FOUNDATION & HIGHER

SAME AT BOTH TIERS

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

P8: Combined events

Reason with independent and dependent events and tree diagrams

20 marks · 25 minutes · Non-calculator

1) Explain why you multiply probabilities to find $P(A \text{ and } B)$ for independent events.

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[Question 1: 2 marks]

2) Show that the probability of two heads with two fair coins is $\frac{1}{4}$

[Question 2: 1 marks]

3) $P(\text{rain}) = 0.3$ each day, independently. Kim says $P(\text{rain on both days}) = 0.3 + 0.3 = 0.6$. Explain her mistake.

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[Question 3: 2 marks]

4) Explain why the probabilities on the second set of branches change when sampling without replacement.

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[Question 4: 2 marks]

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5) A bag has 5 red and 3 blue balls. Two are taken without replacement. Show that $P(\text{both red}) = \frac{5}{14}$

[Question 5: 2 marks]

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6) For the bag in question 5, show that $P(\text{at least one red}) = \frac{25}{28}$

[Question 6: 3 marks]

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7) Explain why the probabilities on each set of branches from a point on a tree diagram add up to 1

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[Question 7: 1 marks]

8) P(pass A) = 0.8 and P(pass B) = 0.6, independently. Show that P(pass exactly one) = 0.44

[Question 8: 2 marks]

9) Two cards are taken from a pack without replacement. Are the events independent? Explain.

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[Question 9: 2 marks]

10) Show that the probability of three 6s with three dice is $\frac{1}{216}$

[Question 10: 1 marks]

11) Explain why $P(A \text{ and } B)$ can never be greater than $P(A)$.

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[Question 11: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Explanation	The fraction $P(A)$ is taken of the fraction $P(B)$ (C2).
2	Shown	$\frac{1}{2} \times \frac{1}{2}$ (C1).
3	0.09	Should multiply (C1); adding could exceed 1 (C1).
4	Explanation	Fewer items left (C1); and fewer of the first colour (C1).
5	Shown	$\frac{5}{8} \times \frac{4}{7}$ (M1); C1.
6	Shown	$P(\text{no red}) = \frac{3}{8} \times \frac{2}{7} = \frac{3}{28}$ (M1, M1); $1 - \frac{3}{28}$ (C1).
7	Explanation	They cover all outcomes at that stage (C1).
8	Shown	$0.8 \times 0.4 + 0.2 \times 0.6$ (M1); C1.
9	No	The first card changes what is left (C2).
10	Shown	$\left(\frac{1}{6}\right)^3$ (C1).
11	Explanation	A and B is part of A (C1); multiplying by a probability $\leqslant 1$ (C1).