



EXAM PAPERS PRACTICE

Probability

Model Answer

Simon has two boxes of cards.

In one box, each card has one shape drawn on it that is either a triangle or a square.

In the other box, each card is coloured either red or blue.

Simon picks a card from each box at random.

The probability of picking a triangle card is t .

The probability of picking a red card is r .

Complete the table for the cards that Simon picks, writing each probability in terms of r and t .

Event	Probability
Triangle and red	tr
Square and red	$(1 - t)r$
Triangle and blue	$t(1 - r)$
Square and blue	$(1 - t)(1 - r)$

[3]

Hattie has a box of coloured pens.
She takes a pen at random from the box.
The probability that she takes a red pen is 0.4 .

- (a) Work out the probability that she does not take a red pen.

[1]

The probability that Hattie does not take a red pen is $1 - 0.4 = 0.6$.

- (b) The box contains only blue, red and green pens.
There are 15 blue pens and 15 green pens.

Complete the table.

Colour of pen	Blue	Red	Green
Number of pens	15	6	15
Probability	0.5	0.4	0.5

[2]


Exam Papers Practice

Question 4

Dan either walks or cycles to school.
The probability that he cycles to school is $\frac{1}{3}$.

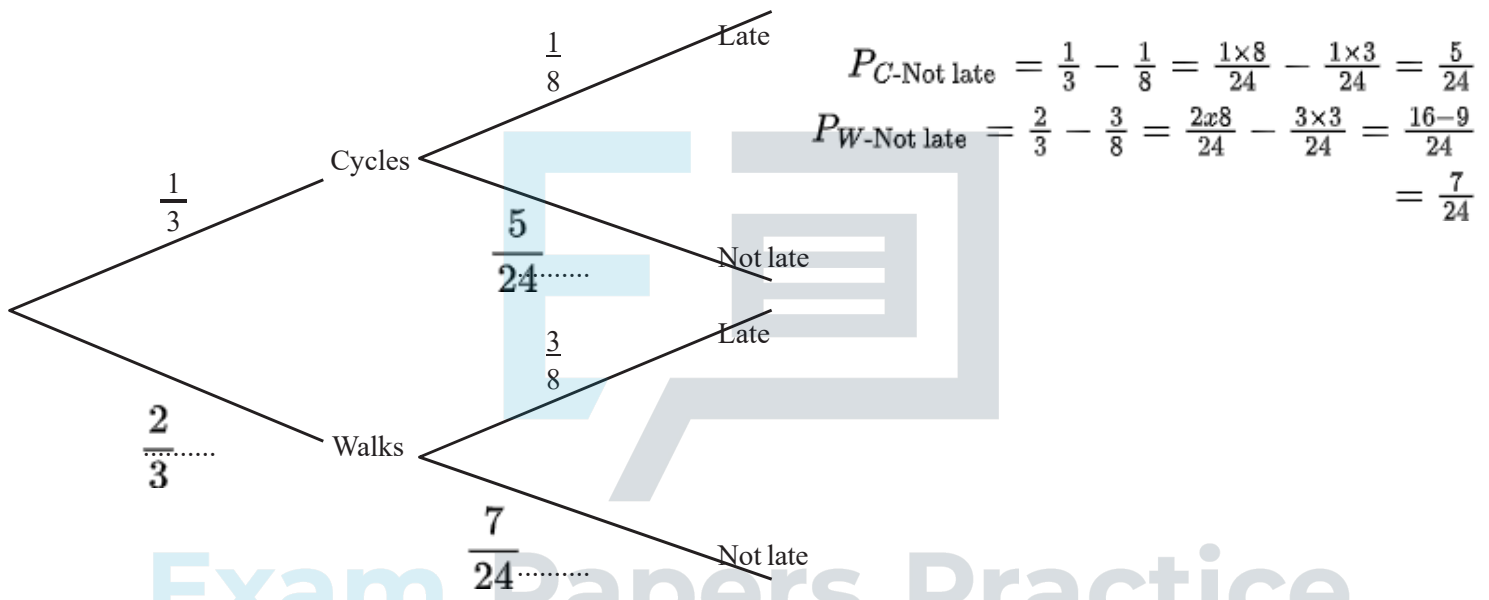
(a) Write down the probability that Dan walks to school.

$$P = 1 - \frac{1}{3} = \frac{2}{3}$$

(b) When Dan cycles to school the probability that he is late is $\frac{1}{8}$.

When Dan walks to school the probability that he is late is $\frac{3}{8}$.

Complete the tree diagram.



(c) Calculate the probability that

(i) Dan cycles to school and is late,

$$P = P_{\text{cycles}} \times P_{\text{late}} = \frac{1}{3} \times \frac{1}{8} = \frac{1}{24}$$

(ii) Dan is not late.

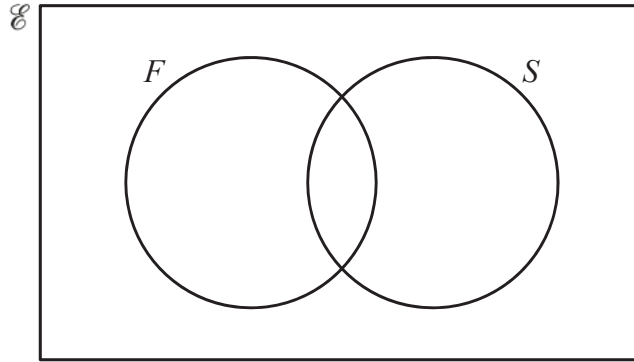
$$\begin{aligned}
 P = P_{\text{Not late}} &= \frac{1}{3} \times \frac{5}{24} + \frac{2}{3} \times \frac{7}{24} \\
 &= \frac{5 + 14}{72} \\
 &= \frac{19}{72}
 \end{aligned}$$

Question 5



EXAM PAPERS PRACTICE

(a) In this part, you may use this Venn diagram to help you answer the questions.



In a class of 30 students, 25 study French (F), 18 study Spanish (S). One student does not study French or Spanish.

(i) Find the number of students who study French and Spanish.

$$[25 - x] + [x] + [18 - x] + [1] = 30$$

$$44 - 30 = x$$

14

[2]

(ii) One of the 30 students is chosen at random.

Find the probability that this student studies French but not Spanish.

11/30

[1]

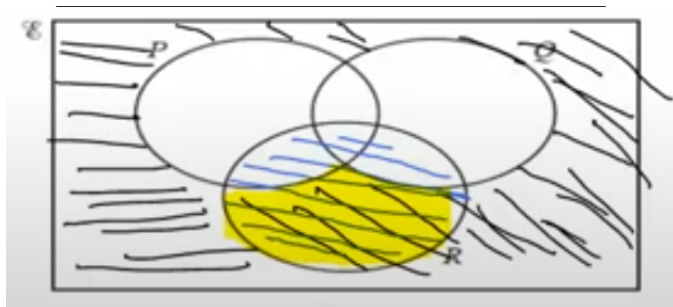
(iii) A student who does not study Spanish is chosen at random.

Find the probability that this student studies French.

11/12

[1]

(b)

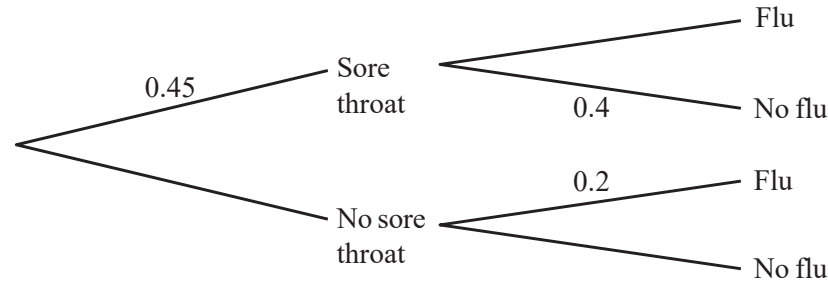


On this Venn diagram, shade the region $R \cap (P \cup Q)$.

[1]



In a flu epidemic 45% of people have a sore throat.
 If a person has a sore throat the probability of not having flu is 0.4.
 If a person does not have a sore throat the probability of having flu is 0.2.



Calculate the probability that a person chosen at random has flu.

[4]

$$\begin{aligned}
 P(\text{having flu}) &= [0.45 \times (1 - 0.4)] + [(1 - 0.45) \times 0.2] \\
 &= (0.45 \times 0.6) + (0.55 \times 0.2) \\
 &= 0.27 + 0.11 \\
 &= 0.38
 \end{aligned}$$

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Rooms in a hotel are numbered from 1 to 19.
Rooms are allocated at random as guests arrive.

- (a) What is the probability that the first guest to arrive is given a room which is a prime number?
(1 is not a prime number.)

Total number of rooms: 19, the number of prime numbers is: 8.

The probability of $\frac{8}{19}$ [2]

- (b) The first guest to arrive is given a room which is a prime number.
What is the probability that the second guest to arrive is given a room which is a prime number?

Exclude the first guest. number of rooms remaining: 18 [1]

the number of primenumbers is: 7 so the probability of: $\frac{7}{18}$



Exam Papers Practice

In a survey of 60 cars, the type of fuel that they use is recorded in the table below.

Each car only uses one type of fuel.

Petrol	Diesel	Liquid Hydrogen	Electricity
40	12	2	6

(a) Write down the mode. [1]

The mode is the most frequent fuel type, which is Petrol. It is used in 40 out of 60 cars.

(b) Olav drew a pie chart to illustrate these figures.

Calculate the angle of the sector for Diesel. [2]

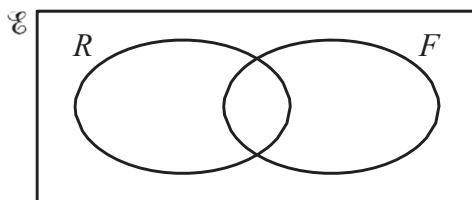
The answer is 72 degrees.

Exam Papers Practice

(c) Calculate the probability that a car chosen at random uses Electricity.

Write your answer as a fraction in its simplest form. [2]

$$\text{Electricity is } \frac{6}{60} = \frac{1}{10}.$$



In the Venn diagram, $E = \{\text{students in a survey}\}$, $R = \{\text{students who like rugby}\}$ and $F = \{\text{students who like football}\}$.

$$n(E) = 20$$

$$n(R \cup F) = 17$$

$$n(R) = 13$$

$$n(F) = 11$$

(a) Find

(i) $n(R \cap F)$,

[1]

$$13 + 11 - 17 = 24 - 17$$

$$= 7$$

(ii) $n(R' \cap F)$. 4

[1]

(b) A student who likes rugby is chosen at random.

Find the probability that this student also likes football.

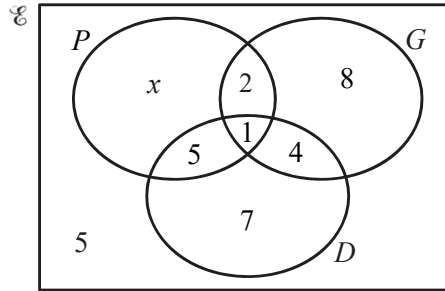
[1]

$$P = \frac{n(R \cap F)}{n(R)} = \frac{7}{13}$$

A teacher asks 36 students which musical instruments they play.

- $P = \{\text{students who play the piano}\}$
- $G = \{\text{students who play the guitar}\}$
- $D = \{\text{students who play the drums}\}$

The Venn diagram shows the results.



(a) Find the value of x .

[1]

4

(b) A student is chosen at random.

Find the probability that this student

(i) plays the drums but not the guitar,

[1]

Exam Papers Practice

(ii) plays only 2 different instruments.

[1]

$\frac{11}{36}, 0.306$

(c) A student is chosen at random from those who play the guitar.

Find the probability that this student plays no other instrument.

[1]

$\frac{7}{22}$



	Boys	Girls	Total
Asia	62	28	90
Europe	35	45	80
Africa	17	17	34
Total	114	90	255

For a small international school, the holiday destinations of the 255 students are shown in the table.

(a) Complete the table. [3]

(b) What is the probability that a student chosen at random is a girl going on holiday to Europe?

$$45/255 * 100\% = 17.6\%$$

[1]

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Xsara throws a ball three times at a target.

Each time she throws the ball, the probability that she hits the target is 0.2.

Calculate the probability that she does **not** hit the target in any of the three throws.

[2]

$$P(\text{not}) = 1 - 0.2 = 0.8$$

$$0.8 \times 0.8 \times 0.8 = 0.512$$



Exam Papers Practice



Two unbiased spinners are used in a game.

One spinner is numbered from 1 to 6 and the other is numbered from 1 to 3.

The scores on each spinner are **multiplied** together. The table below shows the possible outcomes.

	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18

(a) Find the probability that the outcome is even.

[1]

18 sets of data

12 even

$$P = \frac{12}{18} = \frac{2}{3}$$

[2]

(b) When the outcome is even, find the probability that it is also greater than 11.

Four are greater than eleven

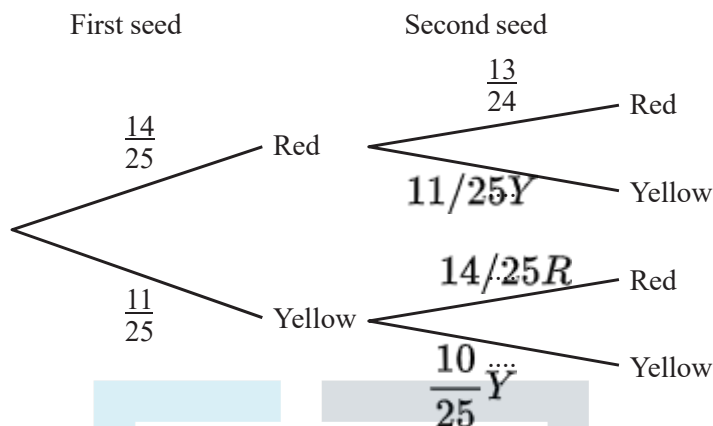
$$p = \frac{4}{12} = \frac{1}{3}$$

Exam Papers Practice



A gardener plants seeds from a packet of 25 seeds.
14 of the seeds will give red flowers and 11 will give yellow flowers.
The gardener chooses two seeds at random.

- (a) Write the missing probabilities on the tree diagram below. [2]



- (b) What is the probability that the gardener chooses two seeds which will give

- (i) two red flowers, [2]

two seeds with red flowers

$$P = \frac{14}{25} \times \frac{13}{24} = \frac{182}{600} = \frac{91}{300}$$

- (ii) two flowers of a different colour? [2]

two flowers of a different colours, i.e one in Red and other m yellow.

$$P = 2 \times \frac{14}{25} \times \frac{11}{24} = \frac{308}{600} = \frac{77}{150}$$

Paul and Sammy take part in a race.

The probability that Paul wins the race is $\frac{9}{35}$

The probability that Sammy wins the race is 26%.

Who is more likely to win the race?

Give a reason for your answer.

[2]

$$26\% = \frac{26}{100} = \frac{13}{50} = \frac{91}{350}$$

$$\frac{9}{35} = \frac{90}{350}$$

$$26\% = \frac{91}{350} > \frac{90}{350}$$

\therefore Sammy is more likely to win.



Exam Papers Practice

A biased 4-sided dice is rolled. The possible scores are 1, 2, 3 or 4. The probability of rolling a 1, 3 or 4 is shown in the table.

Score	1	2	3	4
Probability	0.15	0.2	0.3	0.35

[2]

Complete the table.



Exam Papers Practice

S P A C E S

One of the 6 letters is taken at random.

- (a) Write down the probability that the letter is S. [1]

for at least one days rain

$$\begin{aligned}\text{the probability} &= 1 - 0.6 \times 0.8 \\ &= 1 - 0.48 \\ &= 0.52\end{aligned}$$

- (b) The letter is replaced and again a letter is taken at random.
This is repeated 600 times.

How many times would you expect the letter to be S? [1]

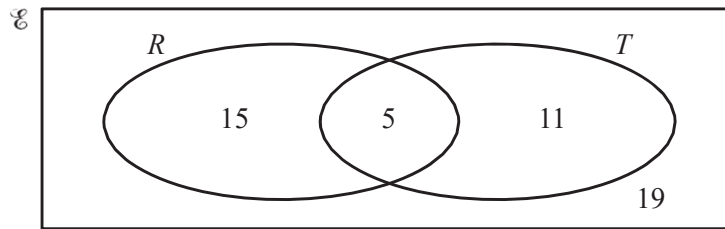
There are 6 letters in the word "SPACES" and one of them is "S".

So, the probability of getting the letter "S" is $1/6$.

If we repeat this experiment 600 times, we expect to get the letter "S" $600 \times (1/6) = 100$ times.

So the answer is 100

Exam Papers Practice



The Venn diagram shows the number of red cars and the number of two-door cars in a car park. There is a total of 50 cars in the car park.

$R = \{\text{red cars}\}$ and $T = \{\text{two-door cars}\}$.

(a) A car is chosen at random.

Write down the probability that

(i) it is red and it is a two-door car, [1]

$$\frac{5}{50} = \frac{1}{10}$$

(ii) it is not red and it is a two-door car. [1]

$$\frac{11}{50}$$

(b) A two-door car is chosen at random.

Write down the probability that it is not red. [1]

$$\frac{11}{16}$$

(c) Two cars are chosen at random. [2]

Find the probability that they are both red.

$$\frac{20}{50} \times \frac{19}{49} = \frac{380}{2450}$$

(d) On the Venn diagram, shade the region $R \cup T'$. [1]



11 students are asked if they like rugby (R) and if they like football (F).
The Venn diagram shows the results.

[1]

(a) A student is chosen at random.

What is the probability that the student likes rugby **and** football?

answer : $\frac{3}{11}$

(b) On the Venn diagram shade the region $R' \cap F'$.

[1]

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The Ocean View Hotel has 300 rooms numbered from 100 to 399.
A room is chosen at random.

Find the probability that the room number ends in zero.

[2]

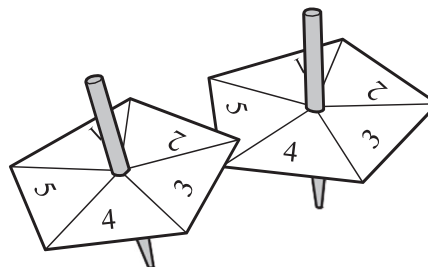
$$P = \frac{30}{300} \times 100\% = 10\%$$



Exam Papers Practice

Two spinners have sections numbered from 1 to 5.
 Each is spun once and each number is equally likely.
 The possibility diagram is shown below.

	5	+	+	+	+	+
	4	+	+	+	+	+
Second spinner	3	+	+	+	+	+
	2	+	+	+	+	+
	1	+	+	+	+	+
		1	2	3	4	5
		First spinner				



Find the probability that

- (a) both spinners show the same number, [2]

$$5/25 = 1/5$$

- (b) the sum of the numbers shown on the two spinners is 7. [2]

Probability = 6/25

In this question, give all your answers as fractions.

A box contains 3 red pencils, 2 blue pencils and 4 green pencils.
Raj chooses 2 pencils at random, without replacement.

Calculate the probability that

- (a) they are both red,

$$\frac{4}{9}$$

[2]

- (b) they are both the same colour,

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

[3]

- (c) exactly one of the two pencils is green.

$$\frac{5}{18}$$

Exam Papers Practice

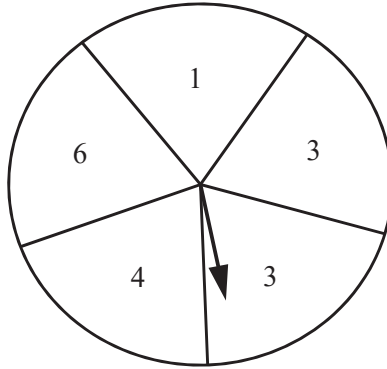
[3]

Question 25



EXAM PAPERS PRACTICE

The diagram shows a fair spinner.



Anna spins it twice and adds the scores.

(a) Complete the table for the total scores.

		Score on first spin				
		1	3	3	4	6
Score on second spin	1	2	4	4	5	7
	3	4	6	6	7	9
	3	4	6	6	7	9
	4	4 + 1	4 + 3	4 + 3	4 + 4	4 + 6
	6	6 + 1	6 + 3	6 + 3	6 + 4	6 + 6

[1]

(b) Write down the most likely total score.

7

[1]

(c) Find the probability that Anna scores

(i) a total less than 6,

$$\frac{7}{25} \text{ or } 0.28 \text{ or } 28\%$$

[2]

(ii) a total of 3.

0

[1]

The probability that Stephanie wins her next tennis match is 0.85 .

Find the probability that Stephanie does not win her next tennis match.

[1]

$$\begin{aligned} p &= 1 - 0.85 \\ &= 0.15 \end{aligned}$$



Exam Papers Practice

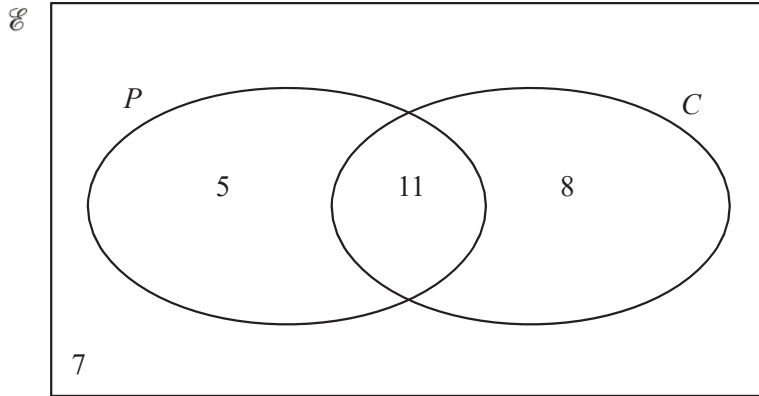
Question 27



EXAM PAPERS PRACTICE

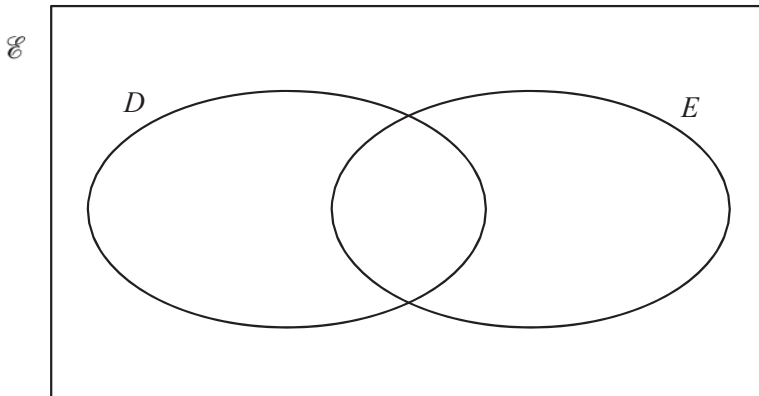
- (a) $\mathcal{E} = \{\text{students in a class}\}$
- $P = \{\text{students who study physics}\}$
- $C = \{\text{students who study chemistry}\}$

The Venn diagram shows numbers of students.



- (i) Find the number of students who study physics or chemistry. [1]
 $5 + 8 + 11 = 24$
- (ii) Find $n(P \cap C')$. [1]
 5
- (iii) A student who does not study chemistry is chosen at random. [1]
 Find the probability that this student does not study physics.
 $7/11$ or 50% .

(b) On the Venn diagram below, shade the region $D \cup E'$. [1]



The probability that Pedro scores a goal in any match is $\frac{2}{5}$.

Calculate the probability that Pedro scores a goal in each of the next two matches.

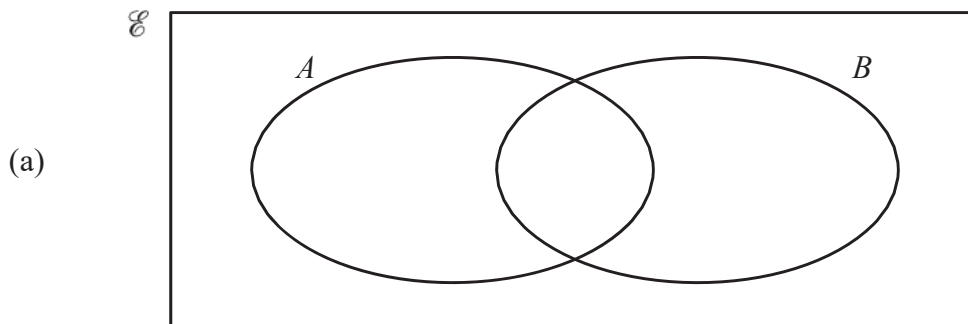
[2]

$$0.2 * 0.2 = 0.04, \text{ or } 4\%$$



Exam Papers Practice

$n(\mathcal{E}) = 10, n(A) = 7, n(B) = 6, n(A \cup B)' = 1.$



(i) Complete the Venn diagram by writing the number of elements in each subset. [2]

$$\begin{aligned} n(A \cap B) &= 2 & n(A \cup B) &= 9 \\ n(A) &= \{5\} & n(E) &= 10 \\ n(B) &= \{4\} \end{aligned}$$

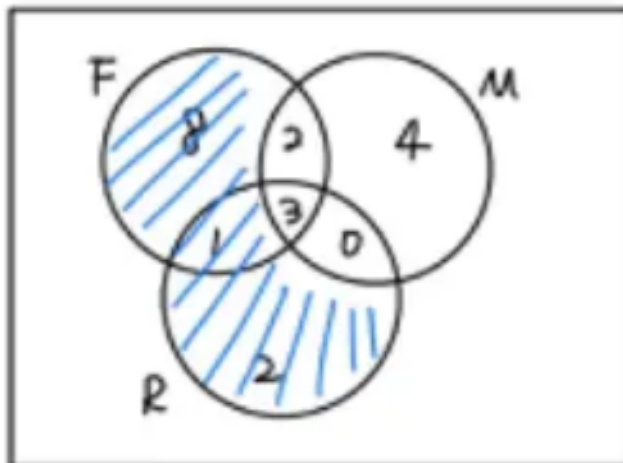
(ii) An element \mathcal{E} is chosen at random.
Find the probability that this element is an element $A' \cap B$. [1]

$$A' \cap B = 4$$

therefore, the probability is

$$P_{(A' \cap B)} = \frac{4}{10} = \frac{2}{5} = 0.4$$

(b) On the Venn diagram below, shade the region $C' \cap D'$. [1]



[1]

The Venn diagram shows the number of people who like films (F), music (M) and reading (R).

(a) Find

(i) $n(M)$,

$$n(M) = 2 + 3 + 0 + 4 = 9$$

[1]

(ii) $n(R \cap M)$.

$$n(R \cap M) = 1 + 2 + 3 + 0 + 2 + 4 = 12$$

(b) A person is chosen at random from the people who like films.

[1]

Write down the probability that this person also likes music.

$$P = \frac{2 + 3}{8 + 2 + 3 + 1} = \frac{5}{14}$$

(c) On the Venn diagram, shade $M' \cap (F \cup R)$.

[1]

The table shows the probability that a person has blue, brown or green eyes.

Eye colour	Blue	Brown	Green
Probability	0.4	0.5	0.1

Use the table to work out the probability that two people, chosen at random,

(a) have blue eyes,

[2]

$$P = 0,4 \times 0,4 + 0,4 \times 0,5 + 0,5 \times 0,4 + 0,4 \times 0,1 + 0,1 \times 0,4 = 0,64$$

(b) have different coloured eyes.

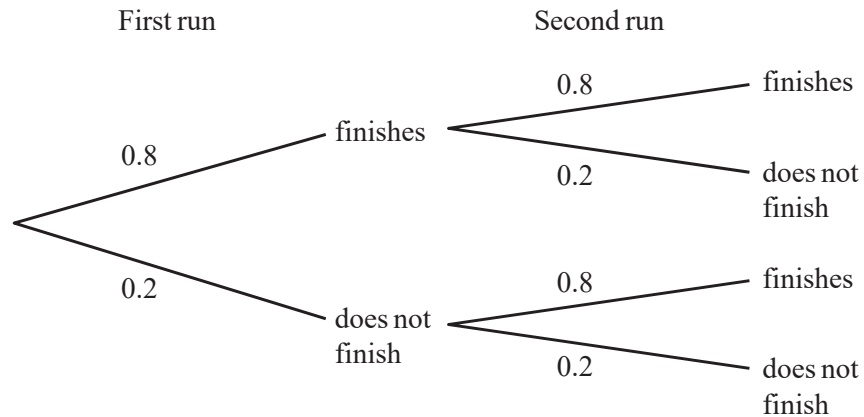
[4]

$$P = 1 - 0,4 \times 0,4 - 0,5 \times 0,5 - 0,1 \times 0,1 = 0,52$$

Exam Papers Practice



Samira takes part in two charity runs.
The probability that she finishes each run is 0.8 .



Find the probability that Samira finishes at least one run.

$$\begin{aligned} P(E) &= (0.8)(0.2) + (0.8)(0.2) + (0.8)(0.8) \\ &= 2(0.8)(0.2) + (0.8)^2 \end{aligned}$$

[3]

Exam Papers Practice