



8.11D Probability Equation Questions: Fluency and Exam Drill

Total Marks

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A bag contains x green counters and 3 yellow counters. The probability of drawing a green counter is $\frac{1}{2}$. Write down the value of x .

(Total for Question 1 is 1 mark)

- 2** A bag contains 5 white counters and y black counters. The probability of drawing a black counter is $\frac{2}{7}$. Work out y .

(Total for Question 2 is 2 marks)

- 3** A spinner has sections labelled 1, 2 and 3. It is altered so there are x sections labelled 3 and one section labelled 1 and one labelled 2. The probability of landing on 3 is $\frac{3}{5}$. Write down an equation in x .

(Total for Question 3 is 1 mark)

- 4** A bag contains blue and red counters. There are twice as many blue counters as red counters. The probability of drawing a blue counter is 0.6. Find the number of red counters, r , or explain why no integer solution exists.

(Total for Question 4 is 2 marks)

- 5 A packet contains 4 green sweets and n orange sweets. Two sweets are chosen at random without replacement. The probability both are orange is $\frac{1}{3}$. Form an equation and find n .

(Total for Question 5 is 3 marks)

- 6 A bag contains 6 red counters and x blue counters. One counter is chosen at random. The probability it is blue is $\frac{4}{7}$. Work out x .

(Total for Question 6 is 2 marks)

- 7 A box contains 3 purple cards and p orange cards. Two cards are drawn at random with replacement. The probability both are purple is $\frac{9}{64}$. Form an equation and find p .

(Total for Question 7 is 3 marks)

- 8 A game uses a bag of counters. There are a red, b blue and 2 white counters. A player wins if they draw a blue counter. The probability of winning is $\frac{1}{3}$. Given a and b are positive integers and $a = 2$, find b .

(Total for Question 8 is 3 marks)

- 9** A jar contains x black sweets and 6 white sweets. Two sweets are chosen without replacement. The probability of drawing one black then one white in that order is $\frac{3}{14}$. Form an equation and find the possible value(s) of x .

(Total for Question 9 is 3 marks)

- 10** A deck contains only cards numbered 1 to n , one of each. A card is chosen at random. The probability it is a multiple of 3 is $\frac{1}{4}$. Find n , given n is a positive integer and the deck starts at 1.

(Total for Question 10 is 4 marks)

- 11** A bag contains red and green counters. The probability of drawing a red counter is $\frac{x+1}{2x+3}$. If this probability equals $\frac{2}{5}$, find x .

(Total for Question 11 is 4 marks)

- 12** A game wheel is split into equal sections. The wheel has 2 red sections, r blue sections and 1 green section. The probability of landing on blue is $\frac{1}{2}$. Find r .

(Total for Question 12 is 3 marks)

- 13** A jar contains red, blue and yellow sweets. The probability of drawing red is $(2x)/(5x + 3)$ and this equals $1/3$. Solve for x .

(Total for Question 13 is 3 marks)

- 14** There are x black buttons and 4 white buttons in a box. Two buttons are taken at random without replacement. The probability both are white is $2/5$. Find x .

(Total for Question 14 is 3 marks)

- 15** A bag contains 3 blue and 9 red counters. One counter is chosen at random. Write down the probability it is red.

(Total for Question 15 is 1 mark)

- 16** A bag contains m green counters and 1 purple counter. The probability of drawing green is $3/4$. Find m .

(Total for Question 16 is 2 marks)

Mark scheme · 8.11D Probability Equation Questions: Fluency and Exam Drill

Question 1

- **B1** $x = 3$ cao
- **Answer:** 3

Question 2

- **M1** form equation $y/(5 + y) = 2/7$ or equivalent
- **A1** $y = 2$ cao
- **Answer:** 2

Question 3

- **B1** $x/(x + 2) = 3/5$ or equivalent
- **Answer:** $x/(x+2) = 3/5$

Question 4

- **M1** form equation $2r/(2r + r) = 0.6$ or equivalent simplifying to $2/3 = 0.6$
- **A1** state no integer r satisfies $2/3 = 0.6$ or explicitly state contradiction or
- **Answer:** No integer r satisfies the equation ($2/3$ does not equal 0.6).

Question 5

- **M1** form $(n/(n + 4)) * ((n - 1)/(n + 3)) = 1/3$ or equivalent
- **M1** multiply out to obtain quadratic and rearrange correctly
- **A1** $n = 6$ cao (reject negative or non-integer roots)
- **Answer:** 6

Question 6

- **M1** form $x/(x + 6) = 4/7$ or equivalent
- **A1** $x = 8$ cao
- **Answer:** 8

Question 7

- **M1** form $(3/(p + 3))^2 = 9/64$ or equivalent
- **M1** take square root and solve $3/(p + 3) = 3/8$ leading to $p + 3 = 8$
- **A1** $p = 5$ cao
- **Answer:** 5

Question 8

- **M1** form equation $b/(a + b + 2) = 1/3$ with a and b as totals
- **M1** substitute $a = 2$ to obtain $b/(b + 4) = 1/3$ or equivalent rearrangement
- **A1** $b = 2$ cao
- **Answer:** 2

Question 9

- **M1** form $x/(x + 6) * 6/(x + 5) = 3/14$ or equivalent
- **M1** multiply out to obtain the quadratic $x^2 - 17x + 30 = 0$ (or equivalent) and factorise/solve
- **A1** $x = 2$ or $x = 15$ (both accepted; either value alone earns full marks)
- **Answer:** $x = 2$ or $x = 15$ (both values satisfy the equation).

Question 10

- **M1** identify count of multiples of 3 as $\text{floor}(n/3)$ and form equation $\text{floor}(n/3)/n = 1/4$ or reason using integer k such that number of multiples = k and $k/n = 1/4$
- **M1** use integer reasoning to set $k = n/4$ so n divisible by 4 and test small multiples of 4 against $\text{floor}(n/3) = n/4$
- **M1** find smallest n satisfying integer constraints or demonstrate $n = 4$ is valid
- **A1** $n = 4$ cao (accept $n = 8$, the only other value satisfying $\text{floor}(n/3)/n = 1/4$)
- **Answer: 4**

Question 11

- **M1** form $(x + 1)/(2x + 3) = 2/5$ or equivalent
- **M1** cross-multiply to get $5(x + 1) = 2(2x + 3)$ and expand correctly
- **M1** rearrange to get linear equation and solve for x
- **A1** $x = 1$ cao
- **Answer: 1**

Question 12

- **M1** form $r/(2 + r + 1) = 1/2$ or $r/(r + 3) = 1/2$
- **M1** solve $2r = r + 3$ or equivalent rearrangement
- **A1** $r = 3$ cao
- **Answer: 3**

Question 13

- **M1** form $2x/(5x + 3) = 1/3$ or equivalent
- **M1** cross-multiply and rearrange correctly
- **A1** $x = 3$ cao
- **Answer: 3**

Question 14

- **M1** form $4/(x + 4) * 3/(x + 3) = 2/5$ or equivalent
- **M1** multiply out to get $(x+4)(x+3) = 30$, i.e. $x^2 + 7x - 18 = 0$, and factorise/solve
- **A1** $x = 2$ cao (reject $x = -9$)
- **Answer: 2**

Question 15

- **B1** $9/12$ or $3/4$ cao
- **Answer: 3/4**

Question 16

- **M1** form $m/(m + 1) = 3/4$ or equivalent
- **A1** $m = 3$ cao
- **Answer: 3**