

KS3 – Relative Frequency

Section A – Relative Frequency

Q1 (5 marks)

A coin is tossed 50 times and lands on Heads 28 times.

a) Write the relative frequency of Heads as a fraction.

b) Write it as a decimal.

c) Find the relative frequency of Tails.

d) How many times did Tails occur?

e) Which outcome had the greater relative frequency?

Q2 (5 marks)

A spinner is spun 80 times. The results are shown in the table.

Colour	Red	Blue	Green
Frequency	36	28	16

a) Find the relative frequency of Red.

- b) Find the relative frequency of Blue.
- c) Find the relative frequency of Green.
- d) Check that the three relative frequencies add to 1.
- e) Which colour appears to be most likely?

Q3 (5 marks)

A six-sided die is rolled 120 times. A 6 is rolled 17 times.

- a) Find the relative frequency of rolling a 6.
- b) Write your answer as a decimal to 3 decimal places.
- c) State the theoretical probability of rolling a 6.
- d) Is the relative frequency exactly equal to the theoretical probability?

e) Give a reason for any difference.

Q4 (5 marks)

Two students test the same fair coin. Aisha tosses it 20 times and gets 13 Heads. Ben tosses it 200 times and gets 104 Heads.

a) Find Aisha's relative frequency of Heads.

b) Find Ben's relative frequency of Heads.

c) Which result is closer to the theoretical probability of 0.5?

d) Which experiment used the larger sample?

e) Explain why a larger number of trials will generally give a more reliable estimate of probability.

Q5 (4 marks)

A basketball player takes 60 free throws and scores 42.

a) Find the relative frequency of scoring.

b) Find the relative frequency of missing.

c) Explain how the relative frequency could be used to estimate the player's chance of scoring the next free throw.

d) Explain why this estimate does not guarantee the result of the next throw.

Section B – Expected Outcomes

Q6 (5 marks)

A fair coin is tossed 300 times.

- a) What is the probability of Heads?

- b) Calculate the expected number of Heads.

- c) Calculate the expected number of Tails.

- d) Must the experiment produce exactly 150 Heads? Explain.

- e) If 147 Heads are actually obtained, find the relative frequency of Heads.

Q7 (5 marks)

A fair six-sided die is rolled 240 times.

- a) Calculate the expected number of 6s.

- b) Calculate the expected number of 1s.

- c) Calculate the expected number of even results.
- d) Calculate the expected number of results greater than 4.
- e) Explain why actual frequencies may differ from these expected frequencies.

Q8 (5 marks)

A bag contains 4 red, 3 blue and 3 yellow counters. One counter is selected at random and replaced. This is repeated 200 times.

- a) Find $P(\text{red})$.
- b) Find $P(\text{blue})$.
- c) Find $P(\text{yellow})$.
- d) Calculate the expected number of red selections.
- e) Calculate the expected number of blue selections.

Q9 (5 marks)

A spinner has four colours. Based on a large experiment, the estimated probabilities are shown in the table.

Colour	Red	Blue	Green	Yellow
Estimated probability	0.34	0.28	0.22	0.16

- a) Check that the probabilities add to 1.

- b) In 500 spins, calculate the expected number of Red results.

- c) Calculate the expected number of Blue results.

- d) Calculate the expected number of Green results.

- e) Calculate the expected number of Yellow results.

Q10 (5 marks)

A footballer has scored 36 of their last 50 penalties.

- a) Find the relative frequency of scoring.

b) Use this relative frequency to estimate how many penalties they would score out of 100.

c) Estimate how many they would score out of 250.

d) Estimate how many they would miss out of 250.

e) State one reason why the actual number scored may differ from the estimate.

Challenge

Q11 (6 marks)

A machine produces components. In a sample of 400 components, 18 are defective.

a) Find the relative frequency of a defective component.

b) Use this result to estimate the number of defective components in a batch of 2,000.

c) Estimate the number of non-defective components in the batch.

d) A second sample of 1,000 components contains 38 defective components. Find the new relative frequency of defective components.

e) Which sample would you generally trust more for estimating the defect rate?

f) Give a reason for your answer.

Total: ____ / 55

Percentage: ____%