



S28-10min Tree Diagrams: 10-minute Pack

EDEXCEL 1ST0 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 Answer the following short questions about branch probabilities on a tree diagram.

(i) Which pair of probabilities could correctly label the two branches leading from the same point on a tree diagram? **(1)**

- ☐ A) 0.3 and 0.6
☐ B) 0.45 and 0.55
☐ C) 0.2 and 0.9
☐ D) 0.5 and 0.6

(ii) A tree diagram has two branches from a point, one labelled 0.35. What is the correct value of the other branch? **(1)**

- ☐ A) 0.35
☐ B) 0.65
☐ C) 1.35
☐ D) 0.7

(Total for Question 1 is 2 marks)

2 For each statement about tree diagrams, write down whether it is True or False.

(i) The probabilities on a set of branches from the same point on a tree diagram must add up to 1. **(1)**

(ii) To find the probability of two events both happening (an 'and' outcome), you add the branch probabilities together. **(1)**

(iii) To find the probability of either of two different end-of-tree outcomes (an 'or' outcome), you add the relevant end-of-tree probabilities. **(1)**

(Total for Question 2 is 3 marks)

3 A student is investigating whether, when two counters are drawn without replacement from a bag containing red and blue counters, the two counters are more likely to be the same colour or different colours. She plans to model this using a tree diagram, then collect data by repeating a physical trial.

(a) State one reason why carrying out a large number of trials would make the experimental relative frequency a more reliable estimate of the theoretical probability. **(1)**

(b) The bag contains 8 counters: 5 red and 3 blue. Using a tree diagram, find the theoretical probability that two counters drawn at random without replacement are of different colours. **(3)**

(c) The student repeats the experiment 56 times and records different colours on 24 occasions. Find the experimental relative frequency, and comment on how it compares with the theoretical probability found in part (b). **(2)**

(Total for Question 3 is 6 marks)

Mark scheme · S28-10min Tree Diagrams: 10-minute Pack

Question 1

- (i) **B1** B cao
- (i) **Answer: B) 0.45 and 0.55**
- (ii) **B1** B cao
- (ii) **Answer: B) 0.65**

Question 2

- (i) **B1** True cao
- (i) **Answer: True**
- (ii) **B1** False cao
- (ii) **Answer: False**
- (iii) **B1** True cao
- (iii) **Answer: True**

Question 3

- (a) **B1** valid reason, e.g. relative frequency from a small number of trials is subject to random variation; more trials reduce this variation so the relative frequency settles closer to the true probability
- (a) **Answer: With more trials, random variation has less effect, so the relative frequency becomes a more reliable estimate of the true (theoretical) probability.**
- (b) **M1** $5/8 \times 3/7$, oe
- (b) **M1** $3/8 \times 5/7$, oe
- (b) **A1** $15/28$ oe cao
- (b) **Answer: 15/28**
- (c) **B1** relative frequency = $24/56 = 3/7$ (approximately 0.429)
- (c) **B1** valid comparison, e.g. this is somewhat lower than the theoretical probability of $15/28$ (approximately 0.536), which is plausible sampling variation for a moderate number of trials
- (c) **Answer: Relative frequency = $24/56 = 3/7$, approximately 0.429, which is lower than the theoretical probability of $15/28$, approximately 0.536; this difference is consistent with normal sampling variation.**