FOUNDATION & HIGHER

SAME AT BOTH TIERS

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

P4: Probabilities that sum to 1

Reason with exhaustive and mutually exclusive events

20 marks · 25 minutes · Non-calculator

1) Explain why $P(A) + P(\text{not } A) = 1$

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[Question 1: 2 marks]

2) The probabilities of four outcomes are 0.3, 0.25, 0.2 and x. Show that $x = 0.25$

[Question 2: 2 marks]

3) Kim says the probabilities of the only three outcomes are 0.4, 0.35 and 0.3. Explain why she must be wrong.

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[Question 3: 2 marks]

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4) $P(\text{win}) = 0.45$ and $P(\text{draw}) = 0.2$. Ben says $P(\text{lose}) = 0.55$. Explain his mistake.

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[Question 4: 2 marks]

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5) Explain what "mutually exclusive" means. Give an example.

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[Question 5: 2 marks]

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6) A dice is rolled. Are "even" and "prime" mutually exclusive? Explain.

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[Question 6: 2 marks]

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7) A and B are mutually exclusive with $P(A) = 0.4$ and $P(B) = 0.3$. Show that $P(A \text{ or } B) = 0.7$

[Question 7: 1 marks]

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8) A biased spinner has probabilities x, $2x$, $3x$ and $4x$. Show that $x = 0.1$

[Question 8: 2 marks]

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9) Explain why $P(\text{even}) + P(\text{greater than 3})$ is not the probability of "even or greater than 3" on a dice.

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[Question 9: 2 marks]

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10) A bag has 24 counters. $P(\text{red}) = \frac{1}{3}$ and $P(\text{blue}) = \frac{1}{4}$. The rest are green. Show that there are 10 green counters.

[Question 10: 2 marks]

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11) Explain what it means for a set of outcomes to be exhaustive.

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[Question 11: 1 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Explanation	Either *A* happens or it does not (C1); these cover all outcomes (C1).
2	Shown	$1 - 0.75$ (M1); C1.
3	Explanation	They add up to 1.05 (M1); must be 1 (C1).
4	0.35	He forgot the draw (C1); $1 - 0.65$ (B1).
5	Explanation	Cannot happen at the same time (C1); example (C1).
6	No	2 is both even and prime (C2).
7	Shown	$0.4 + 0.3$ (C1).
8	Shown	$10x = 1$ (M1); C1.
9	Explanation	4 and 6 are counted twice (C2).
10	Shown	8 red, 6 blue (M1); $24 - 14$ (C1).
11	Explanation	They include every possible outcome (C1).