HIGHER ONLY

HIGHER TIER

Name ..... Class .....

P9: Conditional probability

Solve problems involving conditional probability

20 marks · 25 minutes · Non-calculator

1) Of 200 students, 80 are girls and 120 like sport. 45 girls like sport. Find $P(\text{girl} \mid \text{likes sport})$ and $P(\text{likes sport} \mid \text{girl})$.

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[Question 1: 3 marks]

2) $P(A) = 0.5$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$. Find $P(A \mid B)$ and decide whether A and B are independent.

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[Question 2: 3 marks]

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3) 2% of people have a condition. A test is positive for 95% of people with the condition and 10% of people without it. Find the probability that a person who tests positive has the condition.

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[Question 3: 4 marks]

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4) A bag has 4 red and 6 blue balls. Two are taken without replacement. Given that the second ball is red, find the probability that the first was red.

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[Question 4: 3 marks]

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5) $P(\text{rain}) = 0.25$. $P(\text{late} \mid \text{rain}) = 0.4$ and $P(\text{late} \mid \text{no rain}) = 0.1$. Given that Ben is late, find the probability that it rained.

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[Question 5: 4 marks]

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6) Two dice are rolled. Given that the total is 8, find the probability that both dice show the same number.

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[Question 6: 3 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	$\frac{3}{8}$; $\frac{9}{16}$	$\frac{45}{120}$ (P1, A1); $\frac{45}{80}$ (A1).
2	0.5; independent	$\frac{0.2}{0.4}$ (P1); 0.5 (A1); equals $P(A)$ (C1).
3	$\frac{19}{117}$	True positives 0.019 (P1); false positives 0.098 (P1); $\frac{0.019}{0.117}$ (P1); A1.
4	$\frac{1}{3}$	$P(RR) = \frac{12}{90}$ (P1); $P(\text{second } R) = \frac{4}{10}$ (P1); A1.
5	$\frac{4}{7}$	$0.25 \times 0.4 = 0.1$ (P1); $0.75 \times 0.1 = 0.075$ (P1); $\frac{0.1}{0.175}$ (P1); A1.
6	$\frac{1}{5}$	5 outcomes total 8 (P1); one double (P1); A1.