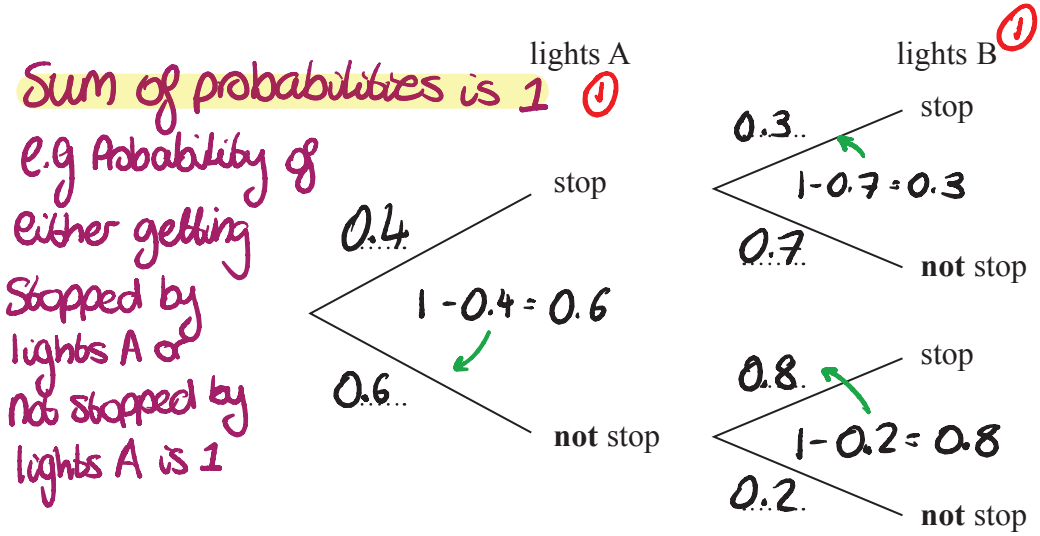
1. A and B are two sets of traffic lights on a road.

The probability that a car is stopped by lights A is 0.4

If a car is stopped by lights A, then the probability that the car is **not** stopped by lights B is 0.7

If a car is **not** stopped by lights A, then the probability that the car is **not** stopped by lights B is 0.2

(a) Complete the probability tree diagram for this information.



Sum of probabilities is 1 (1)

e.g Probability of either getting Stopped by lights A or not stopped by lights A is 1

(1)

(2)

Mark drove along this road.
He was stopped by just one of the sets of traffic lights.

(b) Is it more likely that he was stopped by lights A or by lights B?
You must show your working.

For AND we multiply

Probability of stopped lights A and not stopped lights B
$= 0.4 \times 0.7 = 0.28$ (1)

Probability of not stopped A and stopped lights B
$= 0.6 \times 0.8 = 0.48$ (1)

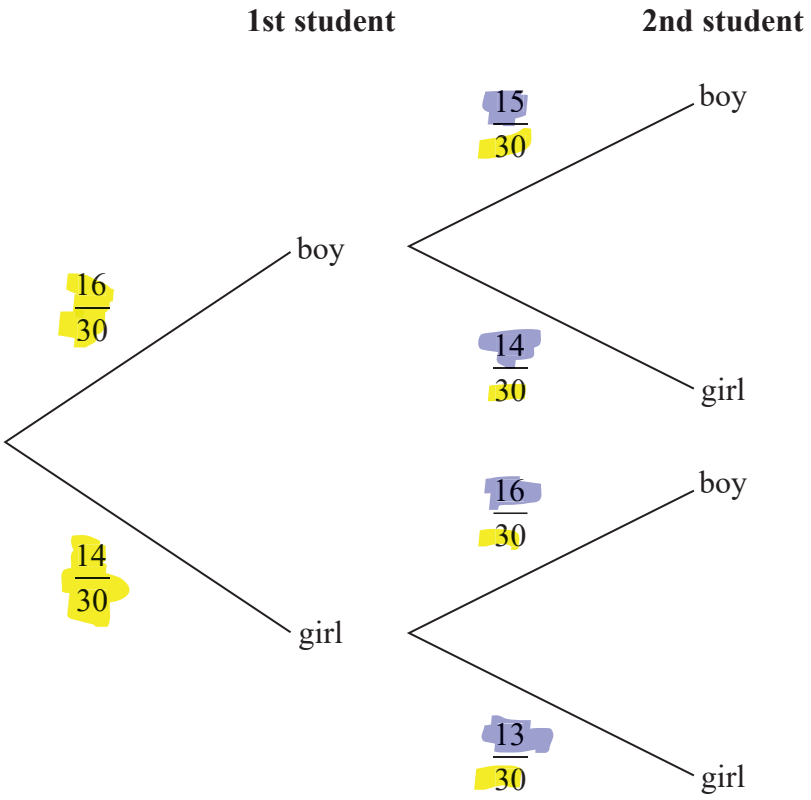
$0.48 > 0.28$ so stopped by lights B is more likely (1)

(3)

2. There are 30 students in Mr Lear's class.
16 of the students are boys.

Two students from the class are chosen at random.

Mr Lear draws this probability tree diagram for this information.



(a) Write down **one** thing that is wrong with the probabilities in the probability tree diagram.

The denominator for the 2nd student is incorrect. It should be 29, not 30.

(1)

Owen and Wasim play for the school football team.

and = x
or = +

The probability that Owen will score a goal in the next match is 0.4
The probability that Wasim will score a goal in the next match is 0.25

Mr Slater says,

"The probability that both boys will score a goal in the next match is 0.4 + 0.25"

(b) Is Mr Slater right?
Give a reason for your answer.

No because the probabilities should be multiplied (0.4 x 0.25)

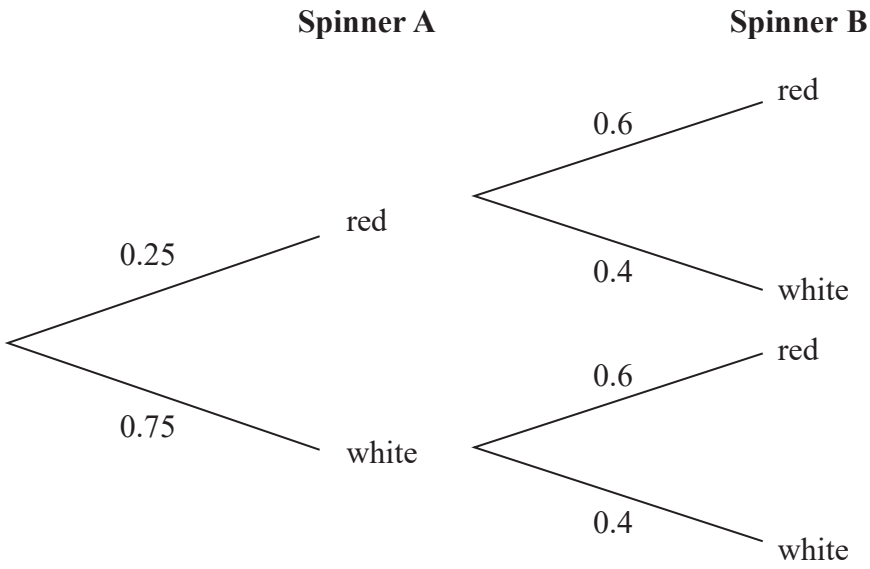
(1)

(Total for Question is 2 marks)

3. Alan has two spinners, spinner **A** and spinner **B**.
Each spinner can land on only red or white.

The probability that spinner **A** will land on red is 0.25
The probability that spinner **B** will land on red is 0.6

The probability tree diagram shows this information.



Alan spins spinner **A** once and he spins spinner **B** once.
He does this a number of times.

The number of times **both** spinners land on red is 24

Work out an estimate for the number of times **both** spinners land on white.

P(Both spinners red) = 0·25 × 0·6
= 0·15 ✓

P(Both spinners white) = 0·75 × 0·4
= 0·3 ✓

0·15 is proportional to 24
×2 ↓ ×2 ↓
0·3 48

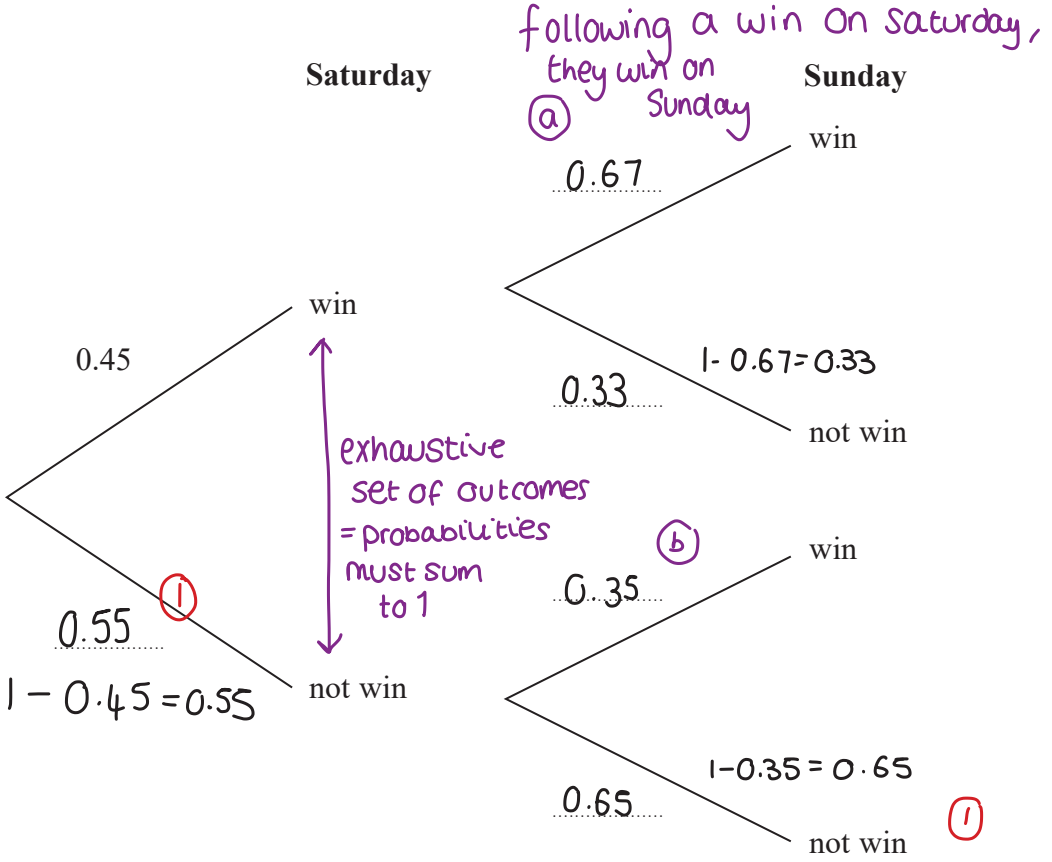
48 ✓

(Total for Question is 3 marks)

4. 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 (a)
If they do **not** win on Saturday, the probability that they will win on Sunday is 0.35 (b)

(a) Complete the probability tree diagram.



(2)

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

Working across → (horizontally) tree diagram, so we multiply probabilities.

P(win on Sat, lose on Sun) = $0.45 \times 0.33 = 0.1485$ (1)

P(lose on Sat, win on Sun) = $0.55 \times 0.35 = 0.1925$

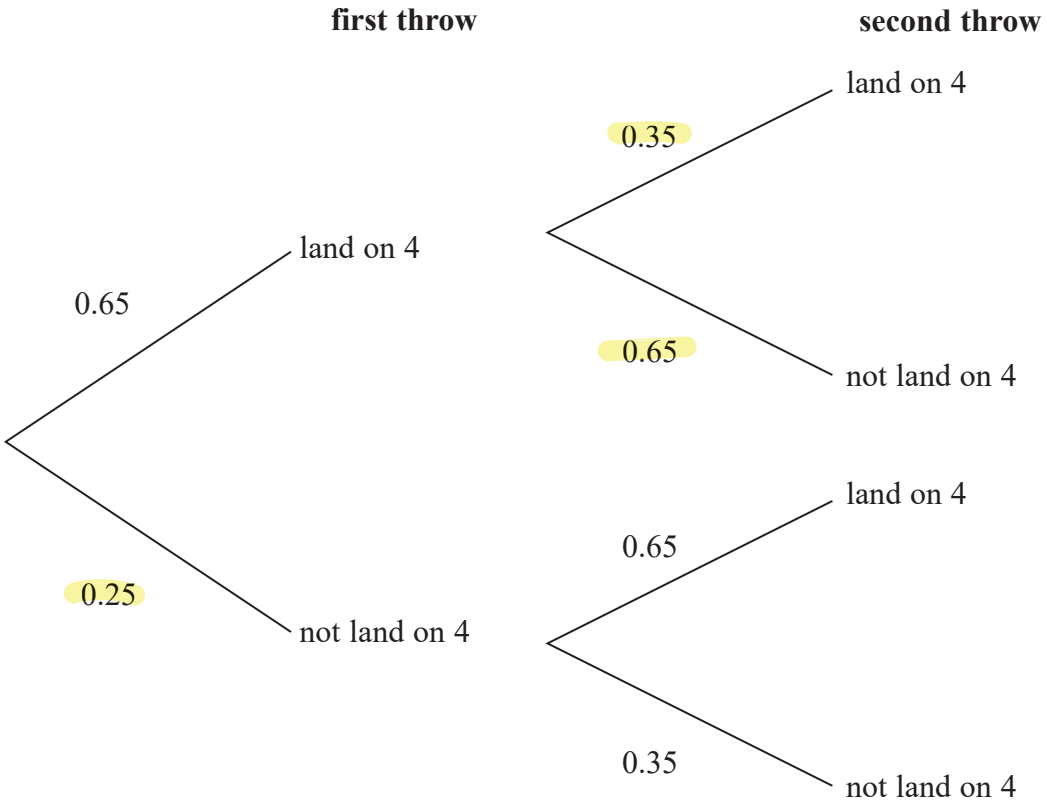
Total probability = $0.1485 + 0.1925$ (1)
$= 0.3410$

0.341 (1)

(3)

5. When a biased 6-sided dice is thrown once, the probability that it will land on 4 is 0.65
The biased dice is thrown twice.

Amir draws this probability tree diagram.
The diagram is **not** correct.



Write down **two** things that are wrong with the probability tree diagram.

1 Probabilities should sum to 1

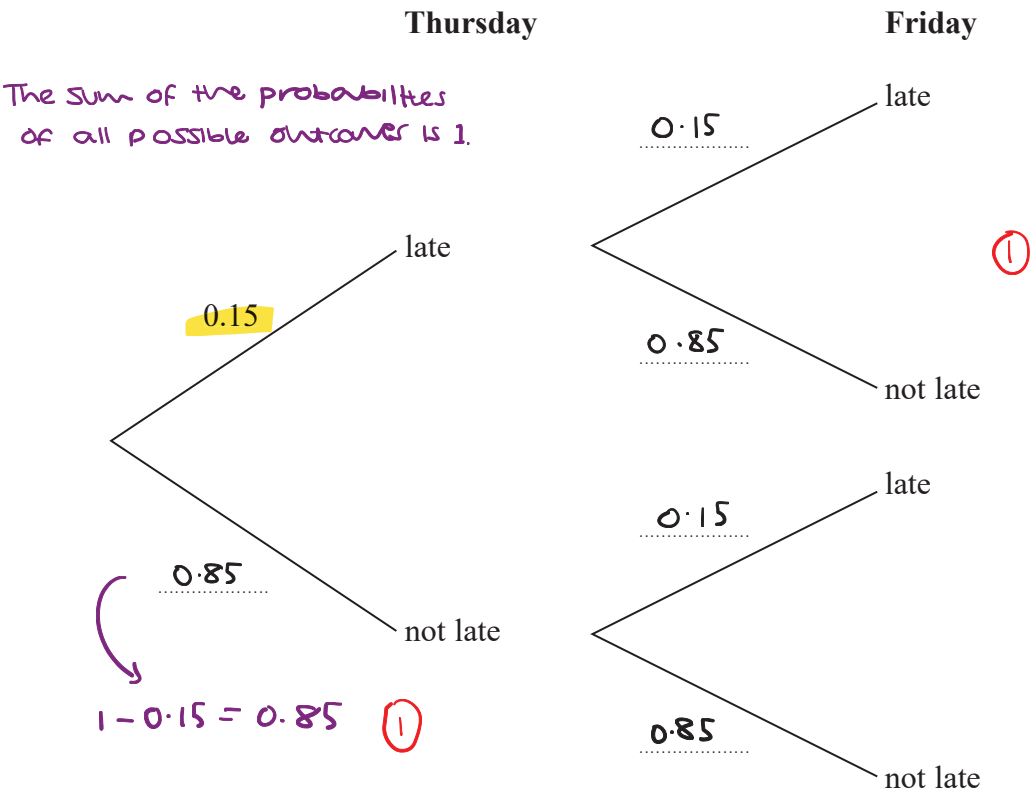
0.25 should be 0.35 (1)

2 For the second throw, the probability it lands on a 4 should still be 0.65 (the top 0.35 and 0.65 should be swapped) (1)

(Total for Question is 2 marks)

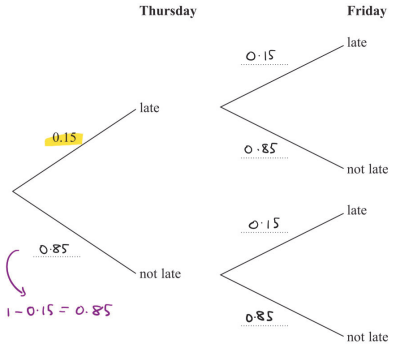
6. Mary travels to work by train every day.
The probability that her train will be late on any day is 0.15

(a) Complete the probability tree diagram for Thursday and Friday.



(2)

(b) Work out the probability that her train will be late on at least one of these two days.



Late = L. Not late = NL

P(late on at least one day)

= P(L and NL)
OR P(NL and L)
OR P(L and L)

AND = Multiply
OR = add.

= (0.15 × 0.85) + (0.85 × 0.15) + (0.15 × 0.15)

= 0.1275 + 0.1275 + 0.0225

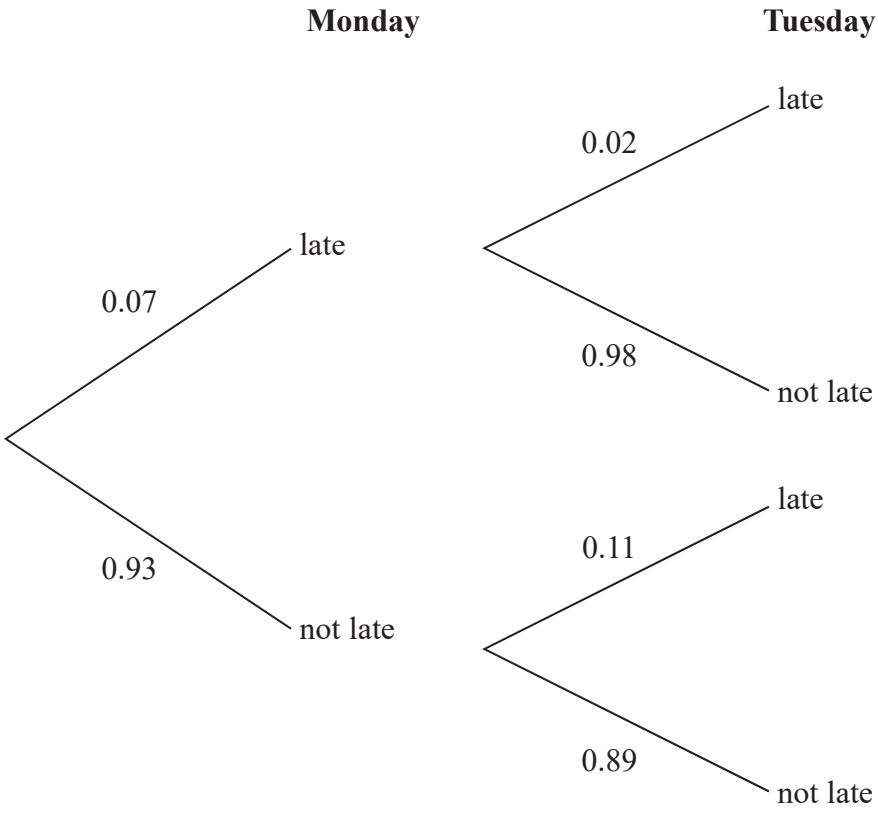
= 0.2275

0.2275

(3)

(Total for Question is 5 marks)

7. The probability tree diagram shows the probabilities that Bismah will be late for work on two days next week.



Calculate the probability that Bismah will be late on exactly one of the two days.

And is X
Or is +

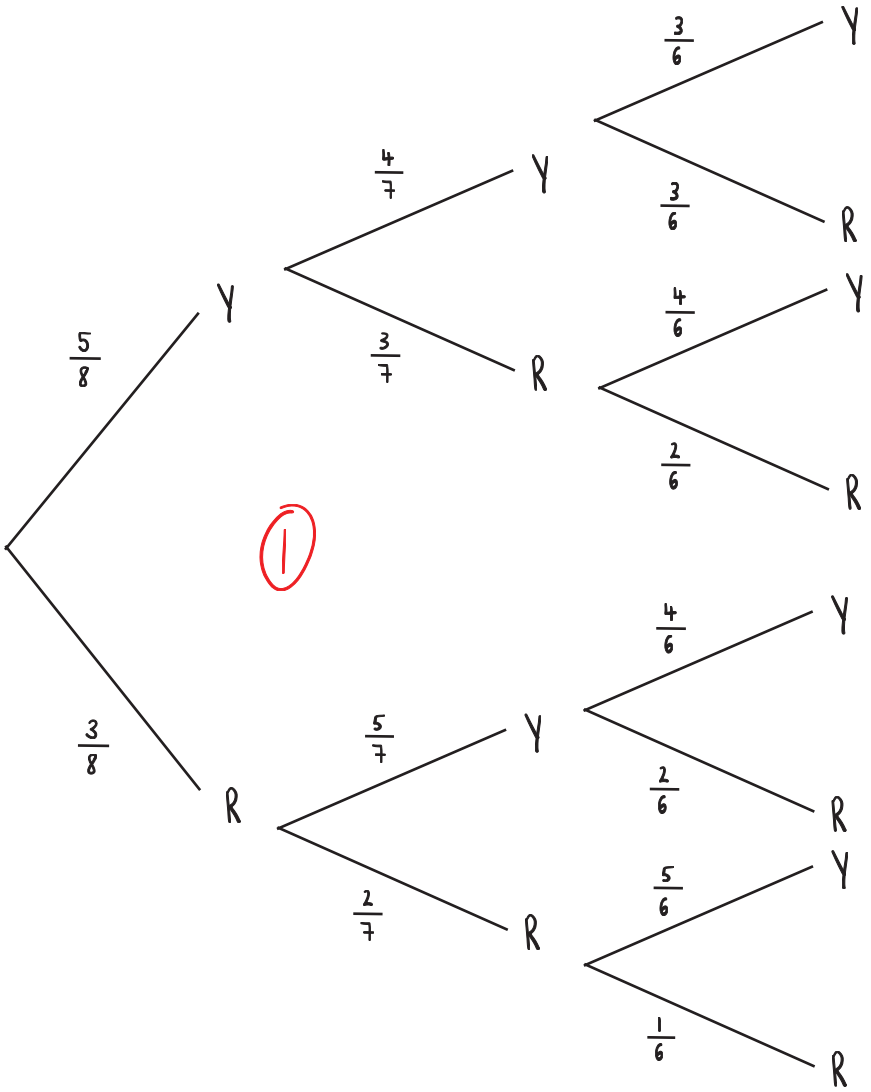
(0.07 x 0.98) + (0.93 x 0.11) (1)

= 0.1709 (1)

8. There are only 3 red counters and 5 yellow counters in a bag.

Jude takes at random 3 counters from the bag.

Work out the probability that he takes exactly one red counter.



P(exactly one Red) = P(RYY) OR P(YRY) OR P(YYR)

$= \left(\frac{3}{8} \times \frac{5}{7} \times \frac{4}{6}\right) + \left(\frac{5}{8} \times \frac{3}{7} \times \frac{4}{6}\right) + \left(\frac{5}{8} \times \frac{4}{7} \times \frac{3}{6}\right)$ (1)

$= \frac{60}{336} + \frac{60}{336} + \frac{60}{336} = \boxed{\frac{180}{336}}$ (1) (1)

$\frac{180}{336}$

(Total for Question is 4 marks)

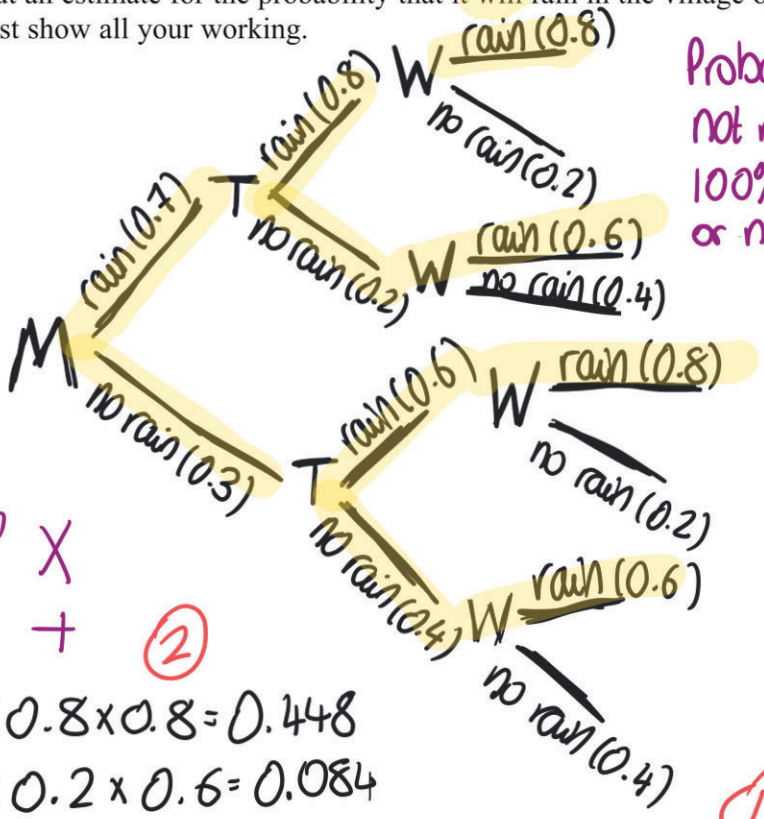
9. In a village,

if it rains on one day, the probability that it will rain on the next day is 0.8
if it does **not** rain on one day, the probability that it will rain on the next day is 0.6

A weather forecaster says,

"There is a 70% chance that it will rain in the village on Monday."

Work out an estimate for the probability that it will rain in the village on Wednesday.
You must show all your working.



Probability of raining or not raining is 1 (because 100% chance of either raining or not raining)

This allows you to work out missing probabilities

'And' X
'Or' +

(2)

$0.7 \times 0.8 \times 0.8 = 0.448$
$0.7 \times 0.2 \times 0.6 = 0.084$
$0.3 \times 0.6 \times 0.8 = 0.144$
$0.3 \times 0.4 \times 0.6 = 0.072$

(1)

Probability will rain Wednesday
$0.448 + 0.084 + 0.144 + 0.072$
$= 0.748$

(1)

0.748