HIGHER

7.17D Conditional Probability: Fluency and Exam Drill

Total Marks

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 50 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A school records results for 100 pupils in a test. The table below summarises the data.

	Passed	Failed	Total
Boys	28	12	40
Girls	42	18	60
Total	70	30	100

Work out the probability that a pupil passed the test given that the pupil is a boy.

(Total for Question 1 is 1 mark)

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2 Using the same table as Question 1, work out the probability that a pupil is a girl given that the pupil failed the test.

(Total for Question 2 is 1 mark)

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3 A bag contains 3 red, 3 yellow and 4 blue counters. One counter is taken at random. Given that the counter taken is not yellow, work out the probability that it is blue.

(Total for Question 3 is 1 mark)

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4 A jar contains 6 sweets: 2 red and 4 green. Two sweets are taken without replacement. Work out the probability that the second sweet is green given that the first sweet was red.

(Total for Question 4 is 1 mark)

5 There are two identical boxes. Box 1 contains 3 red and 2 blue counters. Box 2 contains 1 red and 4 blue counters. One box is chosen at random and then one counter is taken from that box.

Work out the probability that the counter taken is red.

(Total for Question 5 is 2 marks)

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6 Using the situation from Question 5, a counter taken is found to be red. Work out the probability that it came from Box 1.

(Total for Question 6 is 2 marks)

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7 A survey asked 100 pupils if they play football and/or tennis. 40 play football, 30 play tennis and 15 play both.

Find the probability that a randomly chosen pupil plays tennis given that the pupil plays football.

(Total for Question 7 is 1 mark)

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8 In a group of 100 pupils, 50 study maths, 30 study physics and 20 study chemistry. There are 15 who study both maths and physics, 8 who study both maths and chemistry, 6 who study both physics and chemistry and 4 who study all three.

Work out the probability that a pupil studies physics given that they do not study chemistry.

(Total for Question 8 is 2 marks)

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9 A quality check finds 4 defective items and 16 good items in a box of 20. Two items are selected without replacement. Work out the probability that the second item selected is defective given that the first selected was defective.

(Total for Question 9 is 1 mark)

10 A bag contains 2 red and 3 blue counters. Two counters are taken at random without replacement.

Given that at least one of the two counters taken is red, work out the probability that the first counter taken was red.

(Total for Question 10 is 3 marks)

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11 A factory has two production lines. Line A makes 60% of bulbs and Line B makes 40%. Line A has a defect rate of 2% and Line B has a defect rate of 5%.

A bulb is selected at random and found to be defective. Work out the probability that it was produced on Line B.

(Total for Question 11 is 3 marks)

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12 A box contains 3 white, 2 black and 1 red ball. Two balls are drawn at random without replacement. Given that the second ball drawn is white, work out the probability that the first ball drawn was red.

(Total for Question 12 is 3 marks)

Mark scheme · 7.17D Conditional Probability: Fluency and Exam Drill

Question 1

- **B1** 28/40 = 7/10 = 0.7 cao
- **Answer: 7/10 (0.7 or 70%) (cao)**

Question 2

- **B1** 18/30 = 3/5 = 0.6 cao
- **Answer: 3/5 (0.6 or 60%) (cao)**

Question 3

- **B1** 4/(3+4)=4/7 cao
- **Answer: 4/7 (cao)**

Question 4

- **B1** 4/5 = 0.8 cao
- **Answer: 4/5 (0.8) (cao)**

Question 5

- **M1** use total probability: 1/2*(3/5) + 1/2*(1/5) or equivalent method
- **A1** 2/5 = 0.4 cao
- **Answer: 2/5 (0.4) (cao)**

Question 6

- **M1** use Bayes: P(Box1|red) = P(red|Box1)*P(Box1) / P(red) with values substituted
- **A1** 3/4 = 0.75 cao
- **Answer: 3/4 (0.75) (cao)**

Question 7

- **B1** 15/40 = 3/8 cao
- **Answer: 3/8 (0.375) (cao)**

Question 8

- **M1** compute physics and not chemistry = 30 - 6 = 24 and not chemistry = 100 - 20 = 80
- **A1** 24/80 = 3/10 cao
- **Answer: 3/10 (0.3) (cao)**

Question 9

- **B1** 3/19 cao
- **Answer: 3/19 (cao)**

Question 10

- **M1** P(at least one red) = 1 - P(no red) = 1 - (3/5 * 2/4) = 1 - 3/10 = 7/10
- **M1** P(first red) = 2/5
- **A1** P(first red | at least one red) = (2/5)/(7/10) = 4/7 cao
- **Answer: 4/7 (cao)**

Question 11

- **M1** compute P(def) = 0.6*0.02 + 0.4*0.05 = 0.012 + 0.02 = 0.032
- **M1** use Bayes: P(B|def) = 0.4*0.05 / 0.032
- **A1** 0.02/0.032 = 5/8 = 0.625 cao
- **Answer: 5/8 (0.625) (cao)**

Question 12

- **M1** compute P(first red and second white) = (1/6)*(3/5) = 1/10
- **M1** compute P(second white) = P(first white then white) + P(first black then white) + P(first red then white) = (3/6*2/5)+(2/6*3/5)+(1/6*3/5) = 1/5 + 1/5 + 1/10 = 1/2
- **A1** P(first red | second white) = (1/10)/(1/2) = 1/5 cao
- **Answer: 1/5 (0.2) (cao)**