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AQA, OCR, Edexcel

GCSE

GCSE Maths

Probability and Tree Diagrams

Name:

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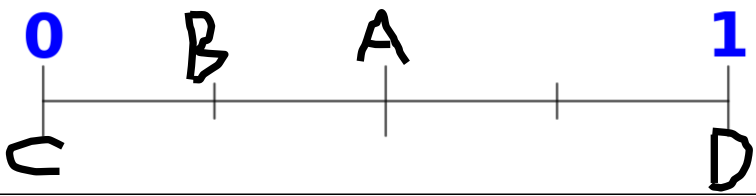
Guidance

1. Read each question carefully.
2. Don't spend too long on each question.
3. Attempt every question.
4. Always show your workings.

Revise GCSE Maths:
www.MathsMadeEasy.co.uk/gcse-maths-revision/

1. Place each of the events below on the probability scale based on their likely probability.

A	Heads on a coin flip
B	Rain on every day in April
C	Roll a 0 on a fair standard dice
D	The sun comes up tomorrow



(4 marks)

2. The probabilities of a spinner landing on each of its three colours are shown in the table below, but one is missing.
   Complete the table

Colour	Blue	Red	Green
Probability	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{6}$

If the spinner is spun 180 times, how many blues would you expect?

$$180 \times \frac{1}{3} = 60$$

Out of 180 spins, only 5 are green. Suggest an explanation for this.

The probabilities are incorrect.
In reality, the probability aren't likely to come up exactly every time.

(1 mark, 1 mark, 1 mark)

3. Ben flips an unbiased coin 3 times.

He states he is more likely to get heads, tails, then heads than all tails for the three flips.

Is he correct? Explain your answer.

Ben is incorrect, the likelihood of both events is equal.

Heads	*Tails*
0.5	0.5

heads, tails, heads ➔ $0.5 \times 0.5 \times 0.5 = 0.125$

tails, tails, tails ➔ $0.5 \times 0.5 \times 0.5 = 0.125$

(2 marks)

4. Three friends flip the same biased coin several times. Their results are shown in the table below.

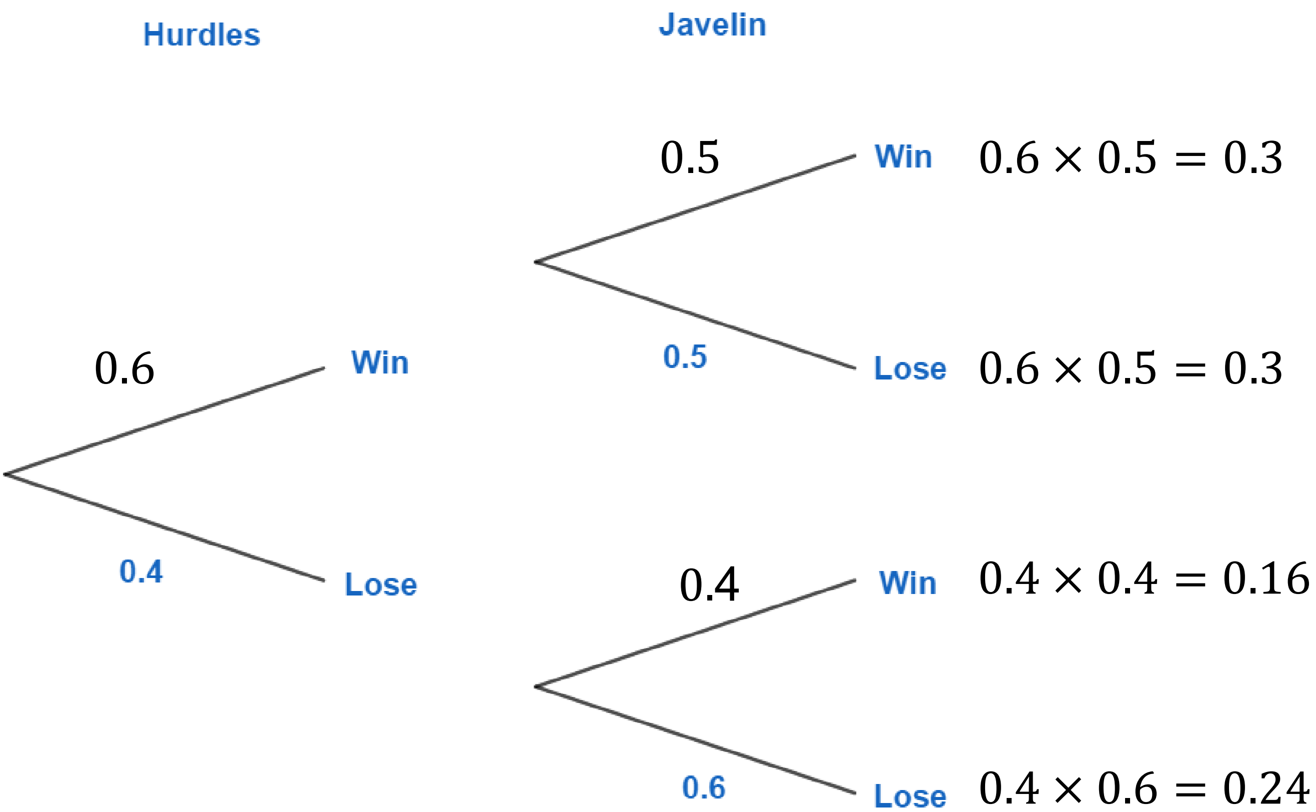
	Heads	Tails
Sonya	33	87
Clive	6	24
Lucy	17	43

Each of the friends calculates their own probability of heads. Which friend is likely to have the probability closest to the true probability?
Explain your answer.

Sonya is most likely to be the closest to the true probability because she did the most trials (120), compared to Clive and Lucy (30 and 60, respectively).

(2 marks)

5. Katie completes two events at her school sports day, hurdles and javelin. The probabilities that she wins each event have been summarised in the tree diagram below.



Complete the tree diagram and use this information to calculate the probability that Katie wins one event and loses the other.

Win hurdles and lose Javelin $= 0.3$
Lose hurdles and win Javelin $= 0.16$

Probability of win one and lose the other $= 0.3 + 0.16 = 0.46$

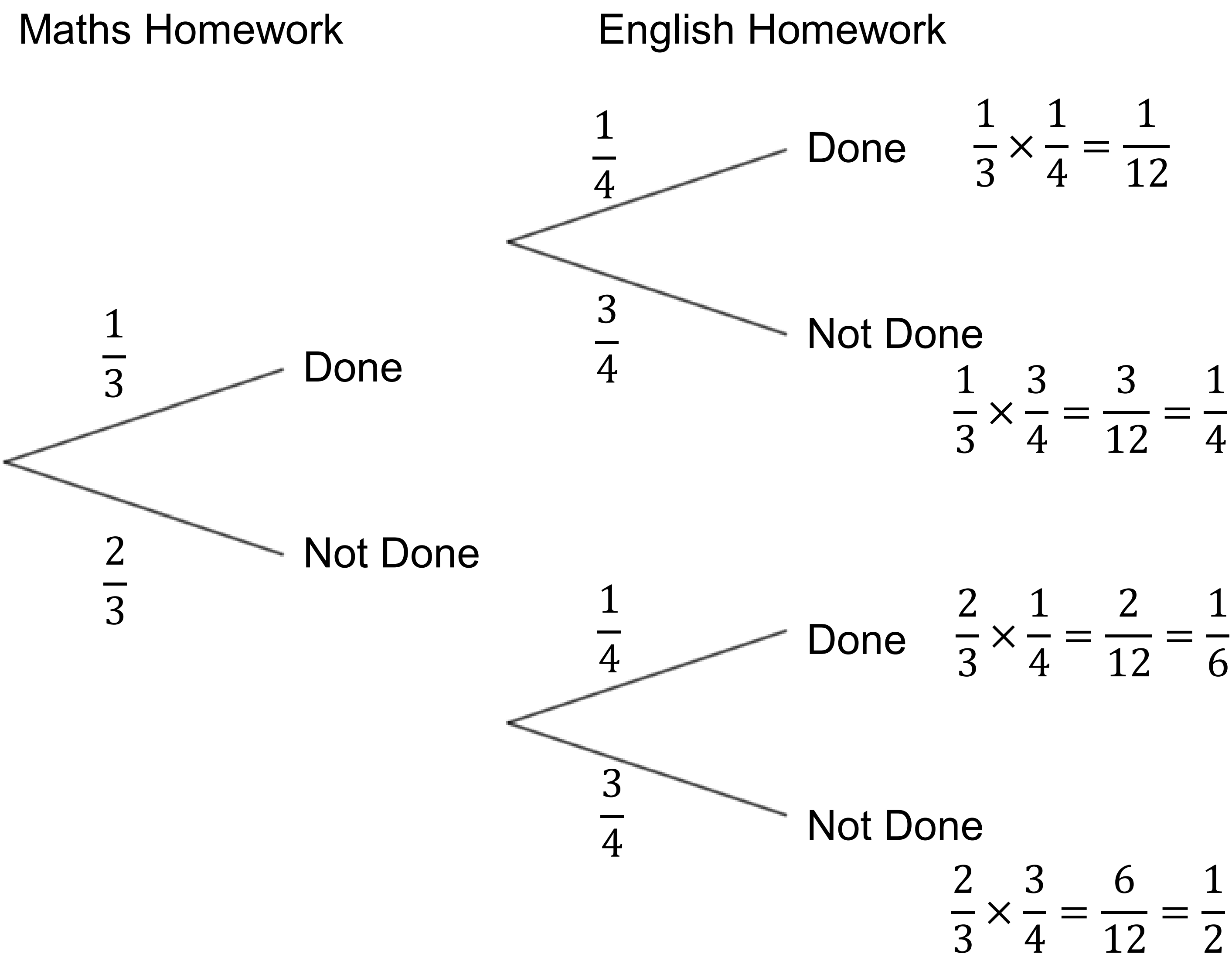
(3 marks)

6. The probability of Ben completing his Maths homework on any night is $\frac{1}{3}$.
   The probability that he completes his English homework is $\frac{1}{4}$.
   These are both independent events.

   By drawing a tree diagram in the space below, calculate the probabilities that:

   Ben completes both pieces of homework = $\frac{1}{12}$

   Ben completes exactly one piece of homework = $\frac{1}{4}+\frac{1}{6}=\frac{5}{12}$



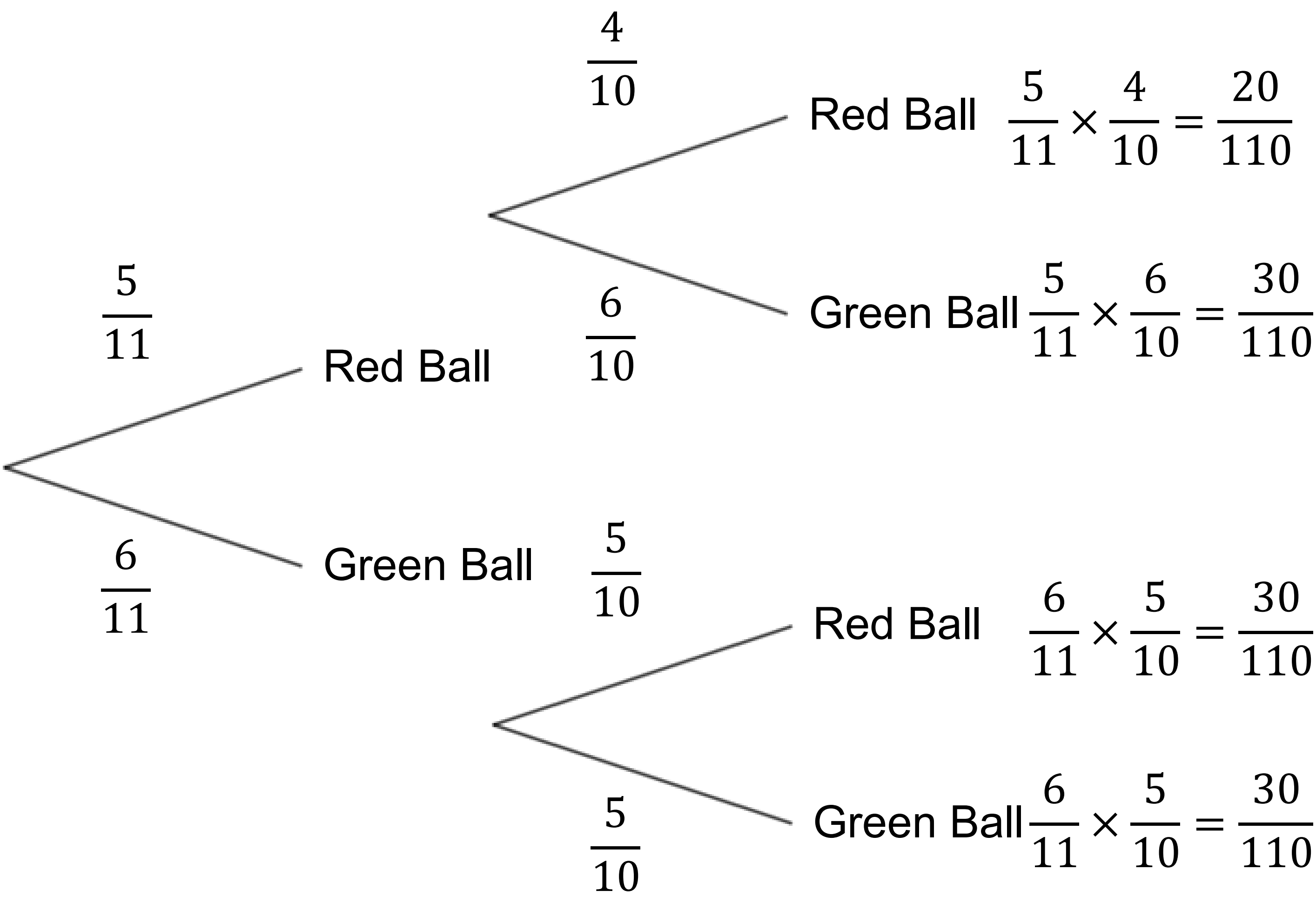
(5 marks)

7. There are 5 red balls and 6 green balls in a bag.
   One ball is drawn from the bag, then another without replacement.

   Draw a tree diagram below to show this information and calculate the probabilities of the following events:

   One red and one green ball are drawn = $\frac{30}{110}+\frac{30}{110}=\frac{60}{110}=\frac{6}{11}$

   A green ball is drawn second, given that a red ball was drawn first = $\frac{6}{10}$



(5 marks)

8. There are x balls in a bag.
   8 of the balls are blue.
   3 of the balls are green.
   The rest of the balls are orange and pink.

   Jake takes two balls from the bag without replacement.
   The probability that he takes a blue then green ball is 1/10.

   Find the total number of balls in the bag.

Probability of blue ball first:
8 *blue balls and* x *balls in total*

$$\frac{8}{x}$$

Probability of choosing a green ball after a ball isn't replaced:
3 *green balls* $x-1$ *balls left in the bag.*

$$\frac{3}{x-1}$$

Probabilities are independent, so multiply to find the probability of both happening, which is equal to $\frac{1}{10}$.

$$\frac{8}{x} \times \frac{3}{x-1} = \frac{1}{10}$$

$$\frac{24}{x(x-1)} = \frac{1}{10}$$

$$240 = x(x-1)$$

$$240 = x^2 - x$$

$$x^2 - x - 240 = 0$$

$$(x-16)(x+15) = 0$$

$$x = 16 \textit{ or } x = -15$$

Can't have a negative number of balls in a bag, so there are 16 in total.

(4 marks)