FOUNDATION & HIGHER

SAME AT BOTH TIERS

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

P5: Sample size and probability

Relative frequency tends to theoretical probability as the number of trials increases

20 marks · 25 minutes · Non-calculator

1) Ali flips a coin 10 times and gets 7 heads. Bea flips the same coin 1000 times and gets 512 heads. Whose results give the better estimate of P(head)? Give a reason.

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[Question 1: 2 marks]

2) A spinner is spun many times. The table shows the number of times it landed on red.

Spins	20	50	100	200	500
Red	8	14	31	58	151
Relative frequency					

(a) Complete the relative frequency row.

(3)

(b) Estimate the probability of red.

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(1)

[Question 2: 4 marks]

3) Sam rolls a dice 6 times and gets no sixes. He says the dice must be biased. Is he right? Give a reason.

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[Question 3: 1 marks]

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4) Kim does 40 trials and gets 12 successes. Lee does 160 trials and gets 52 successes.

(a) Use all the results to estimate the probability of success.

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(2)

(b) Whose results are more reliable on their own?

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(1)

[Question 4: 3 marks]

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5) A fair coin is flipped many times. As the number of flips increases, what value does the relative frequency of heads get closer to?

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[Question 5: 1 marks]

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6) A drawing pin is dropped 150 times. It lands point up 63 times.

(a) Estimate the probability that it lands point up.

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(1)

(b) Estimate how many times it lands point up in 1000 drops.

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(1)

[Question 6: 2 marks]

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7) Is it possible to get 10 heads in 10 flips of a fair coin?

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[Question 7: 1 marks]

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8) A dice is rolled 600 times and lands on 6 a total of 180 times. Is the dice likely to be fair? Show how you decide.

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[Question 8: 2 marks]

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9) How can you make an estimate of a probability more reliable?

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[Question 9: 1 marks]

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10) After 1000 trials, the relative frequency of an event is 0.27. Estimate the probability that the event does not happen.

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[Question 10: 1 marks]

11) What does it mean for a dice to be unbiased?

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[Question 11: 1 marks]

12) After 400 spins, the relative frequencies of four equal-sized colours are 0.24, 0.26, 0.25 and 0.25. Does the spinner seem fair?

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[Question 12: 1 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Bea	More trials (B1); B1 for Bea.
2	(a) 0.4, 0.28, 0.31, 0.29, 0.302 (b) about 0.3	(a) B3 (B2 for 3 or 4 correct, B1 for 2). (b) B1.
3	No; 6 rolls is too few	B1.
4	(a) 0.32 (b) Lee	(a) $\frac{64}{200}$ (M1); A1. (b) B1.
5	0.5	B1.
6	(a) 0.42 (b) 420	B1 each.
7	Yes	B1.
8	No; expect about 100 sixes	Expected 100 (M1); 180 is much more, so likely biased (A1).
9	Do more trials	B1.
10	0.73	B1.
11	Every outcome is equally likely	B1.
12	Yes	B1.