



S28-30min Tree Diagrams: 30-minute Pack

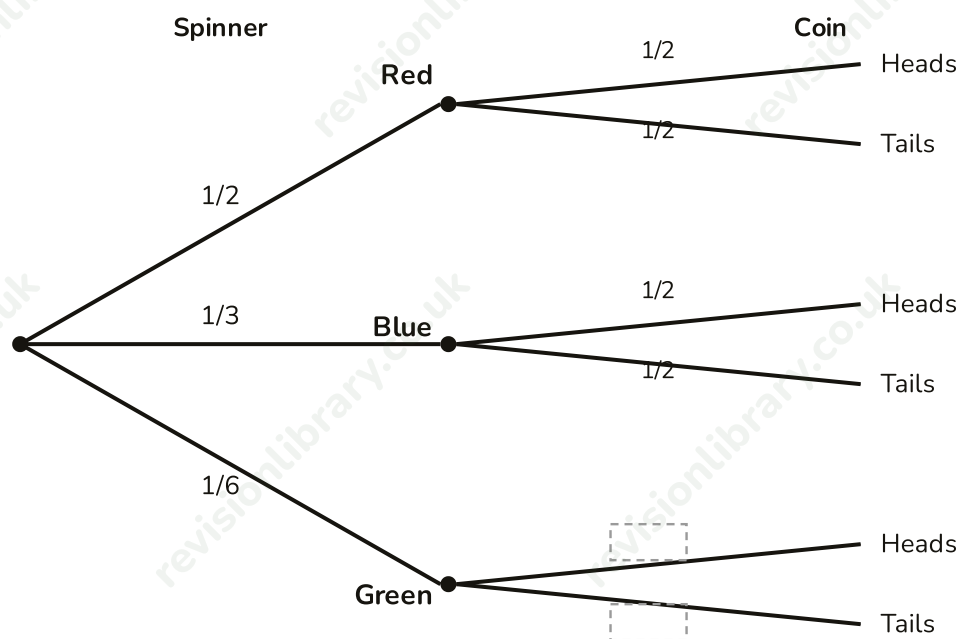
EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1 A spinner is divided into three unequal sections: red, blue and green. The probability of landing on red is $\frac{1}{2}$, on blue is $\frac{1}{3}$, and on green is $\frac{1}{6}$. The spinner is spun once, then a fair coin is thrown. The tree diagram shows the spinner outcomes and part of the coin outcomes.

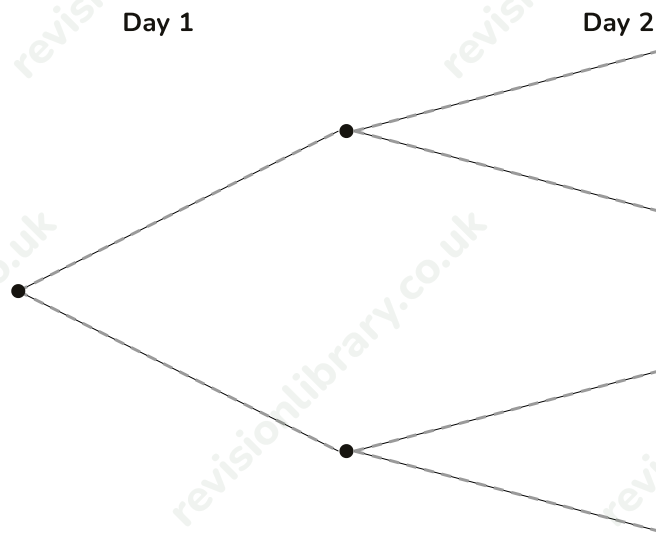


- (a) Write down the probability that the spinner lands on green. (1)
-
- (b) Complete the tree diagram by writing the two missing probabilities for the coin throw following the Green outcome. (2)
- (c) Find the probability that the spinner lands on blue and the coin shows tails. (2)
-

- (d) Show that the probability the coin shows heads is $\frac{1}{2}$, using all three spinner outcomes, and explain why this value makes sense. (3)

(Total for Question 1 is 8 marks)

- 2 The probability that it rains on any given day in a particular week is 0.2, independently of any other day. Sam wants to show the possible outcomes for two consecutive days on a tree diagram.

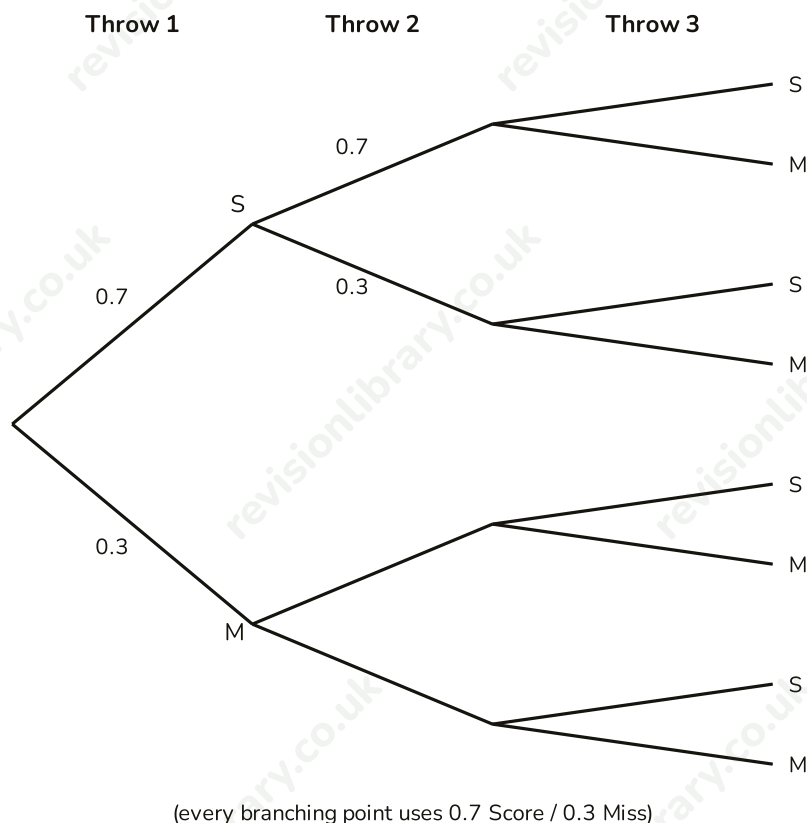


(label each branch Rain or No rain, and write its probability)

- (a) Draw a fully labelled tree diagram to show the possible outcomes (Rain, No rain) for Day 1 and Day 2, with the correct probability on each branch. (3)
- (b) Find the probability that it rains on both days. (2)
- (c) Find the probability that it rains on at least one of the two days. (3)

(Total for Question 2 is 8 marks)

- 3** A basketball player has a probability of 0.7 of scoring with any free throw, independently of any other attempt. She takes three free throws. The tree diagram shows the structure of the three attempts (every branching point uses the same probabilities: 0.7 for Score, 0.3 for Miss).



- (a)** Find the probability that she scores with all three free throws. (2)

.....

- (b)** Find the probability that she scores with exactly two of the three free throws. (3)

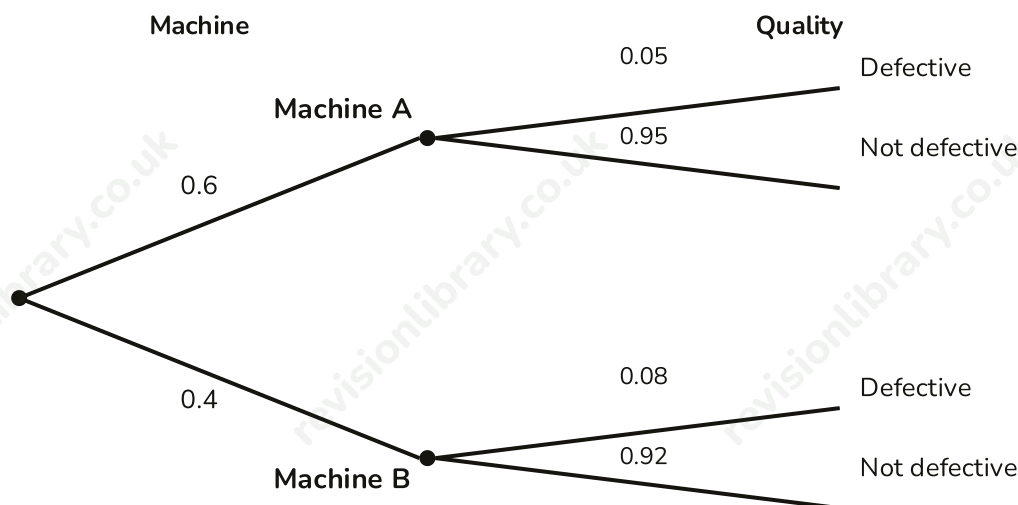
.....

- (c)** Find the probability that she scores with at least one of the three free throws. (2)

.....

(Total for Question 3 is 7 marks)

- 4 A factory has two machines, A and B, that produce identical components. Machine A produces 60% of all the components, and Machine B produces the remaining 40%. 5% of the components from Machine A are defective, and 8% of the components from Machine B are defective. A component is selected at random from the factory's output. The tree diagram shows these probabilities.



- (a) Find the probability that a component is from Machine A and is defective. (2)

- (b) Find the probability that a randomly selected component is defective. (3)

- (c) Given that a component is defective, find the probability that it came from Machine B. (3)

(Total for Question 4 is 8 marks)

Mark scheme · S28-30min Tree Diagrams: 30-minute Pack

Question 1

- (a) **B1** $1/6$ oe cao
- (a) **Answer: $1/6$**
- (b) **B1** Heads = $1/2$
- (b) **B1** Tails = $1/2$
- (b) **Answer: Heads = $1/2$, Tails = $1/2$**
- (c) **M1** $1/3 \times 1/2$, oe
- (c) **A1** $1/6$ oe cao
- (c) **Answer: $1/6$**
- (d) **M1** $(1/2 \times 1/2) + (1/3 \times 1/2) + (1/6 \times 1/2)$, oe
- (d) **A1** correctly evaluates to $1/2$ ($1/4 + 1/6 + 1/12 = 3/12 + 2/12 + 1/12 = 6/12$)
- (d) **B1** valid explanation, e.g. the coin throw is independent of the spinner, so $P(\text{Heads})$ must equal $1/2$ whatever the spinner shows
- (d) **Answer: $1/2$, because the coin is independent of the spinner so $P(\text{Heads})$ is always $1/2$.**

Question 2

- (a) **B1** correct branch structure: two branches at each of the two stages
- (a) **B1** all branches correctly labelled Rain and No rain
- (a) **B1** correct probabilities on every branch: 0.2 for Rain and 0.8 for No rain, at both stages
- (a) **Answer: Tree diagram with Rain (0.2) and No rain (0.8) branches at both Day 1 and Day 2.**
- (b) **M1** 0.2×0.2 , oe
- (b) **A1** 0.04 oe cao
- (b) **Answer: 0.04**
- (c) **M1** 0.8×0.8 (= 0.64), the probability of no rain on either day
- (c) **M1** $1 - 0.64$ (dependent on the first method mark)
- (c) **A1** 0.36 cao
- (c) **Answer: 0.36**

Question 3

- (a) **M1** $0.7 \times 0.7 \times 0.7$, oe
- (a) **A1** 0.343 cao
- (a) **Answer: 0.343**
- (b) **M1** $0.7 \times 0.7 \times 0.3$ (= 0.147), one arrangement of two scores and one miss
- (b) **M1** identifies there are 3 such arrangements (Score-Score-Miss, Score-Miss-Score, Miss-Score-Score)
- (b) **A1** 0.441 cao
- (b) **Answer: 0.441**
- (c) **M1** $1 - 0.3 \times 0.3 \times 0.3$, oe
- (c) **A1** 0.973 cao
- (c) **Answer: 0.973**

Question 4

- (a) **M1** 0.6×0.05 , oe
- (a) **A1** 0.03 cao
- (a) **Answer: 0.03**
- (b) **M1** $0.6 \times 0.05 (+) 0.4 \times 0.08$, oe
- (b) **M1** $0.03 + 0.032$ (dependent, correctly adding both products)
- (b) **A1** 0.062 cao
- (b) **Answer: 0.062**
- (c) **M1** $0.4 \times 0.08 (= 0.032)$ identified as the numerator
- (c) **M1** divides by $P(\text{defective}) = 0.062$ from part (b), ft
- (c) **A1** $16/31$ oe awrt 0.516
- (c) **Answer: 16/31 (approximately 0.516)**