5.7 Tree Diagrams for Independent Events: Test Pack

Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A fair coin is tossed once. State the probability of getting a head.

(1)

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2 Three independent tests each have probability 0.8 of passing. Find the probability that at least one test fails.

(3)

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3 A bag contains 4 white and 1 black ball. A ball is drawn, colour noted, then replaced and the bag shaken. This is done twice. Construct a tree diagram and find the probability both draws are white.

(4)

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4 A fair coin is tossed and a fair 6-sided die is rolled independently. Find the probability that the coin shows Heads or the die shows an even number (or both).

(4)

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5 A fair coin is flipped and a fair six-sided die is rolled. Work out the probability of getting heads and a 6.

(2)

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6 The probability that Maya wins a game of chess is 0.6. Maya plays two games. The results are independent. Work out the probability that Maya wins both games.

(2)

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7 Two fair coins are tossed. Use a two-branch tree diagram idea to find the probability of getting two heads.

(2)

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8 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 at least one of the days.

(3)

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9 A bag contains 6 white counters and 5 green 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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10 A bag contains 1 yellow counters and 5 white 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 the two counters are different colours.

(4)

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11 A spinner has three equal regions labelled A, B and C. The spinner is spun twice. List all possible outcomes for the two spins and give the probability of outcome AB (first A then B).

(2)

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12 A bag contains 3 orange counters and 6 purple 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 the two counters are different colours.

(4)

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13 The probability that the bus is late on each of two mornings is 0.4, independently of the other day.
Work out the probability that the bus is late on both days.

(2)

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14 A bag contains 1 yellow counters and 2 black 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 at least one of the counters is yellow.

(4)

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15 A two-stage experiment has probabilities: Stage 1 gives success (S) with probability 2/5 and failure (F) with probability 3/5. If S occurs, Stage 2 has success with probability 1/3 and failure with probability 2/3. If F occurs, Stage 2 has success with probability 1/4 and failure with probability 3/4. Complete the tree probabilities and find the probability of success on both stages.

(3)

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16 A bag contains 3 white counters and 4 black 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 black.

(3)

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Mark scheme · 5.7 Tree Diagrams for Independent Events: Test Pack

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

Question 1

1/2 or 0.5 or 50% cao	B1

Answer: **1/2**

Question 2

method: find probability all three pass = 0.8^3	M1
method: subtract from 1 to get at least one fail: 1 - 0.8^3	M1
0.488 cao	A1

Answer: **0.488**

Question 3

identify probabilities on branches: white 4/5, black 1/5 for each draw	M1
method: multiply for white-white branch: 4/5 x 4/5	M1
correct calculation to 16/25 or decimal equivalent	M1
16/25 or 0.64 cao	A1

Answer: **16/25**

Question 4

identify P(Heads) = 1/2 and P(even) = 1/2	M1
identify P(Heads and even) = 1/2 x 1/2 = 1/4	M1
use union formula: P(Heads or even) = 1/2 + 1/2 - 1/4	M1
3/4 or 0.75 cao	A1

Answer: **3/4**

Question 5

1/2 x 1/6	M1
1/12 cao	A1

Answer: **1/12**

Question 6

0.6 x 0.6	M1
0.36 cao	A1

Answer: **0.36**

Question 7

method: multiply probabilities for one branch, 1/2 x 1/2 or equivalent	M1
1/4 cao	A1

Answer: **1/4**

Question 8

0.4 x 0.4	M1
1 - P(neither)	M1
0.84 cao	A1

Answer: **0.84**

Question 9

P(white) = 6/11	M1
6/11 x 6/11	M1
36/121 cao	A1

Answer: **36/121**

Question 10

1/6 x 5/6 seen	M1
considers both orders: yellow then white and white then yellow	M1
adds the two probabilities	M1
5/18 cao	A1

Answer: **5/18**

Question 11

list of 9 outcomes or recognition of all pairs: AA, AB, AC, BA, BB, BC, CA, CB, CC oe	M1
probability of AB = 1/9 cao	A1

Answer: **Outcomes: AA, AB, AC, BA, BB, BC, CA, CB, CC; AB = 1/9**

Question 12

1/3 x 2/3 seen	M1
considers both orders: orange then purple and purple then orange	M1
adds the two probabilities	M1
4/9 cao	A1

Answer: **4/9**

Question 13

0.4 x 0.4	M1
0.16 cao	A1

Answer: **0.16**

Question 14

P(both black) = 2/3 x 2/3	M1
4/9 found	M1
1 - P(both not yellow)	M1
5/9 cao	A1

Answer: **5/9**

Question 15

correct completion of branch probabilities, e.g. S->S 2/5 x 1/3, S->F 2/5 x 2/3, F->S 3/5 x 1/4, F->F 3/5 x 3/4	M1
method: multiply for S then S branch: 2/5 x 1/3	M1
2/15 cao	A1

Answer: **2/15**

Question 16

P(black) = 4/7	M1
4/7 x 4/7	M1
16/49 cao	A1

Answer: **16/49**

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