

WA7MPSP1

Probability and statistics

Core + Challenge

Sample Spaces and Probability

I can list the sample space for a single-stage chance experiment and assign probabilities as fractions, decimals and percentages.

Name: _____ Date: _____ Score: _____ / 55

Key idea

The **sample space** is the list of all possible outcomes. Rolling a die: {1, 2, 3, 4, 5, 6}

For equally likely outcomes: **P(event) = number of favourable outcomes ÷ total number of outcomes.**

$$P(\text{even}) = \frac{3}{6} = \frac{1}{2} = 0.5 = 50\%$$

Probabilities range from **0 (impossible)** to **1 (certain)**.

Complement: $P(\text{not } A) = 1 - P(A)$. If $P(\text{red}) = \frac{3}{8}$, then $P(\text{not red}) = \frac{5}{8}$.

A

Fluency *practise the skill*

/ 16 marks

Give each probability as a fraction in simplest form.

1. A die is rolled. $P(3)$ _____

9. Bag: 5 red, 3 blue, 2 green.
 $P(\text{blue})$ _____

2. $P(\text{even number})$ _____

10. Same bag. $P(\text{not green})$ _____

3. $P(\text{number greater than 4})$ _____

11. Same bag. $P(\text{red or blue})$ _____

4. $P(7)$ _____

12. A letter from MATHEMATICS.
 $P(M)$ _____

5. $P(\text{number} \leq 6)$ _____

13. Same word. $P(\text{vowel})$ _____

6. A coin is tossed. $P(\text{heads})$ _____

14. Cards 1–20. $P(\text{multiple of 5})$ _____

7. 8 equal sectors, 3 red. $P(\text{red})$ _____

15. Number of outcomes when a die is rolled _____

8. Same spinner. $P(\text{not red})$ _____

16. Sample space for a coin toss _____

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B**Core** *apply the skill to problems***/ 21 marks**

- 1** A spinner has five equal sectors numbered 1 to 5. [3 marks]
(a) List the sample space.
(b) Find $P(\text{odd number})$ as a fraction, decimal and percentage.

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Answer: _____

- 2** A bag holds 12 marbles. The probability of choosing a red marble is $\frac{1}{3}$. How many red marbles are in the bag? [2 marks]

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Answer: _____

- 3** In a class of 28 students, 12 play a sport. A student is chosen at random. What is the probability they play a sport? [2 marks]

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Answer: _____

- 4** Describe each as impossible, unlikely, even chance, likely or certain: [2 marks]
(a) rolling a 7 on a die (b) a coin landing heads (c) rolling a number less than 6

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- 5** Design a spinner with 8 equal sectors so that $P(\text{blue}) = \frac{1}{4}$. How many sectors should be blue? [2 marks]

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Answer: _____

- 6** A raffle sells 500 tickets and Tom buys 5. What is the probability he wins first prize? Give a fraction and a percentage. [2 marks]

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Answer: _____

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- 7 A number from 1 to 30 is chosen at random. What is the probability that it is prime? [2 marks]

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Answer: _____

- 8 A bag of 20 marbles has red and blue marbles in the ratio 2 : 3. What is the probability of choosing blue? [2 marks]

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Answer: _____

- 9 The probability that it rains tomorrow is 0.35. What is the probability that it does not rain? [2 marks]

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Answer: _____

- 10 A day of the week is chosen at random. What is the probability that it starts with the letter T? [2 marks]

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Answer: _____

C Reasoning *explain, justify and check*

/ 9 marks

- 1 Explain why a probability can never be greater than 1. [2 marks]

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- 2 Ali tossed a coin and got heads 4 times in a row. He says tails is now more likely. Is he right? Explain. [2 marks]

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- 3 P(6) on a die is $\frac{1}{6}$. Priya rolled 12 times and got no 6s. Is that possible? Explain. [2 marks]

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- 4 A spinner has a red sector covering $\frac{3}{4}$ of the circle and a blue sector covering $\frac{1}{4}$. Kai says $P(\text{red}) = \frac{1}{2}$ because there are two colours. Explain his mistake. [3 marks]

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D Challenge *multi-step and problem-solving*

/ 9 marks

- 1 A bag contains red and blue marbles. $P(\text{red}) = \frac{2}{5}$. When 3 more red marbles are added, $P(\text{red}) = \frac{1}{2}$. How many marbles were in the bag at first? [3 marks]

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Answer: _____

- 2 A whole number from 1 to 100 is chosen at random. What is the probability it is a perfect square? [2 marks]

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Answer: _____

- 3 Design a spinner with 6 equal sectors so that $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(C) = \frac{1}{6}$. [2 marks]

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Answer: _____

- 4 A box has 40 balls. The probability of choosing green is 0.15. How many balls are **not** green? [2 marks]

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Answer: _____

How did I go?

Fluency ____ / 16 Core ____ / 21 Reasoning ____ / 9 Challenge ____ / 9 **Total** ____ / 55

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