Probability
Difficulty: Medium

Question Paper 1

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Probability
Paper	Paper 4
Difficulty	Medium
Booklet	Question Paper 1

Time allowed: **92 minutes**

Score: **/80**

Percentage: **/100**

Grade Boundaries:

CIE IGCSE Maths (0580)

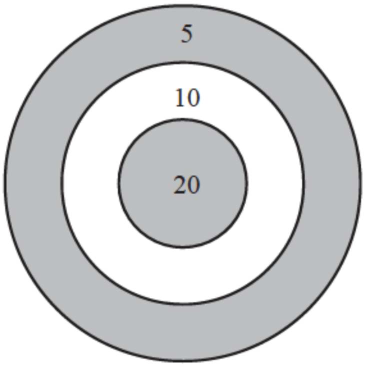
A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980) Assembled by A.S

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

Question 1

Kiah plays a game.
The game involves throwing a coin onto a circular board.
Points are scored for where the coin lands on the board.



If the coin lands on part of a line or misses the board then 0 points are scored.
The table shows the probabilities of Kiah scoring points on the board with one throw.

Points scored	20	10	5	0
Probability	x	0.2	0.3	0.45

(a) Find the value of x. [2]

(b) Kiah throws a coin fifty times.

Work out the expected number of times she scores 5 points. [1]

(c) Kiah throws a coin two times.

Calculate the probability that

(i) she scores either 5 or 0 with her first throw, [2]

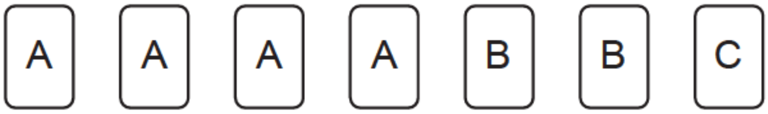
(ii) she scores 0 with her first throw and 5 with her second throw, [2]

(iii) she scores a total of 15 points with her two throws. [3]

(d) Kiah throws a coin three times.

Calculate the probability that she scores a total of 10 points with her three throws. [5]

Question 2



(a) One of these 7 cards is chosen at random.

Write down the probability that the card

(i) shows the letter *A*, [1]

(ii) shows the letter *A* or *B*, [1]

(iii) does not show the letter *B*. [1]

(b) Two of the cards are chosen at random, without replacement.

Find the probability that

(i) both show the letter *A*, [2]

(ii) the two letters are different. [3]

(c) Three of the cards are chosen at random, without replacement.

Find the probability that the cards do not show the letter *C*. [2]

In this question write any probability as a fraction.

Navpreet has 15 cards with a shape drawn on each card.
5 cards have a square, 6 cards have a triangle and 4 cards have a circle drawn on them.

(a) Navpreet selects a card at random.

Write down the probability that the card has a circle drawn on it. [1]

(b) Navpreet selects a card at random and replaces it.
She does this 300 times.

Calculate the number of times she expects to select a card with a circle drawn on it. [1]

(c) Navpreet selects a card at random, replaces it and then selects another card.

Calculate the probability that

(i) one card has a square drawn on it and the other has a circle drawn on it,

[3]

(ii) neither card has a circle drawn on it. [3]

(d) Navpreet selects two cards at random, without replacement.

Calculate the probability that

(i) only one card has a triangle drawn on it,

[3]

(ii) the two cards have different shapes drawn on them.

[4]

(a) A square spinner is biased.
The probabilities of obtaining the scores 1, 2, 3 and 4 when it is spun are given in the table.

Score	1	2	3	4
Probability	0.1	0.2	0.4	0.3

(i) Work out the probability that on one spin the score is 2 or 3. [2]

(ii) In 5000 spins, how many times would you expect to score 4 with this spinner? [1]

(iii) Work out the probability of scoring 1 on the first spin and 4 on the second spin. [2]

(b) In a bag there are 7 red discs and 5 blue discs.
From the bag a disc is chosen at random and not replaced.
A second disc is then chosen at random.

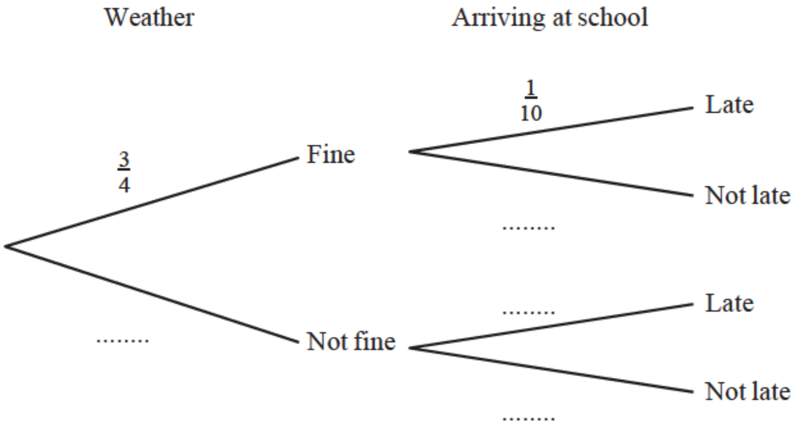
Work out the probability that at least one of the discs is red.
Give your answer as a fraction. [3]

If the weather is fine the probability that Carlos is late arriving at school is $\frac{1}{10}$.

If the weather is not fine the probability that he is late arriving at school is $\frac{1}{3}$.

The probability that the weather is fine on any day is $\frac{3}{4}$.

(a) Complete the tree diagram to show this information. [3]



(b) In a school term of 60 days, find the number of days the weather is expected to be fine. [1]

(c) Find the probability that the weather is fine and Carlos is late arriving at school. [2]

(d) Find the probability that Carlos is not late arriving at school. [3]

(e) Find the probability that the weather is not fine on at least one day in a school week of 5 days. [2]

Question 6

In this question, give all your answers as fractions.

N **A** **T** **I** **O** **N**

The letters of the word **NATION** are printed on 6 cards.

(a) A card is chosen at random.

Write down the probability that

(i) it has the letter **T** printed on it, [1]

(ii) it does not have the letter **N** printed on it, [1]

(iii) the letter printed on it has no lines of symmetry. [1]

(b) Lara chooses a card at random, replaces it, then chooses a card again.

Calculate the probability that only **one** of the cards she chooses has the letter **N** printed on it. [3]

(c) Jacob chooses a card at random and does not replace it.
He continues until he chooses a card with the letter **N** printed on it.

Find the probability that this happens when he chooses the 4th card. [3]

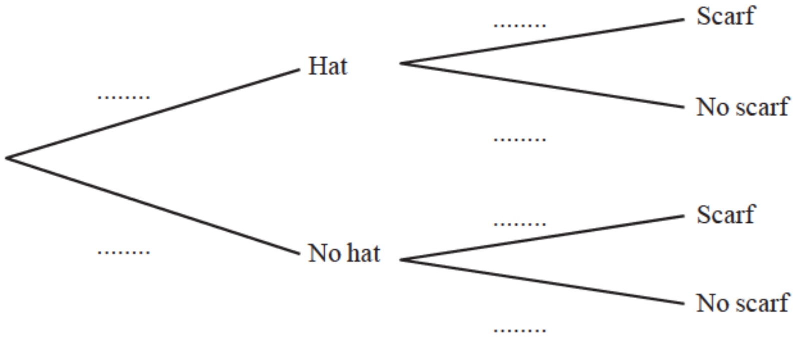
In this question, give all your answers as fractions.

When Ivan goes to school in winter, the probability that he wears a hat is $\frac{5}{8}$.

If he wears a hat, the probability that he wears a scarf is $\frac{2}{3}$.

If he does not wear a hat, the probability that he wears a scarf is $\frac{1}{6}$.

(a) Complete the tree diagram. [3]



(b) Find the probability that Ivan

(i) does not wear a hat and does not wear a scarf, [2]

(ii) wears a hat but does not wear a scarf, [2]

(iii) wears a hat or a scarf but not both. [2]

(c) If Ivan wears a hat and a scarf, the probability that he wears gloves is $\frac{7}{10}$.

Calculate the probability that Ivan does **not** wear all three of hat, scarf and gloves. [3]

Probability
Difficulty: Medium

Question Paper 2

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Probability
Paper	Paper 4
Difficulty	Medium
Booklet	Question Paper 2

Time allowed: **77 minutes**

Score: **/67**

Percentage: **/100**

Grade Boundaries:

CIE IGCSE Maths (0580)

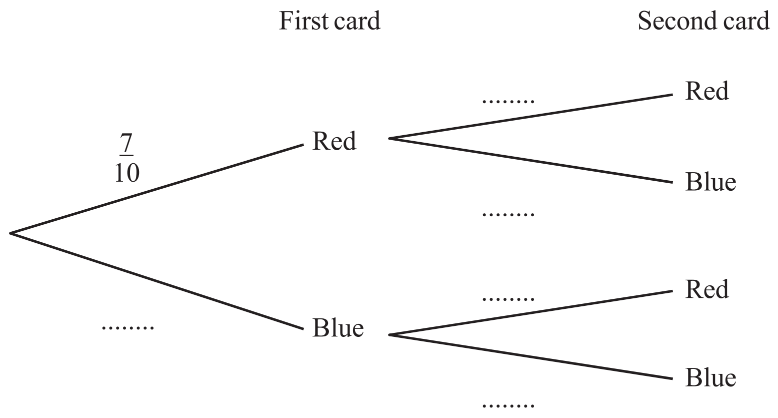
A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

In a box there are 7 red cards and 3 blue cards.
A card is drawn at random from the box and is not replaced.
A second card is then drawn at random from the box.

(a) Complete this tree diagram. [3]



(b) Work out the probability that the two cards are of different colours.
Give your answer as a fraction. [3]

Question 2

In all parts of this question give your answer as a fraction in its lowest terms.

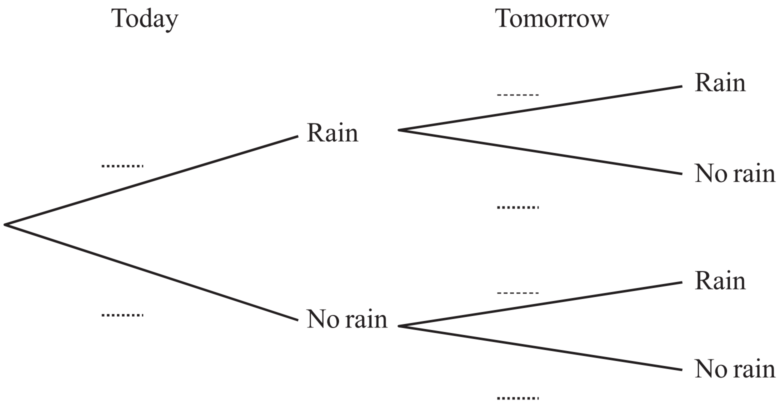
(a) (i) The probability that it will rain today is $\frac{1}{3}$.

What is the probability that it will not rain today? [1]

(ii) If it rains today, the probability that it will rain tomorrow is $\frac{2}{5}$.

If it does not rain today, the probability that it will rain tomorrow is $\frac{1}{6}$.

Complete the tree diagram.

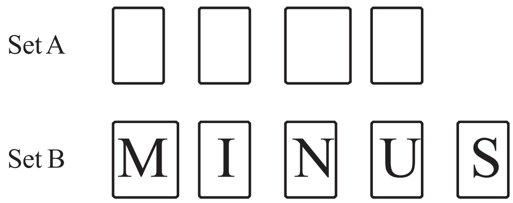


[2]

(b) Find the probability that it will rain on at least one of these two days. [3]

(c) Find the probability that it will rain on only one of these two days. [3]

Question 3



The diagram shows two sets of cards.

(a) One card is chosen at random from Set A and replaced.

(i) Write down the probability that the card chosen shows the letter M. [1]

(ii) If this is carried out 100 times, write down the expected number of times the card chosen shows the letter M. [1]

(b) Two cards are chosen at random, **without** replacement, from Set A.

Find the probability that both cards show the letter S. [2]

(c) One card is chosen at random from Set A and one card is chosen at random from Set B.

Find the probability that exactly one of the two cards shows the letter U. [3]

(d) A card is chosen at random, **without** replacement, from Set B until the letter shown is either I or U.

Find the probability that this does not happen until the 4th card is chosen. [2]

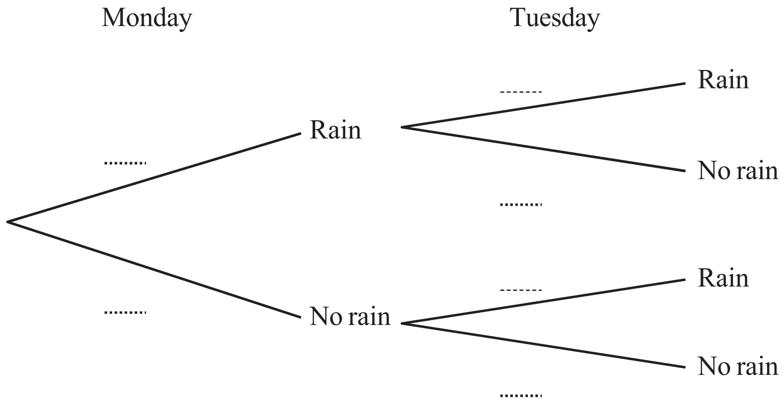
In this question give all your answers as fractions.

The probability that it rains on Monday is $\frac{3}{5}$.

If it rains on Monday, the probability that it rains on Tuesday is $\frac{4}{7}$.

If it does not rain on Monday, the probability that it rains on Tuesday is $\frac{5}{7}$.

(a) Complete the tree diagram. [3]



(b) Find the probability that it rains

(i) on both days, [2]

(ii) on Monday but not on Tuesday, [2]

(iii) on only one of the two days. [2]

(c) If it does not rain on Monday and it does not rain on Tuesday, the probability that it does not rain on Wednesday is $\frac{1}{4}$.

Calculate the probability that it rains on at least one of the three days. [3]

Katrina puts some plants in her garden.

The probability that a plant will produce a flower is $\frac{7}{10}$.

If there is a flower, it can only be red, yellow or orange.

When there is a flower, the probability it is red is $\frac{2}{3}$ and the probability it is yellow is $\frac{1}{4}$.

(a) Draw a tree diagram to show **all** this information.

Label the diagram and write the probabilities on each branch. [5]

(b) A plant is chosen at random.

Find the probability that it will **not** produce a yellow flower. [3]

(c) If Katrina puts 120 plants in her garden, how many orange flowers would she expect? [2]

Sacha either walks or cycles to school.

On any day, the probability that he walks to school is $\frac{3}{5}$.

(a) (i) A school term has 55 days.

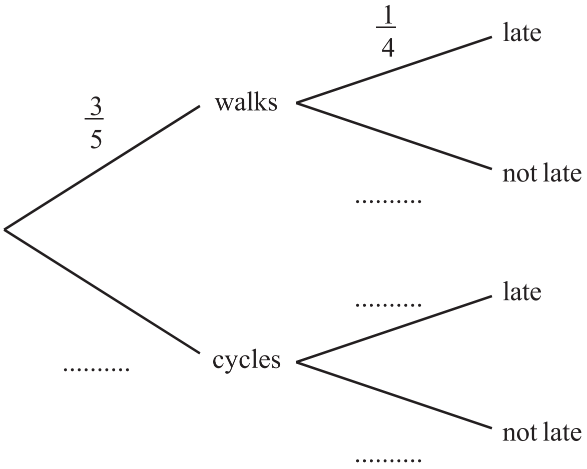
Work out the expected number of days Sacha walks to school. [1]

(ii) Calculate the probability that Sacha walks to school on the first 5 days of the term. [2]

(b) When Sacha walks to school, the probability that he is late is $\frac{1}{4}$.

When he cycles to school, the probability that he is late is $\frac{1}{8}$.

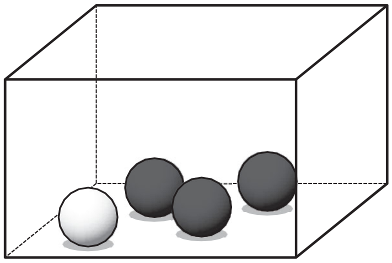
(i) Complete the tree diagram by writing the probabilities in the four spaces provided.



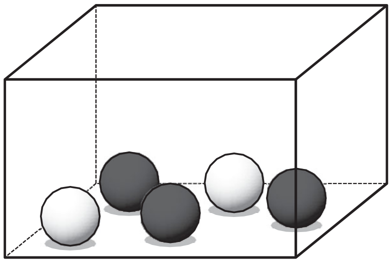
[3]

(ii) Calculate the probability that Sacha cycles to school and is late. [2]

(iii) Calculate the probability that Sacha is late to school. [2]



A



B

Box A contains 3 black balls and 1 white ball.
Box B contains 3 black balls and 2 white balls.

(a) A ball can be chosen at random from either box.
Complete the following statement.

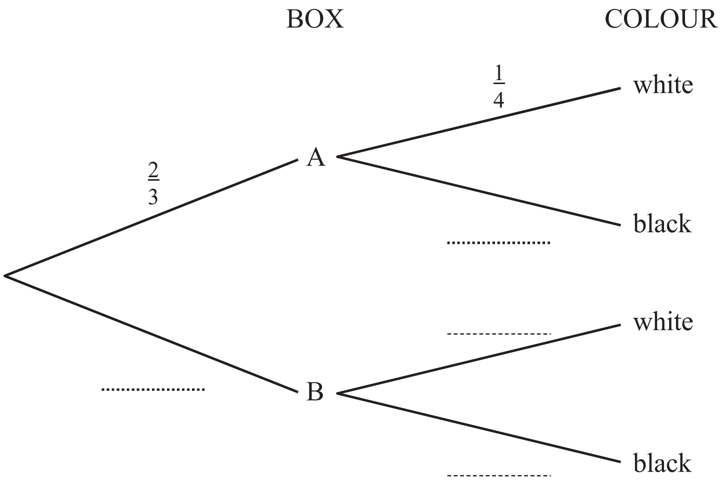
There is a greater probability of choosing a white ball from Box .

Explain your answer. [1]

(b) Abdul chooses a box and then chooses a ball from this box at random.

The probability that he chooses box A is $\frac{2}{3}$.

(i) Complete the tree diagram by writing the four probabilities in the empty spaces.



[4]

(ii) Find the probability that Abdul chooses box A and a black ball. [2]

(iii) Find the probability that Abdul chooses a black ball. [2]

(c) Tatiana chooses a box and then chooses **two** balls from this box at random (without replacement).

The probability that she chooses box A is $\frac{2}{3}$.

Find the probability that Tatiana chooses two white balls. [2]

Probability
Difficulty: Medium

Question Paper 3

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Probability
Paper	Paper 4
Difficulty	Medium
Booklet	Question Paper 3

Time allowed: **94 minutes**

Score: **/82**

Percentage: **/100**

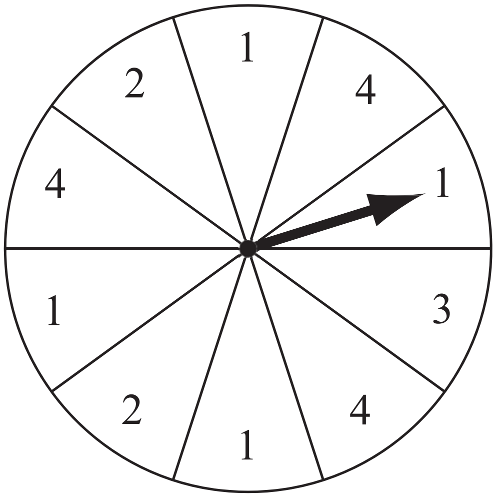
Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980) Assembled by A.S

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%



The diagram shows a circular board, divided into 10 numbered sectors.

When the arrow is spun it is equally likely to stop in any sector.

(a) Complete the table below which shows the probability of the arrow stopping at each number.

Number	1	2	3	4
Probability		0.2		0.3

[1]

(b) The arrow is spun once.

Find

(i) the most likely number, [1]

(ii) the probability of a number less than 4. [1]

(c) The arrow is spun twice.

Find the probability that

(i) both numbers are 2, [1]

(ii) the first number is 3 and the second number is 4, [2]

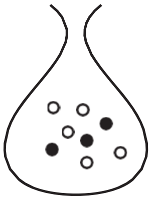
(iii) the two numbers add up to 4. [3]

(d) The arrow is spun several times until it stops at a number 4.

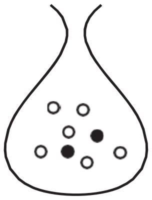
Find the probability that this happens on the third spin. [2]

Question 2

(a)



Bag A

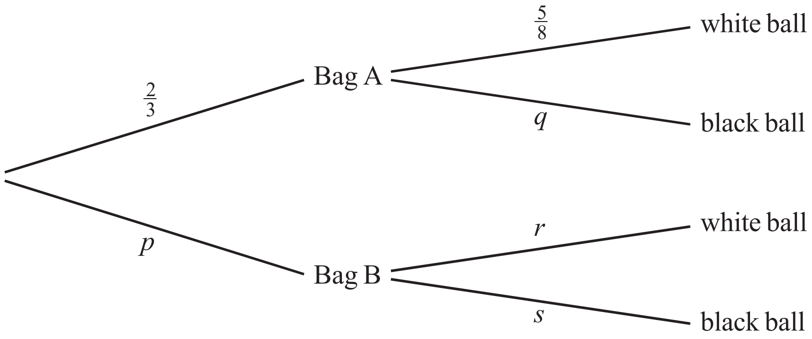


Bag B

Nadia must choose a ball from Bag A or from Bag B.
The probability that she chooses Bag A is $\frac{2}{3}$.

Bag A contains 5 white and 3 black balls.
Bag B contains 6 white and 2 black balls.

The tree diagram below shows some of this information.



(i) Find the values of p, q, r and s. [3]

(ii) Find the probability that Nadia chooses Bag A and then a white ball. [2]

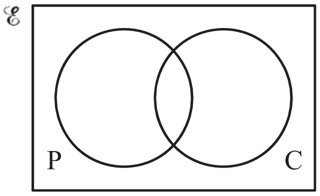
(iii) Find the probability that Nadia chooses a white ball. [2]

(b) Another bag contains 7 green balls and 3 yellow balls.
Sani takes three balls out of the bag, without replacement.

(i) Find the probability that all three balls he chooses are yellow. [2]

(ii) Find the probability that at least one of the three balls he chooses is green. [1]

(a) There are 30 students in a class.
20 study Physics, 15 study Chemistry and 3 study neither Physics nor Chemistry.



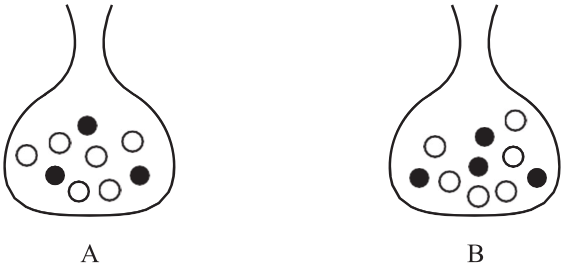
(i) **Copy and complete** the Venn diagram to show this information. [2]

(ii) Find the number of students who study both Physics **and** Chemistry. [1]

(iii) A student is chosen at random. Find the probability that the student studies Physics but not Chemistry. [2]

(iv) A student who studies Physics is chosen at random. Find the probability that this student does not study Chemistry. [2]

(b)



Bag A contains 6 white beads and 3 black beads.
Bag B contains 6 white beads and 4 black beads.
One bead is chosen at random from each bag.
Find the probability that

(i) both beads are black, [2]

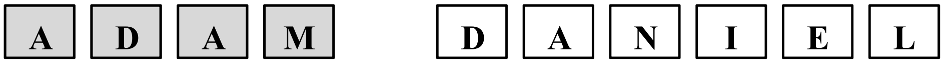
(ii) at least one of the two beads is white. [2]

The beads are not replaced.
A second bead is chosen at random from each bag.
Find the probability that

(iii) all four beads are white, [3]

(iv) the beads are not all the same colour. [3]

Question 4



Adam writes his name on four red cards and Daniel writes his name on six white cards.

(a) One of the ten cards is chosen at random. Find the probability that

(i) the letter on the card is **D**, [1]

(ii) the card is red, [1]

(iii) the card is red **or** the letter on the card is **D**, [1]

(iv) the card is red **and** the letter on the card is **D**, [1]

(v) the card is red **and** the letter on the card is **N**. [1]

(b) Adam chooses a card at random and then Daniel chooses one of the remaining 9 cards at random. Giving your answers as fractions, find the probability that the letters on the two cards are

(i) both **D**, [2]

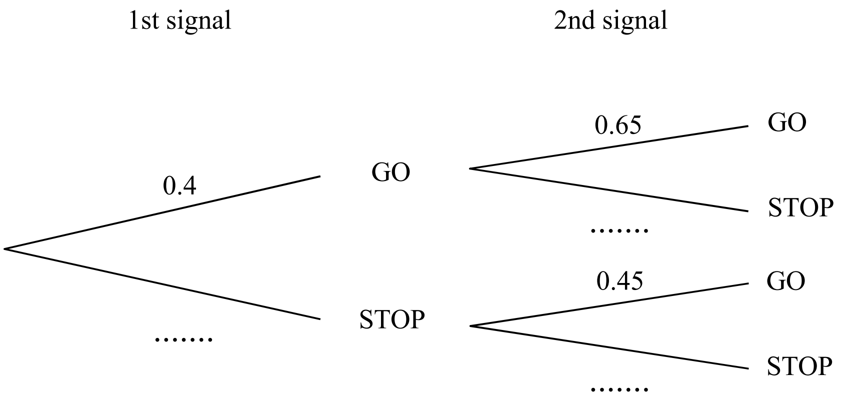
(ii) both **A**, [2]

(iii) the same, [2]

(iv) different. [2]

There are 2 sets of road signals on the direct 12 kilometre route from Acity to Beetown.
The signals say either "GO" or "STOP".
The probabilities that the signals are "GO" when a car arrives are shown in the tree diagram.

(a) **Copy and complete** the tree diagram for a car driver travelling along this route. [3]



(b) Find the probability that a car driver

(i) finds both signals are "GO", [2]

(ii) finds exactly one of the two signals is "GO", [3]

(iii) does not find two "STOP" signals. [2]

(c) With no stops, Damon completes the 12 kilometre journey at an average speed of 40 kilometres per hour.

(i) Find the time taken in **minutes** for this journey. [1]

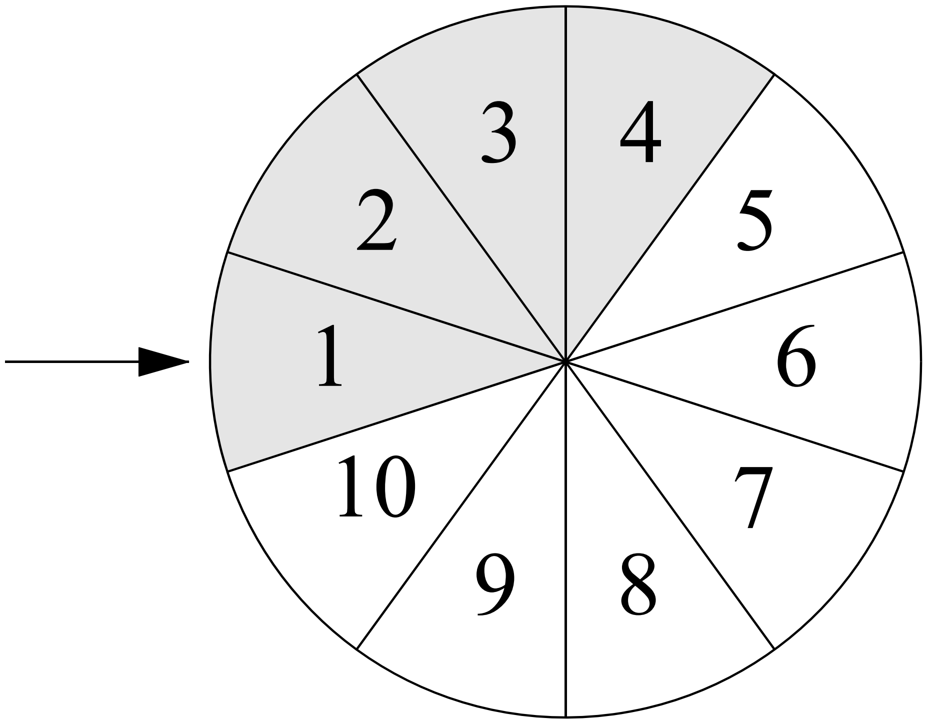
(ii) When Damon has to stop at a signal it adds 3 minutes to this journey time.

Calculate his average speed, in **kilometres per hour**, if he stops at both road signals. [2]

(d) Elsa takes a different route from Acity to Beetown.
This route is 15 kilometres and there are no road signals.
Elsa's average speed for this journey is 40 kilometres per hour.
Find

(i) the time taken in **minutes** for this journey, [1]

(ii) the probability that Damon takes more time than this on his 12 kilometre journey. [2]



A wheel is divided into 10 sectors numbered 1 to 10 as shown in the diagram.
The sectors 1, 2, 3 and 4 are shaded.
The wheel is spun and when it stops the fixed arrow points to one of the sectors.
(Each sector is equally likely.)

(a) The wheel is spun once so that one sector is selected. Find the probability that

(i) the number in the sector is even, [1]

(ii) the sector is shaded, [1]

(iii) the number is even **or** the sector is shaded, [1]

(iv) the number is odd **and** the sector is shaded. [1]

(b) The wheel is spun twice so that each time a sector is selected. Find the probability that

(i) both sectors are shaded, [2]

(ii) one sector is shaded and one is not, [2]

(iii) the sum of the numbers in the two sectors is greater than 20, [2]

(iv) the sum of the numbers in the two sectors is less than 4, [2]

(v) the product of the numbers in the two sectors is a square number. [3]

Probability
Difficulty: Hard

Question Paper 1

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Probability
Paper	Paper 4
Difficulty	Hard
Booklet	Question Paper 1

Time allowed: **83 minutes**

Score: **/72**

Percentage: **/100**

Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

(a) A bag contains red beads and green beads.
There are 80 beads altogether.
The probability that a bead chosen at random is green is 0.35 .

(i) Find the number of red beads in the bag. [2]

(ii) Marcos chooses a bead at random and replaces it in the bag.
He does this 240 times.

Find the number of times he would expect to choose a green bead. [1]

(b) A different bag contains 2 blue marbles, 3 yellow marbles and 4 white marbles.
Huma chooses a marble at random, notes the colour, then replaces it in the bag.
She does this three times.

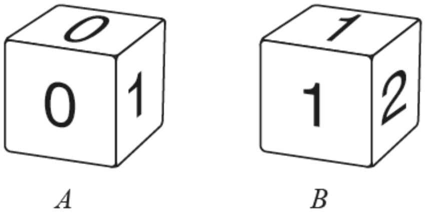
Find the probability that

(i) all three marbles are yellow, [2]

(ii) all three marbles are different colours. [3]

(c) Another bag contains 2 green counters and 3 pink counters.
Teresa chooses three counters at random **without** replacement.

Find the probability that she chooses more pink counters than green counters. [4]



The diagram shows two fair dice.
The numbers on dice *A* are 0, 0, 1, 1, 1, 3.
The numbers on dice *B* are 1, 1, 2, 2, 2, 3.
When a dice is rolled, the score is the number on the top face.

(a) Dice *A* is rolled once.

Find the probability that the score is not 3. [1]

(b) Dice *A* is rolled twice.

Find the probability that the score is 0 both times. [2]

(c) Dice *A* is rolled 60 times.

Calculate an estimate of the number of times the score is 0. [1]

(d) Dice *A* and dice *B* are each rolled once.
The product of the scores is recorded.

(i) Complete the possibility diagram.

Dice *B*

3	0	0				
2	0	0				
2	0	0				
2	0	0				
1	0	0				
1	0	0	1	1	1	3
	0	0	1	1	1	3

Dice *A* [2]

(ii) Find the probability that the product of the scores is

(a) 2, [1]

(b) greater than 3. [1]

(e) Eva keeps rolling dice *B* until 1 is scored.

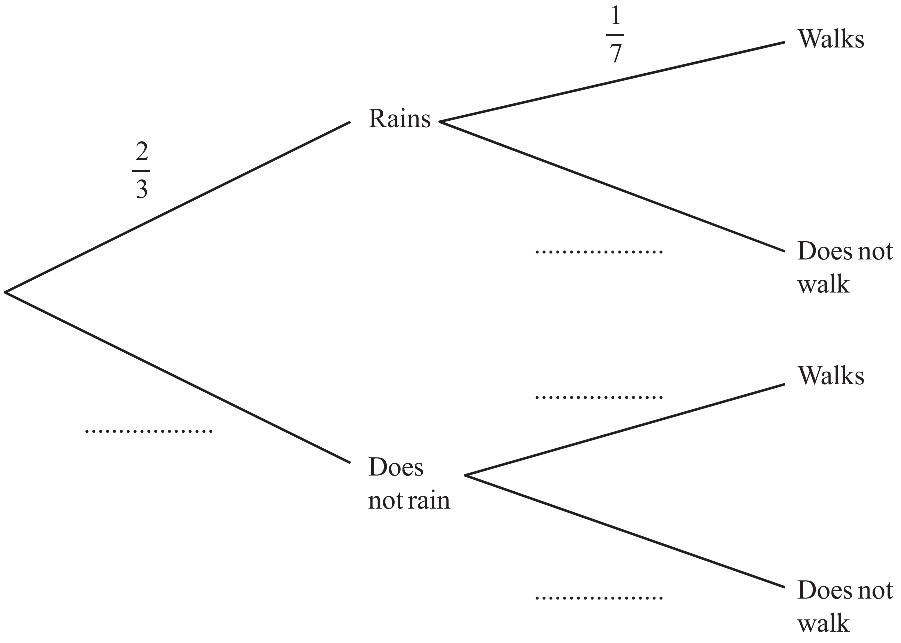
Find the probability that this happens on the 5th roll. [2]

Each morning the probability that it rains is $\frac{2}{3}$.

If it rains, the probability that Asha walks to school is $\frac{1}{7}$.

If it does not rain, the probability that Asha walks to school is $\frac{4}{7}$.

(a) Complete the tree diagram.



[2]

(b) Find the probability that it rains and Asha walks to school. [2]

(c) (i) Find the probability that Asha does not walk to school. [3]

(ii) Find the expected number of days Asha does not walk to school in a term of 70 days. [2]

(d) Find the probability that it rains on exactly one morning in a school week of 5 days. [2]

Ravi spins a biased 5-sided spinner, numbered 1 to 5.
The probability of each number is shown in the table.

Number	1	2	3	4	5
Probability	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{3}$	x	x

(a) Find the value of x. [3]

(b) Ravi spins the spinner once.

Find the probability that the number is 2 or 3. [2]

(c) Ravi spins the spinner twice.

Find the probability that

(i) the number is 2 both times, [2]

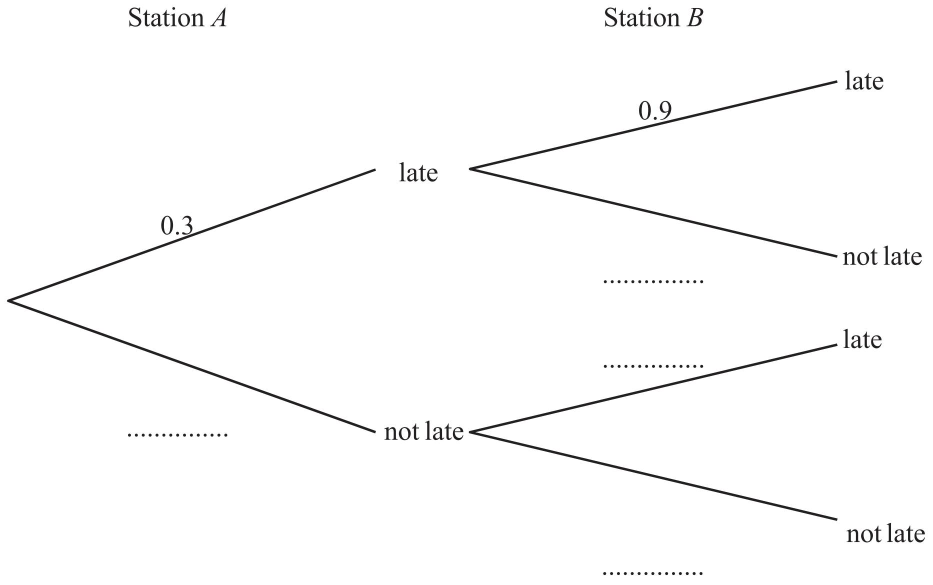
(ii) the sum of the numbers is 3. [3]

(d) Ravi spins the spinner 72 times.

Calculate how many times he expects the number 1. [1]

A train stops at station A and then at station B.
If the train is late at station A, the probability that it is late at station B is 0.9 .
If the train is not late at station A, the probability that it is late at station B is 0.2 .
The probability that the train is late at station A is 0.3 .

(a) Complete the tree diagram. [2]



(b) (i) Find the probability that the train is late at one or both of the stations. [3]

(ii) This train makes 250 journeys.

Find the number of journeys that the train is expected to be late at one or both of the stations.

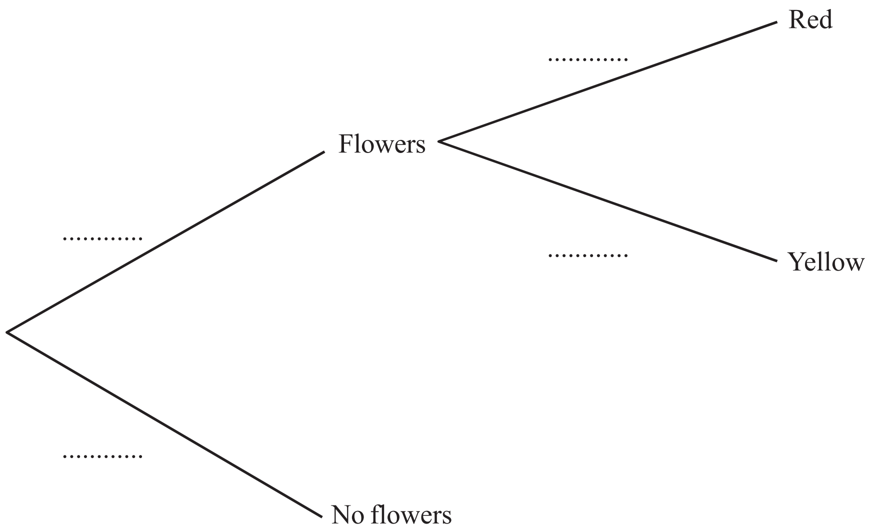
[1]

(c) The train continues to station C.
The probability that it is late at all 3 stations is 0.27 .

Describe briefly what this probability shows. [1]

The probability that a plant will produce flowers is $\frac{7}{8}$.
The flowers are either red or yellow.
If the plant produces flowers, the probability that the flowers are red is $\frac{3}{4}$.

(a) (i) Complete the tree diagram by writing a probability beside each branch. [2]



(ii) Calculate the probability that a plant, chosen at random, will produce red flowers. [2]

(iii) Two plants are chosen at random.

Calculate the probability that both will produce red flowers. [2]

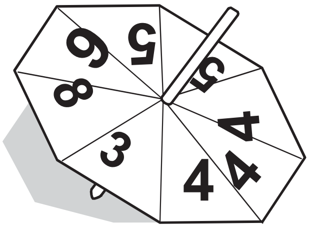
(b) Alphonse buys 200 of these plants.

Calculate the number of plants that are expected to produce flowers. [2]

(c) Gabriel has 1575 plants with red flowers.

Estimate the total number of plants that Gabriel has. [2]

Sandra has a fair eight-sided spinner.
The numbers on the spinner are 3, 4, 4, 4, 5, 5, 6 and 8.
Sandra spins the spinner twice and records each number it lands on.



Find the probability that

(a) both numbers are 8, [2]

(b) the two numbers are not both 8, [1]

(c) one number is odd and one number is even, [2]

(d) the total of the two numbers is at least 13, [3]

(e) the second number is bigger than the first number. [3]

Probability
Difficulty: Hard

Question Paper 2

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Probability
Paper	Paper 4
Difficulty	Hard
Booklet	Question Paper 2

Time allowed: **90 minutes**

Score: **/78**

Percentage: **/100**

Grade Boundaries:

CIE IGCSE Maths (0580)

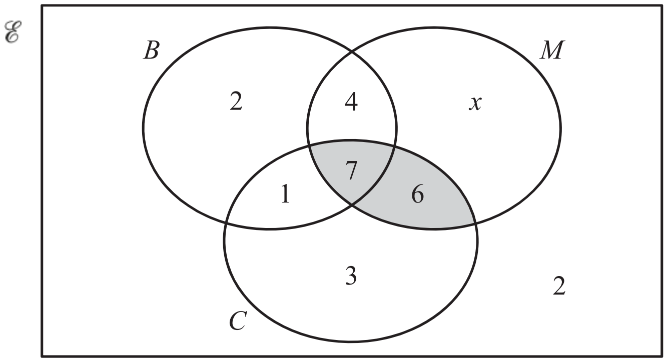
A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

Assembled by A.S

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

30 students were asked if they had a bicycle (B), a mobile phone (M) and a computer (C).
The results are shown in the Venn diagram.



(a) Work out the value of x. [1]

(b) Use set notation to describe the shaded region in the Venn diagram. [1]

(c) Find $n(C \cap (M \cup B)')$. [1]

(d) A student is chosen at random.

(i) Write down the probability that the student is a member of the set M' [1]

(ii) Write down the probability that the student has a bicycle. [1]

(e) Two students are chosen at random from the students who have computers.

Find the probability that each of these students has a mobile phone but no bicycle. [3]

Question 2

Gareth has 8 sweets in a bag.
4 sweets are orange flavoured, 3 are lemon flavoured and 1 is strawberry flavoured.

(a) He chooses two of the sweets at random.

Find the probability that the two sweets have different flavours. [4]

(b) Gareth now chooses a third sweet.

Find the probability that **none** of the three sweets is lemon flavoured. [2]

Question 3

Kenwyn plays a board game.
Two cubes (dice) each have faces numbered 1, 2, 3, 4, 5 and 6.
In the game, a **throw** is rolling the **two** fair 6-sided dice and then adding the numbers on their top faces.
This total is the number of spaces to move on the board.
For example, if the numbers are 4 and 3, he moves 7 spaces.

(a) Giving each of your answers as a fraction in its simplest form, find the probability that he moves

(i) two spaces with his next throw, [2]

(ii) ten spaces with his next throw. [3]

(b) What is the most likely number of spaces that Kenwyn will move with his next throw? [2]
Explain your answer.

(c)

95	**96**	**97**	**98**	**99**	**100**
				Go back 3 spaces	WIN

To win the game he must move **exactly** to the 100th space.
Kenwyn is on the 97th space.
If his next throw takes him to 99, he has to move back to 96.
If his next throw takes him over 100, he stays on 97.

Find the probability that he reaches 100 in either of his next two throws. [5]

Question 4

E	N	L	A	R	G	E	M	E	N	T

Prettie picks a card at random from the 11 cards above and does not replace it.
She then picks a second card at random and does not replace it.

(a) Find the probability that she picks

(i) the letter L and then the letter G, [2]

(ii) the letter E twice, [2]

(iii) two letters that are the same. [2]

(b) Prettie now picks a third card at random.

Find the probability that the three letters

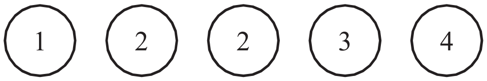
(i) are all the same, [2]

(ii) **do not** include a letter E, [2]

(iii) include exactly two letters that are the same. [5]

Question 5

(a)



Two discs are chosen at random **without** replacement from the five discs shown in the diagram.

(i) Find the probability that both discs are numbered 2. [2]

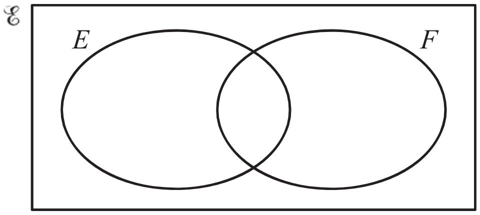
(ii) Find the probability that the numbers on the **two** discs have a total of 5. [3]

(iii) Find the probability that the numbers on the two discs do **not** have a total of 5. [1]

(b) A group of international students take part in a survey on the nationality of their parents.

E = {students with an English parent}
F = {students with a French parent}

$n(\mathscr{E}) = 50$, $n(E) = 15$, $n(F) = 9$ and $n(E \cup F)' = 33$.



(i) Find $n(E \cap F)$. [1]

(ii) Find $n(E' \cup F)$. [1]

(iii) A student is chosen at random.
Find the probability that this student has an English parent and a French parent. [1]

(iv) A student who has a French parent is chosen at random.
Find the probability that this student also has an English parent. [1]

(a) Emile lost 2 blue buttons from his shirt.

A bag of spare buttons contains 6 white buttons and 2 blue buttons.

Emile takes 3 buttons out of the bag at random **without replacement**.

Calculate the probability that

(i) all 3 buttons are white, [3]

(ii) exactly one of the 3 buttons is blue. [3]

(b) There are 25 buttons in another bag.

This bag contains x blue buttons.

Two buttons are taken at random **without replacement**.

The probability that they are both blue is $\frac{7}{100}$.

(i) Show that $x^2 - x - 42 = 0$. [4]

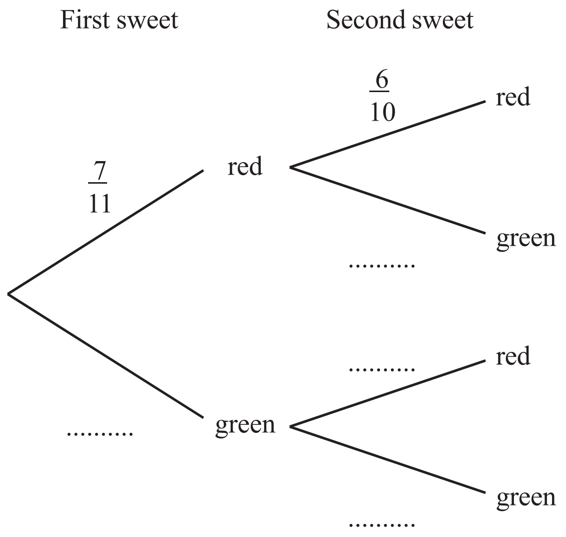
(ii) Factorise $x^2 - x - 42$. [2]

(iii) Solve the equation $x^2 - x - 42 = 0$. [1]

(iv) Write down the number of buttons in the bag which are **not** blue. [1]

A bag contains 7 red sweets and 4 green sweets.
Aimee takes out a sweet at random and eats it.
She then takes out a second sweet at random and eats it.

(a) Complete the tree diagram.



[3]

(b) Calculate the probability that Aimee has taken

(i) two red sweets, [2]

(ii) one sweet of each colour. [3]

(c) Aimee takes a third sweet at random.
Calculate the probability that she has taken

(i) three red sweets, [2]

(ii) at least one red sweet. [3]

Probability
Difficulty: Hard

Question Paper 3

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Probability
Paper	Paper 4
Difficulty	Hard
Booklet	Question Paper 3

Time allowed:	**83 minutes**
Score:	**/72**
Percentage:	**/100**

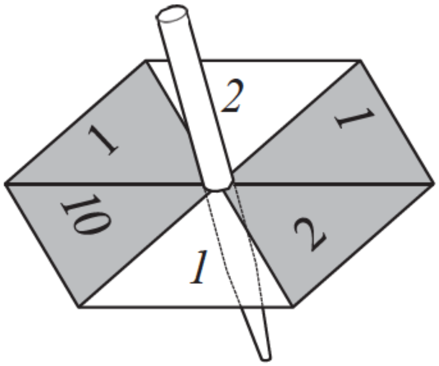
Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%



The diagram shows a spinner with six numbered sections.
Some of the sections are shaded.
Each time the spinner is spun it stops on one of the six sections.
It is equally likely that it stops on any one of the sections.

(a) The spinner is spun once.

Find the probability that it stops on

(i) a shaded section, [1]

(ii) a section numbered 1, [1]

(iii) a shaded section numbered 1, [1]

(iv) a shaded section or a section numbered 1. [1]

(b) The spinner is now spun twice.

Find the probability that the total of the two numbers is

(i) 20, [2]

(ii) 11. [2]

(c) (i) The spinner stops on a shaded section.

Find the probability that this section is numbered 2. [1]

(ii) The spinner stops on a section numbered 2.

Find the probability that this section is shaded. [1]

(d) The spinner is now spun until it stops on a section numbered 2.
The probability that this happens on the nth spin is $\frac{16}{243}$.

Find the value of n. [2]

1	1	6	7	11	12

Six cards are numbered 1, 1, 6, 7, 11 and 12.

In this question, give all probabilities as fractions.

(a) One of the six cards is chosen at random.

(i) Which number has a probability of being chosen of $\frac{1}{3}$? [1]

(ii) What is the probability of choosing a card with a number which is smaller than **at least three of the other numbers**? [1]

(b) Two of the six cards are chosen at random, without replacement.

Find the probability that

(i) they are both numbered 1, [2]

(ii) the total of the two numbers is 18, [3]

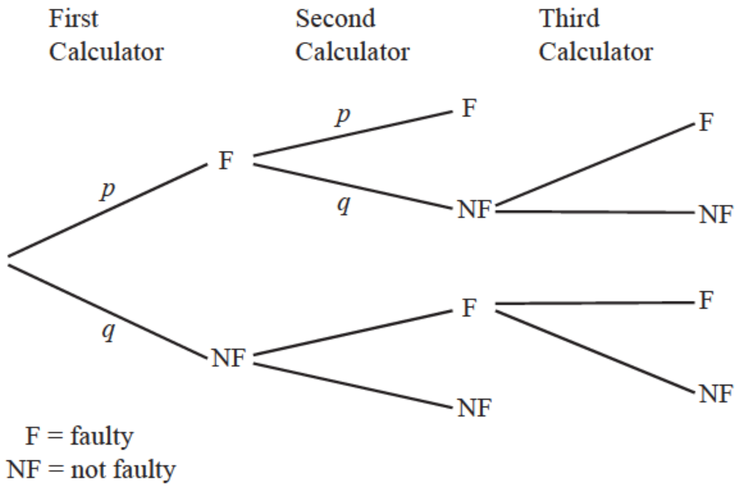
(iii) the first number is **not** a 1 and the second number is a 1. [2]

(c) Cards are chosen, without replacement, until a card numbered 1 is chosen.

Find the probability that this happens before the third card is chosen. [2]

(d) A seventh card is added to the six cards shown in the diagram.
The mean value of the seven numbers on the cards is 6.

Find the number on the seventh card. [2]



The tree diagram shows a testing procedure on calculators, taken from a large batch.

Each time a calculator is chosen at random, the probability that it is faulty (F) is $\frac{1}{20}$.

(a) Write down the values of p and q. [1]

(b) Two calculators are chosen at random.

Calculate the probability that

(i) both are faulty, [2]

(ii) **exactly one** is faulty. [2]

(c) If **exactly one** out of two calculators tested is faulty, then a third calculator is chosen at random.

Calculate the probability that exactly one of the first two calculators is faulty **and** the third one is faulty.

[2]

(d) The whole batch of calculators is rejected

either if the first two chosen are both faulty

or if a third one needs to be chosen and it is faulty.

Calculate the probability that the whole batch is rejected.

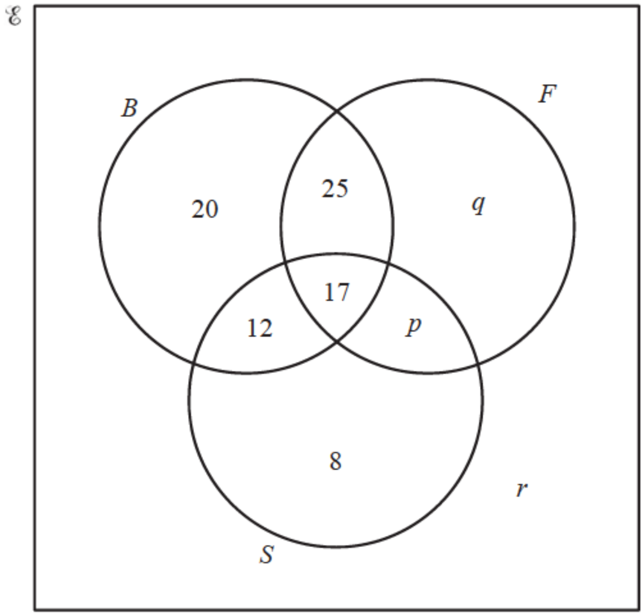
[2]

(e) In one month, 1000 batches of calculators are tested in this way.

How many batches are expected to be rejected? [1]

In a survey, 100 students are asked if they like basketball (B), football (F) and swimming (S).

The Venn diagram shows the results.



42 students like swimming.

40 students like exactly one sport.

(a) Find the values of p, q and r. [3]

(b) How many students like

(i) all three sports, [1]

(ii) basketball and swimming but not football? [1]

(c) Find

(i) $n(B')$, [1]

(ii) $n((B \cup F) \cap S')$. [1]

(d) One student is chosen at random from the 100 students.
Find the probability that the student

(i) only likes swimming, [1]

(ii) likes basketball but not swimming. [1]

(e) Two students are chosen at random from those who like basketball.

Find the probability that they each like exactly one other sport. [3]

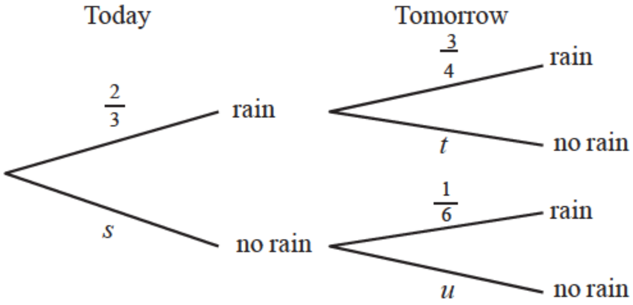
Give your answers to this question as fractions.

(a) The probability that it rains today is $\frac{2}{3}$.

If it rains today, the probability that it will rain tomorrow is $\frac{3}{4}$.

If it does not rain today, the probability that it will rain tomorrow is $\frac{1}{6}$.

The tree diagram below shows this information.



(i) Write down, as fractions, the values of s, t and u. [3]
(ii) Calculate the probability that it rains on both days. [2]
(iii) Calculate the probability that it will not rain tomorrow. [2]

(b) Each time Christina throws a ball at a target, the probability that she hits the target is $\frac{1}{3}$.

She throws the ball three times.
Find the probability that she hits the target

(i) three times, [2]
(ii) at least once. [2]

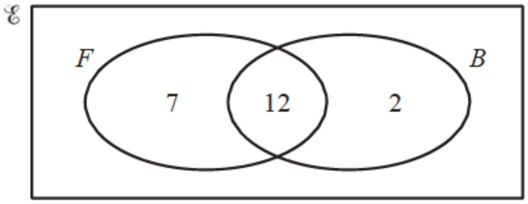
(c) Each time Eduardo throws a ball at the target, the probability that he hits the target is $\frac{1}{4}$.

He throws the ball until he hits the target.
Find the probability that he **first** hits the target with his

(i) 4th throw, [2]
(ii) nth throw. [1]

Question 6

(a) All 24 students in a class are asked whether they like football and whether they like basketball. Some of the results are shown in the Venn diagram below.



ℰ = {students in the class}.
F = {students who like football}.
B = {students who like basketball}.

(i) How many students like both sports? [1]

(ii) How many students do not like either sport? [1]

(iii) Write down the value of $n(F \cup B)$. [1]

(iv) Write down the value of $n(F' \cap B)$. [1]

(v) A student from the class is selected at random. What is the probability that this student likes basketball? [1]

(vi) A student who likes football is selected at random. What is the probability that this student likes basketball? [1]

(b) Two students are selected at random from a group of 10 boys and 12 girls. Find the probability that

(i) they are both girls, [2]

(ii) one is a boy and one is a girl. [3]