FOUNDATION & HIGHER

SAME AT BOTH TIERS

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

P7: Sample spaces

Reason with sample spaces and theoretical probability

20 marks · 25 minutes · Non-calculator

1) Two fair dice are rolled. Show that $P(\text{total} = 7) = \frac{1}{6}$

[Question 1: 2 marks]

2) Kim says there are 11 possible totals (2 to 12), so $P(\text{total} = 7) = \frac{1}{11}$. Explain her mistake.

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[Question 2: 2 marks]

3) Show that the probability of a head and a 6, when a coin is flipped and a dice rolled, is $\frac{1}{12}$

[Question 3: 1 marks]

4) Explain why the probability of a double with two dice is $\frac{1}{6}$

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[Question 4: 2 marks]

5) With two dice, is a total of 7 or a total of 8 more likely? Explain.

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[Question 5: 2 marks]

6) Show that the probability that the product of two dice is even is $\frac{3}{4}$

[Question 6: 2 marks]

7) Explain why outcomes in a sample space must be equally likely before you count them to find probabilities.

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[Question 7: 2 marks]

8) Show that the probability of exactly 2 heads with 3 coins is $\frac{3}{8}$

[Question 8: 2 marks]

9) A four-sided spinner (1–4) is spun and a dice rolled. Ben says $P(\text{total} = 5) = \frac{1}{24}$. Show that it is $\frac{1}{6}$

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[Question 9: 2 marks]

10) Show that the probability of at least one 6 with two dice is $\frac{11}{36}$

[Question 10: 2 marks]

11) Explain why HT and TH are different outcomes when two coins are flipped.

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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	Shown	6 out of 36 (M1); C1.
2	Explanation	The totals are not equally likely (C2).
3	Shown	1 out of 12 (C1).
4	Explanation	6 doubles out of 36 (C2).
5	7	6 ways against 5 ways (M1); C1.
6	Shown	Odd product needs both odd: $\frac{9}{36}$ (M1); $1-\frac{1}{4}$ (C1).
7	Explanation	Counting assumes each outcome has the same chance (C2).
8	Shown	HHT, HTH, THH (M1); out of 8 (C1).
9	Shown	(1,4), (2,3), (3,2), (4,1) (M1); $\frac{4}{24}$ (C1).
10	Shown	$1-\frac{25}{36}$ (M1); C1.
11	Explanation	The coins are different, so first head or first tail is a different result (C1).