Relative Frequency

KS3 Maths · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

A coin is flipped 50 times and lands on heads 23 times. Find the relative frequency of heads.

Step 1 · Relative frequency = frequency ÷ trials

23 ÷ 50

Step 2 · Calculate

0.46

Answer: 0.46 (or 23/50)

Check: Close to the theoretical 0.5, for a fair coin with 50 flips ✓

2. Now try one with the steps

A fair dice is rolled 300 times. How many 6s would you expect?

Step 1 · P(6) for a fair dice

Step 2 · Expected number = probability × trials

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. A coin is flipped 40 times and lands on heads 18 times. Find the relative frequency of heads. [1]

2. A fair dice is rolled 600 times. How many times would you expect to roll a 4? [1]

3. The probability it rains on any day in April is 0.3. How many rainy days would you expect in the 30 days of April? [1]

4. A spinner lands on red 70 times in 200 spins. Find the relative frequency of red. [1]

5. Counters are taken from a bag and put back 50 times. A green counter is taken 12 times. Estimate P(green). [1]

6. Which gives a more reliable estimate of a probability: 20 trials or 500 trials? [1]

7. Zane scores 18 penalties out of 24. What is the relative frequency of him scoring? [1]

8. Using the spinner that landed on red 70 times in 200 spins, estimate how many reds there would be in 1000 spins. [2]

9. A drawing pin lands point up 64 times in 160 throws. Find the relative frequency of point up. [1]

10. Using the drawing pin results, how many times would you expect it to land point up in 1000 throws? [2]

11. The relative frequencies of outcomes A and B are 0.2 and 0.35. A, B and C are the only outcomes. What is the relative frequency of C? [1]

12. A dice is rolled 120 times. How many 6s would you expect if it is fair? [1]

13. That dice actually showed a 6 on 38 of the 120 rolls. What does this suggest? [2]

14. Using Zane's record of 18 goals from 24 penalties, how many goals would you expect from his next 40 penalties? [2]

15. A bag holds 10 counters. A counter is taken and replaced 100 times, and 31 are red. Estimate how many of the 10 counters are red. [2]

4. Before you hand it in

Flipping a fair coin 10 times, getting 6 heads, and saying the coin is biased

Random results vary. With 10 flips, 6 heads is very normal. Only a big difference over MANY trials suggests bias.

'It has landed on tails five times in a row, so heads is due next'

A coin has no memory. P(heads) on the next flip is still 1/2, whatever happened before.

Relative frequency of heads = 23 ÷ 27 (heads ÷ tails)

Divide by the TOTAL number of trials: 23 heads in 50 flips gives 23 ÷ 50 = 0.46.

Expected number of 6s in 50 rolls = 8.333..., so you will get 8

The expected number is an average over many repeats. You might get 5 or 12 sixes. Say 'about 8'.