Sample space diagrams

Grade 4 | Worked solutions

GCSE Statistics topic practice

1 Kofi flips a fair coin and spins a fair spinner numbered 1, 2, 3. One possible outcome is a head and a 1, written H1.

a. Complete the sample space diagram to show all the possible outcomes. (1)

b. Work out the probability that Kofi gets a head and an odd number. (1)

c. Work out the probability that Kofi gets a tail, or a 1, or both. (1)

Spinner

	1	2	3
Head (H)	H1	H2	H3
Tail (T)	T1	T2	T3

(3 marks)

a)

Heads row is H1, H2, H3

Tails row is T1, T2, T3

b)

There are 6 outcomes. H1 and H3 are a head and odd.

$$P = \frac{2}{6}$$

$$= \frac{1}{3}$$

That is 2 outcomes out of 6

c)

T1, T2, T3 and H1 have a tail or a 1

$$P = \frac{4}{6}$$

$$= \frac{2}{3}$$

a) 6 outcomes listed b) $\frac{1}{3}$ c) $\frac{2}{3}$

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2 At a school summer fair, each player spins two fair spinners. Spinner A is numbered 1, 2, 3, 4. Spinner B is numbered 1, 3, 5. The score is the sum of the two numbers.

Score	B = 1	B = 3	B = 5
A = 1	2	4	6
A = 2	3		
A = 3			
A = 4			

a. Complete the sample space diagram. (1)

b. Work out the probability that a player scores exactly 6. (1)

c. A player wins a prize with a score of 7 or more. 150 people play the game. Work out an estimate for the number of prizes won. (2)

(4 marks)

a)

Row A = 2 is 3, 5, 7

Row A = 3 is 4, 6, 8

Row A = 4 is 5, 7, 9

b)

There are 12 outcomes and 2 of them are 6

$$P(6) = \frac{2}{12} = \frac{1}{6}$$

c)

7 or more is 7, 7, 8, 9 so 4 outcomes

$$P(\text{prize}) = \frac{4}{12} = \frac{1}{3}$$

$$\frac{1}{3} \times 150 = 50$$

a) table completed b) $\frac{1}{6}$ c) 50 prizes

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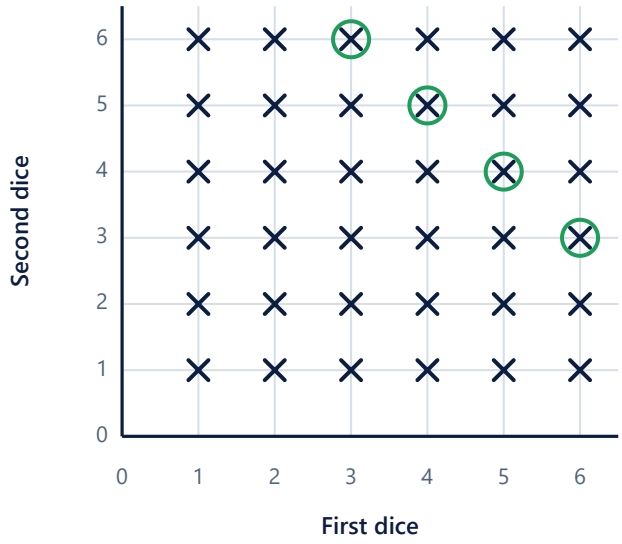
3 Two fair six-sided dice are rolled. The sample space diagram shows all the possible outcomes. Each cross is one outcome.

a. Write down the total number of possible outcomes. (1)

b. On the diagram, put a ring around each outcome that gives a total of 9. (1)

c. Work out the probability that the total is 9. (1)

d. Work out the probability that both dice show the same number. (1)



(4 marks)

a)

$6 \times 6 = 36$

There are 36 outcomes.

b)

Ring (3, 6) (4, 5) (5, 4) (6, 3)

c)

4 of the 36 outcomes give a total of 9

$P(9) = \frac{4}{36}$

$= \frac{1}{9}$

So the probability is 1 out of 9

d)

(1, 1) up to (6, 6) is 6 outcomes

$P(\text{same}) = \frac{6}{36}$

$= \frac{1}{6}$

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a) 36 b) 4 rings c) $\frac{1}{9}$ d) $\frac{1}{6}$

4 Priya spins two fair spinners. Spinner A is numbered 1, 2, 3. Spinner B is numbered 2, 3, 4, 5. She multiplies the two numbers to get her score.

a. Complete the sample space diagram. (2)

b. Work out the probability that her score is an even number. (1)

c. Work out the probability that her score is greater than 8. (1)

		Spinner B			
	×	2	3	4	5
Spinner A	1	2	3	4	5
	2	4	6	8	10
	3	6	9	12	15

(4 marks)

a)

Row A = 2 is 4, 6, 8, 10

Row A = 3 is 6, 9, 12, 15

b)

There are 12 outcomes.

Even scores are 2, 4, 4, 6, 8, 10, 6, 12

That is 8 outcomes.

$P(\text{even}) = \frac{8}{12}$

$= \frac{2}{3}$

So the probability is 2 out of 3

c)

Greater than 8 is 10, 9, 12, 15 so 4 outcomes

$P = \frac{4}{12}$

$= \frac{1}{3}$

a) table completed b) $\frac{2}{3}$ c) $\frac{1}{3}$

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5 Ali and Beth play a game. They roll two fair four-sided dice, each numbered 1, 2, 3, 4. The score is the difference between the two numbers.

Ali wins if the score is 0 or 1. Beth wins if the score is 2 or 3.

a. Complete the sample space diagram to show the scores. (2)

b. Is the game fair? You must give a reason for your answer. (2)

c. Ali and Beth play the game 80 times. Work out an estimate for the number of times Beth wins. (1)

Second dice

First dice	Score	1	2	3	4
	1	0	1	2	3
	2	1	0	1	2
	3	2	1	0	1
	4	3	2	1	0

(5 marks)

a)

Take the smaller number from the bigger number.

Row 2 is 1, 0, 1, 2

Row 3 is 2, 1, 0, 1

Row 4 is 3, 2, 1, 0

b)

There are 16 outcomes.

A score of 0 or 1 comes up 10 times

A score of 2 or 3 comes up 6 times

$P(\text{Ali wins}) = \frac{10}{16}$ and $P(\text{Beth wins}) = \frac{6}{16}$

Not fair. Ali is more likely to win.

c)

$\frac{6}{16} \times 80 = 30$

a) table completed b) not fair, $\frac{10}{16}$ and $\frac{6}{16}$ c) 30

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