

# P33- Probability Tree Diagrams- Conditional Probability

OCR

- 14 Adam has 10 sweets in a bag.  
5 are cherry sweets, 4 are lemon sweets and 1 is an orange sweet.

Adam chooses a sweet at random from the bag and eats it.  
He then takes another sweet at random from the bag and eats it.

- (a) Adam says

P31 The probability that I choose two cherry sweets is  $\frac{25}{100}$ .

He is incorrect. Explain his error.

.....  
..... [2]

- (b) Find the probability that the two sweets he chooses have different flavours.

P33

(b) ..... [4]

- 14 Adam has 10 sweets in a bag.  
5 are cherry sweets, 4 are lemon sweets and 1 is an orange sweet.

and = x  
or = +

Adam chooses a sweet at random from the bag and eats it.  
He then takes another sweet at random from the bag and eats it.

Ch	Le	O
5	4	1

- (a) Adam says

P31

The probability that I choose two cherry sweets is  $\frac{25}{100}$ .

He is incorrect. Explain his error.

$$\frac{5}{10} \text{ and } \frac{4}{9} = \frac{20}{90} = \frac{2}{9} \checkmark$$

Adam did  $\frac{5}{10} \times \frac{5}{10} = \frac{25}{100}$   
x

[2]

- (b) Find the probability that the two sweets he chooses have different flavours.

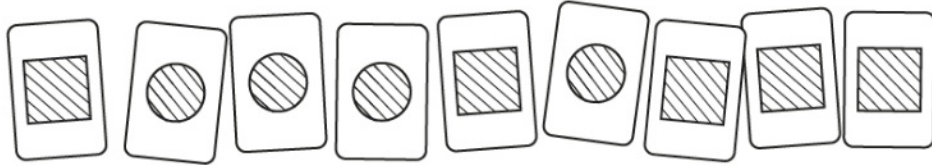
P33

$$\begin{aligned}
 & (\text{Ch and L}) \text{ or } (\text{Ch and Or}) \text{ or } (\text{L and C}) \text{ or } (\text{L and O}) \text{ or } (\text{O and C}) \text{ or } (\text{O and L}) \\
 & \left(\frac{5}{10} \times \frac{4}{9}\right) + \left(\frac{5}{10} \times \frac{1}{9}\right) + \left(\frac{4}{10} \times \frac{5}{9}\right) + \left(\frac{4}{10} \times \frac{1}{9}\right) + \left(\frac{1}{10} \times \frac{5}{9}\right) + \left(\frac{1}{10} \times \frac{4}{9}\right) \\
 & \frac{20}{90} + \frac{5}{90} + \frac{20}{90} + \frac{4}{90} + \frac{5}{90} + \frac{4}{90}
 \end{aligned}$$

(b)  $\frac{58}{90}$  [4]

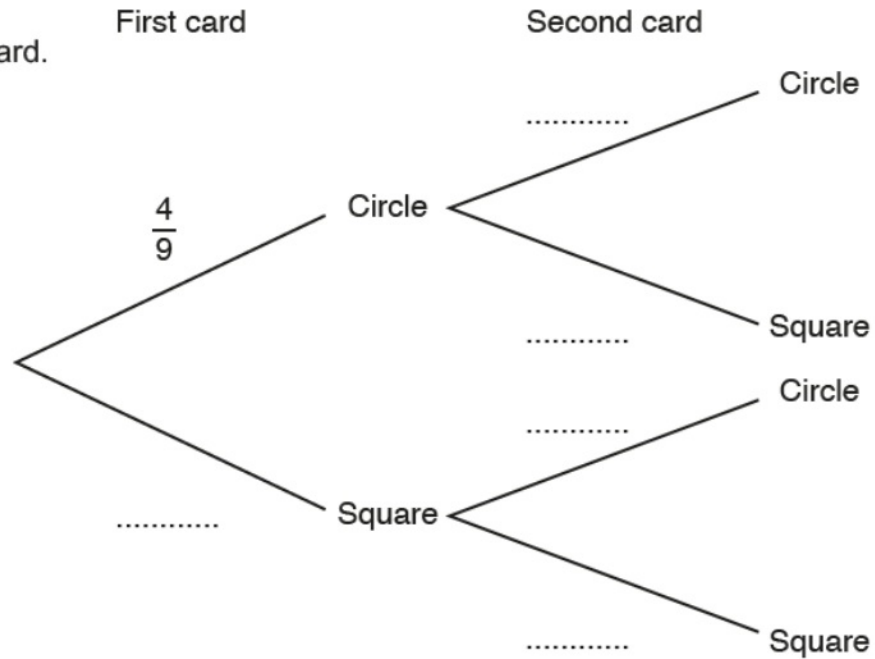
11 Reuben is playing a matching game with these cards.

Created by W Neill



He turns the cards over and shuffles them.  
 Reuben takes a card and keeps it. He then takes a second card.  
 If the cards are different, he wins the game.

P33



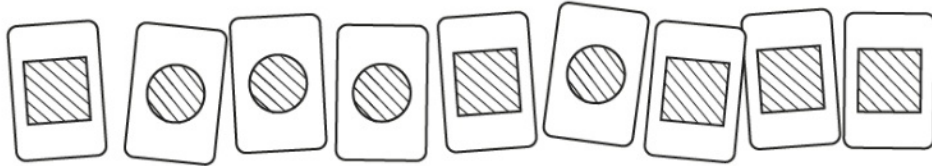
(a) Complete this tree diagram to show the probabilities for each card picked in the game.

(b) What is the probability that Reuben wins the game?

(b) ..... [3]

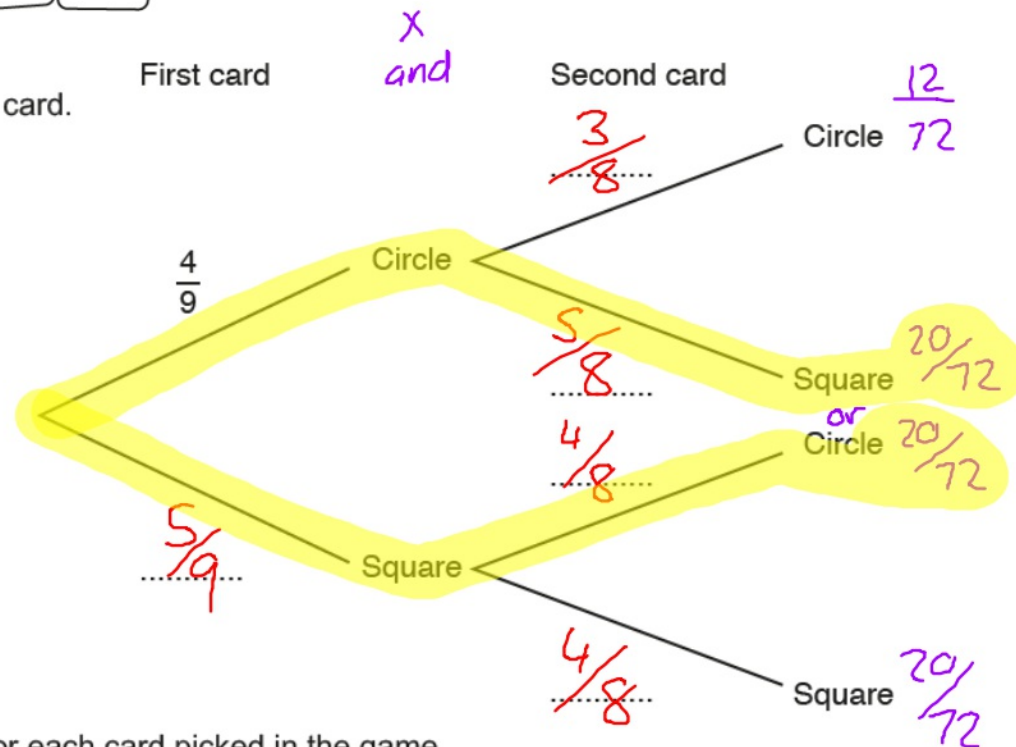
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P33



(a) Complete this tree diagram to show the probabilities for each card picked in the game.

(b) What is the probability that Reuben wins the game?

(b)  $\frac{40}{72}$  ✓ [3]

$\frac{20}{72} + \frac{20}{72} = \frac{40}{72} = 1$

Edexcel

20 There are 9 counters in a bag.

There is an even number on 3 of the counters.

There is an odd number on 6 of the counters.

Three counters are going to be taken at random from the bag.

The numbers on the counters will be added together to give the total.

Find the probability that the total is an odd number.

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**(Total for Question 20 is 5 marks)**



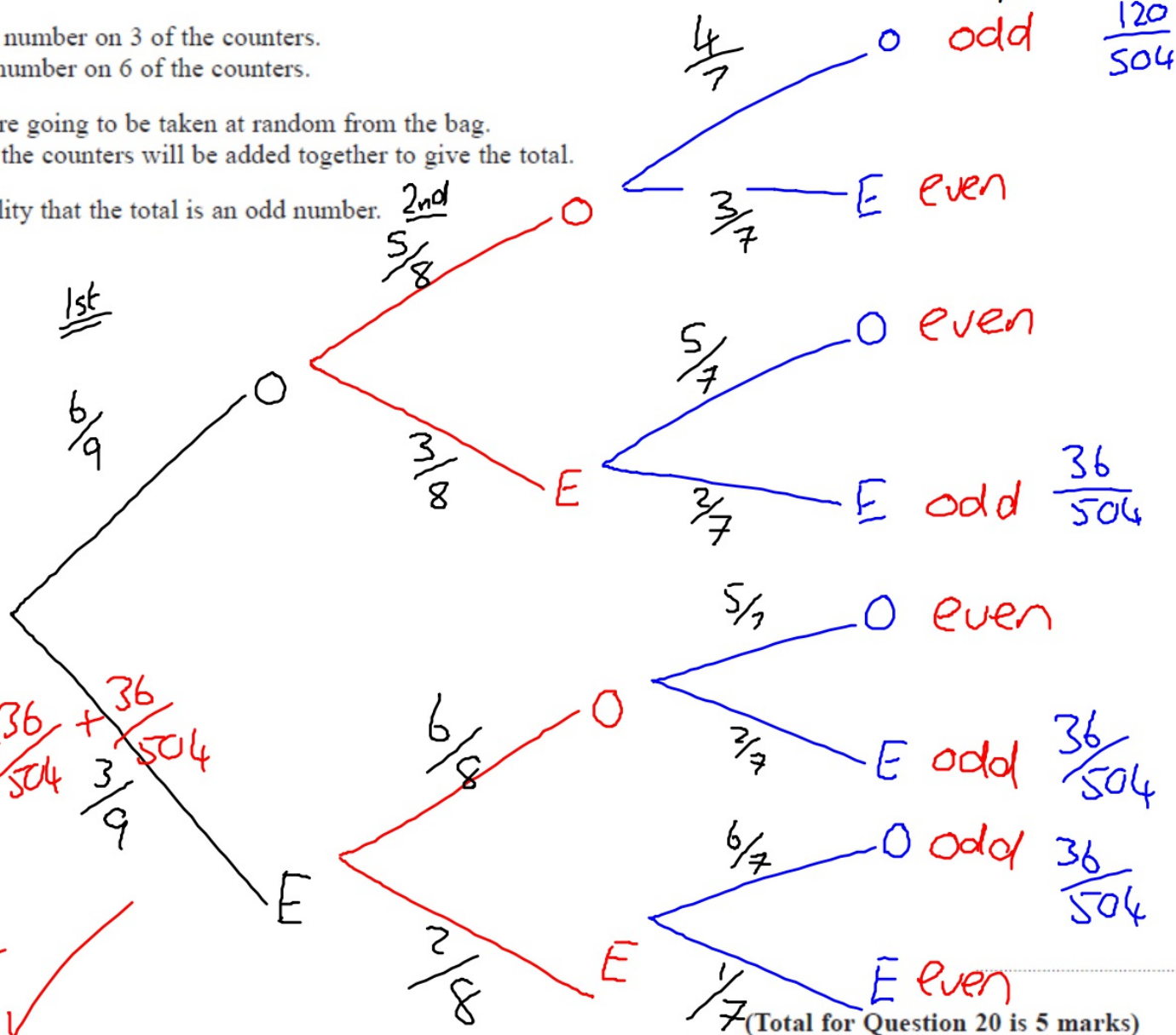
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Created by W Neill



Ans

$$\frac{120}{504} + \frac{36}{504} + \frac{36}{504} + \frac{36}{504}$$

$$= \frac{228}{504} \checkmark$$

13 When Lee goes to work, he either travels by car or by bus.

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The probability that on any day Lee goes to work he travels by car is 0.2

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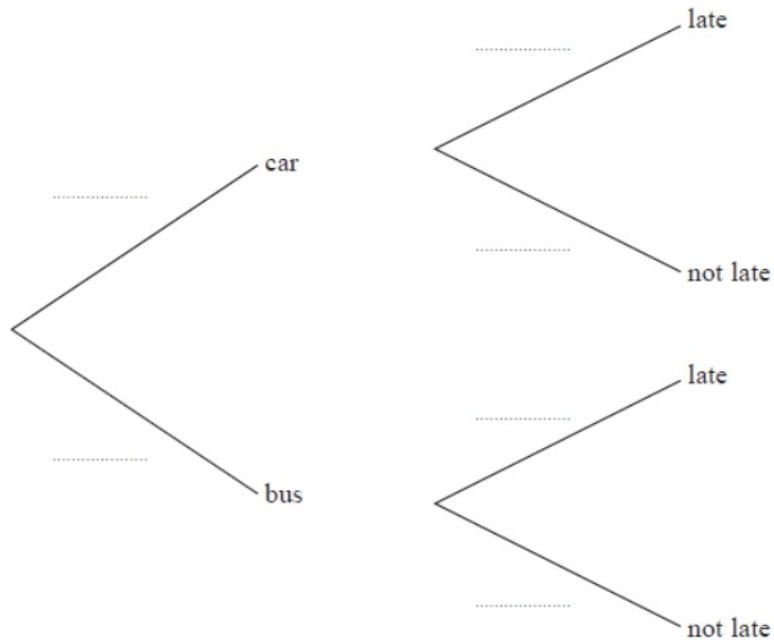
When Lee travels to work by car, the probability that he is late is 0.35

When Lee travels to work by bus, the probability that he is late is 0.15

(a) Complete the probability tree diagram for this information. (2)

(b) Work out the probability that on any day Lee goes to work he is late. ....

(3)



13 When Lee goes to work, he either travels by car or by bus.

Video created by W Neill

The probability that on any day Lee goes to work he travels by car is 0.2

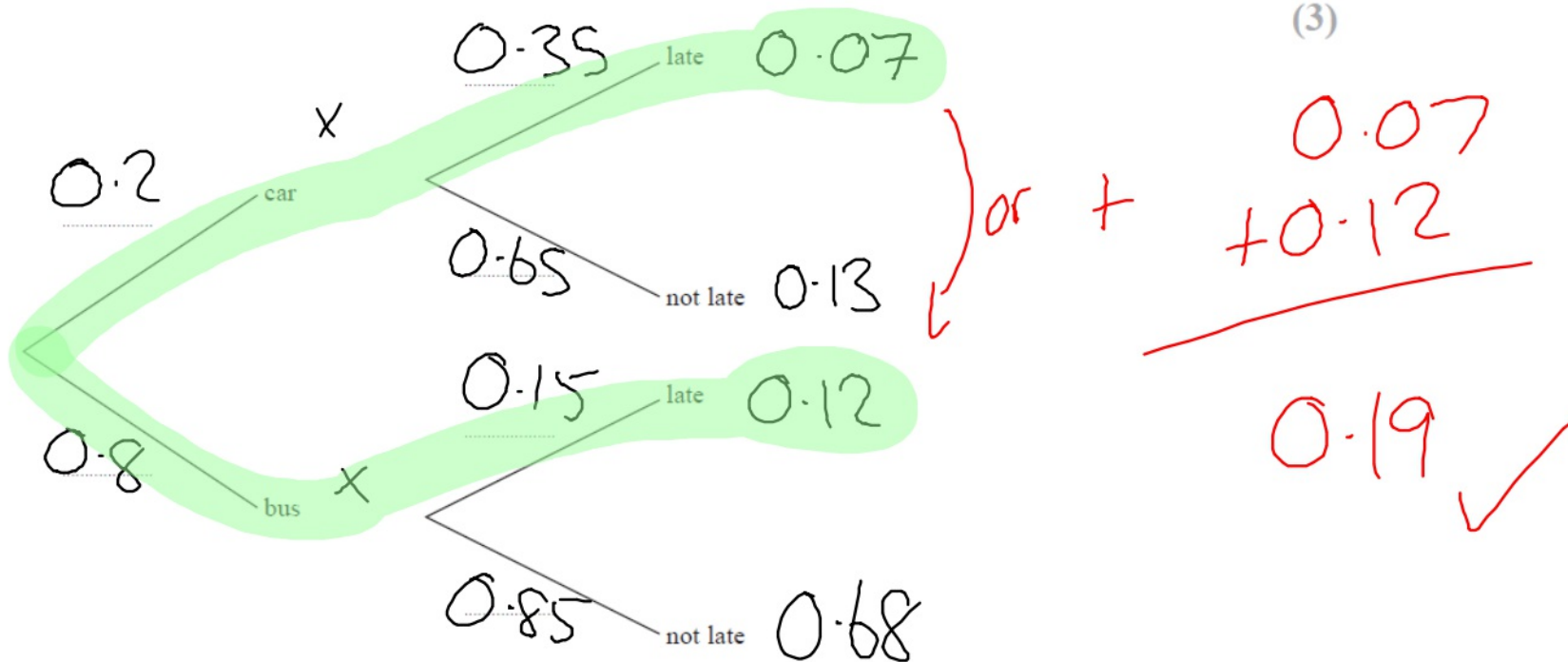
P33

When Lee travels to work by car, the probability that he is late is 0.35

When Lee travels to work by bus, the probability that he is late is 0.15

(a) Complete the probability tree diagram for this information. (2) ✓

(b) Work out the probability that on any day Lee goes to work he is late. .... (3)



**17** There are 9 counters in a bag.

Video created by W Neill

7 of the counters are green.

2 of the counters are blue.

Ria takes at random two counters from the bag.

Work out the probability that Ria takes one counter of each colour.

You must show your working.

.....  
(Total for Question 17 is 4 marks)

17 There are 9 counters in a bag.

Video created by W Neill

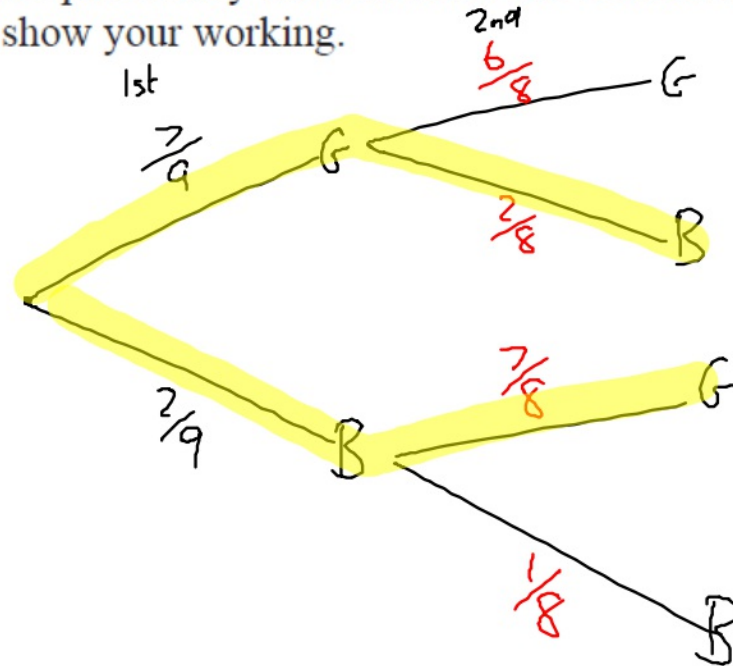
7 of the counters are green.

2 of the counters are blue.

Ria takes at random two counters from the bag.

Work out the probability that Ria takes one counter of each colour.

You must show your working.



and =  $\times$

or =  $+$

$$\frac{7}{9} \times \frac{2}{8} = \frac{14}{72}$$

$$\frac{2}{9} \times \frac{7}{8} = \frac{14}{72} +$$

$$\frac{28}{72} \checkmark$$

$$\frac{28}{72} \checkmark$$

(Total for Question 17 is 4 marks)

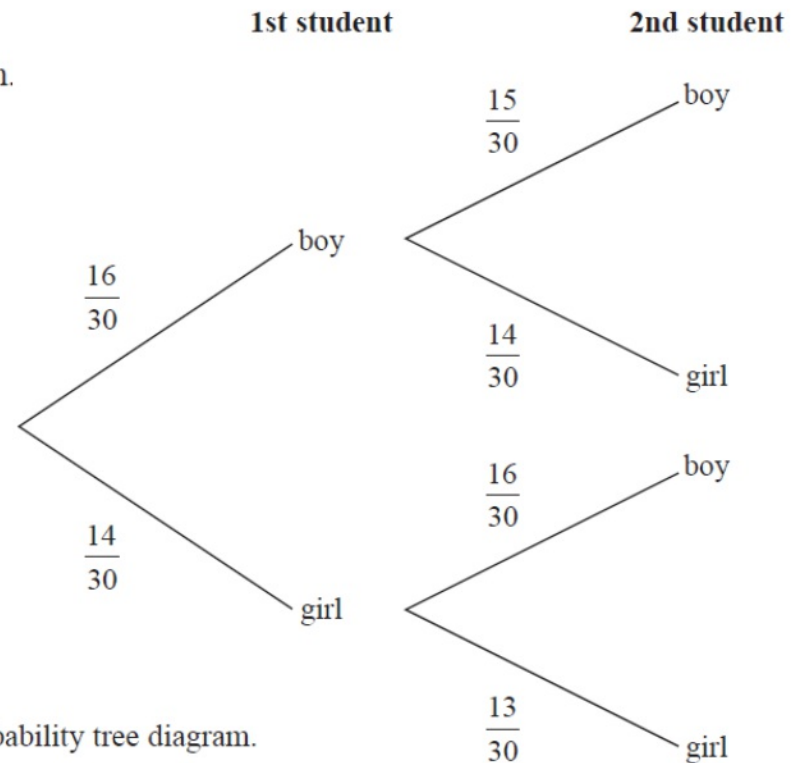
12 There are 30 students in Mr Lear's class.

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.

Video created by W Neill



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

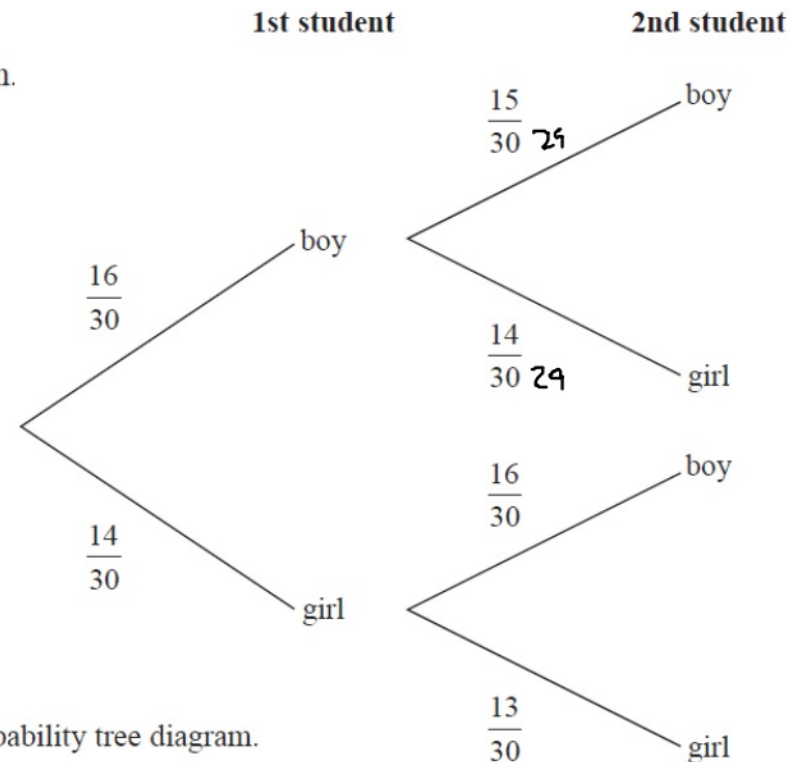
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Two students from the class are chosen at random.

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

2nd student should have a denominator of 29

Owen and Wasim play for the school football team.

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.

---

---

(1)



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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,

Owen and Wasim Score

→ and = X

$0.4 \times 0.25$  ✓

(1)

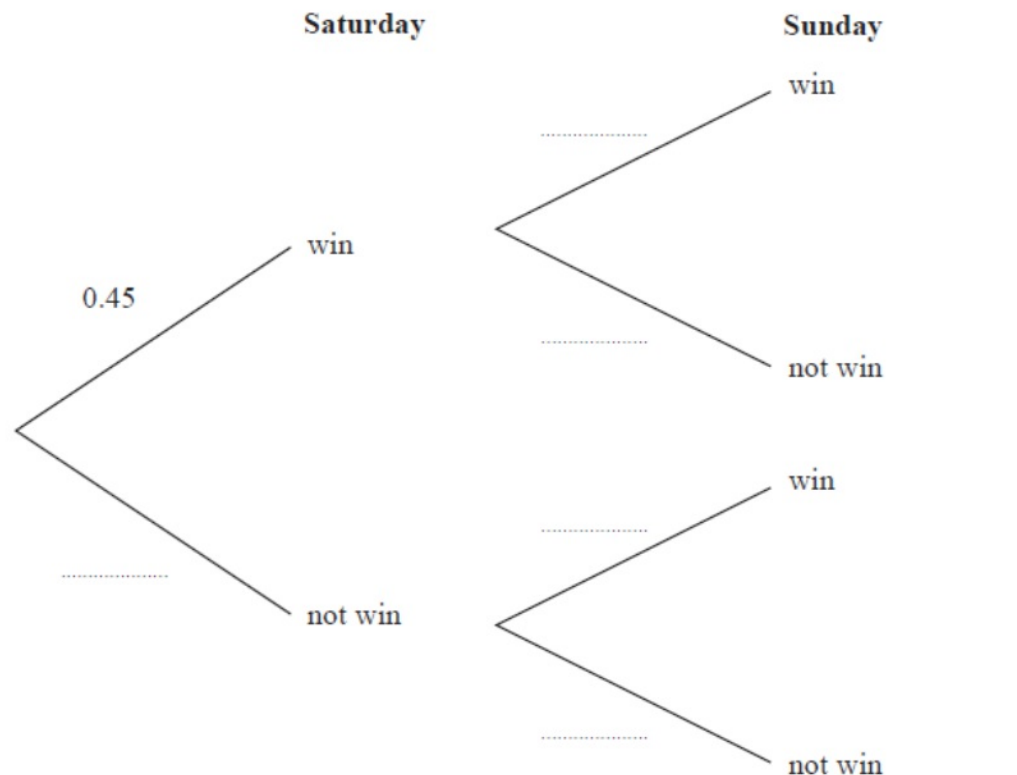
15 A darts team is going to play a match on Saturday and on Sunday.

P33 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

(a) Complete the probability tree diagram.



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

(3)

15 A darts team is going to play a match on Saturday and on Sunday.

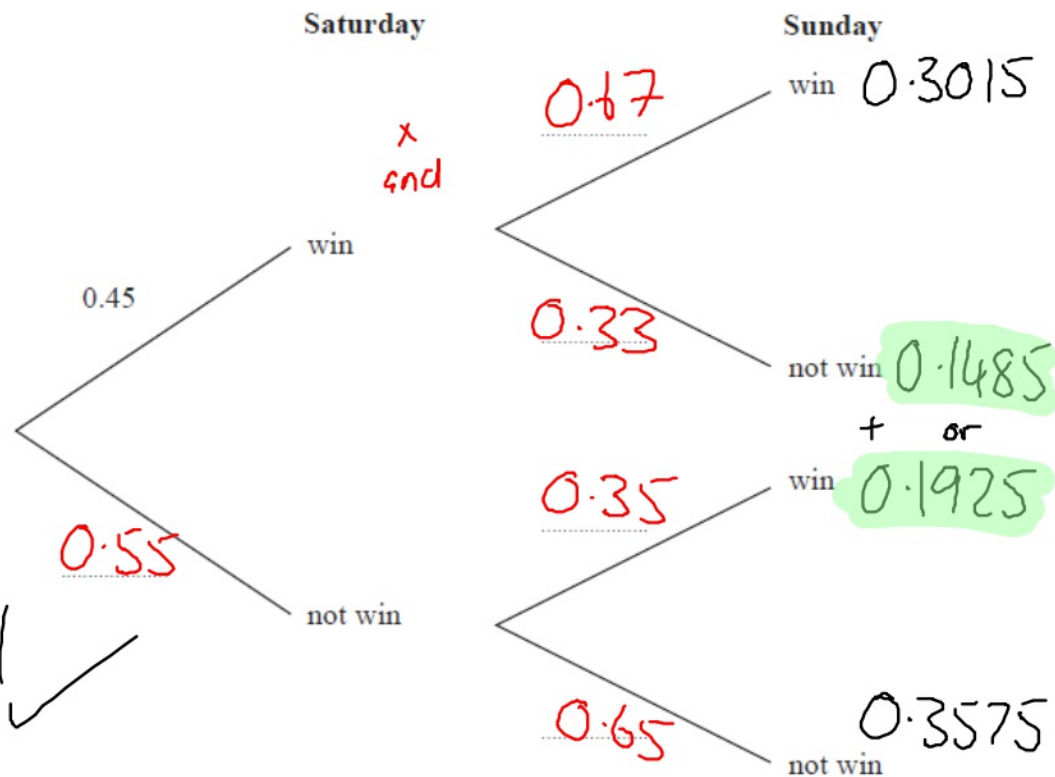
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If they win on Saturday, the probability that they will win on Sunday is 0.67

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

and = x  
or = +

(a) Complete the probability tree diagram.



$$0.1485 + 0.1925 = 0.341$$

ans ✓



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

(3)

**22** There are only green pens and blue pens in a box.

Video Created by W Neill

**A54** There are three more blue pens than green pens in the box.

**P31** There are more than 12 pens in the box.

**P33** Simon is going to take at random two pens from the box.

The probability that Simon will take two pens of the same colour is  $\frac{27}{55}$

Work out the number of green pens in the box.

.....  
(Total for Question 22 is 6 marks)

22 There are only green pens and blue pens in a box.

A54 There are three more blue pens than green pens in the box.  
There are more than 12 pens in the box.

P31 Simon is going to take at random two pens from the box.

P33 The probability that Simon will take two pens of the same colour is  $\frac{27}{55}$

Work out the number of green pens in the box.

Video Created by W Neill

$$\left. \begin{array}{l} \rightarrow \text{green} = x \\ \quad \quad \quad + \\ \text{blue} = x + 3 \end{array} \right\} \text{Total } 2x + 3$$

green & green or blue and blue

$$\left( \frac{x}{2x+3} \times \frac{x-1}{2x+2} \right) + \left( \frac{x+3}{2x+3} \times \frac{x+2}{2x+2} \right) = \frac{27}{55}$$

$$(2x+3)(2x+2)$$

$$4x^2 + 4x + 6x + 6$$

$$4x^2 + 10x + 6$$

$$(x+3)(x+2)$$

$$x^2 + 5x + 6$$

$$55(2x^2 + 4x + 6) = 27(4x^2 + 10x + 6)$$

$$\frac{x^2 - x}{4x^2 + 10x + 6} + \frac{x^2 + 5x + 6}{4x^2 + 10x + 6} = \frac{27}{55}$$

$$110x^2 + 220x + 330 = 108x^2 + 270x + 162$$

$$110x^2 - 108x^2 + 220x - 270x + 330 - 162 = 0$$

$$2x^2 - 50x + 168 = 0$$

$$x^2 - 25x + 84 = 0$$

$$(x - 21)(x - 4) = 0$$

$$\rightarrow \begin{array}{l} x = 21 \\ x = 4 \end{array}$$

21 ✓

(Total for Question 22 is 6 marks)

AQA

27

There are 11 pens in a box.

P33

8 are black and 3 are red.

Two pens are taken out at random **without** replacement.

Work out the probability that the two pens are the **same** colour.

**[4 marks]**

Answer \_\_\_\_\_

27

There are 11 pens in a box.

Video created by W Neill

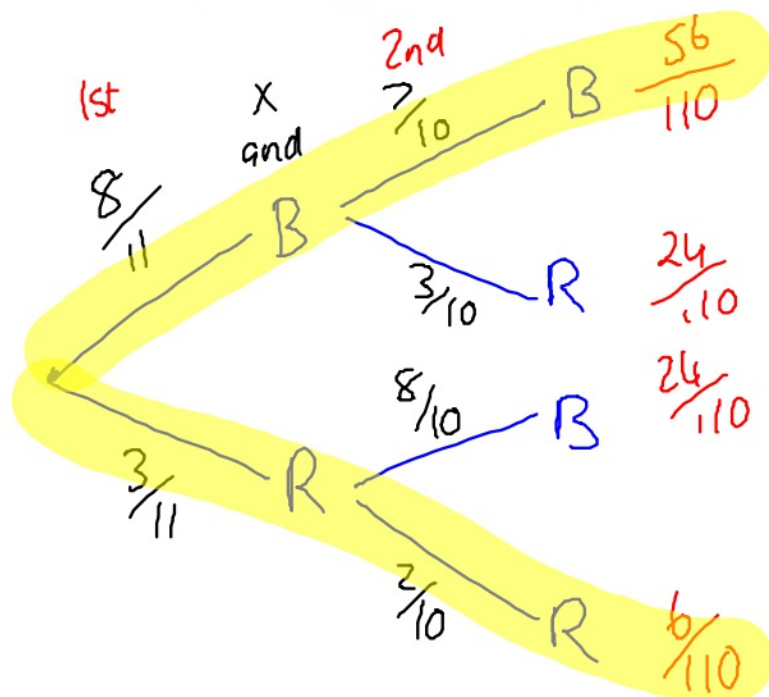
P33

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Work out the probability that the two pens are the **same** colour.

[4 marks]



$$(B \text{ and } B) \text{ or } (R \text{ and } R)$$

$$\frac{56}{110} + \frac{6}{110}$$

$$\frac{62}{110} \checkmark$$

Answer \_\_\_\_\_



27

A bag contains 30 discs.

10 are red and 20 are blue.

P33

One disc is taken out at random and replaced by **two** of the other colour.

Another disc is then taken out at random and replaced by **two** of the other colour.

Another disc is then taken out at random.

Work out the probability that all three discs taken out are **red**.

**[3 marks]**

Answer \_\_\_\_\_

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A bag contains 30 discs.

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Another disc is then taken out at random.

Work out the probability that all three discs taken out are **red**.**[3 marks]**

Red and Red and Red

$$\frac{10}{30} \times \frac{9}{31} \times \frac{8}{32} = \frac{3}{124}$$

Answer            $\frac{3}{124}$           

take out red  $\rightarrow$  (29)