Surname	
Other Names	
Candidate's Signature	

GCSE 9 - 1 Questions

Tree Diagrams 3

Calculator Allowed

INSTRUCTIONS TO CANDIDATES

- Write your name in the space provided.

- Write your answers in the spaces provided in this question paper.

- Answer ALL questions.

- Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

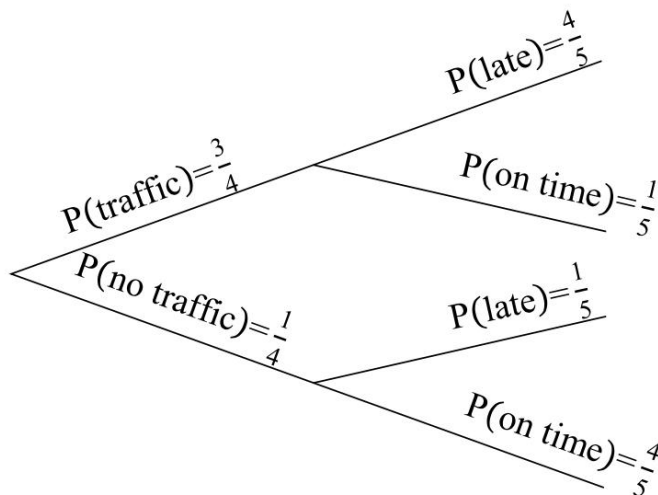- You should have a ruler, compass and protractor where required.

Total Marks :

1) A bag contains 3 **red** spheres and 3 **black** spheres. The probability tree shows all the outcomes when two spheres are picked at random. What is the probability that **two red** spheres are picked?

$$\frac{3}{6} \quad R \quad \frac{2}{5} \quad R$$
$$\frac{3}{5} \quad B$$
$$\frac{3}{6} \quad B \quad \frac{3}{5} \quad R$$
$$\frac{2}{5} \quad B$$
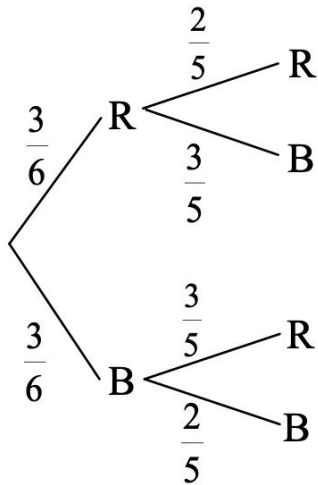
Ans: _____ [2]

2) The chances, that next Monday James arrives late for work or not, depend on whether he finds a traffic jam.
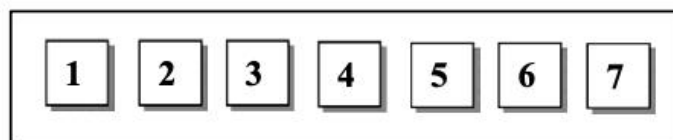These chances are shown in the probability tree below.

$$P(\text{traffic}) = \frac{3}{4} \qquad P(\text{late}) = \frac{4}{5}$$
$$P(\text{on time}) = \frac{1}{5}$$
$$P(\text{no traffic}) = \frac{1}{4} \qquad P(\text{late}) = \frac{1}{5}$$
$$P(\text{on time}) = \frac{4}{5}$$

What is the probability that next Monday James arrives at work **on time**?
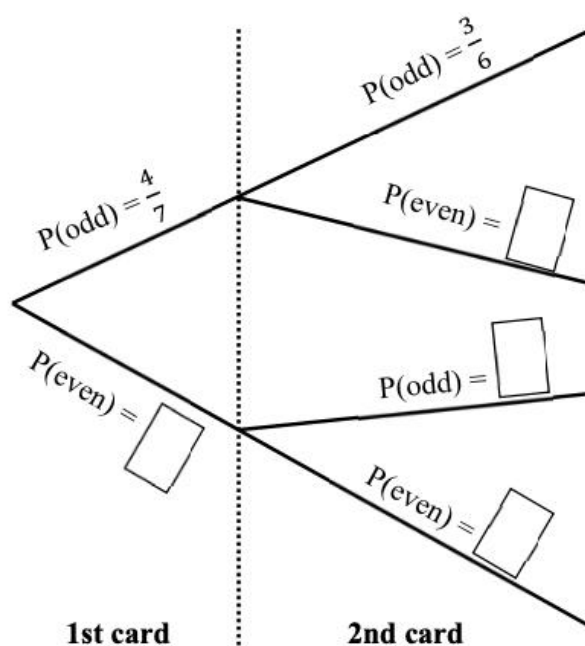
Ans: _____

[2]

3)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

A pack is made up of cards with numbers from 1 to 7.
Two cards are going to be drawn, without replacing the first one.

a)   Complete the probability tree for odd and even numbers to be drawn.

1st card   2nd card

b)   What is the probability that both cards drawn show an odd number?

Ans_____

c)   A third card is now going to be drawn (without replacing the first and second cards).
What is the probability that the three cards show an odd number?

Ans_____

(6 marks)

4) A teacher goes to school by bus or by car. The probability that she goes by bus is $\frac{1}{4}$. When she goes by bus, the probability that she is late is $\frac{4}{5}$. When she goes by car, the probability that she is late is $\frac{1}{3}$.
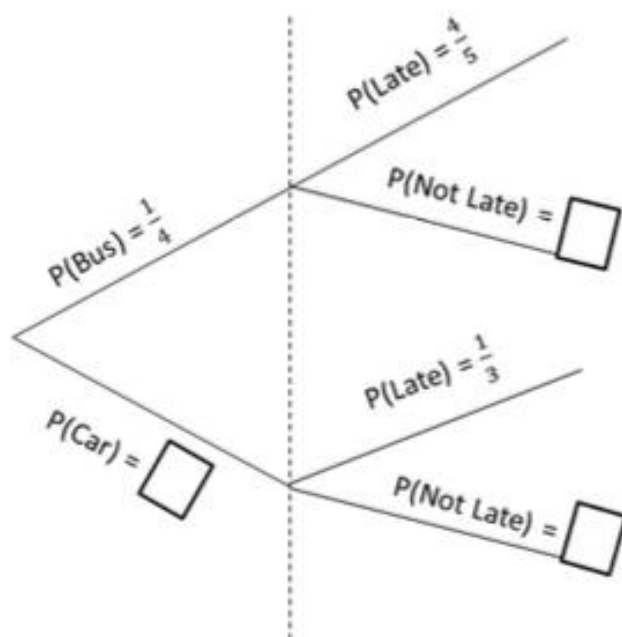
a)   Complete the Probability tree diagram.

b)   Using the probability tree or otherwise, find the probability that:

   (i)   The teacher is late.

Ans: _____
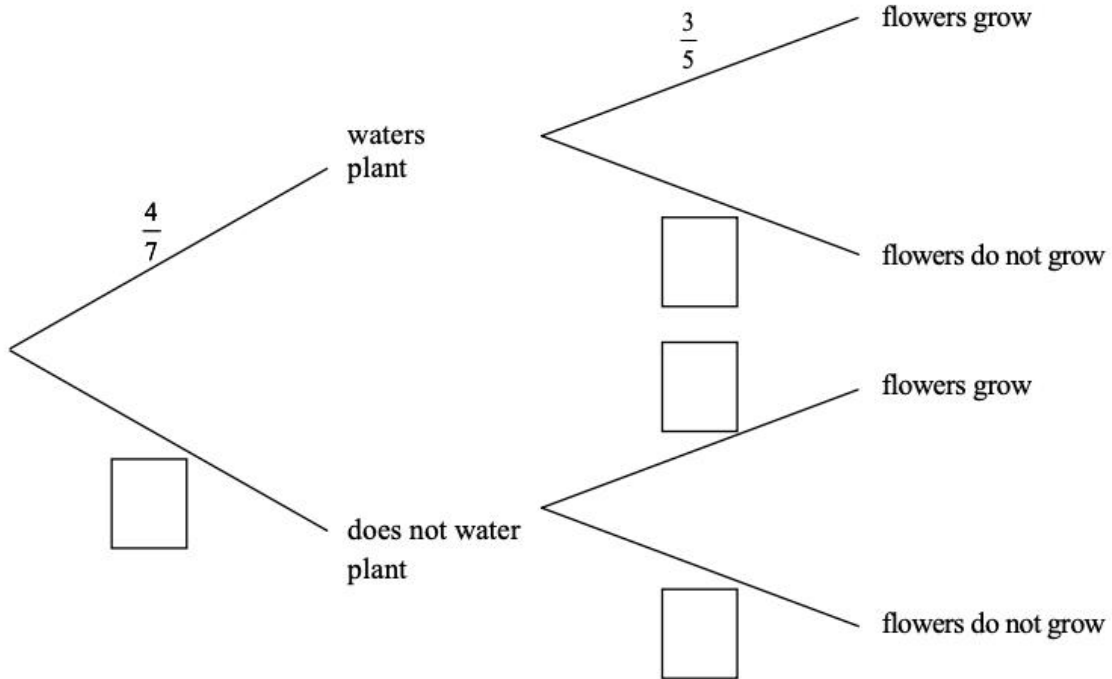
   (ii)   She goes by car and she is not late.

Ans: _____

(7 marks)

5) The probability that Lina **waters** her plant is $\dfrac{4}{7}$.

If she waters her plant, the probability that flowers grow is $\dfrac{3}{5}$.

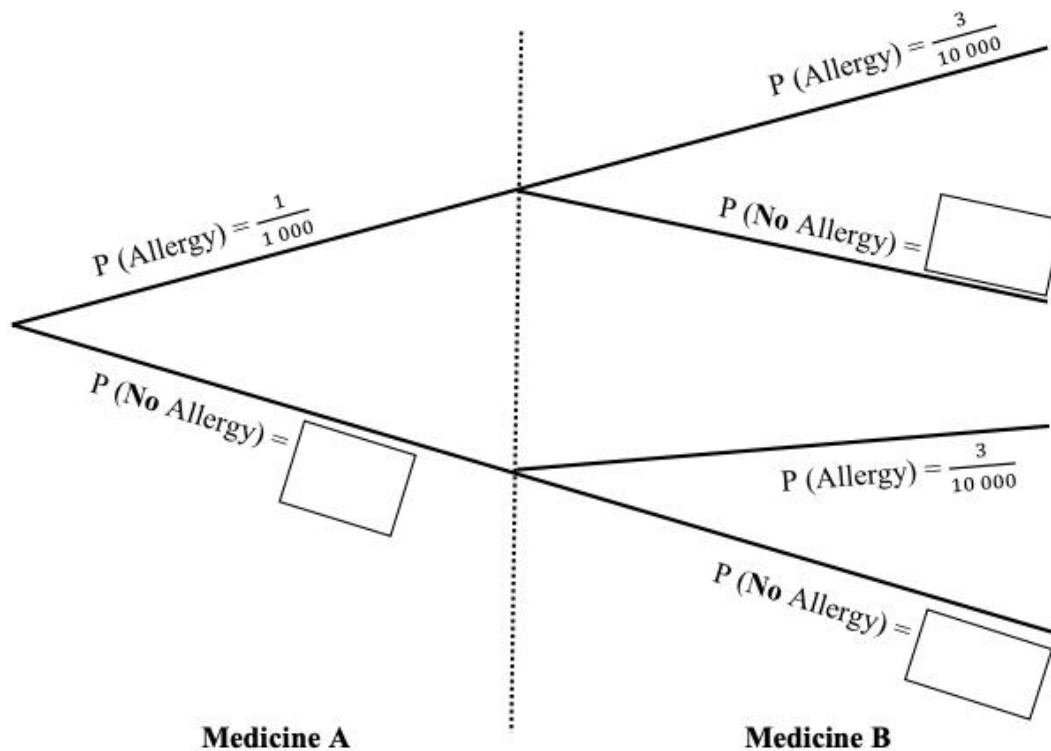If she does not water her plant, the probability that flowers grow is $\dfrac{1}{5}$.

i)   Complete the tree diagram below

ii)   Calculate the probability that flowers grow.

Ans. _____

(8 marks)

6) Alfred calculates the probability that a person develops an allergy after taking some medicines. For Medicine A this is $\frac{1}{1\,000}$. For Medicine B this is $\frac{3}{10\,000}$.

P (Allergy) = $\frac{3}{10\,000}$

P (No Allergy) = [ ]

P (Allergy) = $\frac{1}{1\,000}$

P (No Allergy) = [ ]

P (Allergy) = $\frac{3}{10\,000}$

P (No Allergy) = [ ]

Medicine A   **Medicine B**

a)   Complete the probability tree.

Erika takes Medicine A and Medicine B.

b)   What is the probability that she develops an allergy to **both** medicines?

Ans: _____

c)   Show that the probability that she develops an allergy to **only one** medicine is about $\frac{13}{10\,000}$.
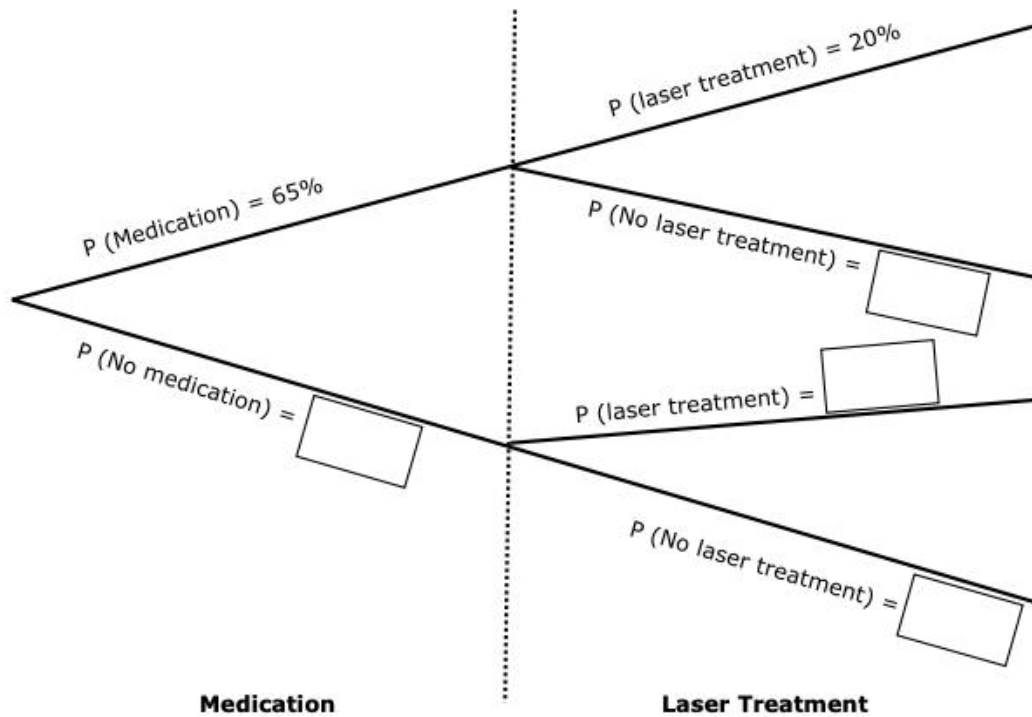
Ans: _____

(7 marks)

7) Daniel is looking at statistics that represent the success rate of a treatment for a particular health condition.

In 65% of the cases the condition is first treated by medication.
If Daniel takes medication, there is 20% chance that he will need laser treatment after a few years.
If Daniel does not take medication, there is 85% chance that he will need laser treatment after a few years.

(a)   Use this information to complete the probability tree below.

P (Medication) = 65%

P (laser treatment) = 20%

P (No laser treatment) =

P (No medication) =

P (laser treatment) =

P (No laser treatment) =

Medication   **Laser Treatment**

(b)   What is the probability that Daniel heals without any medication or laser treatment?

(c)   What is the probability that Daniel will need laser treatment?

(d)   Daniel states "I have about 1 in 2 chance of healing with medication only". Explain why Daniel is correct.

(10 marks)

8) Oliver uses the school transport to go to school.
   On any day, the probability his bus is late is 0.3.

   The following tree diagram shows the possibilities as to his timings for school on Monday and Tuesday.
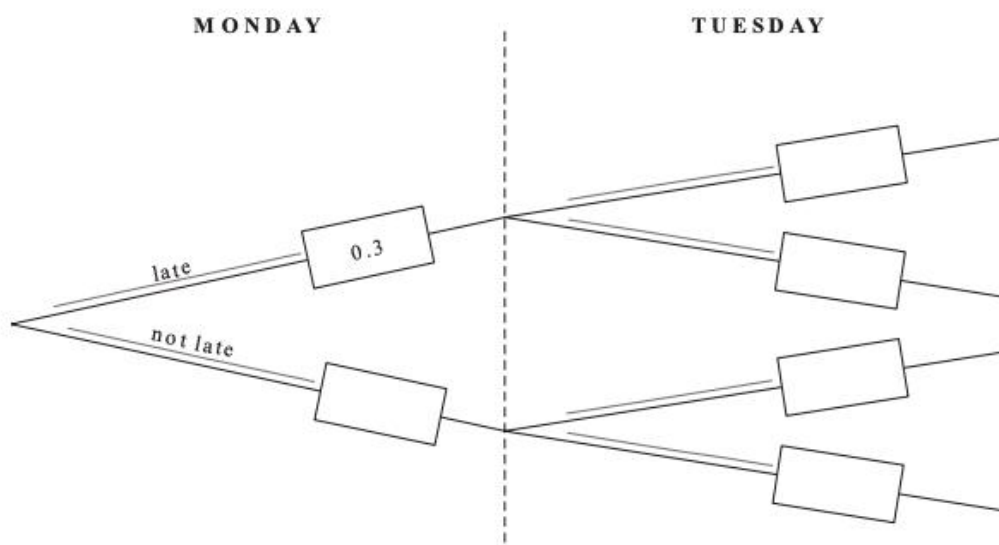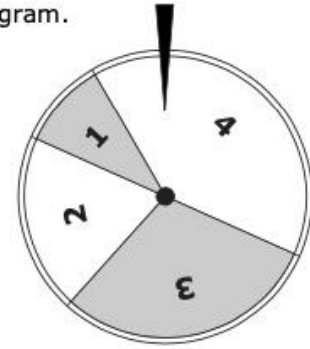

   (i)   Complete the tree diagram above.

   3 marks

   (ii) Work out the probability that Oliver's bus will **not** be late on both Monday and Tuesday.

   1 mark

   (iii) Work out the probability that Oliver's bus will be late on **at least one** of these two days.

   3 marks

9) The face of a spinner is divided into four sectors as shown in the diagram.

On spinning, the relative probability of the spinner landing on each sector is given in the table below.

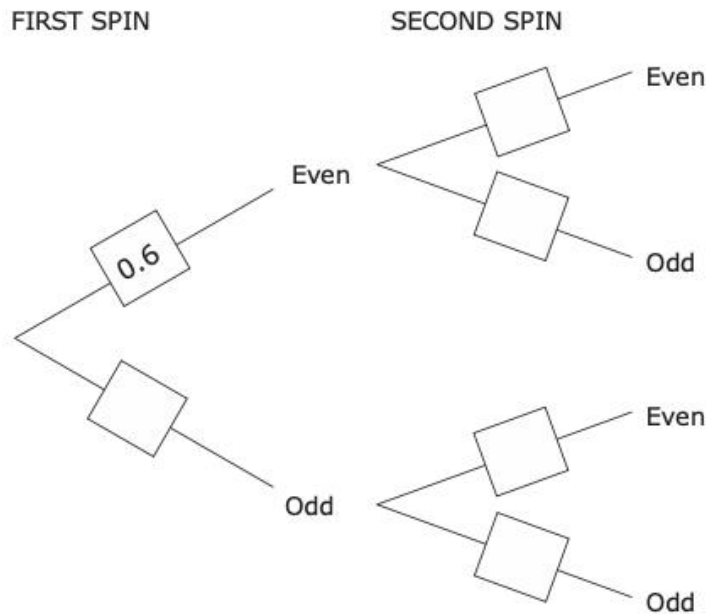| SECTOR	1	2	3	4
Probability of landing on sector	x	$2x$	$3x$	$4x$

(a) Show that the value of x is $\dfrac{1}{10}$

(1)

The spinner is spun twice.

(b) Complete the tree diagram

FIRST SPIN   SECOND SPIN

                                              Even

                        Even

                0.6

                                              Odd

                                              Even

                        Odd

                                              Odd

(3)

(c) Work out the following probabilities:
(i) both spins land on an even number;

(2)

(ii) one of the spins lands on an even number and the other lands on an odd one.

(2)

(d) The spinner is spun 200 times. How many times is it expected that it lands on sector 4?
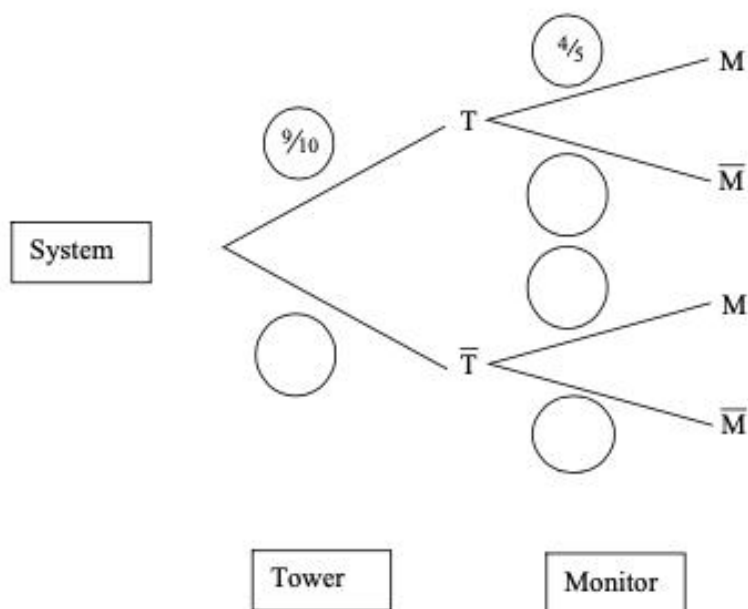
(1)

(Total: 9 marks)

10) The probability P(T) that a computer tower works perfectly is $\frac{9}{10}$ and the probability P(M) that a monitor works perfectly is $\frac{4}{5}$. $\overline{T}$ denotes a faulty tower and $\overline{M}$ denotes a faulty monitor.

A man buys a computer system consisting of two parts, a tower and a monitor.

(a) Complete the following tree diagram.

(b) Find the probability that no part of the system has a fault.

Answer: _____

(c) Find the probability that both the tower and the monitor have a fault.

Answer: _____

(d) Find the probability that **at least** one part of the system has a fault.

Answer: _____

(8 marks)

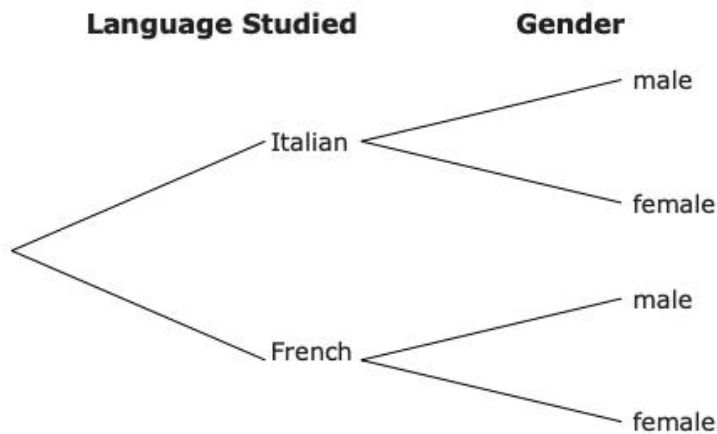11) In a school, 80 students study one language only; either French or Italian.

There are 20 more students studying French than Italian.

60% of those studying French are female

30% of those studying Italian are male.

A student is chosen at random from this group of students.

(a) Complete the probability tree to show the probabilities associated with each branch.

Language Studied   **Gender**

```
                                      male
                   Italian
                                      female

                                      male
                   French
                                      female
```

(4)

(b) What is the probability that the chosen student studies Italian and is a female?

(2)

(c) What is the probability that the chosen student is female?

(3)

(Total: 9 marks)

12) Before starting the scholastic year, $\frac{5}{7}$ of the students in a school, have had a flu vaccine.

If a student has had the vaccine, the probability of catching the flu is $\frac{1}{35}$.

If a student has NOT had the vaccine, the probability of catching the flu is $\frac{9}{14}$.

(i) Draw a tree diagram to show the given data.

5 marks

(ii) Calculate the probability that a student, chosen at random from this school, does NOT catch the flu.

3 marks

(iii) It is expected that around 150 students from this school will catch the flu. How many students attend this school?

3 marks

13) A lottery is held every week using a packet of 90 tickets. The winning number is drawn from the integers from 1 to 90.

Mona buys five tickets in the first week and one ticket in the second week.

(i)   What is the probability that Mona wins in the first week?

(1)

Using a tree diagram or otherwise; work out the probability that:

(ii)   Mona wins on both weeks;

(2)

(iii)   Mona wins just once in these two weeks.

(3)

14) There is a special team's award presented at a school assembly.

There is no prior warning about the award.

The hockey team is to receive the award.

The award must be accepted by the Captain or, if the Captain is absent, by the Vice Captain.

The Captain of the hockey team is present at assembly 95% of the time.

The Vice Captain of the team is present at assembly 93% of the time that the Captain is present and 75% of the time the Captain is absent.

Some of the information is shown on the probability tree below.
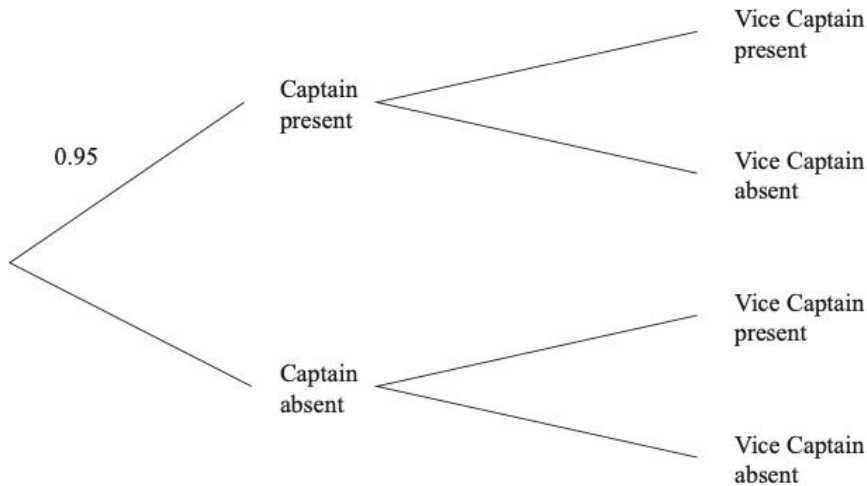
(i) Calculate the probability that both the Captain and the Vice Captain of the hockey team will be present at the assembly when the award is being presented.

_____

_____

_____

(ii) Calculate the probability that the award will be presented to the hockey team at the assembly (ie at least the Captain or the Vice Captain is present at the assembly).

_____

_____

_____

[10 marks]