FOUNDATION & HIGHER

SAME AT BOTH TIERS

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

P3: Probability and relative frequency

Reason about theoretical probability, relative frequency and the probability scale

20 marks · 25 minutes · Non-calculator

1) Explain why a probability cannot be 1.3

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[Question 1: 1 marks]

2) Kim says the probability that it rains tomorrow is 50% because it either rains or it does not. Explain her mistake.

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[Question 2: 2 marks]

3) A spinner has two equal colours. After 500 spins the relative frequency of red is 0.48. Is this consistent with the spinner being fair? Explain.

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[Question 3: 2 marks]

4) Explain the difference between theoretical probability and experimental probability.

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[Question 4: 2 marks]

5) A letter is chosen at random from MATHEMATICS. Show that $P(\text{vowel}) = \frac{4}{11}$

[Question 5: 2 marks]

6) Put these probabilities in order, least likely first, and explain how you decided: 0.3, $\frac{2}{5}$, 35%

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[Question 6: 2 marks]

7) Ben flips a coin 10 times and estimates $P(\text{head}) = 0.7$. Explain why this estimate is unreliable.

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[Question 7: 2 marks]

8) Explain why a probability of 0 means impossible and a probability of 1 means certain.

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[Question 8: 2 marks]

9) Does "likely" always mean a probability greater than 0.5? Explain.

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[Question 9: 1 marks]

10) A bag has 3 red and 7 blue counters. Show that $P(\text{red}) = 0.3$ and explain why you would expect about 30 reds in 100 picks with replacement.

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[Question 10: 2 marks]

11) After 1000 trials the relative frequency of an event is 0.25. The theoretical probability is $\frac{1}{4}$. What does this suggest? Explain.

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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	Probabilities are between 0 and 1 (C1).
2	Explanation	The two outcomes are not equally likely (C2).
3	Yes	0.48 is close to 0.5 (M1); large number of trials (C1).
4	Explanation	Theoretical: from equally likely outcomes (C1); experimental: from trials (C1).
5	Shown	Vowels A, E, A, I (M1); 11 letters (C1).
6	0.3, 35%, $\frac{2}{5}$	Convert to decimals 0.3, 0.35, 0.4 (M1); C1.
7	Explanation	Only 10 trials (C2).
8	Explanation	0: never happens (C1); 1: always happens (C1).
9	Not exactly	It describes chances above evens in everyday language (C1).
10	Shown	$\frac{3}{10}$ (M1); 0.3×100, but results vary (C1).
11	Explanation	The experiment supports the theoretical probability (C2).