



F08-30min Conditional Probability (Foundation): 30-minute Pack

EDEXCEL 1ST0 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** $P(X \text{ and } Y) = 0.3$ and $P(Y) = 0.6$. Write down the formula used to find $P(X|Y)$.

(Total for Question 1 is 1 mark)

- 2** 60 students were asked whether they own a cat and whether they own a dog. The two-way table shows the results.

	Owens a dog	Does not own a dog	Total
Owens a cat	9	21	30
Does not own a cat	15	15	30
Total	24	36	60

- (a) Write down the number of students who own both a cat and a dog. (1)

- (b) A student is chosen at random from those who own a cat. Find the probability that this student also owns a dog. (2)

- (c) A student is chosen at random from those who do not own a dog. Find the probability that this student owns a cat. (2)

(Total for Question 2 is 5 marks)

- 3** State whether the following are independent or dependent events: rolling a fair dice, then rolling it again.

(Total for Question 3 is 1 mark)

- 4** Cards numbered 1 to 20 are placed in a bag. A card is drawn at random from the bag.

(a) List the multiples of 4 from 1 to 20. (1)

(b) Given that the number drawn is a multiple of 4, find the probability that it is also a multiple of 3. (2)

(Total for Question 4 is 3 marks)

- 5** For each situation described, state whether the two events are independent or dependent.

(a) Rolling a fair dice, and then rolling it again. (1)

(b) Taking two sweets at random from a bag, one after another, without replacing the first. (1)

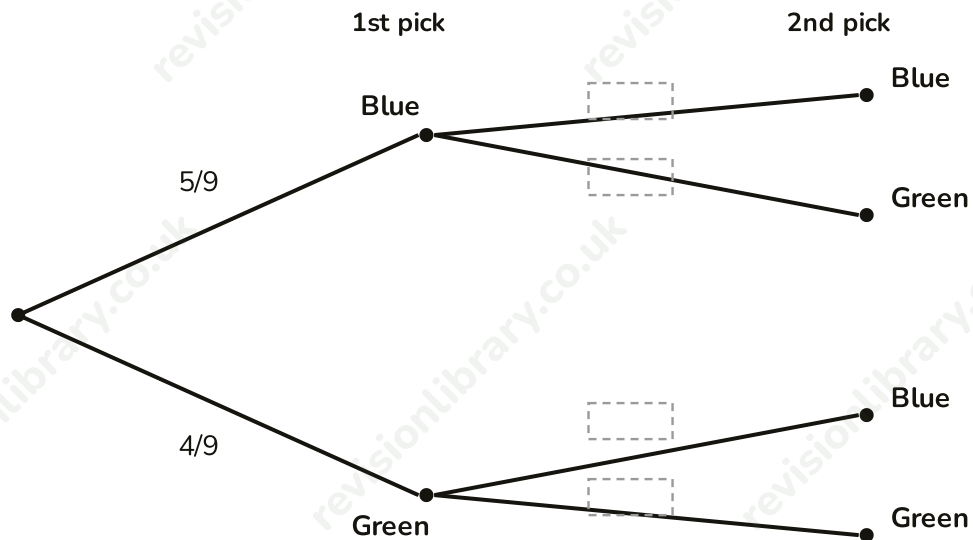
(c) Explain, in the context of part (b), why the second event is dependent on the first. (2)

(Total for Question 5 is 4 marks)

- 6** A bag contains 12 marbles: 7 blue and 5 orange. Priti takes a marble at random from the bag and does not replace it. The marble she took was blue. Find the probability that the second marble she takes is also blue.

(Total for Question 6 is 2 marks)

- 7 A bag contains 9 counters: 5 blue and 4 green. Rhys takes a counter at random from the bag and does not replace it. He then takes a second counter at random from the bag. The tree diagram shows the first pick.



- (a) Complete the tree diagram by writing the four missing second-pick probabilities. (2)
- (b) Find the probability that both counters are blue. (2)
- (c) Find the probability that the two counters are different colours. (2)

(Total for Question 7 is 6 marks)

8 A student carries out a statistics project to investigate whether pupils who play a musical instrument are more likely to also play a team sport.

(a) Write a suitable hypothesis for this investigation. (1)

(b) The student plans to collect data only from members of the school orchestra. (1)
Give one reason why this sampling method could make the investigation's conclusions unreliable.

(c) The student instead surveys 90 pupils across the whole school. The two-way table shows the results. (3)

	Plays a sport	Does not play a sport	Total
Plays an instrument	21	9	30
Does not play an instrument	24	36	60
Total	45	45	90

Find $P(\text{plays a sport} \mid \text{plays an instrument})$ and $P(\text{plays a sport} \mid \text{does not play an instrument})$.

(d) Using your answers to part (c), comment on whether the data supports the hypothesis in part (a), and give one limitation of this conclusion. (2)

(Total for Question 8 is 7 marks)

Mark scheme · F08-30min Conditional Probability (Foundation): 30-minute Pack

Question 1

- **B1** $P(X|Y) = P(X \text{ and } Y) / P(Y)$, oe
- **Answer:** $P(X|Y) = P(X \text{ and } Y) / P(Y)$

Question 2

- (a) **B1** 9 cao
- (a) **Answer:** 9
- (b) **M1** 9/30 seen, oe
- (b) **A1** 3/10 oe cao
- (b) **Answer:** 3/10
- (c) **M1** 21/36 seen, oe
- (c) **A1** 7/12 oe cao
- (c) **Answer:** 7/12

Question 3

- **B1** Independent cao
- **Answer:** Independent

Question 4

- (a) **B1** 4, 8, 12, 16, 20
- (a) **Answer:** 4, 8, 12, 16, 20
- (b) **M1** restricts the sample space to {4, 8, 12, 16, 20} and identifies 12 as the only multiple of 3
- (b) **A1** 1/5 oe cao
- (b) **Answer:** 1/5

Question 5

- (a) **B1** Independent cao
- (a) **Answer:** Independent
- (b) **B1** Dependent cao
- (b) **Answer:** Dependent
- (c) **M1** identifies that the total number of sweets, and the number of each colour, changes after the first sweet is removed
- (c) **A1** correctly links this change to the probability of the second event depending on the outcome of the first
- (c) **Answer:** Because removing the first sweet changes both the total number of sweets left and the number of each colour left, the probability of each outcome on the second pick depends on which sweet was taken first.

Question 6

- **M1** 6/11 seen (6 blue marbles remain out of 11 left)
- **A1** 6/11 cao
- **Answer:** 6/11

Question 7

- (a) **B1** after Blue: $P(\text{Blue}) = 4/8$ and $P(\text{Green}) = 4/8$
- (a) **B1** after Green: $P(\text{Blue}) = 5/8$ and $P(\text{Green}) = 3/8$
- **(a) Answer: After first Blue: 4/8 Blue, 4/8 Green. After first Green: 5/8 Blue, 3/8 Green.**
- (b) **M1** $5/9 \times 4/8$, oe
- (b) **A1** $5/18$ oe cao
- **(b) Answer: 5/18**
- (c) **M1** $(5/9 \times 4/8) + (4/9 \times 5/8)$, oe
- (c) **A1** $5/9$ oe cao
- **(c) Answer: 5/9**

Question 8

- (a) **B1** a clear, testable hypothesis linking playing an instrument with playing a sport, e.g. 'Pupils who play a musical instrument are more likely to also play a team sport'
- **(a) Answer: Pupils who play a musical instrument are more likely to also play a team sport (accept any equivalent testable statement).**
- (b) **B1** identifies bias, e.g. orchestra members already play an instrument so there is no fair comparison group, or the sample is too small/unrepresentative of the whole school
- **(b) Answer: Sampling only orchestra members is biased: it excludes pupils who do not play an instrument, so there is no fair comparison group and the sample may not represent the whole school.**
- (c) **M1** 21/30 and 24/60 identified
- (c) **A1** $7/10$ oe cao
- (c) **A1** $2/5$ oe cao
- **(c) Answer: $P(\text{sport} | \text{instrument}) = 7/10$; $P(\text{sport} | \text{no instrument}) = 2/5$**
- (d) **B1** valid comparative comment supporting the hypothesis, e.g. $7/10$ (0.7) is greater than $2/5$ (0.4), so pupils who play an instrument are more likely to also play a sport
- (d) **B1** a valid limitation, e.g. the sample of 90 pupils from one school may not represent all pupils, or the data shows an association but does not prove that playing an instrument causes pupils to play sport
- **(d) Answer: The data supports the hypothesis, since $7/10$ (0.7) is greater than $2/5$ (0.4): pupils who play an instrument are more likely to also play a sport. Limitation: this is a sample of 90 pupils from one school, and an association does not prove that one causes the other.**