5.7 Tree Diagrams for Independent Events: 30-minute Pack

Calculators not allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A bag contains 2 red, 3 blue and 5 green counters. A counter is drawn, its colour noted and then replaced. This is repeated twice in total (two independent draws with replacement). Find the probability both draws give green.

(3)

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2 An experiment has two independent stages. Stage 1 succeeds with probability 0.7 and fails with probability 0.3. Stage 2 succeeds with probability 0.5 and fails with probability 0.5, regardless of Stage 1. Find the probability that exactly one of the two stages succeeds.

(3)

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3 Three independent events each have probability 0.6 of happening. Find the probability that exactly two of them happen.

(3)

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4 A two-stage device works as follows. Stage A works with probability 0.25 independently of Stage B. Stage B works with probability 0.5. Find the probability that at least one of the two stages works.

(4)

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5 Two biased coins are tossed independently. The first coin shows Heads with probability 0.6 and Tails with probability 0.4. The second coin shows Heads with probability 0.7 and Tails with probability 0.3.

(a) Find the probability both coins show Heads. **(2)**

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(b) Find the probability exactly one coin shows Heads. **(1)**

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6 A bag contains 1 white counters and 5 blue counters. A counter is taken at random, its colour is noted and it is put back. A second counter is then taken at random.
Work out the probability that both counters are white.

(3)

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7 The probability that it rains on each of two days is 0.6, independently of the other day. Work out the probability that it rains on exactly one of the days.

(3)

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8 A bag contains a red and a blue counter. A counter is chosen, its colour noted, then it is replaced and the bag is shaken. A second counter is chosen. Find the probability the first is red and the second is blue.

(2)

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Mark scheme · 5.7 Tree Diagrams for Independent Events: 30-minute Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

identify probability of green on one draw: 5/10 = 1/2	M1
method: multiply probabilities for two independent draws: 1/2 x 1/2	M1
1/4 cao	A1

Answer: **1/4**

Question 2

method: calculate probabilities for S then F and F then S: 0.7 x 0.5 and 0.3 x 0.5	M1
add the two branch probabilities	M1
0.5 cao	A1

Answer: **0.5**

Question 3

method: probability of a given two happening and one not = 0.6^2 x 0.4	M1
multiply by 3 for the three possible choices of the single failure	M1
0.432 cao	A1

Answer: **0.432**

Question 4

method: find probability neither works = (1 - 0.25) x (1 - 0.5) = 0.75 x 0.5	M1
method: calculate neither works = 0.375	M1
method: subtract from 1 to get at least one works: 1 - 0.375	M1
0.625 cao	A1

Answer: **0.625**

Question 5

(a) method: multiply probabilities for independent coins: 0.6 x 0.7	M1
(a) 0.42 cao	A1

(a) Answer: **0.42**

(b) 0.6 x 0.3 + 0.4 x 0.7 = 0.18 + 0.28 = 0.46 cao	B1

(b) Answer: **0.46**

Question 6

P(white) = 1/6	M1
1/6 x 1/6	M1
1/36 cao	A1

Answer: **1/36**

Question 7

0.6 x 0.4 seen	M1
two routes added	M1
0.48 cao	A1

Answer: **0.48**

Question 8

method: 1/2 x 1/2 or equivalent for independent draws with replacement	M1
1/4 cao	A1

Answer: **1/4**

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