

# SAMPLE SPACE DIAGRAMS

- 1) A fair coin is tossed and then a fair 6-sided dice is rolled.



- a. Complete the sample space diagram below with the possible outcomes.

	1	2	3	4	5	6
H	H1	H2	H3	H4	H5	H6
T	T1	T2	T3	T4	T5	T6

- b. What is the probability of landing on heads and an odd number?  $\frac{3}{12} = \frac{1}{4}$
- c. What is the probability of landing on tails and a multiple of 3?  $\frac{2}{12} = \frac{1}{6}$
- 2) Two fair 6-sided dice are rolled. The numbers on the dice are added together.
- a. Complete the table to show all possible totals.

		Dice 1					
Dice 2	+	1	2	3	4	5	6
	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

- b. Which total is most likely? 7
- c. What of the probability of scoring a 2?  $\frac{1}{36}$
- d. What is the probability of scoring a 5?  $\frac{4}{36} = \frac{1}{9}$
- e. What is the probability of scoring an odd number?  $\frac{18}{36} = \frac{1}{2}$
- f. What is the probability of scoring a number less than 4?  $\frac{3}{36} = \frac{1}{12}$

- 3) Two fair 6-sided dice are rolled. The numbers on the dice are multiplied together.

- a. Complete the table to show all possible products.

		Dice 1					
Dice 2	×	1	2	3	4	5	6
	1	1	2	3	4	5	6
	2	2	4	6	8	10	12
	3	3	6	9	12	15	18
	4	4	8	12	16	20	24
	5	5	10	15	20	25	30
	6	6	12	18	24	30	36

- b. What is the probability of a product of 1?  $\frac{1}{36}$
- c. What is the probability of the product being a square number?  $\frac{8}{36} = \frac{2}{9}$

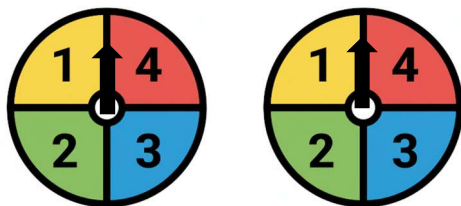
- 4) Two bags contain numbered counters. The first bag has even numbers from 2 to 8 inclusive. The second bag has odd numbers from 1 to 7 inclusive. One counter is drawn from each bag and the positive difference between the numbers is taken.

- a. Complete the table below to show all possible outcomes.

		Bag 1			
Bag 2	-	2	4	6	8
	1	1	3	5	7
	3	1	1	3	5
	5	3	1	1	3
	7	5	3	1	1

- b. What is the most common difference? 1
- c. Work out the probability of a difference of 3.  $\frac{5}{16}$

- 5) Two fair 4-sided spinners are spun. Their outcomes are squared and then added together.



- a. Complete the table below to show all possible outcomes.

Spinner 1		1	2	3	4
Spinner 2	1	2	5	10	17
	2	5	8	13	20
	3	10	13	18	25
	4	17	20	25	32

- b. There are four outcomes that only occur once. What are they? **2, 8, 18, 32**
- c. Work out the probability of an outcome greater than 10.  $\frac{10}{16} = \frac{5}{8}$
- 6) Two fair coins are tossed. Each coin has an outcome of heads and tails.  
The score is given as:

Heads = +2, Tails = -1

- a. Complete the sample space diagram to show all possible totals.

	H	T
H	4	1
T	1	-2

- b. Work out the probability that the score is positive.  $\frac{3}{4}$
- c. Work out the probability that the score is 0. **0**

- 7) Two fair spinners are shown below.



Both spinners are spun, and the final score is given by:

Letter value: A = 1, B = 2, C = 3, D = 4

Final score = (letter value) × (number)

- a. Complete the table to show all possible scores.

	A	B	C	D
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12

- b. Work out the probability the score is a multiple of 4.  $\frac{4}{12} = \frac{1}{3}$
- c. Work out the probability the score is less than 5.  $\frac{7}{12}$
- 8) A game at a local fair involves rolling a fair 6-sided dice two times. The numbers on the dice are added together and then cubed. Each person plays £2 to play the game. If they score a square number, they win £10. The game is played 200 times. Calculate the expected profit made by the fair.

Dice 1		1	2	3	4	5	6
Dice 2	1	8	27	64	125	216	343
	2	27	64	125	216	343	512
	3	64	125	216	343	512	729
	4	125	216	343	512	729	1000
	5	216	343	512	729	1000	1331
	6	343	512	729	1000	1331	1728

$$\text{Revenue from game} = 200 \times £2 = £400$$

$$\text{Expected number of wins} = \frac{7}{36}$$

$$\text{Expected pay out} = \frac{7}{36} \times 200 \times £10 = 388.89$$

$$£400 - 388.89 = £11.11$$