HIGHER

7.17 Conditional Probability: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The probability that event A occurs given that event B has already occurred is written P(A|B).

(a) Which of these gives the correct formula for P(A|B)? **(1)**

- ☐ A) P(A) x P(B)
- ☐ B) P(A and B) / P(B)
- ☐ C) P(A and B) / P(A)
- ☐ D) P(A) / P(B)

(Total for Question 1 is 1 mark)

---

2 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 2 is 1 mark)

© Revision Library | revisionlibrary.co.uk

3 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 3 is 1 mark)

---

4 100 students at a school study either French or Spanish. The two-way table shows some information about the students, split by gender.

French Spanish Total
Boys 21 ? 48
Girls 25 ? 52
Total ? ? 100

	French	Spanish	Total
Boys	21	?	48
Girls	25	?	52
Total	?	?	100

(a) Complete the two-way table. **(2)**

(b) One student is chosen at random from the girls. Find the probability that this student studies Spanish. **(2)**

.....

(Total for Question 4 is 4 marks)

© Revision Library | revisionlibrary.co.uk

5 A fair coin is flipped and, independently, a fair six-sided dice is rolled. Event A is 'the coin shows Heads'. Event B is 'the dice shows a number greater than 4'.

(a) Find P(A), P(B) and P(A and B). **(3)**

(b) Show that P(A|B) = P(A), and state what this tells you about events A and B. **(3)**

(Total for Question 5 is 6 marks)

---

6 A bag contains 9 gold beads and 7 silver beads. Two beads are taken at random without replacement. Work out the probability that both beads are gold. Give your answer as a fraction in its simplest form.

(Total for Question 6 is 3 marks)

---

7 A bag contains 3 orange, 6 lemon and 4 cherry sweets. Two sweets are taken at random without replacement. Work out the probability that they are different colours. Give your answer as a fraction in its simplest form.

(Total for Question 7 is 4 marks)

© Revision Library | revisionlibrary.co.uk

8 For two events A and B, P(A) = 0.6, P(B) = 0.45 and P(A and B) = 0.3.

(a) Find P(A|B). **(2)**

.....

(b) Find P(B|A). **(2)**

.....

(c) Determine, showing your working, whether events A and B are independent. **(2)**

(Total for Question 8 is 6 marks)

---

9 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 9 is 3 marks)

---

10 A bag contains 8 counters, which are either green or red. Two counters are taken at random from the bag, one after another, without replacement. The probability that both counters are green is 3/14.

(a) Show that there are 4 green counters in the bag. **(3)**

(Total for Question 10 is 3 marks)

© Revision Library | revisionlibrary.co.uk

11 For any two events A and B, with P(B) not equal to 0 and P(A) not equal to 0.

(a) Prove that P(A|B) x P(B) = P(B|A) x P(A). **(3)**

(Total for Question 11 is 3 marks)

---

12 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 12 is 3 marks)

---

13 A drawer contains 6 blue socks and 4 black socks. Three socks are taken at random from the drawer, one after another, without replacement.

(a) Find the probability that all three socks taken are the same colour. **(4)**

(b) Given that all three socks taken are the same colour, find the probability that all three are blue. **(2)**

(Total for Question 13 is 6 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 7.17 Conditional Probability: Test Pack

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

Question 1

(a) B **B1**

(a) Answer: B

Question 2

4/(3+4)=4/7 cao **B1**

Answer: 4/7 (cao)

Question 3

15/40 = 3/8 cao **B1**

Answer: 3/8 (0.375) (cao)

Question 4

(a) Boys Spanish = 27 and Girls Spanish = 27 **B1**

(a) Total French = 46 and Total Spanish = 54 **B1**

(a) Answer: Boys Spanish = 27, Girls Spanish = 27, Total French = 46, Total Spanish = 54

(b) 27/52 seen **M1**

(b) 27/52 cao (does not simplify) **A1**

(b) Answer: 27/52

Question 5

(a) P(A) = 1/2 **B1**

(a) P(B) = 1/3 (numbers greater than 4 on a dice are 5 and 6) **B1**

(a) P(A and B) = 1/6 **B1**

(a) Answer: P(A) = 1/2, P(B) = 1/3, P(A and B) = 1/6

(b) P(A|B) = P(A and B) / P(B) = (1/6) / (1/3) **M1**

(b) = 1/2 = P(A) cso **A1**

(b) states A and B are independent, because P(A|B) = P(A) **B1**

(b) Answer: P(A|B) = 1/2 = P(A), so A and B are independent.

Question 6

P(first gold) = 9/16 **M1**

P(second gold) = 8/15 and multiplies **M1**

3/10 oe **A1**

Answer: 3/10

Question 7

P(same colour) probabilities for one colour, e.g. 3/13 x 2/12 **M1**

all three same-colour products added **M1**

1 - P(same) **M1**

9/13 oe **A1**

Answer: 9/13

Question 8

(a) 0.3 / 0.45 **M1**

(a) 2/3 oe awrt 0.67 **A1**

(a) Answer: 2/3 (awrt 0.67)

(b) 0.3 / 0.6 **M1**

(b) 0.5 cao **A1**

(b) Answer: 0.5

(c) P(A) x P(B) = 0.6 x 0.45 (= 0.27) calculated and compared with P(A and B) = 0.3 **M1**

(c) correct conclusion: not independent, since 0.27 does not equal 0.3 (oe using P(A|B) not equal to P(A)) **A1**

(c) Answer: Not independent

Question 9

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 **M1**

P(first red | at least one red) = (2/5)/(7/10) = 4/7 cao **A1**

Answer: 4/7 (cao)

Question 10

(a) g/8 x (g-1)/7 = 3/14 formed, where g is the number of green counters **M1**

(a) rearranges to g(g-1) = 12 (oe g^2 - g - 12 = 0) **M1**

(a) solves to g = 4, rejecting g = -3, cso **A1**

(a) Answer: g = 4

Question 11

(a) states P(A|B) = P(A and B)/P(B), so P(A|B) x P(B) = P(A and B) **M1**

(a) states P(B|A) = P(A and B)/P(A), so P(B|A) x P(A) = P(A and B) **M1**

(a) both expressions equal P(A and B), so P(A|B) x P(B) = P(B|A) x P(A), cso **A1**

(a) Answer: Proven: both sides equal P(A and B).

Question 12

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 **M1**

0.02/0.032 = 5/8 = 0.625 cao **A1**

Answer: 5/8 (0.625) (cao)

Question 13

(a) P(BBB) = 6/10 x 5/9 x 4/8 (= 1/6) **M1**

(a) P(KKK) = 4/10 x 3/9 x 2/8 (= 1/30) **M1**

(a) adds the two probabilities: 1/6 + 1/30 **M1**

(a) 1/5 oe cao **A1**

(a) Answer: 1/5

(b) (1/6) / (1/5) formed **M1**

(b) 5/6 oe cao **A1**

(b) Answer: 5/6

© Revision Library | revisionlibrary.co.uk