your turn



ξ = the whole sample space (1 to 6)

A = even number on a die thrown

B = prime number on a die thrown

State what it means in this context, and the resulting set of outcomes:

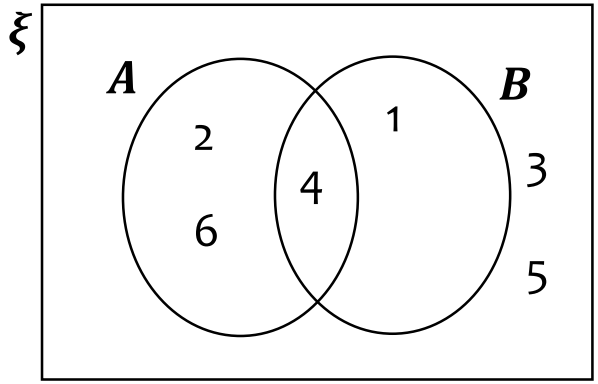
B'

Not B (the complement of B)

Not rolling a prime number

$\{1, 4, 6\}$

Worked example

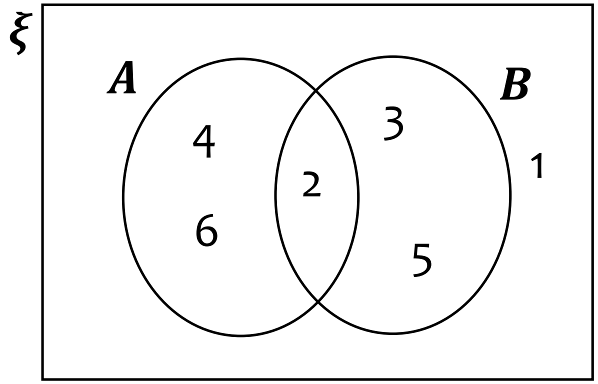


ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = square number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$A \cup B$$

Your turn



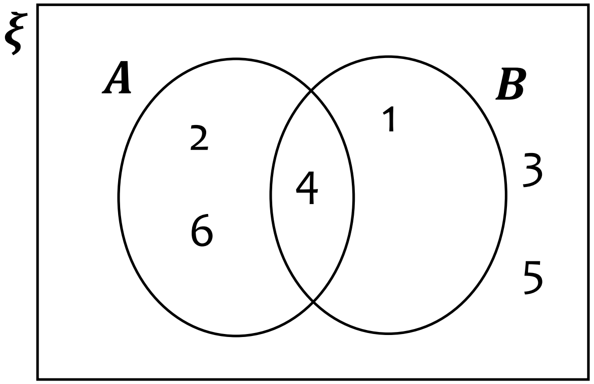
ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = prime number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$A \cup B$$

A or B (the union of A and B)
Rolling an even number or a prime number
$\{2, 3, 4, 5, 6\}$

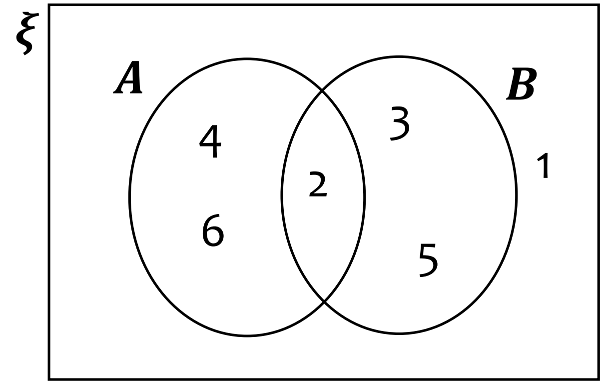
Worked example	Your turn



ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = square number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$A \cap B$$



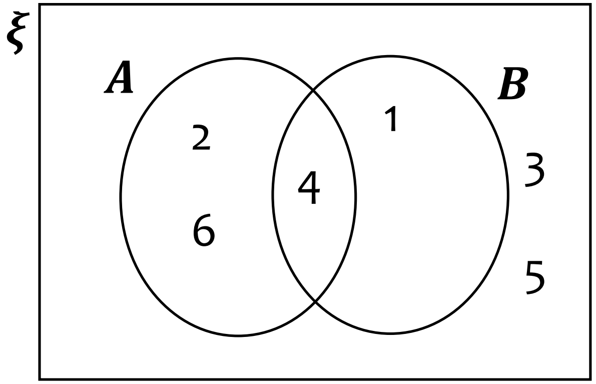
ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = prime number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$A \cap B$$

A and B (the intersection of A and B)
Rolling a number which is even and prime
{2}

Worked example

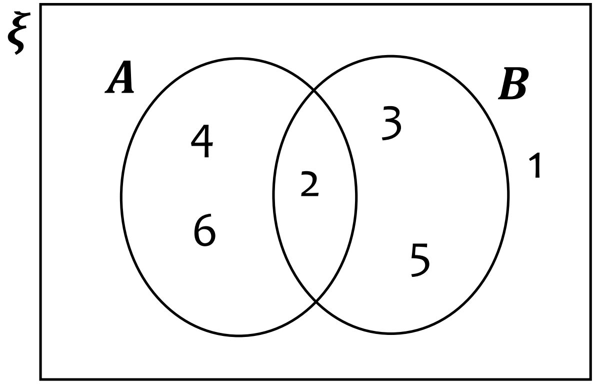


ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = square number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$A \cap B'$$

Your turn



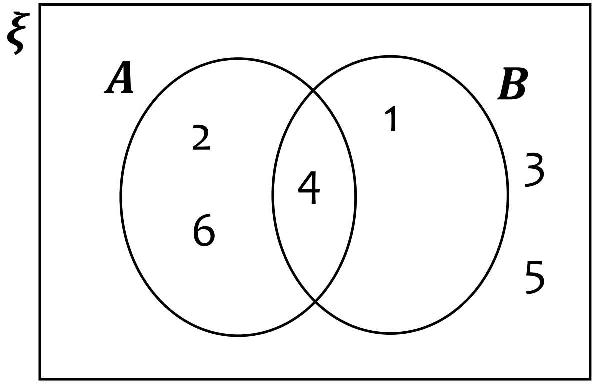
ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = prime number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$A \cap B'$$

A and not B
Rolling a number which is even and not prime
$\{4,6\}$

Worked example

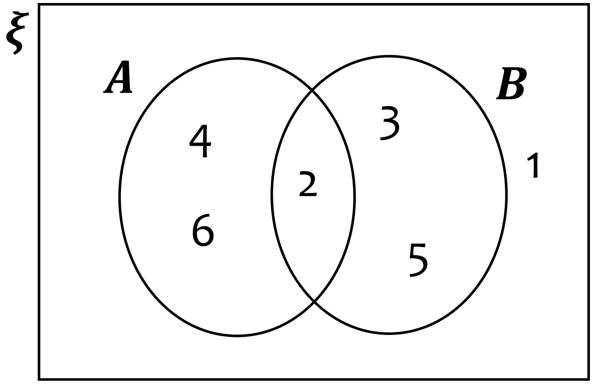


ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = square number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$A' \cap B$$

Your turn



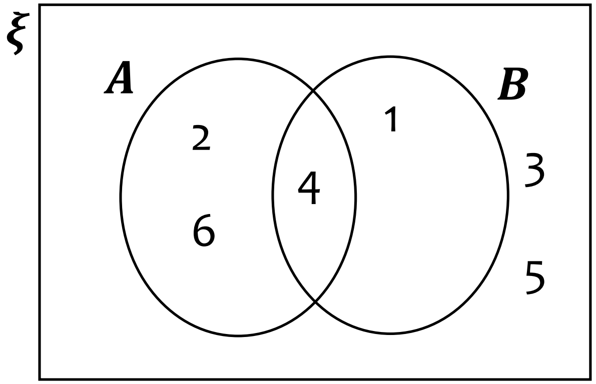
ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = prime number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$A' \cap B$$

B and not A
Rolling a number which is prime and not even
$\{3, 5\}$

Worked example

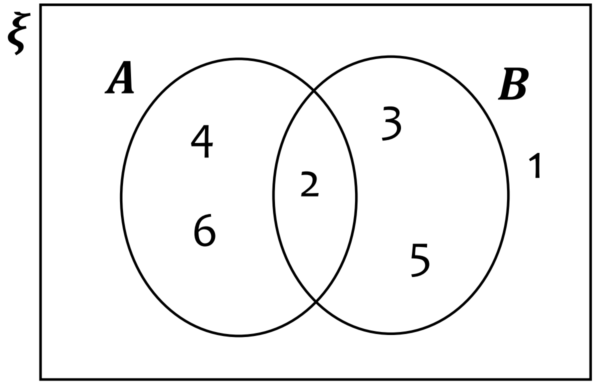


ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = square number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$(A \cup B)'$$

Your turn



ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = prime number on a die thrown

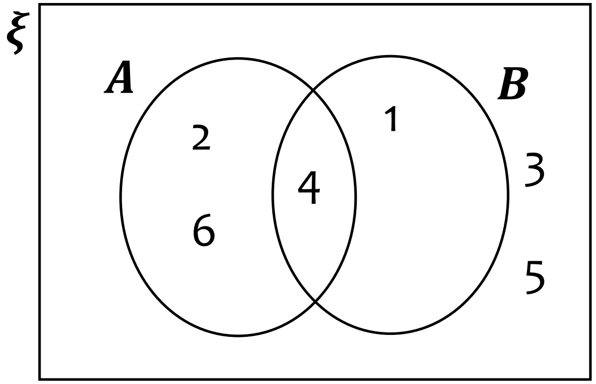
State what it means in this context, and the resulting set of outcomes:

$$(A \cup B)'$$

Not (A or B)
Rolling a number which is not (even or prime)
$\{1\}$

Worked example	Your turn

Worked example

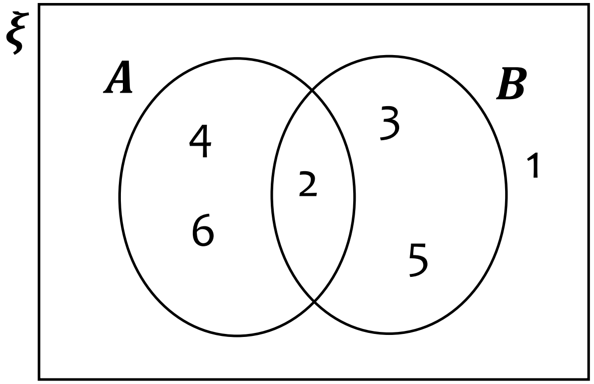


ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = square number on a die thrown

State what it means in this context, and the resulting set of outcomes:

$$(A \cap B)'$$

Your turn



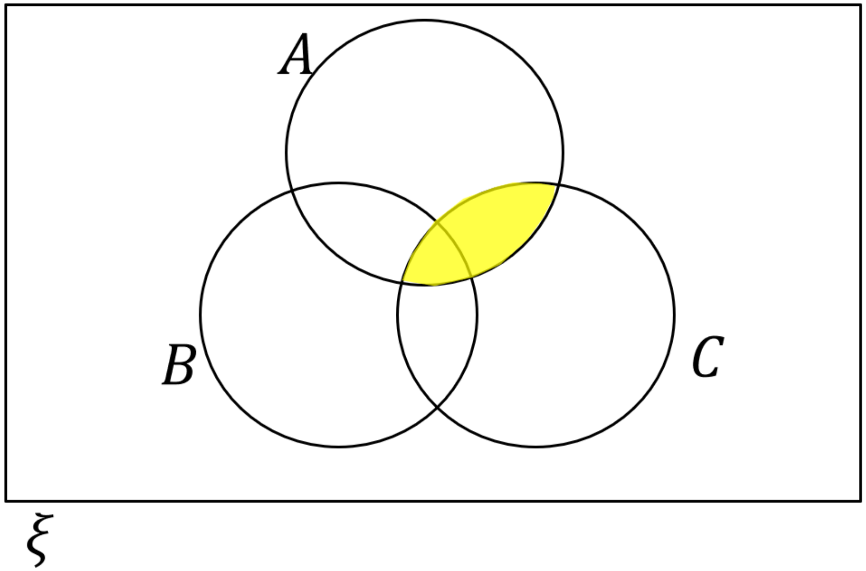
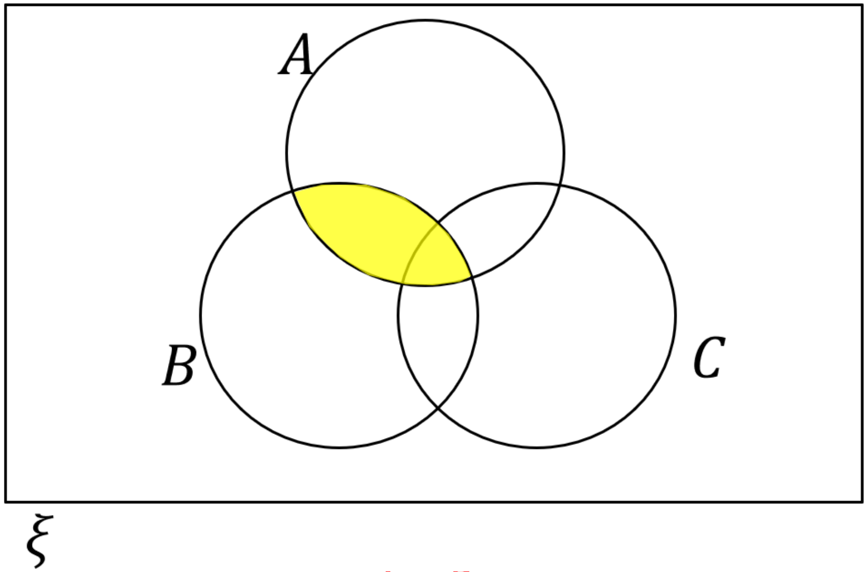
ξ = the whole sample space (1 to 6)
A = even number on a die thrown
B = prime number on a die thrown

State what it means in this context, and the resulting set of outcomes:

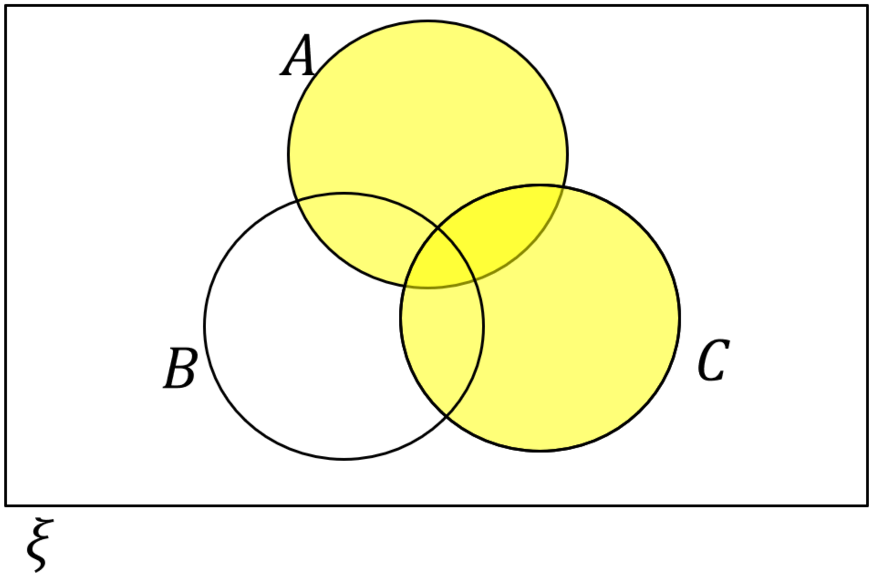
$$(A \cap B)'$$

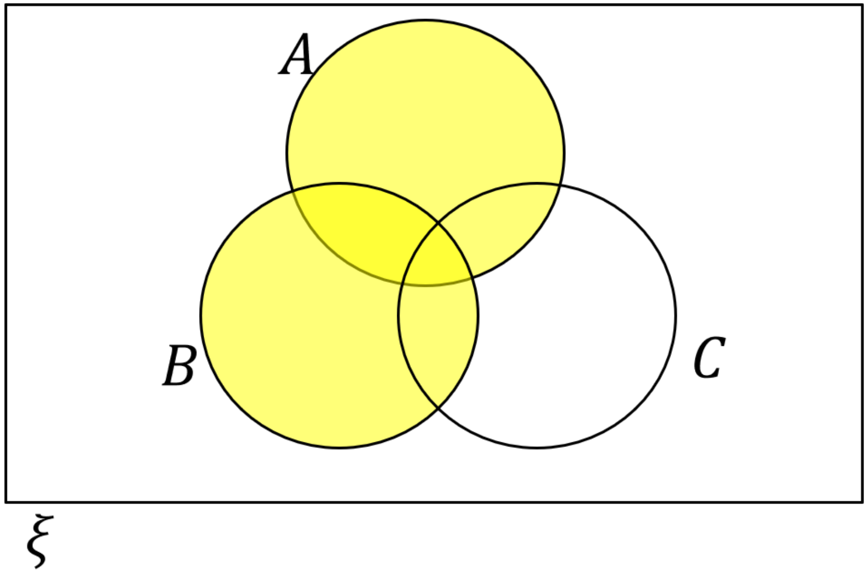
Not (A and B)
Rolling a number which is not (even and prime)
$\{1\}$

Diagrams/Graphs used with permission from DrFrostMaths: https://www.drfrostmaths.com/

Worked example	Your turn
Describe the area indicated using set notation:	Describe the area indicated using set notation:
	
	$A \cap B$

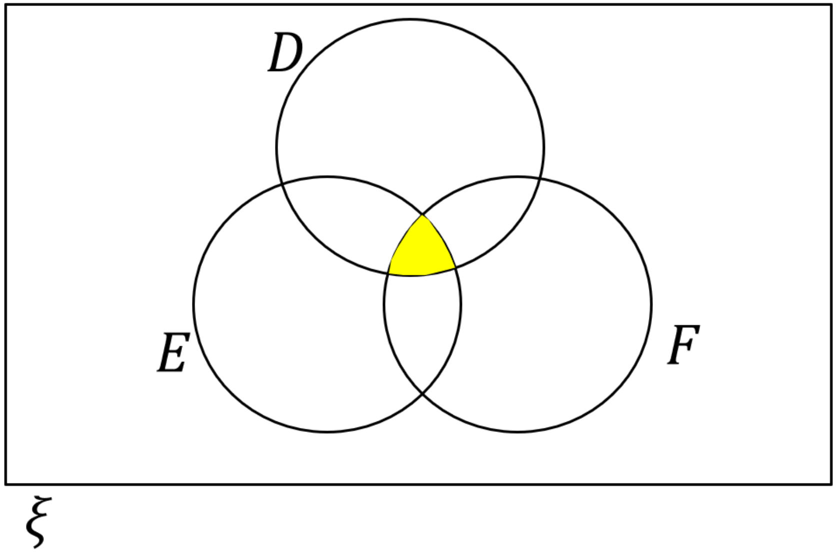
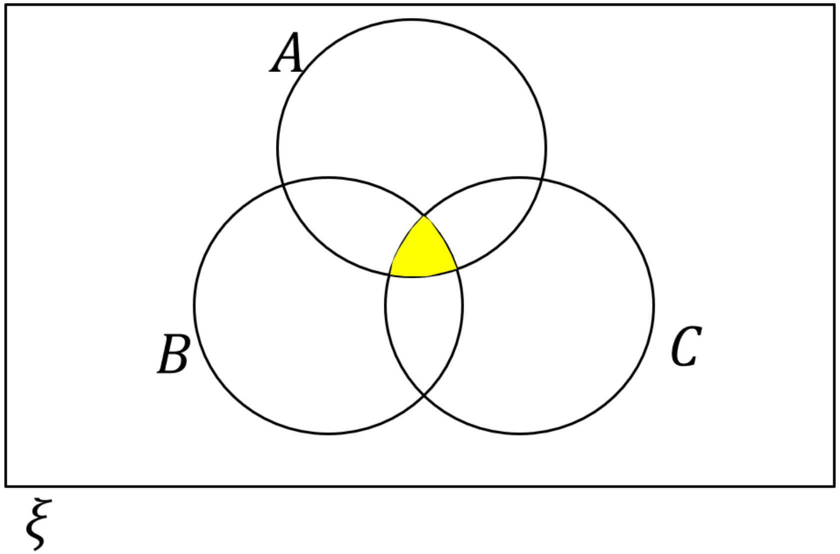
Worked example	Your turn
Describe the area indicated using set notation:	Describe the area indicated using set notation:



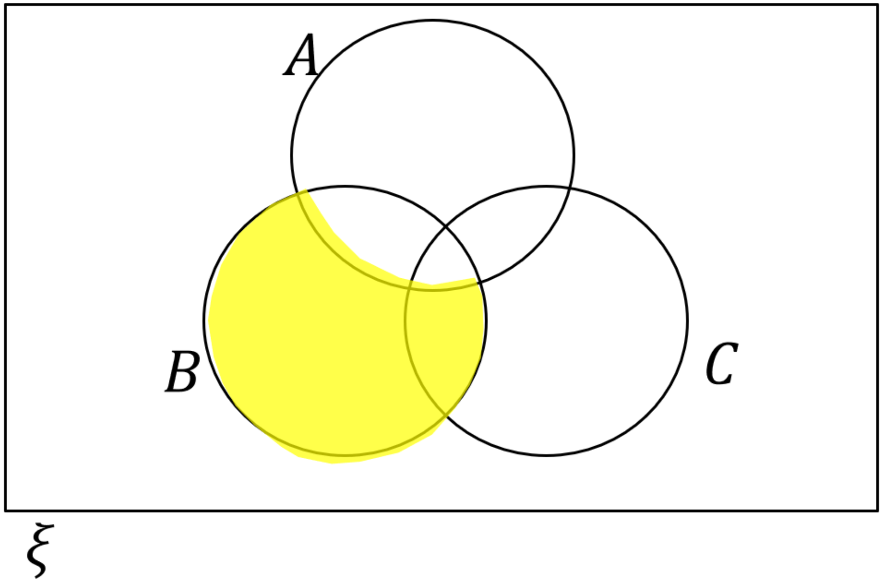


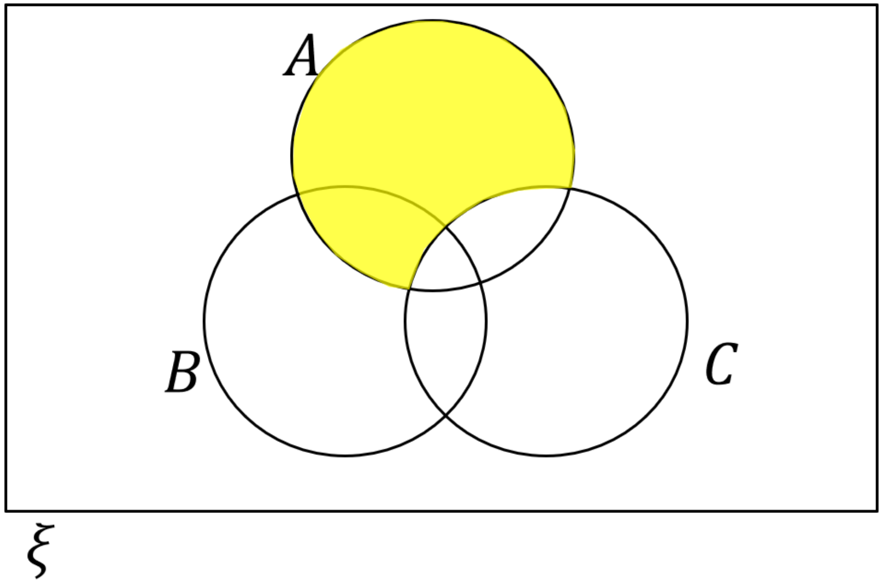
$A \cup B$

Diagrams/Graphs used with permission from DrFrostMaths: https://www.drfrostmaths.com/

Worked example	Your turn
Describe the area indicated using set notation:	Describe the area indicated using set notation:
	
	$A \cap B \cap C$

Worked example	Your turn
Describe the area indicated using set notation:	Describe the area indicated using set notation:



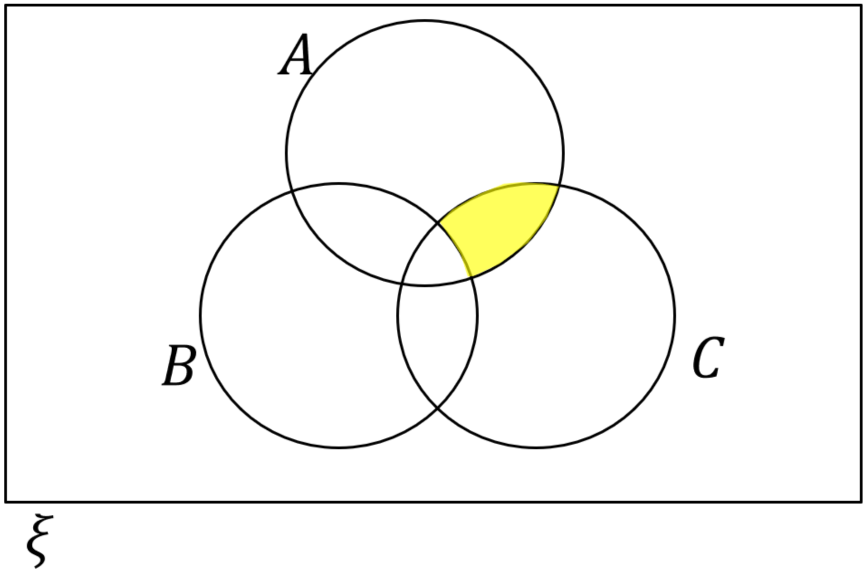


$A \cap C'$

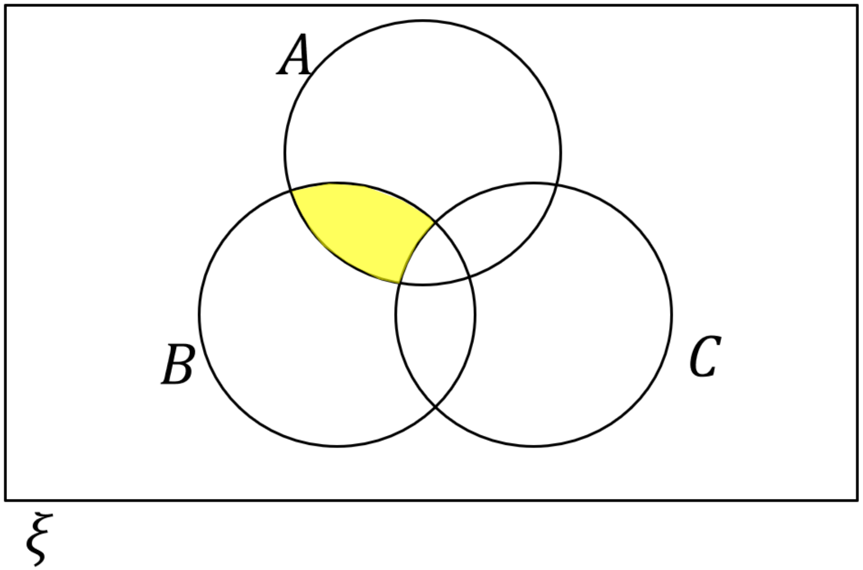
Diagrams/Graphs used with permission from DrFrostMaths: https://www.drfrostmaths.com/

Worked example	Your turn

Describe the area indicated using set notation:

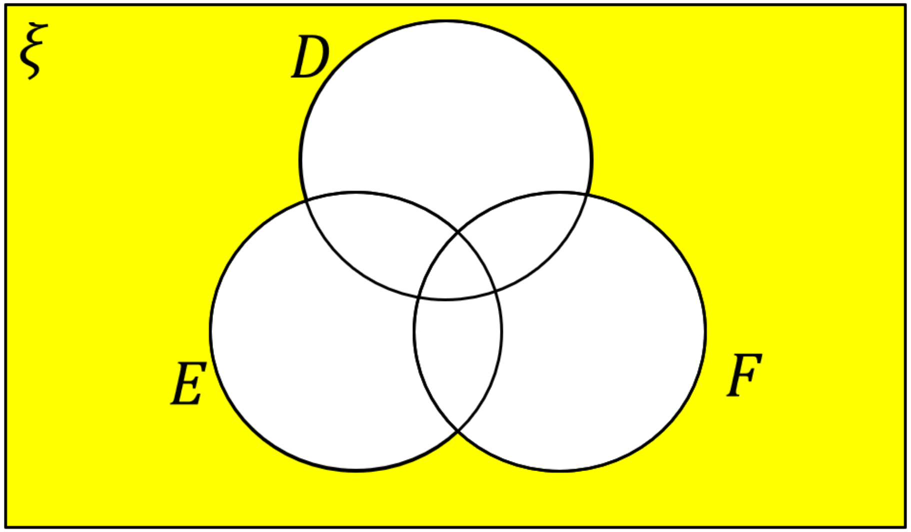


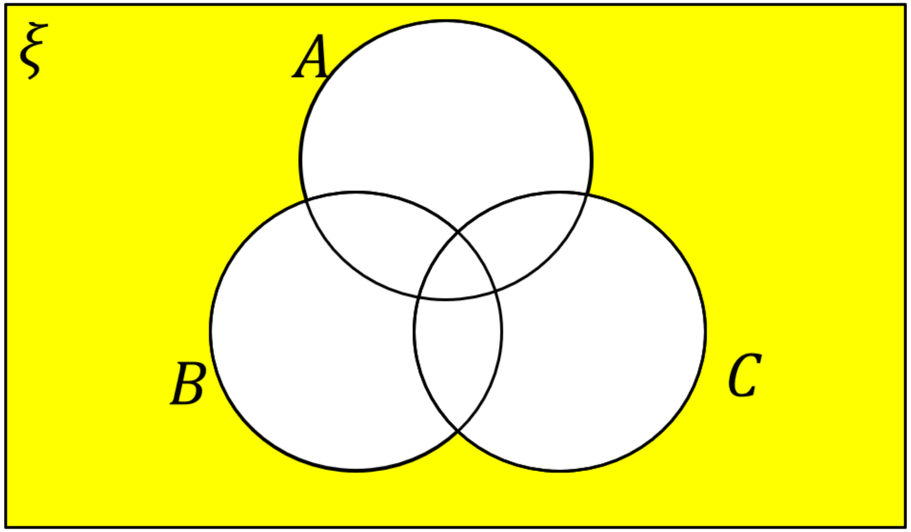
Describe the area indicated using set notation:



$A \cap B \cap C'$

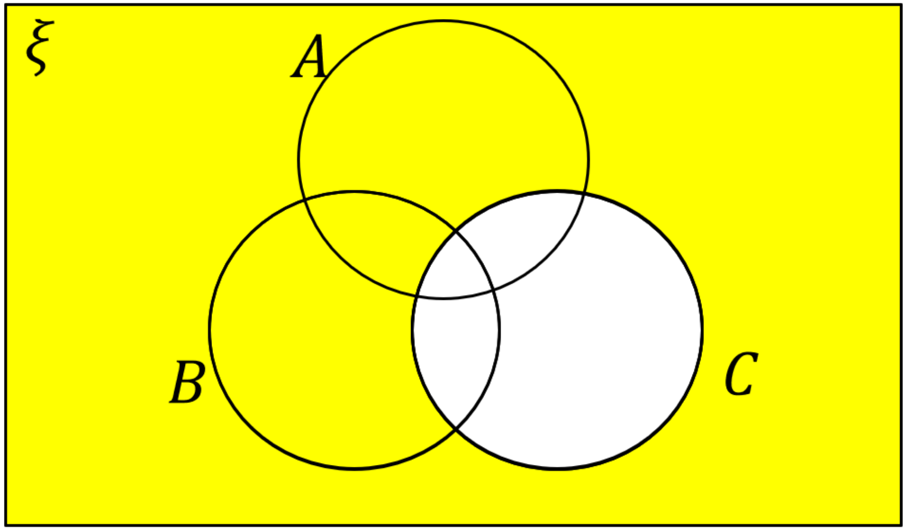
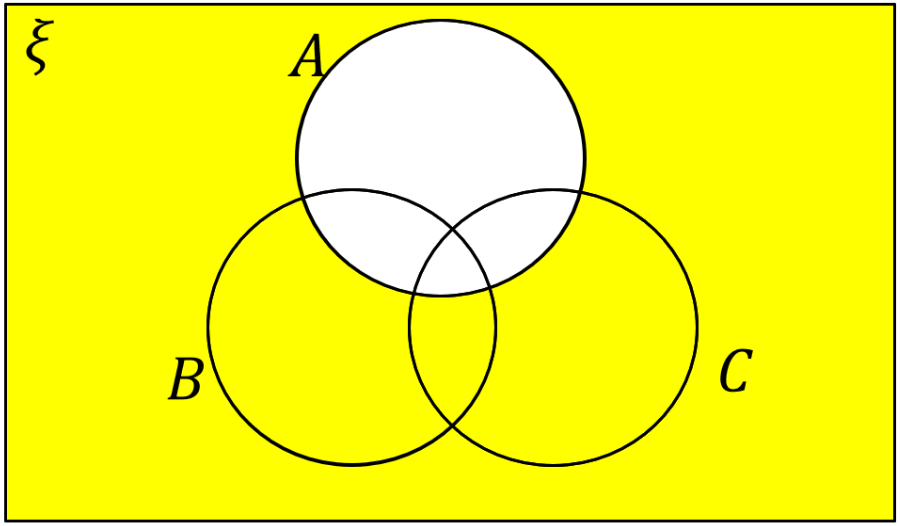
Worked example	Your turn
Describe the area indicated using set notation:	Describe the area indicated using set notation:





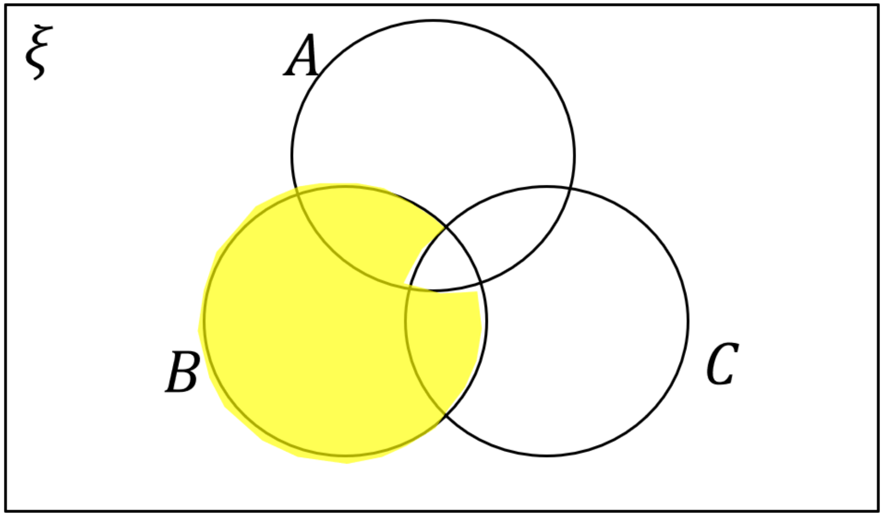
$A' \cap B' \cap C'$ or $(A \cup B \cup C)'$

Diagrams/Graphs used with permission from DrFrostMaths: https://www.drfrostmaths.com/

Worked example	Your turn
Describe the area indicated using set notation: 	Describe the area indicated using set notation:  A'

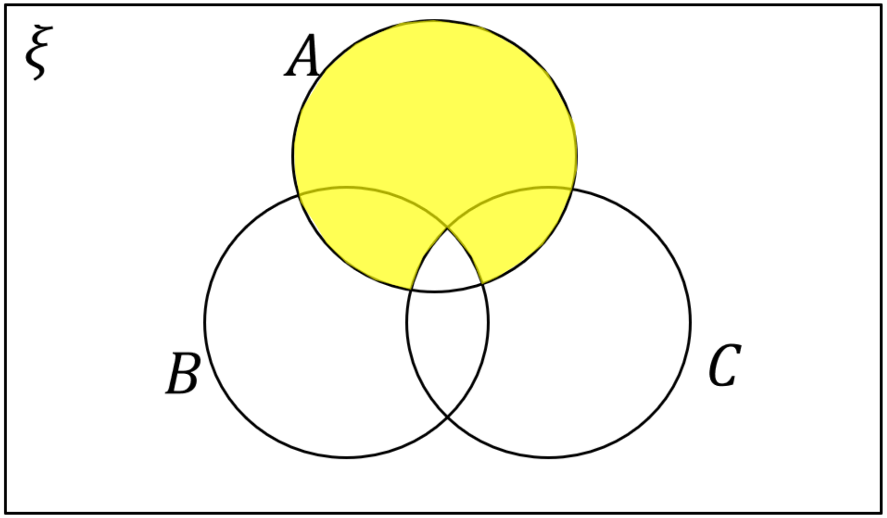
Worked example

Describe the area indicated using set notation:

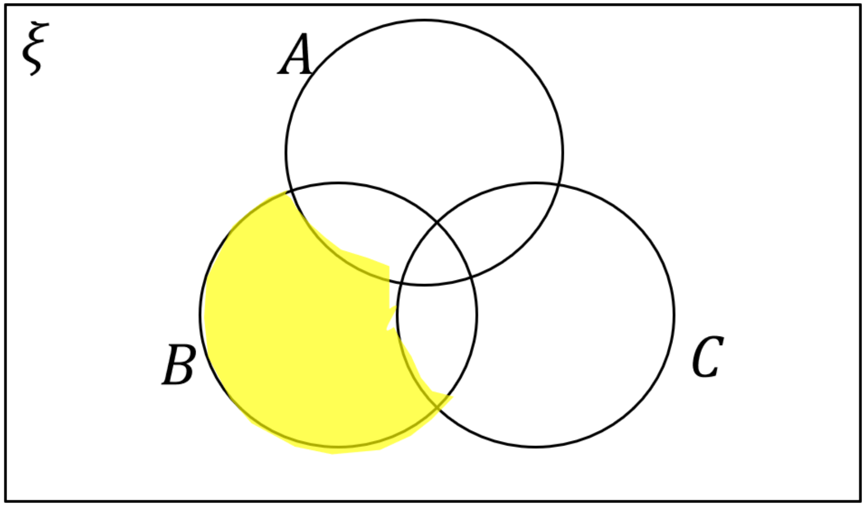
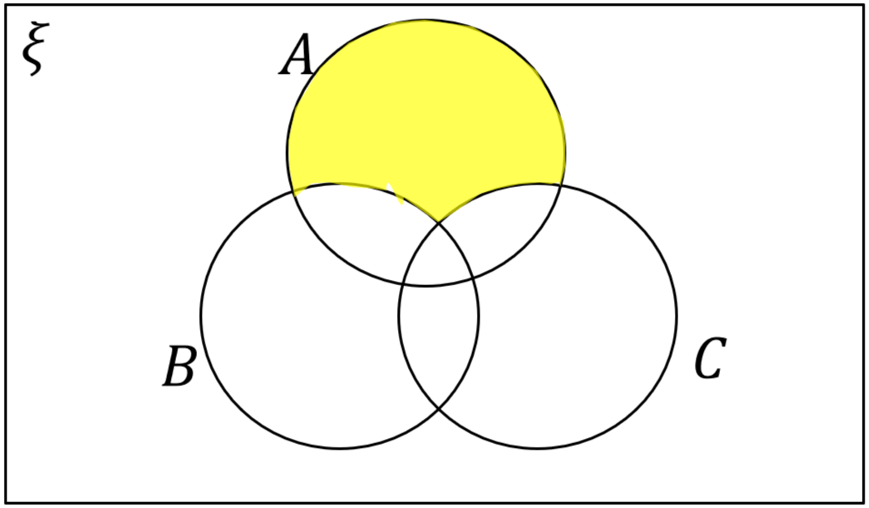


Your turn

Describe the area indicated using set notation:

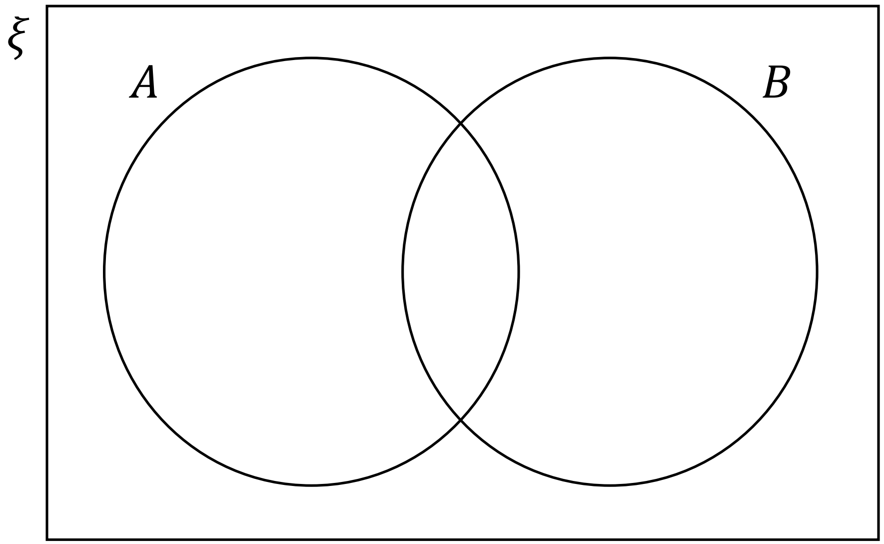


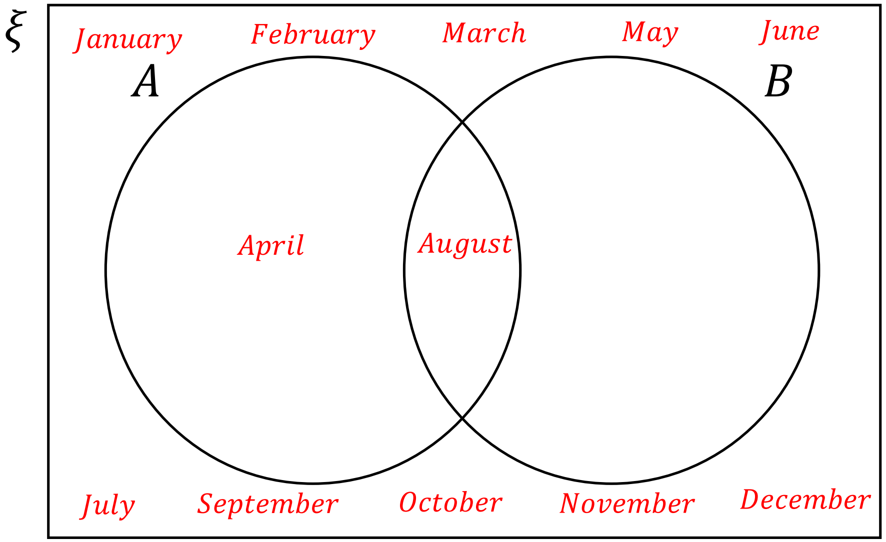
$A \cap (B \cap C)'$

Worked example	Your turn
Describe the area indicated using set notation:	Describe the area indicated using set notation:
	
	$A \cap B' \cap C'$

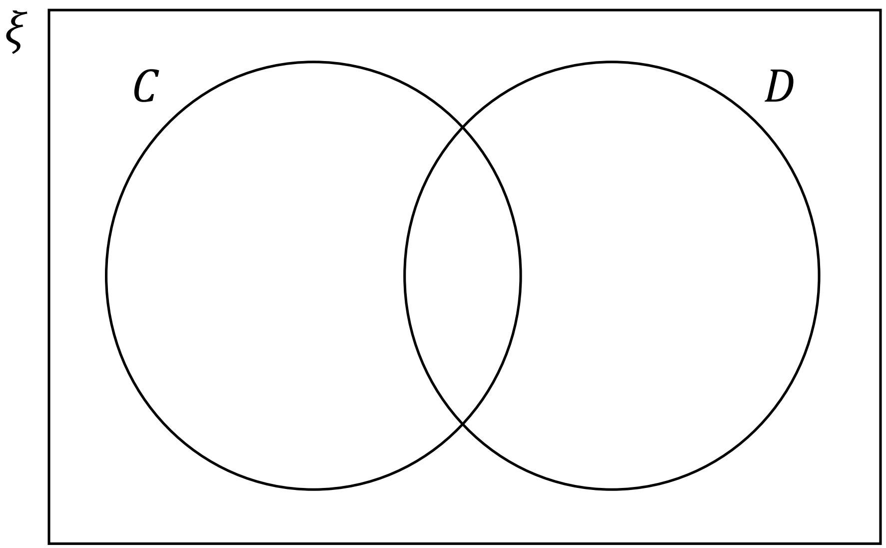
Diagrams/Graphs used with permission from DrFrostMaths: https://www.drfrostmaths.com/

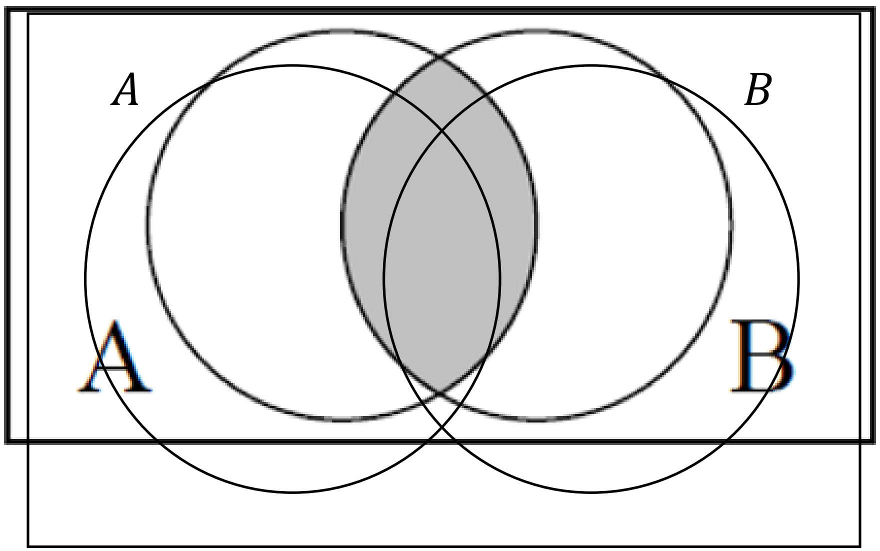
Worked example	Your turn
ξ = $\{Days\ of\ the\ week\}$ A = $\{Tuesday, Thursday\}$ B = $\{Days\ starting\ with\ S\ or\ T\}$ Draw a Venn diagram to represent this information.	ξ = $\{Months\ of\ the\ year\}$ A = $\{Months\ starting\ with\ A\}$ B = $\{Months\ with\ six\ letters\}$ Draw a Venn diagram to represent this information.



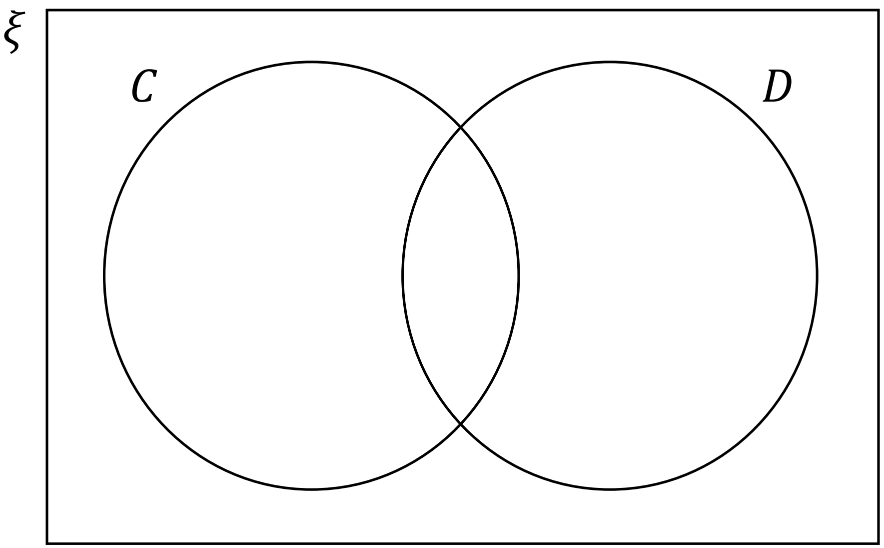


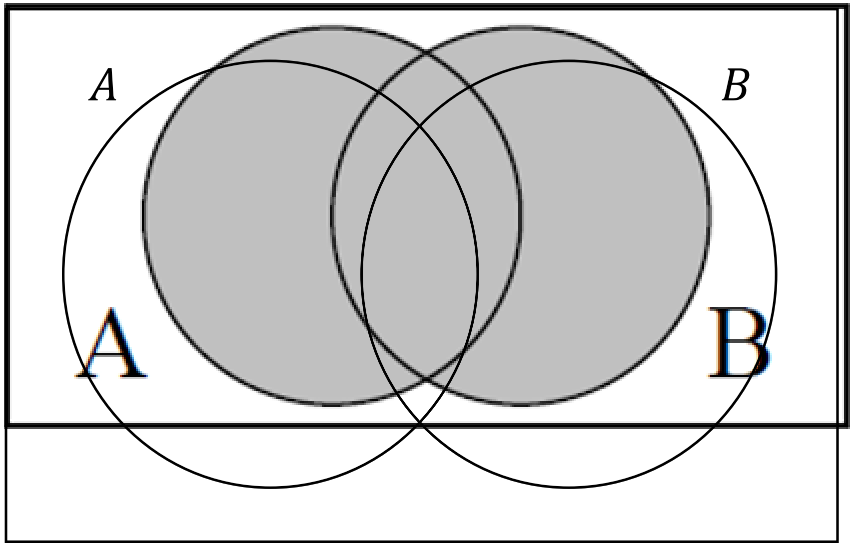
Worked example	Your turn
On the Venn diagram, shade the region representing: $C \cap D$	On the Venn diagram, shade the region representing: $A \cap B$



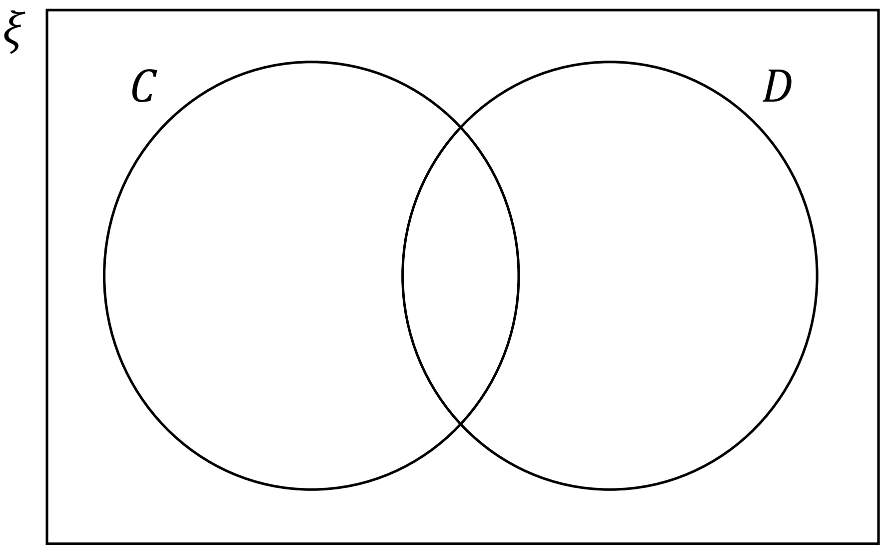


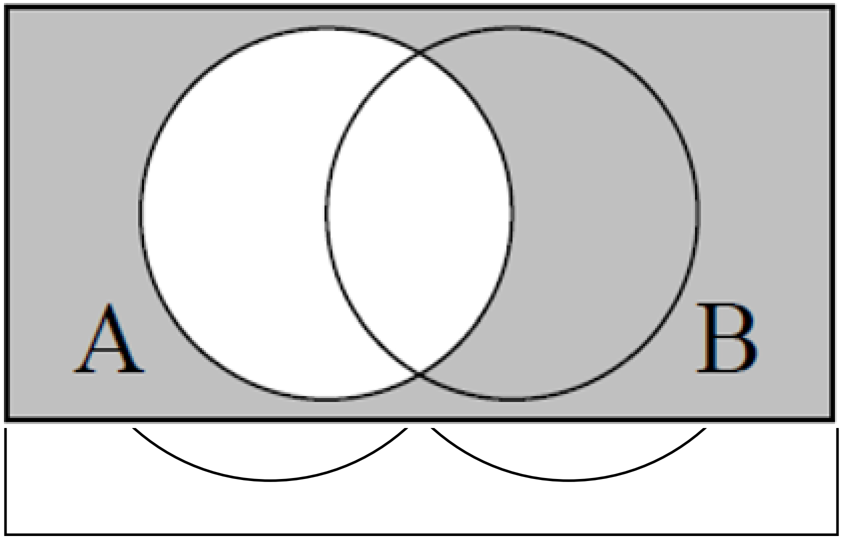
Worked example	Your turn
On the Venn diagram, shade the region representing: $C \cup D$	On the Venn diagram, shade the region representing: $A \cup B$



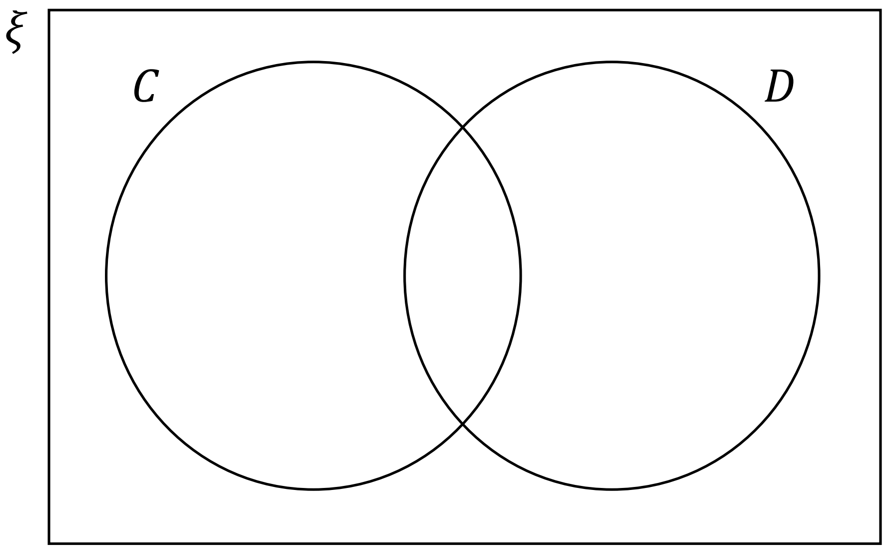


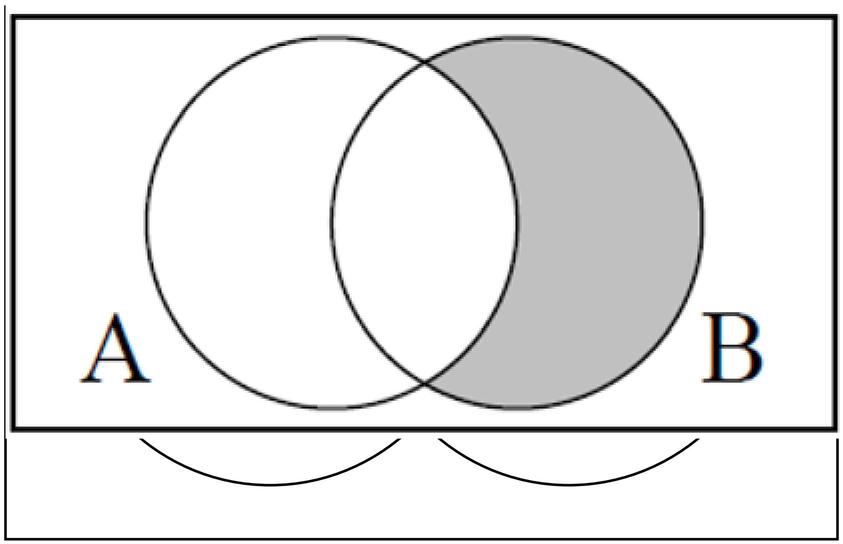
Worked example	Your turn
On the Venn diagram, shade the region representing: D'	On the Venn diagram, shade the region representing: A'



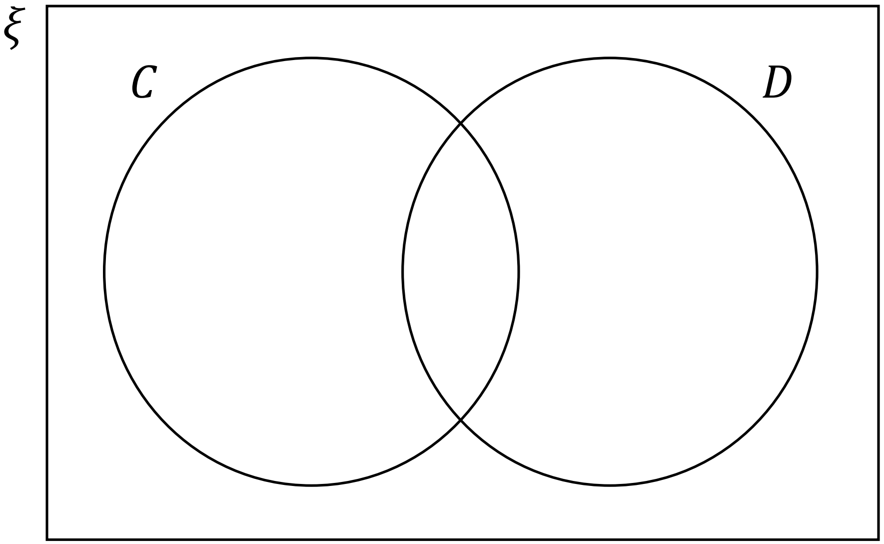


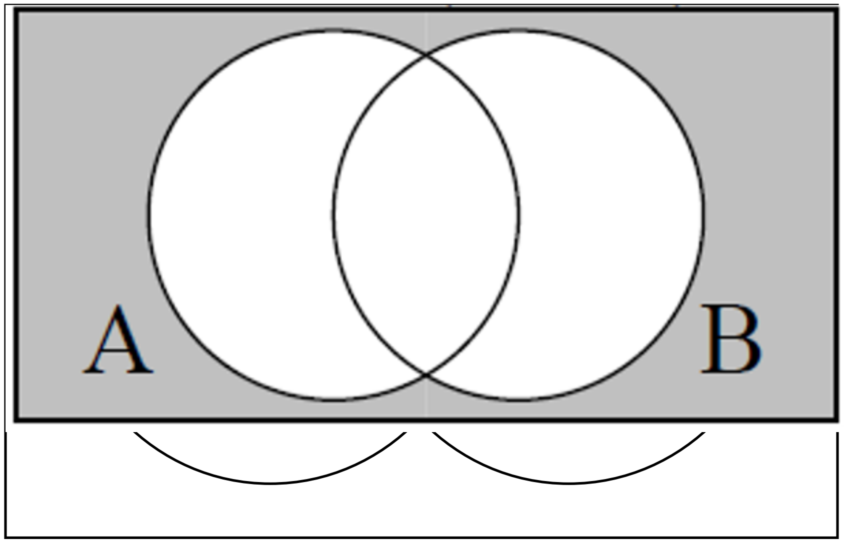
Worked example	Your turn
On the Venn diagram, shade the region representing: $C \cap D'$	On the Venn diagram, shade the region representing: $A' \cap B$



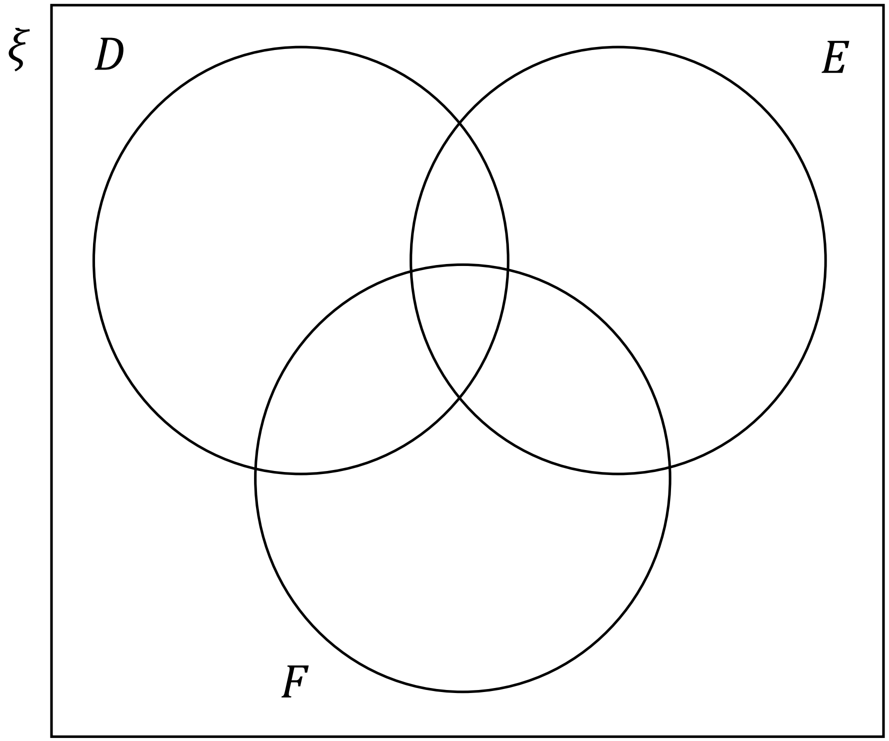


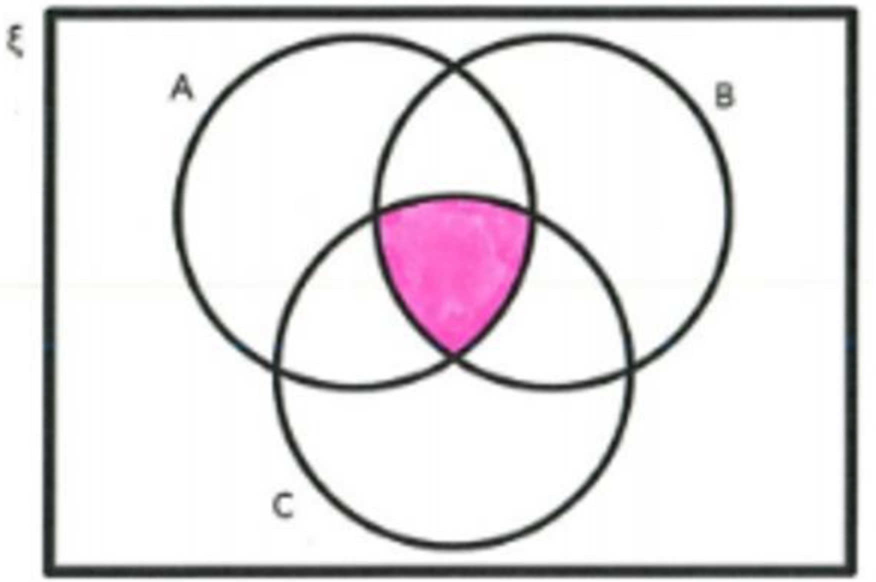
Worked example	Your turn
On the Venn diagram, shade the region representing: $(C \cup D)'$ or $C' \cap D'$	On the Venn diagram, shade the region representing: $(A \cup B)'$ or $A' \cap B'$





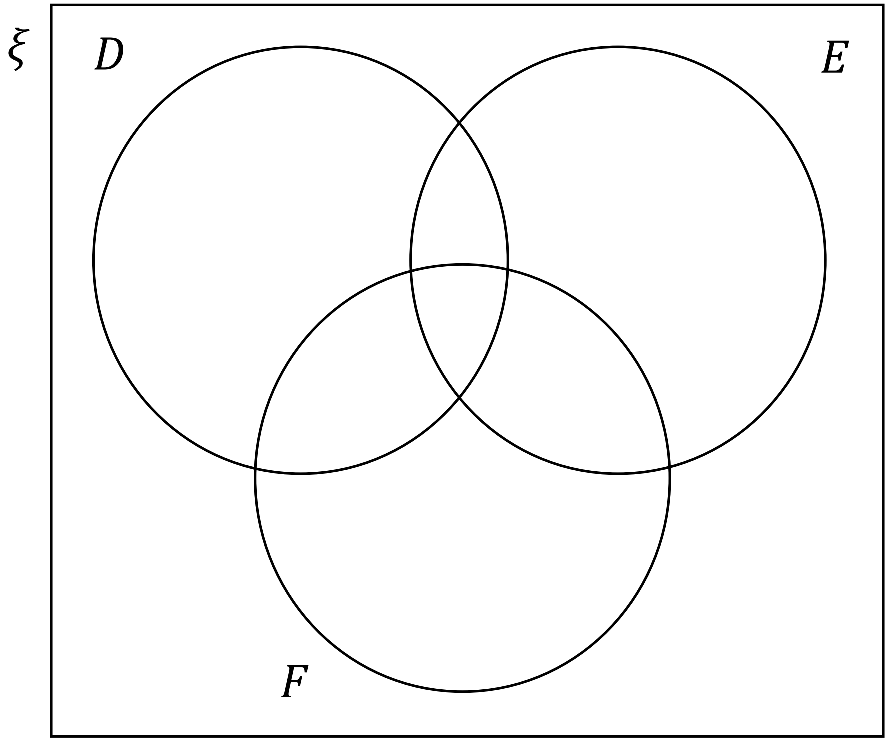
Worked example	Your turn
On the Venn diagram, shade the region representing: $D \cap E \cap F$	On the Venn diagram, shade the region representing: $A \cap B \cap C$

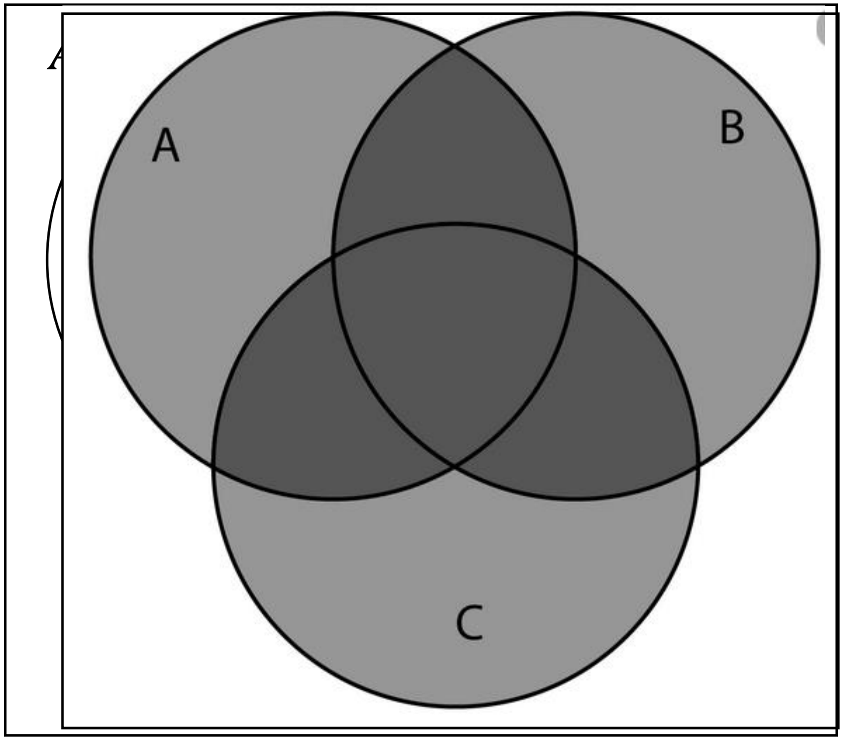




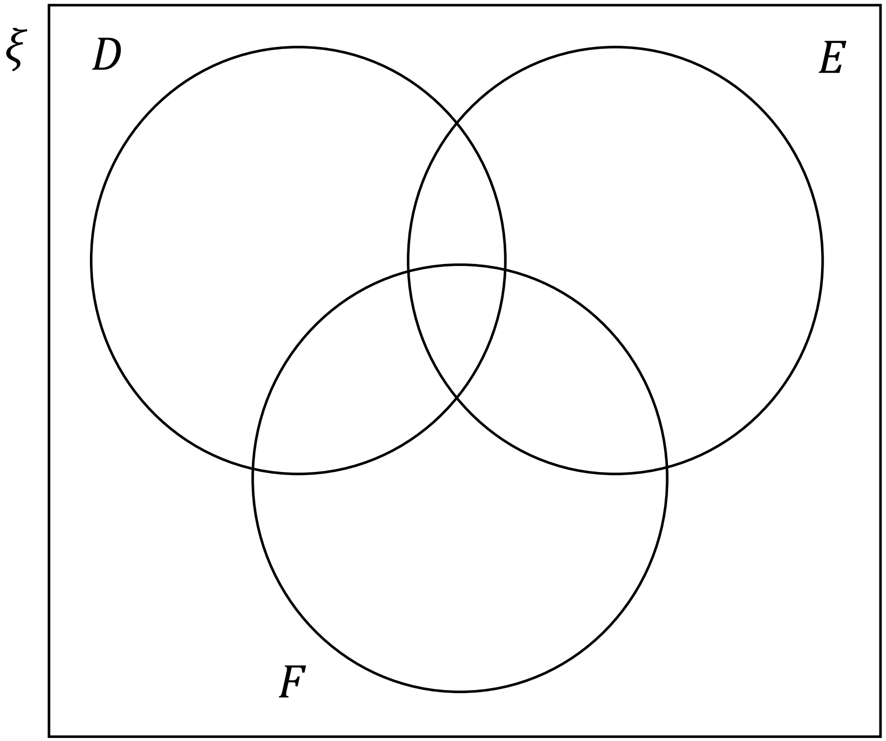
C

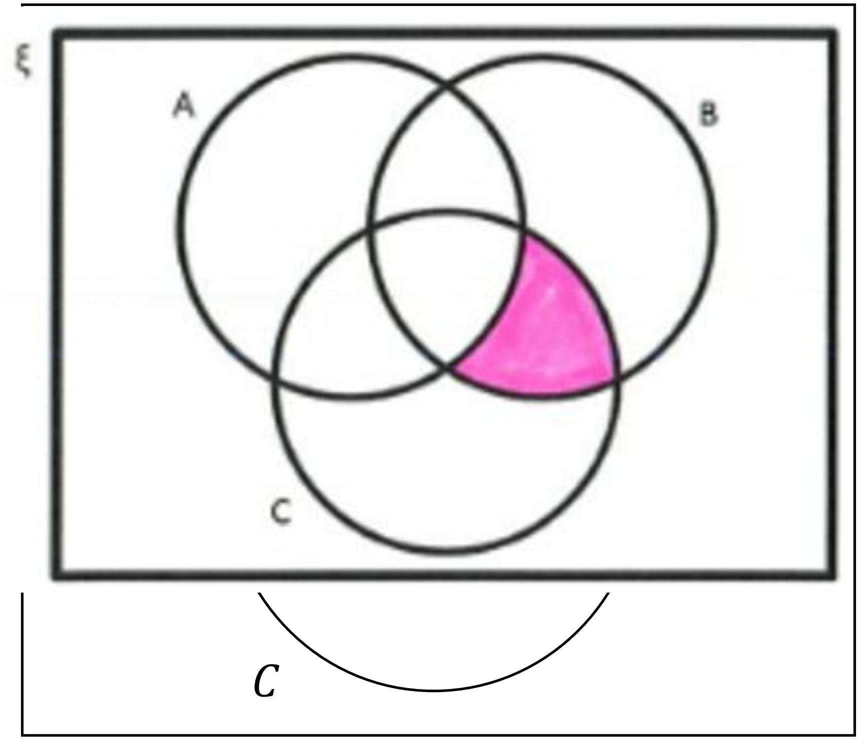
Worked example	Your turn
On the Venn diagram, shade the region representing: $D \cup E \cup F$	On the Venn diagram, shade the region representing: $A \cup B \cup C$



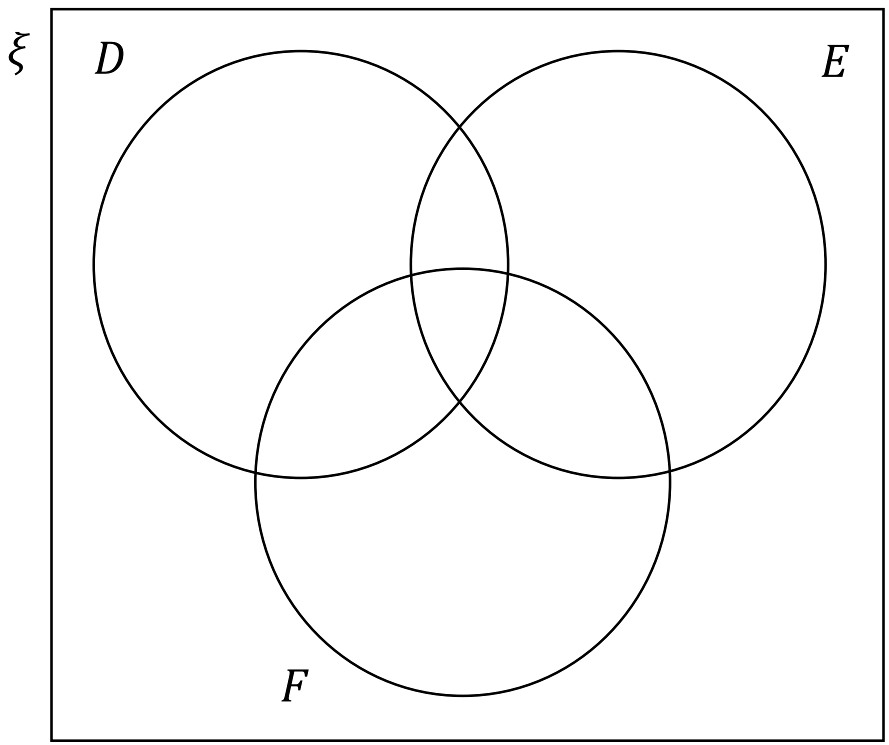


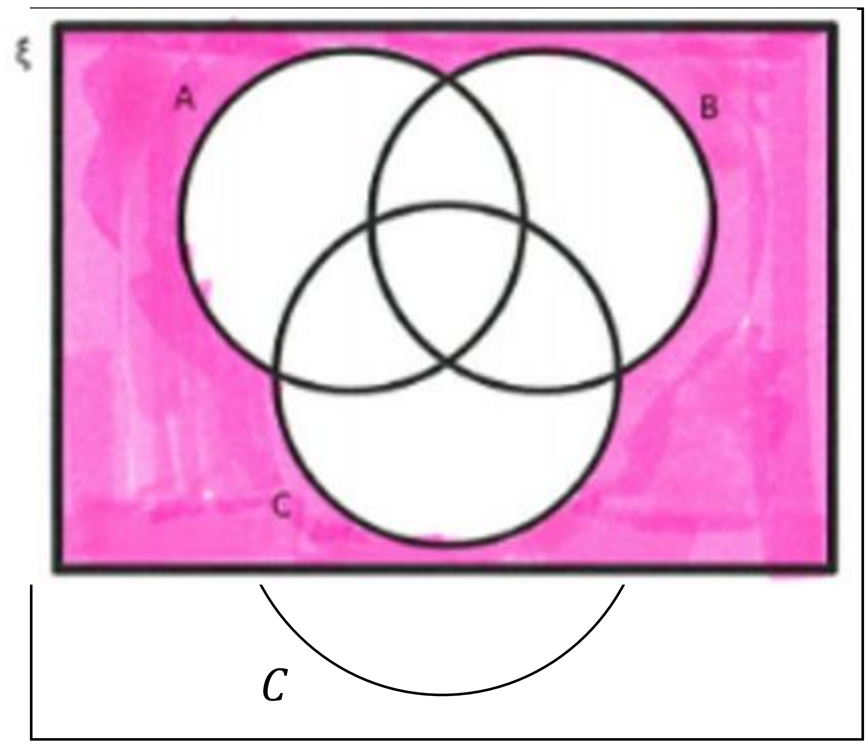
Worked example	Your turn
On the Venn diagram, shade the region representing: $D \cap E' \cap F$	On the Venn diagram, shade the region representing: $A' \cap B \cap C$



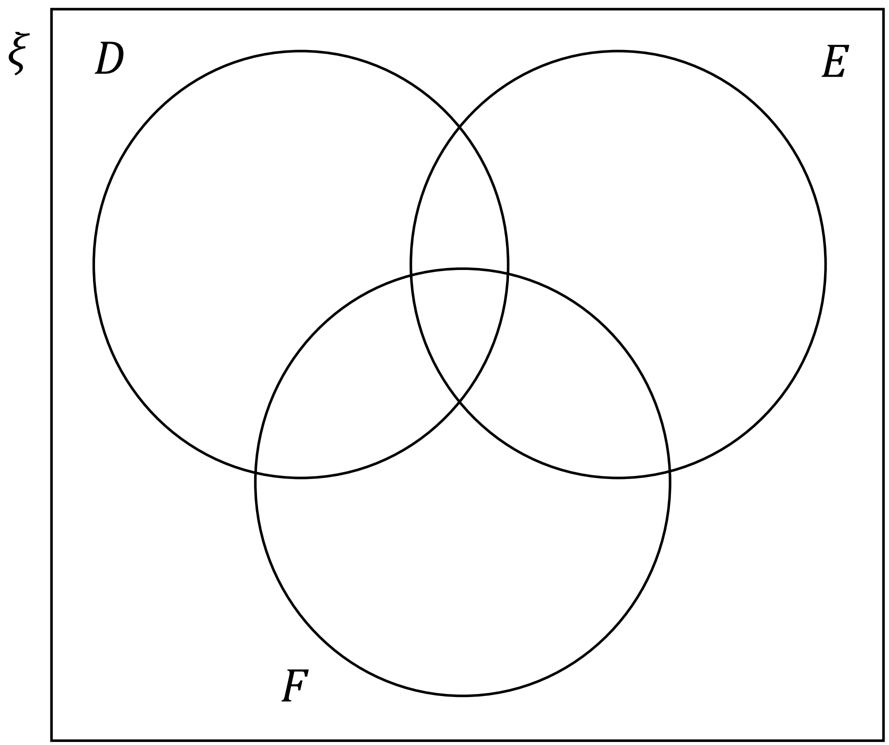


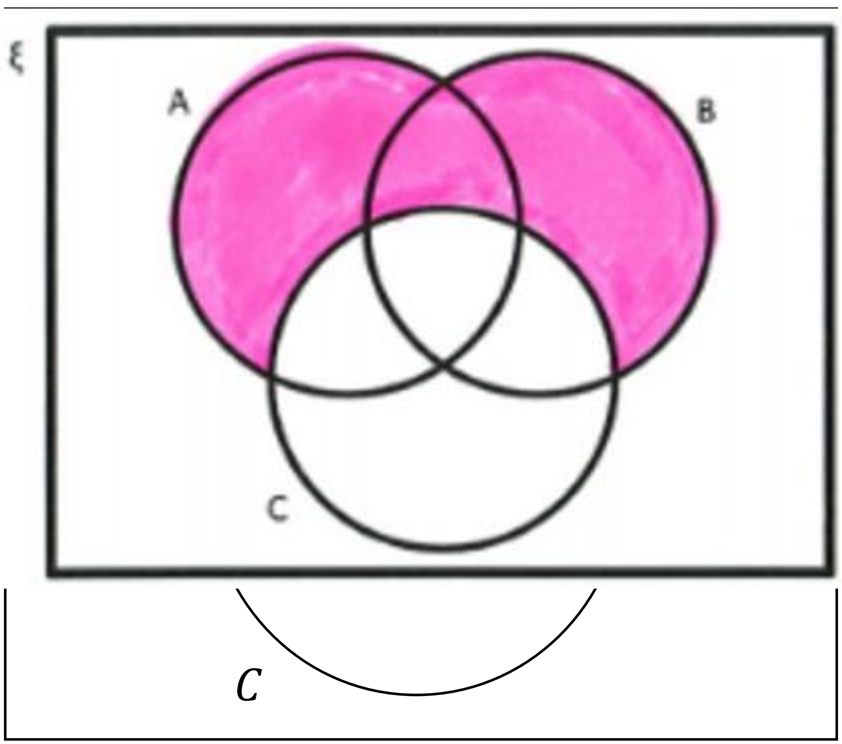
Worked example	Your turn
On the Venn diagram, shade the region representing: $(D \cup E \cup F)'$	On the Venn diagram, shade the region representing: $(A \cup B \cup C)'$





Worked example	Your turn
On the Venn diagram, shade the region representing: $(D \cup E) \cap F'$	On the Venn diagram, shade the region representing: $(A \cup B) \cap C'$

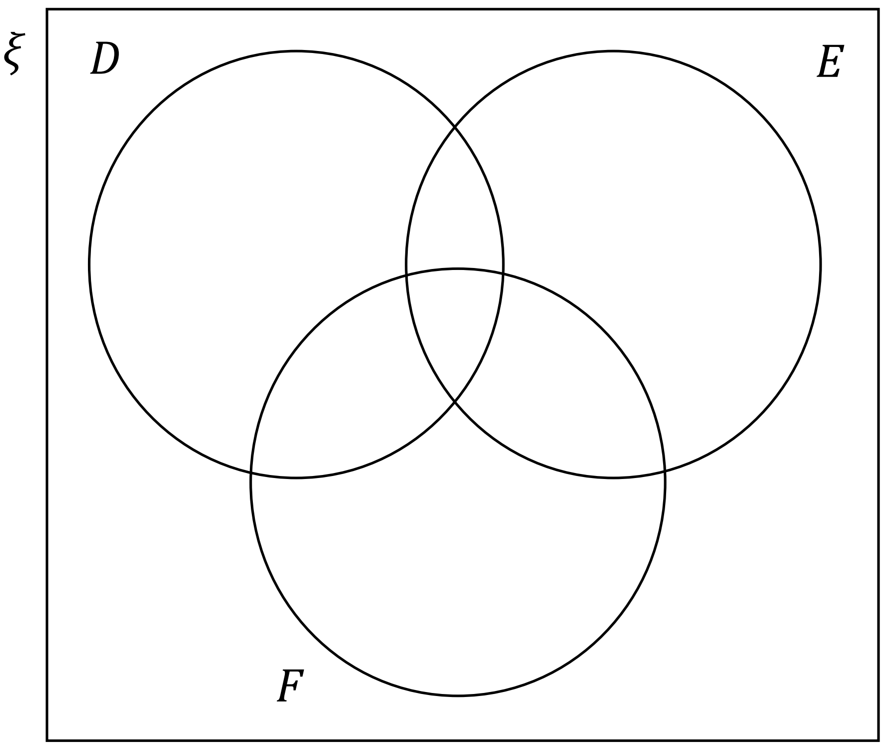




Worked example

On the Venn diagram, shade the region representing:

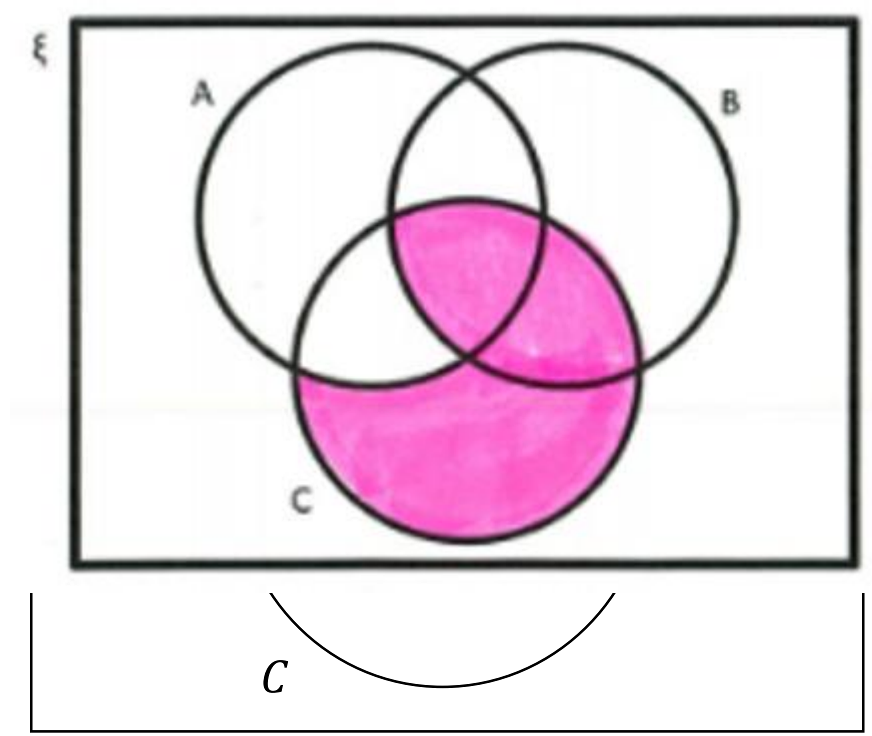
$$(D \cap F) \cup (E \cap F')$$



Your turn

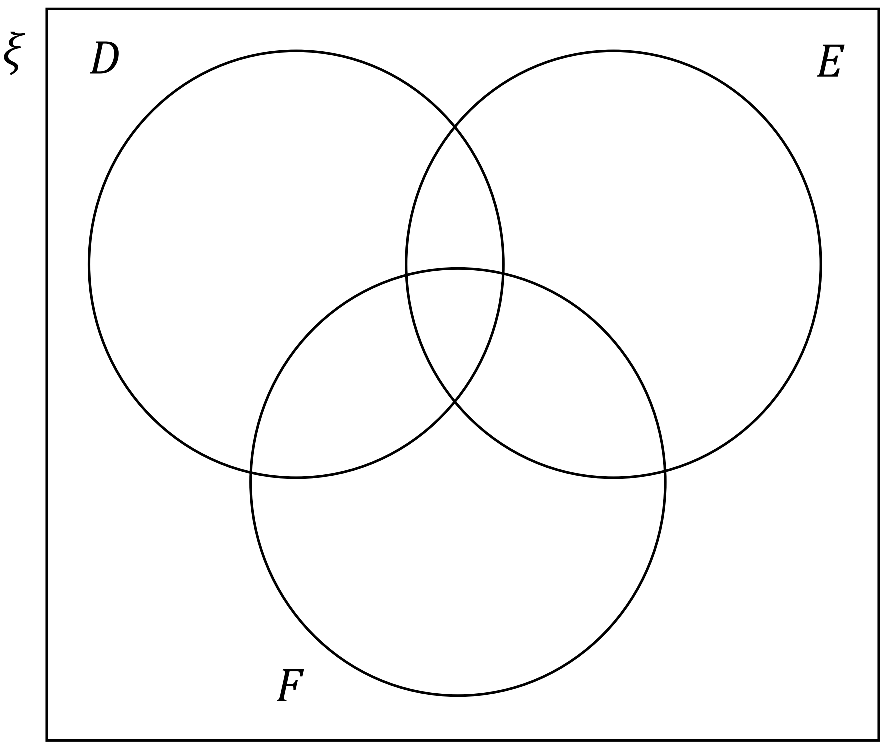
On the Venn diagram, shade the region representing:

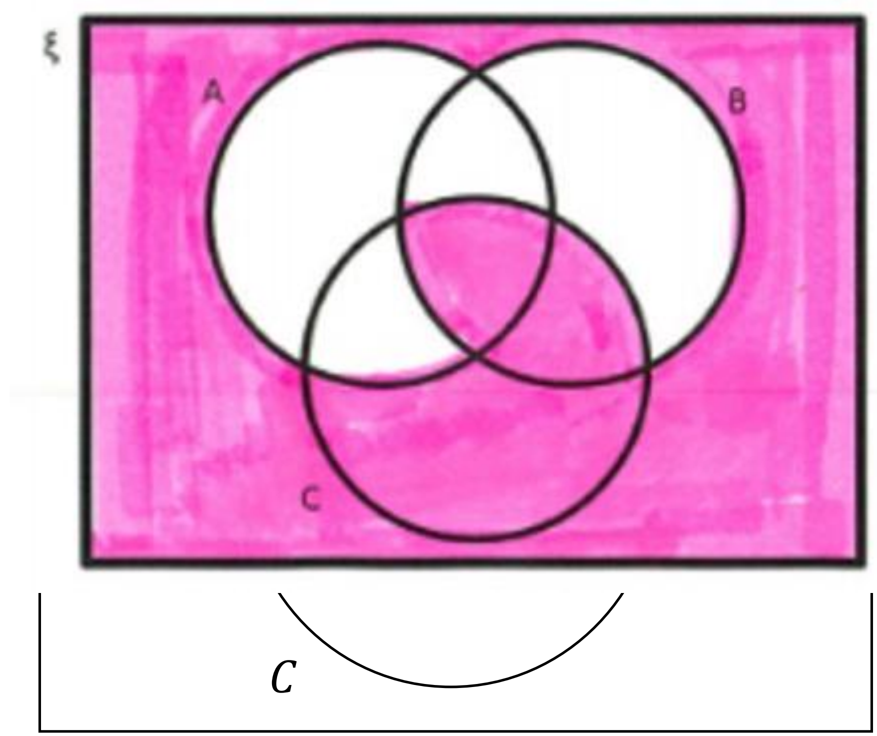
$$(B \cap C) \cup (A' \cap C)$$



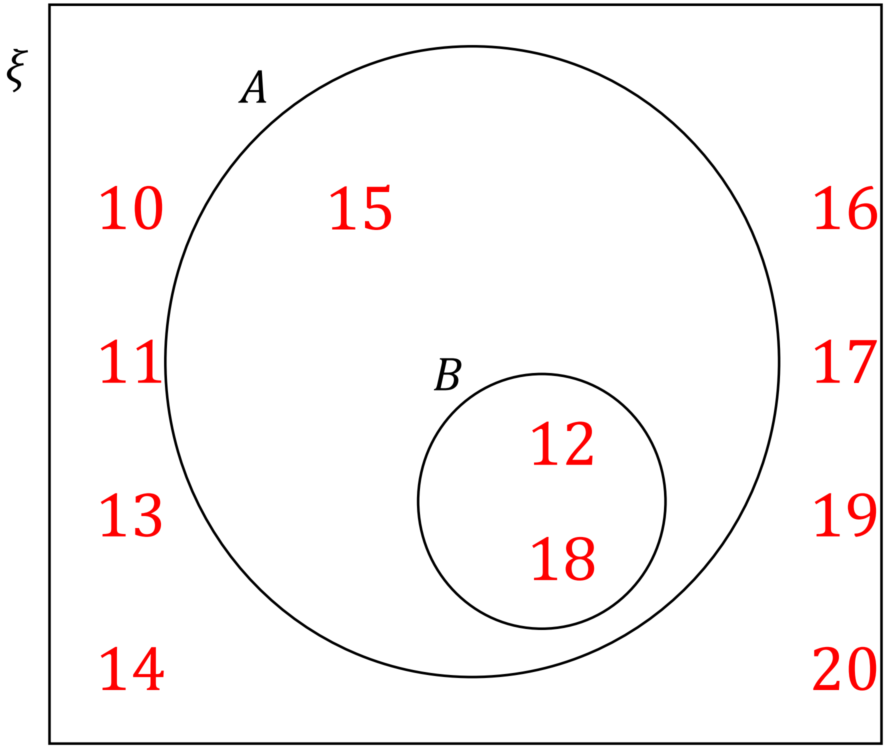
Worked example	Your turn
On the Venn diagram, shade the region representing: $(D' \cup F) \cap (D \cup E')$	On the Venn diagram, shade the region representing: $(A' \cup B) \cap (B' \cup C)$

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





Worked example	Your turn
Represent as a Venn diagram: ξ =Positive integers between 1 and 10 inclusive A = {Multiples of 2} B = {Multiples of 4}	Represent as a Venn diagram: ξ =Positive integers between 10 and 20 inclusive A = {Multiples of 3} B = {Multiples of 6}



Worked example	Your turn
In a group of 28 scientists: • 20 have degrees in Physics. • 18 have degrees in Chemistry. • Some have degrees in both • 4 scientists have degrees which are neither Physics nor Chemistry. Find the number of scientists who have degrees in both Physics and Chemistry.	In a group of 30 mathematicians: • 15 have studied Calculus. • 22 have studied Topology. • Some have studied both. • 3 mathematicians have not yet studied either Calculus or topology Find the number of mathematicians who have studied both Calculus and Topology. 10

2.2) Conditional probability

Worked example	Your turn

Worked example

A group is made up of 62 men and 48 women. 32 of the men and 46 of the women are right-handed.

a) Draw a two-way table to show this information.

b) One person is chosen at random. Find:

i) $P(\text{right-handed})$

ii) $P(\text{right-handed} \mid \text{woman})$

iii) $P(\text{man} \mid \text{right-handed})$

Your turn

A group is made up of 42 men and 68 women. 36 of the women and 24 of the men are left-handed.

a) Draw a two-way table to show this information.

b) One person is chosen at random. Find:

i) $P(\text{left-handed})$

ii) $P(\text{left-handed} \mid \text{man})$

iii) $P(\text{woman} \mid \text{left-handed})$

a)

	L	**L′**
M	24	18
W	36	32

b)

i) $\frac{60}{110} = \frac{6}{11}$

ii) $\frac{24}{42} = \frac{4}{7}$

iii) $\frac{36}{60} = \frac{3}{5}$

Worked example

The following two-way table shows what foreign language students in Year 9 study.
G is the event that the student is a girl.
S is the event they chose Spanish as their language.

	$\boldsymbol{G}$	$\boldsymbol{G'}$
$\boldsymbol{S}$	18	34
$\boldsymbol{S'}$	16	32

Determine:
a) $P(S'|G)$
b) $P(G'|S)$

Your turn

The following two-way table shows what foreign language students in Year 9 study.
B is the event that the student is a boy.
F is the event they chose French as their language.

	$\boldsymbol{B}$	$\boldsymbol{B'}$
$\boldsymbol{F}$	14	38
$\boldsymbol{F'}$	26	22

Determine:
a) $P(F|B')$
b) $P(B|F')$

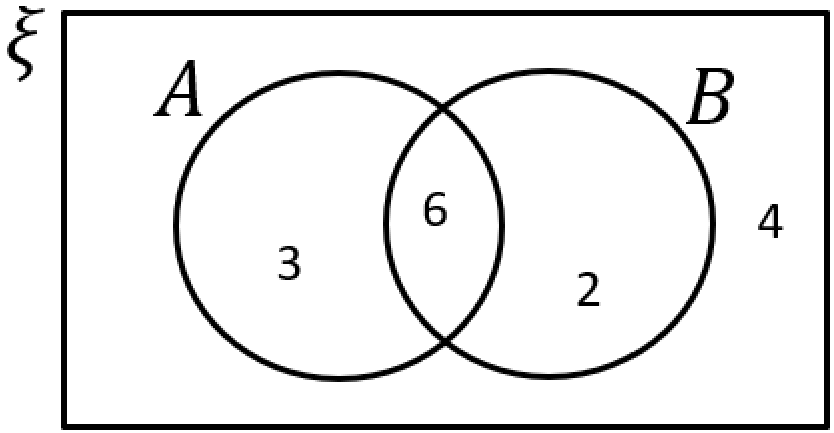
a) $\frac{38}{60}$
b) $\frac{26}{48}$

2.3) Conditional probabilities in Venn diagrams

Chapter CONTENTS

Worked example

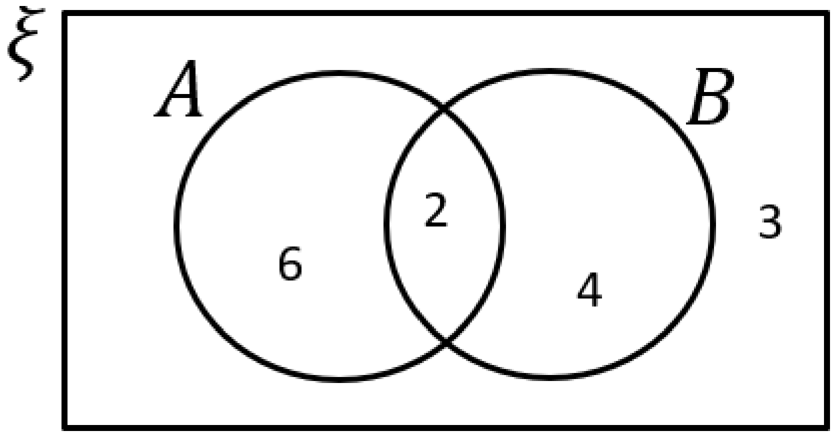
Using the Venn diagram, determine:



a) $P(A|B)$
b) $P(A'|B')$
c) $P(A|A \cup B)$

Your turn

Using the Venn diagram, determine:



a) $P(A|B)$
b) $P(A'|B')$
c) $P(B|A \cup B)$

a) $\frac{1}{3}$
b) $\frac{1}{3}$
c) $\frac{1}{2}$

Worked example	Your turn
Given that $P(X) = 0.7$ and $P(X \cap Y) = 0.2$, determine: $$P(Y\|X)$$	Given that $P(A) = 0.5$ and $P(A \cap B) = 0.3$, determine: $$P(B\|A)$$ $$0.6$$

Worked example	Your turn
Given that $P(B) = 0.7$ and $P(A \cap B) = 0.2$, determine: $$P(A'\|B)$$	Given that $P(Y) = 0.6$ and $P(X \cap Y) = 0.4$, determine: $$P(X'\|Y)$$ $$\frac{1}{3}$$

Worked example	Your turn
Given that $P(X) = 0.4$, $P(Y) = 0.4$ and $P(X \cap Y) = 0.3$, determine: $$P(Y\|X')$$	Given that $P(A) = 0.5$, $P(B) = 0.5$ and $P(A \cap B) = 0.4$, determine: $$P(B\|A')$$ 0.2

Worked example	Your turn
Given that	Given that

Worked example

Given that

$$P(E) = 0.24$$
$$P(E \cup F) = 0.79$$
$$P(E \cap F') = 0.12$$

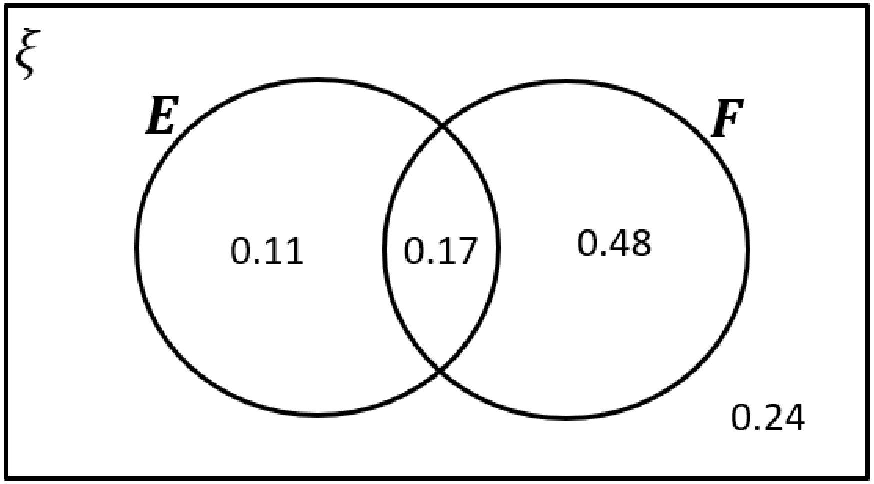
Draw a Venn diagram to illustrate the probabilities of each region.

Your turn

Given that

$$P(E) = 0.28$$
$$P(E \cup F) = 0.76$$
$$P(E \cap F') = 0.11$$

Draw a Venn diagram to illustrate the probabilities of each region.



Worked example	Your turn
Given that $$P(A \cap B') = 0.3$$ $$P(A \cup B) = 0.65$$ Determine: a) $P(B)$ b) $P(A' \cap B')$	Given that $$P(A \cap B') = 0.4$$ $$P(A \cup B) = 0.75$$ Determine: a) $P(B)$ b) $P(A' \cap B')$ a) 0.35 b) 0.25

Worked example

Given that

$$P(A') = 0.6,$$
$$P(B') = 0.15$$
$$P(A \cap B') = 0.05$$

Determine:

a) $P(A \cup B')$

b) $P(B|A')$

Your turn

Given that

$$P(A') = 0.7,$$
$$P(B') = 0.2$$
$$P(A \cap B') = 0.1$$

Determine:

a) $P(A \cup B')$

b) $P(B|A')$

a) 0.4

b) $\frac{6}{7}$

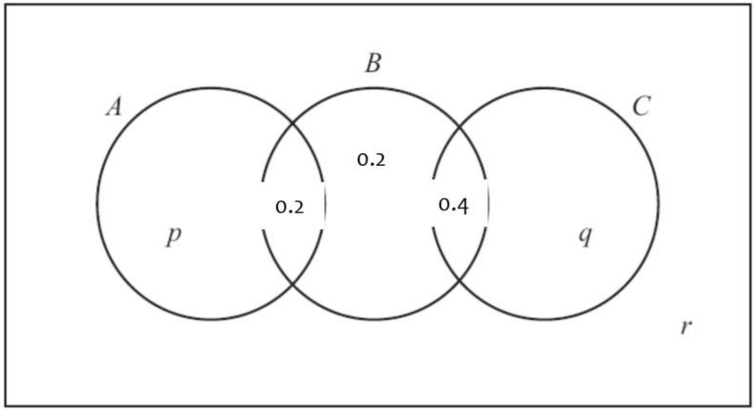
Worked example

The events A and B are independent.

$P(B|C) = \frac{10}{11}$,

a) Find the values of p, q and r

b) Find $P(A \cup C|B)$



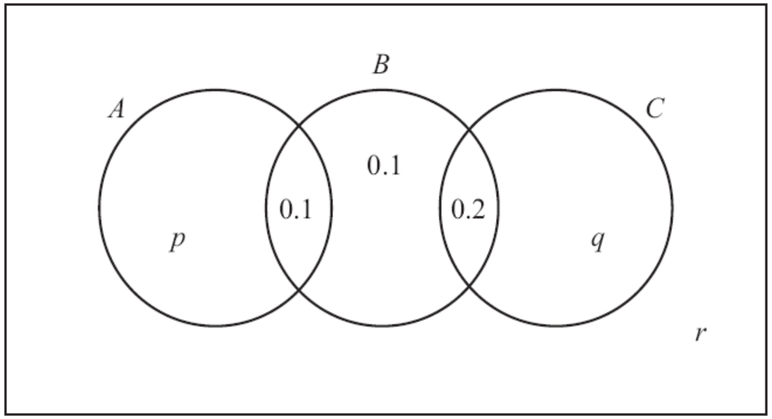
Your turn

The events A and B are independent.

$P(B|C) = \frac{5}{11}$,

a) Find the values of p, q and r

b) Find $P(A \cup C|B)$



a) $p = 0.15, q = 0.24, r = 0.21$

b) 0.75

2.4) Probability formulae

Worked example	Your turn
Two events A and B are independent. $$P(A) = \frac{1}{5}$$ $$P(B) = \frac{1}{6}$$ Find: a) $P(A \cap B)$ b) $P(B\|A)$ c) $P(A \cup B)$	Two events A and B are independent. $$P(A) = \frac{1}{3}$$ $$P(B) = \frac{1}{4}$$ Find: a) $P(A \cap B)$ b) $P(A\|B)$ c) $P(A \cup B)$ a) $\frac{1}{12}$ b) $\frac{1}{3}$ c) $\frac{1}{2}$

Worked example	Your turn
A and B are two events such that $$P(A) = 0.3$$ $$P(B) = 0.4$$ $$P(A\|B) = 0.2$$ Find: a) $P(A \cap B)$ b) $P(B\|A)$ c) $P(A \cup B)$	C and D are two events such that $$P(C) = 0.2$$ $$P(D) = 0.6$$ $$P(C\|D) = 0.3$$ Find: a) $P(C \cap D)$ b) $P(D\|C)$ c) $P(C \cup D)$ a) 0.18 b) 0.9 c) 0.62

Worked example	Your turn
C and D are two independent events such that $$P(C)=\frac{1}{3}$$ $$P(C\cup D)=\frac{3}{5}$$ Find: a) $P(D)$ b) $P(C'\cap D)$ c) $P(D'\|C)$	A and B are two independent events such that $$P(A)=\frac{1}{4}$$ $$P(A\cup B)=\frac{2}{3}$$ Find: a) $P(B)$ b) $P(A'\cap B)$ c) $P(B'\|A)$ a) $\frac{5}{9}$ b) $\frac{5}{12}$ c) $\frac{4}{9}$

Worked example

There are three events: A, B and C.
A and C are mutually exclusive.
A and B are independent.

$$P(A) = 0.4$$
$$P(C) = 0.3$$
$$P(A \cup B) = 0.6$$

Find:

a) $P(A|B)$

b) $P(A \cup C)$

c) $P(B)$

Your turn

There are three events: A, B and C.
A and B are mutually exclusive.
A and C are independent.

$$P(A) = 0.2$$
$$P(B) = 0.4$$
$$P(A \cup C) = 0.7$$

Find:

a) $P(A|C)$

b) $P(A \cup B)$

c) $P(C)$

a) 0.2

b) 0.6

c) 0.625

Worked example	Your turn
Write out the law for conditional probability:	Write out the law for conditional probability:
“Given John runs to school, find the probability that he’s not late…”	“Given Bob walks to school, find the probability that he’s not late…” $$P(L'\|W) = \frac{P(L' \cap W)}{P(W)} = \cdots$$
“Given an even number is rolled on a die, find the probability that the number is prime…”	

Worked example

Write out the relevant probability laws:

- C and D are independent events.

- C and D are mutually exclusive events.

Your turn

Write out the law for independent events:

- A and B are independent events.

$$P(A \cap B) = P(A)P(B)$$
$$P(A|B) = P(A)$$

- C and D are mutually exclusive events.

$$P(C \cap D) = 0$$
$$P(C \cup D) = P(C) + P(D)$$

2.5) Tree diagrams

Chapter CONTENTS

Worked example	Your turn
A bag contains 7 green beads and 3 yellow beads. A bead is taken from the bag at random, the colour is recorded and it is not replaced. A second bead is then taken from the bag and its colour recorded. Given that both balls are the same colour, find the probability that they are both green.	A bag contains 6 green beads and 4 yellow beads. A bead is taken from the bag at random, the colour is recorded and it is not replaced. A second bead is then taken from the bag and its colour recorded. Given that both balls are the same colour, find the probability that they are both yellow. $\frac{2}{7}$

Worked example	Your turn
There are two bags. Bag A contains 5 red balls and 5 blue balls Bag B contains 3 red balls and 6 blue balls. One ball is taken from bag A and placed in bag B. Then one ball is taken from bag B. Find the probability that: a) A blue ball is taken from bag B. b) Given that a blue ball is taken from bag B, the ball taken from bag A was also blue.	There are two bags. Bag A contains 5 red balls and 5 blue balls Bag B contains 3 red balls and 6 blue balls. One ball is taken from bag A and placed in bag B. Then one ball is taken from bag B. Find the probability that: a) A red ball is taken from bag B. b) Given that a red ball is taken from bag B, the ball taken from bag A was also red. a) $\frac{7}{20}$ b) $\frac{4}{7}$

Worked example	Your turn
On a randomly chosen day the probability that a person travels to work by bus, train or motorbike is $\frac{2}{5}, \frac{1}{4}$ and $\frac{7}{20}$ respectively. The probability of being late when using these methods of travel is $\frac{1}{3}, \frac{2}{7}$ and $\frac{3}{8}$ respectively. Given that the person is late, find the probability that they did not travel by bus.	On a randomly chosen day the probability that a person travels to school by car, bicycle or on foot is $\frac{1}{2}, \frac{1}{6}$ and $\frac{1}{3}$ respectively. The probability of being late when using these methods of travel is $\frac{1}{5}, \frac{2}{5}$ and $\frac{1}{10}$ respectively. Given that the person is late, find the probability that they did not travel on foot. $\frac{5}{6}$

Worked example	Your turn
A bag contains 9 blue balls and 3 red balls. A ball is selected at random from the bag and its colour is recorded. The ball is not replaced. A second ball is selected at random and its colour is recorded. Find the probability that: a) The second ball selected is blue b) Both balls selected are blue, given that the second ball selected is blue.	A bag contains 9 blue balls and 3 red balls. A ball is selected at random from the bag and its colour is recorded. The ball is not replaced. A second ball is selected at random and its colour is recorded. Find the probability that: a) The second ball selected is red b) Both balls selected are red, given that the second ball selected is red. a) $\frac{1}{4}$ b) $\frac{2}{11}$

Worked example	Your turn
In bag A there are 2 white and 5 red counters. In bag B there are 7 white counters and 3 red counters. A person takes at random one counter from A and one counter from B. Find the probability that the counters are the same colour	In bag A there are 5 white and 2 red counters. In bag B there are 3 white counters and 7 red counters. A person takes at random one counter from A and one counter from B. Find the probability that the counters are the same colour $\frac{29}{70}$

Worked example	Your turn
In bag A there are 2 white and 5 red counters. In bag B there are 7 white counters and 3 red counters. A person takes at random one counter from A and one counter from B. Find the probability that the counters are different colours	In bag A there are 5 white and 2 red counters. In bag B there are 3 white counters and 7 red counters. A person takes at random one counter from A and one counter from B. Find the probability that the counters are different colours $\frac{41}{70}$

Worked example	Your turn
A person plays a game of tennis and then a game of golf. They can only win or lose each game. The probability of winning tennis is 0.3 The probability of winning golf is 0.7 The results of each game are independent of each other. Calculate the probability that the person wins at least one game	A person plays a game of tennis and then a game of golf. They can only win or lose each game. The probability of winning tennis is 0.6 The probability of winning golf is 0.35 The results of each game are independent of each other. Calculate the probability that the person wins at least one game $\frac{37}{50} = 0.74$

Worked example	Your turn

Worked example

The table shows 100 students, who each study one language.
Two students are chosen at random.

	French	**German**
Female	26	30
Male	10	34

Calculate the probability that the two chosen students study the same language.

Your turn

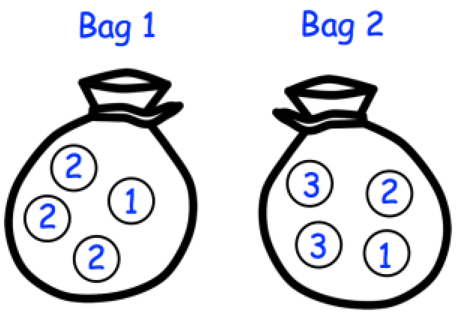
The table shows 50 students, who each study one language.
Two students are chosen at random.

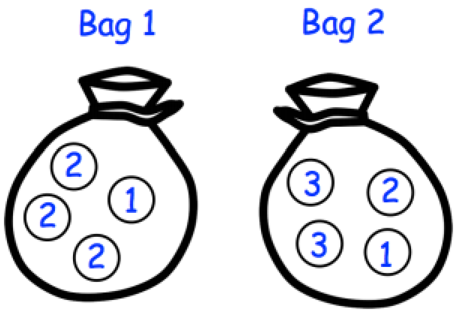
	Japanese	**Spanish**
Female	13	15
Male	5	17

Calculate the probability that the two chosen students study the same language.

$$\frac{64}{245}$$

Worked example	Your turn
There are two bags with numbered discs as shown.	There are two bags with numbered discs as shown.





Worked example	Your turn
A person chooses a disc at random from bag 1. If it is labelled 2, he puts the disc in bag 2. If it is labelled 1, he does not put the disc in bag 2. He then chooses a disc at random from bag 2. He then adds the numbers of the two discs he selected to give his score. Find the probability that his score is 5.	A person chooses a disc at random from bag 1. If it is labelled 1, he puts the disc in bag 2. If it is labelled 2, he does not put the disc in bag 2. He then chooses a disc at random from bag 2. He then adds the numbers of the two discs he selected to give his score. Find the probability that his score is 4. $$\frac{23}{80}$$