IGCSE · Cambridge (CIE) · Maths

1 hour 16 questions

Calculator Questions

Probability Diagrams (Tree & Venn Diagrams)

Two-Way Tables / Probabilities from Venn Diagrams / Probability Tree Diagrams / Combined Probabilities

Medium (7 questions)	/30
Hard (5 questions)	/23
Very Hard (4 questions)	/19
Total Marks	**/72**

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Medium Questions

1 (a) On any day the probability that it rains is $\frac{1}{3}$.

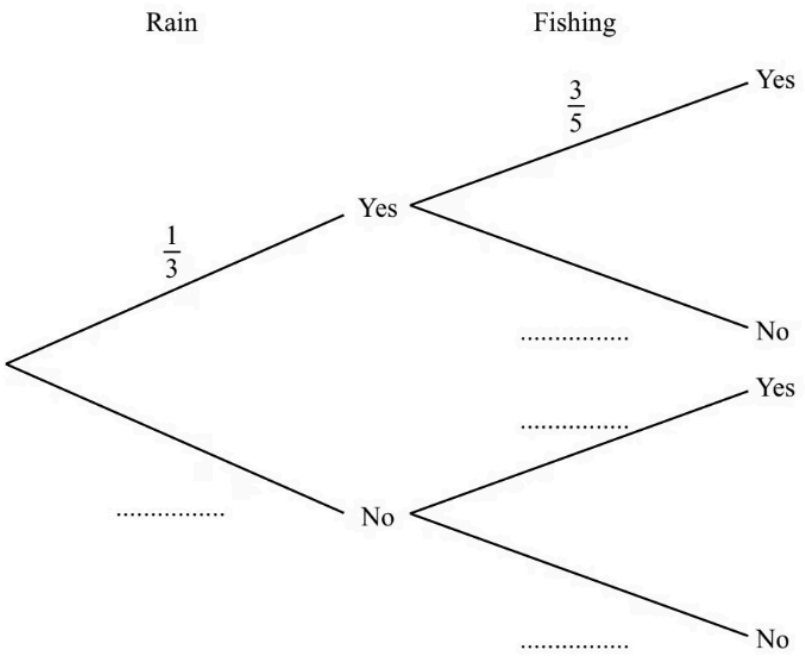
When it rains the probability that Amira goes fishing is $\frac{3}{5}$.

When it does not rain the probability that Amira goes fishing is $\frac{3}{4}$.

In a period of 60 days on how many days is it expected to rain?

(1 mark)

(b) Complete the tree diagram.



(2 marks)

(c) Find the probability that on any day Amira goes fishing.

(3 marks)

2 (a) A bag contains 15 red beads and 10 yellow beads.
Ariana picks a bead at random, records its colour and replaces it in the bag.
She then picks another bead at random.

Find the probability that she picks two red beads.

(2 marks)

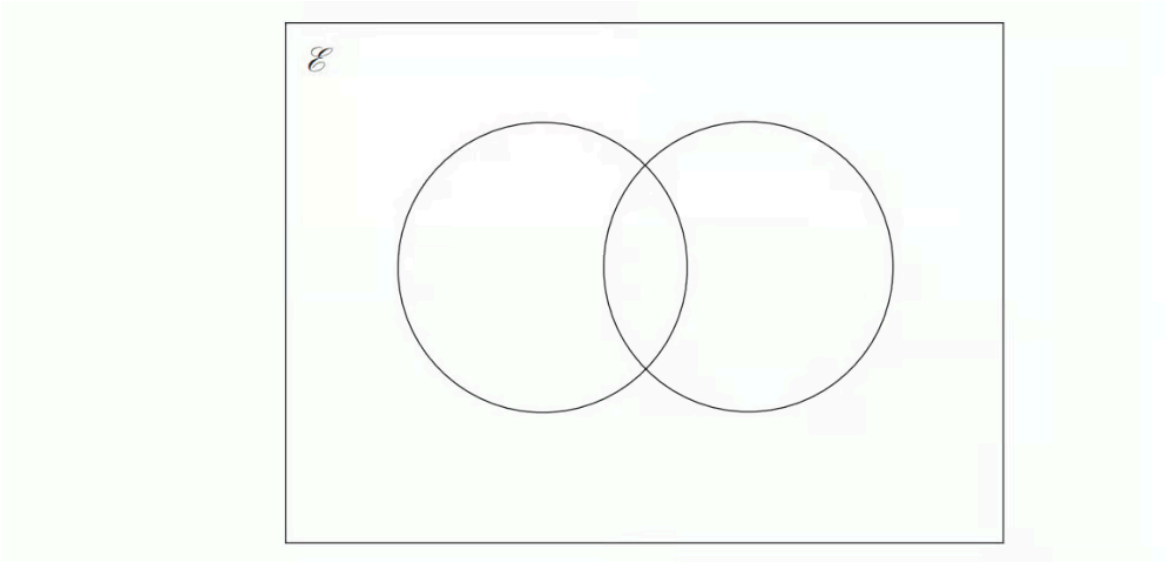
(b) Find the probability that she does not pick two red beads.

(1 mark)

3 (a) $\mathscr{E}$ = {odd numbers less than 30}

A = {3, 9, 15, 21, 27}
B = {5, 15, 25}

Complete the Venn diagram to represent this information.



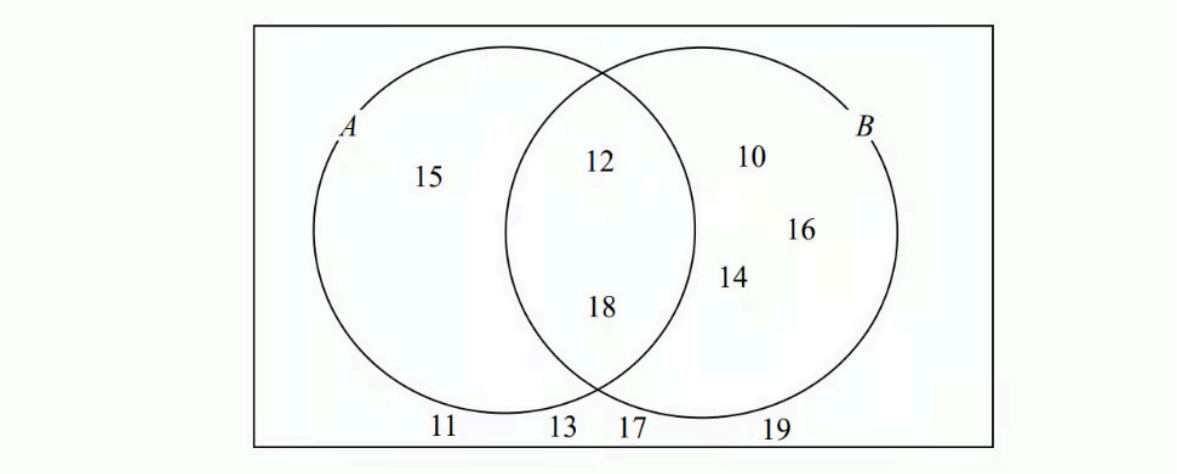
(4 marks)

(b) A number is chosen at random from the universal set, $\mathscr{E}$.

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

(2 marks)

4 (a) Here is a Venn diagram.



Write down the numbers that are in set

i) $A \cup B$

[1]

ii) $A \cap B$

[1]

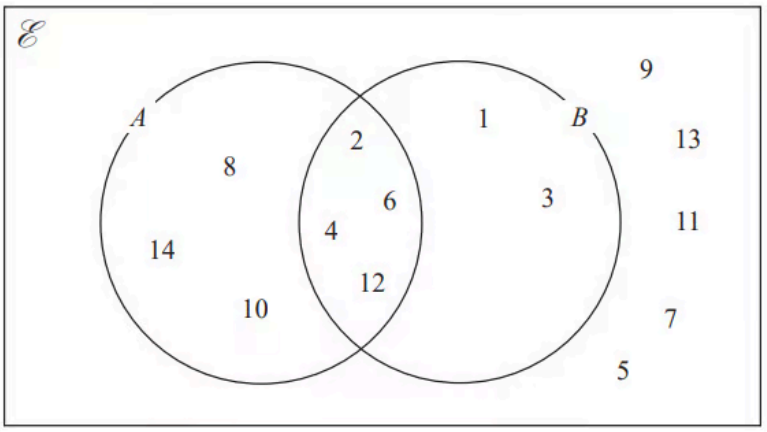
(2 marks)

(b) One of the numbers in the diagram is chosen at random.

Find the probability that the number is in set A'.

(2 marks)

5 (a) The numbers from 1 to 14 are shown in the Venn diagram.



i) List the members of the set $A \cap B$

[1]

ii) List the members of the set B'

[1]

(2 marks)

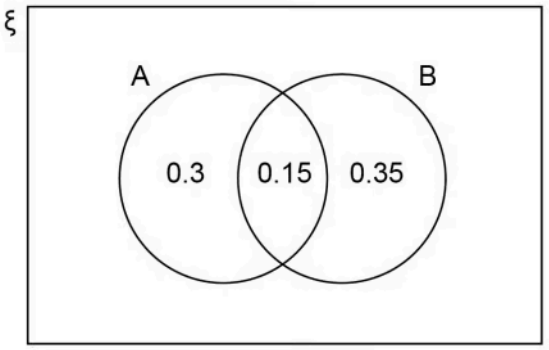
(b) A number is picked at random from the numbers in the Venn diagram.

Find the probability that this number is in set A but is **not** in set B.

(2 marks)

6 A and B are two events.

Some probabilities are shown on the Venn diagram.



Work out $\mathrm{P}(\mathrm{A}' \cup \mathrm{B})$.

(2 marks)

7 (a) At a school, students can travel using one of three bus routes: A, B, and C.

- 40% of students use route A
- 35% of students use route B
- The rest of the students use route C

On any given day, some buses may be late.

- Buses that use route A have an 8% chance of being late
- Buses that use route B have an 5% chance of being late
- Buses that use route C have an 12% chance of being late

Draw a tree diagram to demonstrate all possible outcomes and associated probabilities.

(2 marks)

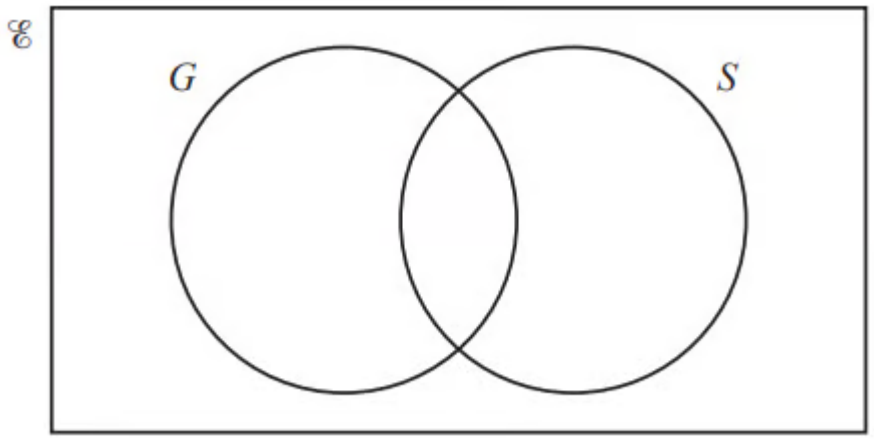
(b) Calculate the probability that a student is late.

(3 marks)

Hard Questions

1 (a) There are 32 students in a class.

5 do not study any languages. 15 study German (G). 18 study Spanish (S).



Complete the Venn diagram to show this information.

(2 marks)

(b) A student is chosen at random.
Find the probability that the student studies Spanish but not German.

(1 mark)

(c) A student who studies German is chosen at random.
Find the probability that this student also studies Spanish.

(1 mark)

2 (a) On any Saturday, the probability that Bob plays football is $\frac{2}{5}$. Calculate the probability that Bob plays football for 2 of the next 3 Saturdays.

(3 marks)

(b) On any Saturday, the probability that Arun plays football is $\frac{3}{4}$. When Arun plays football, the probability that he scores the winning goal is $\frac{1}{7}$.

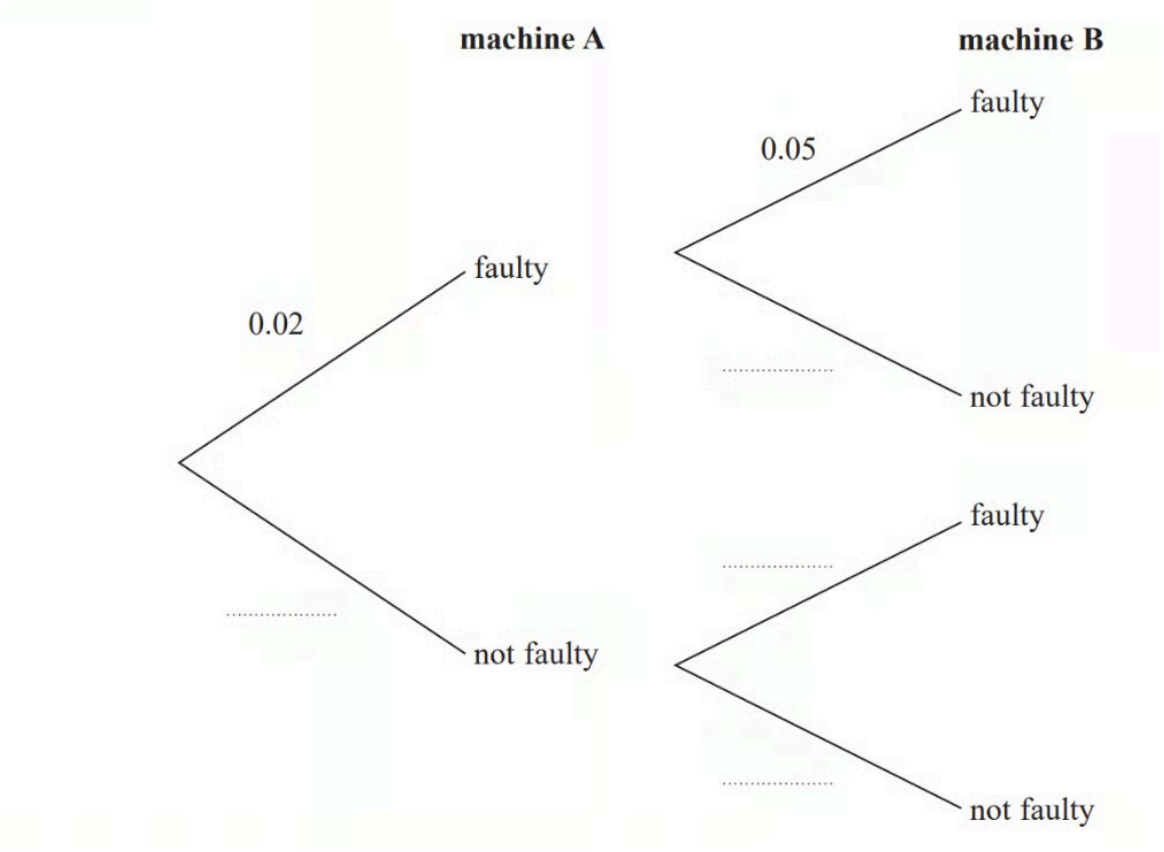
Calculate the probability that Arun scores the winning goal one Saturday.

(2 marks)

3 (a) Machine A and machine B make bottles.

The probability that a bottle made by machine A is faulty is 0.02 The probability that a bottle made by machine B is faulty is 0.05

Complete the probability tree diagram.



(2 marks)

(b) Shazia takes at random one bottle made by machine A and one bottle made by machine B.

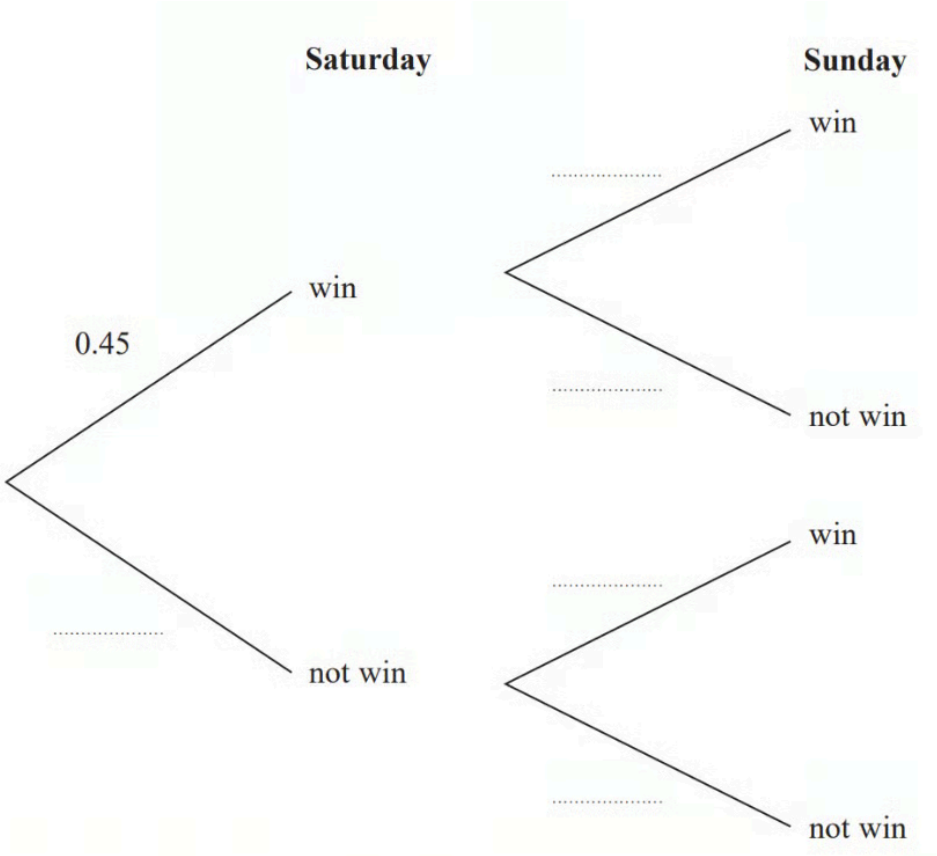
Work out the probability that at least one of these bottles is faulty.

(3 marks)

4 (a) A darts team is going to play a match on Saturday and on Sunday. The probability that the team will win on Saturday is 0.45

If they win on Saturday, the probability that they will win on Sunday is 0.67 If they do **not** win on Saturday, the probability that they will win on Sunday is 0.35

Complete the probability tree diagram.



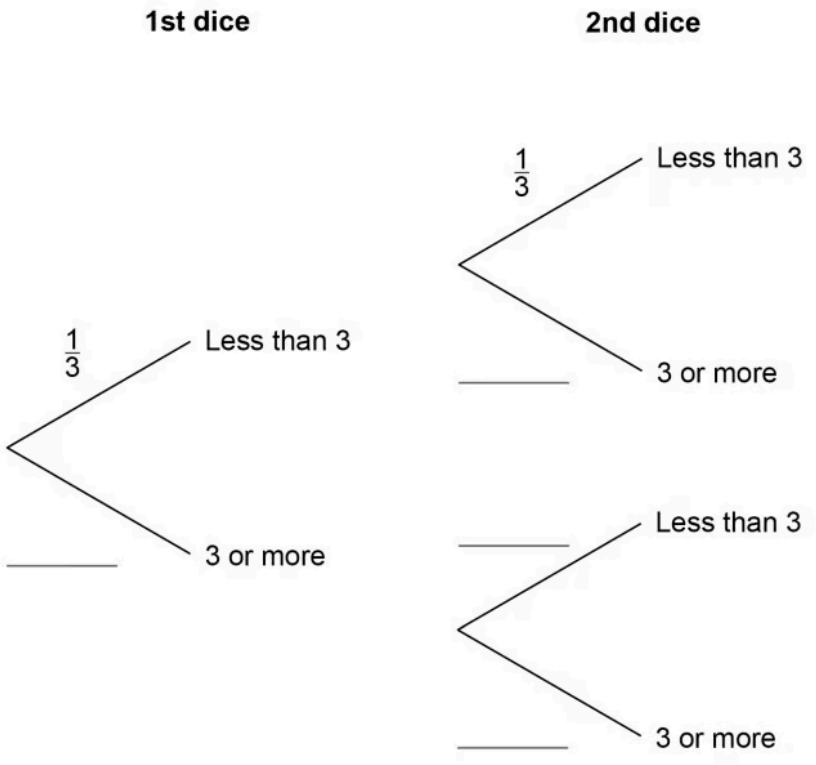
(2 marks)

(b) Find the probability that the team will win exactly one of the two matches.

(3 marks)

5 (a) Two ordinary fair dice are rolled.

Complete the tree diagram.



(1 mark)

(b) Work out the probability that **both** dice land on a number less than 3.

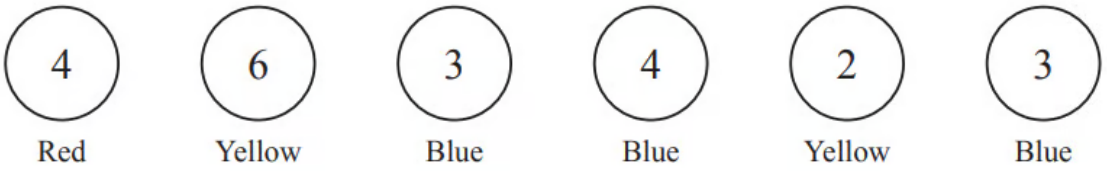
(1 mark)

(c) Work out the probability that **exactly one** of the dice lands on a number less than 3.

(2 marks)

Very Hard Questions

1



The diagram shows six discs. Each disc has a colour and a number.

Two of the six discs are picked at random **with** replacement.

Find the probability that both discs have the same colour.

(3 marks)

2 The probability that the school bus is late is $\frac{9}{10}$.

If the school bus is late, the probability that Seb travels on the bus is $\frac{15}{16}$.

If the school bus is on time, the probability that Seb travels on the bus is $\frac{3}{4}$.

Find the probability that Seb travels on the bus.

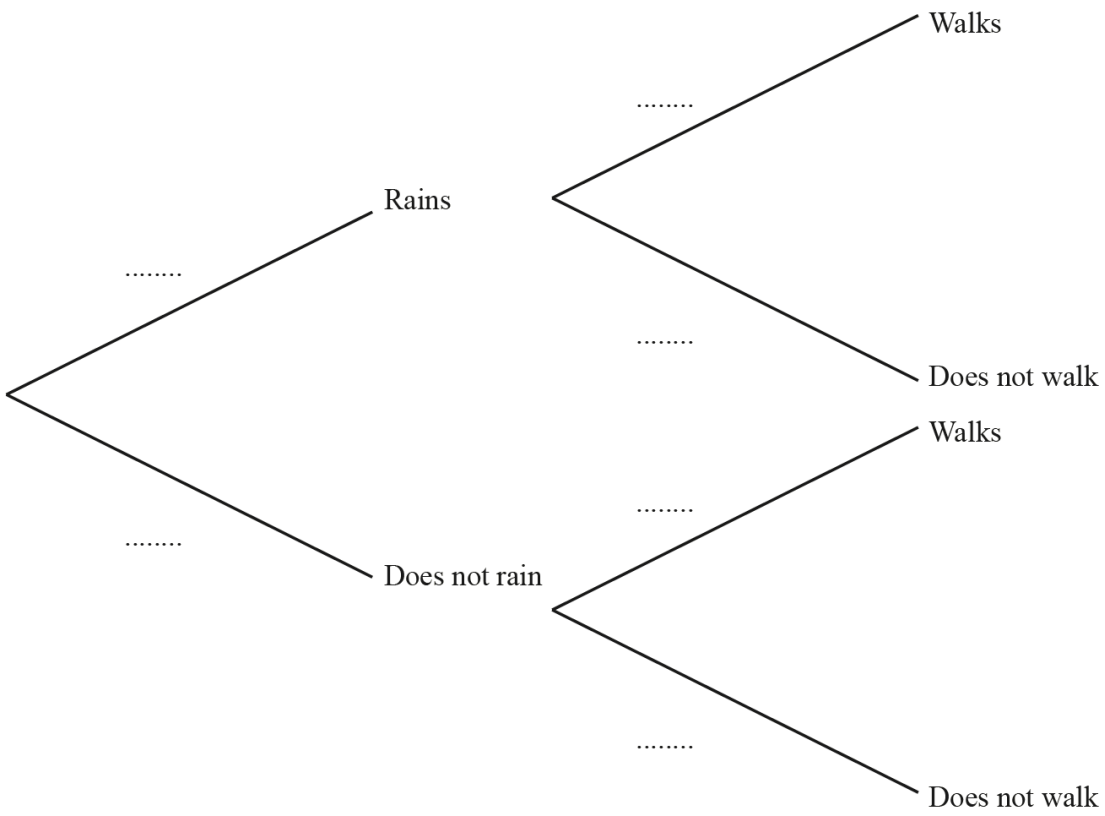
(3 marks)

3 (a) The probability that it will rain tomorrow is $\frac{5}{8}$.

If it rains, the probability that Rafael walks to school is $\frac{1}{6}$.

If it does not rain, the probability that Rafael walks to school is $\frac{7}{10}$.

Complete the tree diagram.



(3 marks)

(b) Calculate the probability that it will rain tomorrow and Rafael walks to school.

(2 marks)

(c) Calculate the probability that Rafael does not walk to school.

(3 marks)

4 (a) Box *A* and box *B* each contain blue and green pens only.
Raphael picks a pen at random from box *A* and Paulo picks a pen at random from box *B*.
The probability that Raphael picks a blue pen is $\frac{2}{3}$. The probability that both Raphael and Paulo pick a blue pen is $\frac{8}{15}$.

Find the probability that Paulo picks a blue pen.

(2 marks)

(b) Find the probability that both Raphael and Paulo pick a green pen.

(3 marks)