5.7 Tree Diagrams for Independent Events: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A bag contains 6 black counters and 4 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)

2 A bag contains 6 red counters and 7 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 red.

(3)

3 A bag contains 2 orange counters and 4 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 both counters are purple.

(3)

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4 Events A and B are independent. P(A) = 1/4 and P(B) = 7/9. Work out the probability that both A and B happen.

(2)

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5 A bag contains 5 purple counters and 2 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 at least one of the counters is purple.

(4)

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6 The probability that the bus is late on each of two mornings is 0.7, independently of the other day.
Work out the probability that the bus is late on both days.

(2)

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7 A bag contains 2 red counters and 4 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 blue.

(3)

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8 The probability that the bus is late on each of two mornings is 0.7, independently of the other day.
Work out the probability that the bus is late on at least one of the days.

(3)

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9 The probability that Wendy wins a game of chess is 0.7. Wendy plays two games. The results are independent. Work out the probability that Wendy wins both games.

(2)

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10 The probability that it rains on each of two days is 0.4, independently of the other day.
Work out the probability that it rains on both days.

(2)

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11 Events A and B are independent. P(A) = 1/6 and P(B) = 7/10. Work out the probability that both A and B happen.

(2)

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12 A bag contains 3 black counters and 3 orange 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 Events A and B are independent. P(A) = 1/10 and P(B) = 5/9. Work out the probability that both A and B happen.

(2)

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14 A bag contains 2 white counters and 7 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 at least one of the counters is white.

(4)

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15 Events A and B are independent. P(A) = 1/8 and P(B) = 7/10. Work out the probability that both A and B happen.

(2)

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16 A bag contains 1 red counters and 6 orange 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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17 The probability that Hamza wins a game of chess is 0.3. Hamza plays two games. The results are independent. Work out the probability that Hamza wins both games.

(2)

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18 A bag contains 1 yellow counters and 6 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 at least one of the counters is yellow.

(4)

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19 The probability that Tom wins a game of chess is 0.3. Tom plays two games. The results are independent. Work out the probability that Tom wins both games.

(2)

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20 A bag contains 5 black counters and 4 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 black.

(3)

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21 A bag contains 6 red counters and 5 orange 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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22 Events A and B are independent. P(A) = 1/2 and P(B) = 4/9. Work out the probability that both A and B happen.

(2)

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23 The probability that Ben wins a game of chess is 0.7. Ben plays two games. The results are independent. Work out the probability that Ben wins both games.

(2)

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24 The probability that the bus is late on each of two mornings is 0.6, independently of the other day.
Work out the probability that the bus is late on both days.

(2)

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25 The probability that it rains on each of two days is 0.4, independently of the other day.
Work out the probability that it rains on at least one of the days.

(3)

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

(2)

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27 A bag contains 2 blue counters and 5 orange 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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28 The probability that it rains on each of two days is 0.7, independently of the other day.
Work out the probability that it rains on both days.

(2)

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29 The probability that the bus is late on each of two mornings is 0.3, independently of the other day.
Work out the probability that the bus is late on exactly one of the days.

(3)

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30 A bag contains 5 red counters and 7 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 red.

(3)

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31 The probability that it rains on each of two days is 0.3, independently of the other day.
Work out the probability that it rains on at least one of the days.

(3)

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32 Two fair coins are tossed. Work out the probability of getting at least one tail.

(2)

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33 A factory machine has a 0.1 chance of producing a faulty widget each time and 0.9 chance of a good widget. Two widgets are produced independently. Find the probability that exactly one of the two widgets is faulty.

(3)

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Mark scheme · 5.7 Tree Diagrams for Independent Events: 2-hour Pack

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

Question 1

3/5 x 2/5 seen	M1
considers both orders: black then white and white then black	M1
adds the two probabilities	M1
12/25 cao	A1

Answer: **12/25**

Question 2

P(red) = 6/13	M1
6/13 x 6/13	M1
36/169 cao	A1

Answer: **36/169**

Question 3

P(purple) = 2/3	M1
2/3 x 2/3	M1
4/9 cao	A1

Answer: **4/9**

Question 4

1/4 x 7/9	M1
7/36 cao	A1

Answer: **7/36**

Question 5

P(both blue) = 2/7 x 2/7	M1
4/49 found	M1
1 - P(both not purple)	M1
45/49 cao	A1

Answer: **45/49**

Question 6

0.7 x 0.7	M1
0.49 cao	A1

Answer: **0.49**

Question 7

P(blue) = 2/3	M1
2/3 x 2/3	M1
4/9 cao	A1

Answer: **4/9**

Question 8

0.3 x 0.3	M1
1 - P(neither)	M1
0.91 cao	A1

Answer: **0.91**

Question 9

0.7 x 0.7	M1
0.49 cao	A1

Answer: **0.49**

Question 10

0.4 x 0.4	M1
0.16 cao	A1

Answer: **0.16**

Question 11

1/6 x 7/10	M1
7/60 cao	A1

Answer: **7/60**

Question 12

1/2 x 1/2 seen	M1
considers both orders: black then orange and orange then black	M1
adds the two probabilities	M1
1/2 cao	A1

Answer: **1/2**

Question 13

1/10 x 5/9	M1
1/18 cao	A1

Answer: **1/18**

Question 14

P(both purple) = 7/9 x 7/9	M1
49/81 found	M1
1 - P(both not white)	M1
32/81 cao	A1

Answer: **32/81**

Question 15

1/8 x 7/10	M1
7/80 cao	A1

Answer: **7/80**

Question 16

1/7 x 6/7 seen	M1
considers both orders: red then orange and orange then red	M1
adds the two probabilities	M1
12/49 cao	A1

Answer: **12/49**

Question 17

0.3 x 0.3	M1
0.09 cao	A1

Answer: **0.09**

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Question 18

P(both blue) = 6/7 x 6/7	M1
36/49 found	M1
1 - P(both not yellow)	M1
13/49 cao	A1

Answer: **13/49**

Question 19

0.3 x 0.3	M1
0.09 cao	A1

Answer: **0.09**

Question 20

P(black) = 5/9	M1
5/9 x 5/9	M1
25/81 cao	A1

Answer: **25/81**

Question 21

6/11 x 5/11 seen	M1
considers both orders: red then orange and orange then red	M1
adds the two probabilities	M1
60/121 cao	A1

Answer: **60/121**

Question 22

1/2 x 4/9	M1
2/9 cao	A1

Answer: **2/9**

Question 23

0.7 x 0.7	M1
0.49 cao	A1

Answer: **0.49**

Question 24

0.6 x 0.6	M1
0.36 cao	A1

Answer: **0.36**

Question 25

0.6 x 0.6	M1
1 - P(neither)	M1
0.64 cao	A1

Answer: **0.64**

Question 26

0.6 x 0.6	M1
0.36 cao	A1

Answer: **0.36**

Question 27

2/7 x 5/7 seen	M1
considers both orders: blue then orange and orange then blue	M1
adds the two probabilities	M1
20/49 cao	A1

Answer: **20/49**

Question 28

0.7 x 0.7	M1
0.49 cao	A1

Answer: **0.49**

Question 29

0.3 x 0.7 seen	M1
two routes added	M1
0.42 cao	A1

Answer: **0.42**

Question 30

P(red) = 5/12	M1
5/12 x 5/12	M1
25/144 cao	A1

Answer: **25/144**

Question 31

0.7 x 0.7	M1
1 - P(neither)	M1
0.51 cao	A1

Answer: **0.51**

Question 32

method: 1 - P(no tails) or count branches: 1 - 1/4 or 3/4	M1
3/4 cao	A1

Answer: **3/4**

Question 33

method: two branches: faulty-good and good-faulty probabilities 0.1 x 0.9 and 0.9 x 0.1	M1
add the two branch probabilities	M1
0.18 or 18% cao	A1

Answer: **0.18**

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