Experimental probability and expected frequency

Grade 3 | Worked solutions

GCSE Statistics topic practice

1 Kai records the colour of each of 50 cars in a car park.

Colour	Silver	Black	White	Other
Frequency	20	15	10	5

Kai picks one of the cars at random.

a. Write down the probability that the car is silver. (1)

b. Work out the probability that the car is not black. (2)

(3 marks)

a) 20 silver cars out of 50

$\frac{20}{50} = \frac{2}{5}$

b) number of cars that are not black

$50 - 15 = 35$

$\frac{35}{50} = \frac{7}{10}$

a) $\frac{2}{5}$ b) $\frac{7}{10}$

2 Ewa thinks a spinner may be biased. She spins it 40 times. The table shows her results.

Colour	Red	Blue	Green
Frequency	14	10	16

a. Use the results to estimate the probability that the spinner lands on green. (1)

b. Ewa is going to spin the spinner 200 times.
Work out an estimate for the number of times it will land on green. (2)

c. Write down one way Ewa could get a more reliable estimate of the probability. (1)

(4 marks)

a) green 16 times out of 40 spins

$\frac{16}{40} = \frac{2}{5}$

This is the same as 0.4

b) probability × number of spins

$\frac{2}{5} \times 200 = 80$

c)

Do more spins

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More trials give a more reliable estimate

a) $\frac{2}{5}$ b) 80 c) more spins

3 Lena rolls a dice 60 times. The table shows her results.

Score	1	2	3	4	5	6
Frequency	8	11	9	10	7	15

a. For a fair dice, how many times would you expect each score in 60 rolls? (1)

b. Use Lena's results to estimate the probability of rolling a 6 with her dice. (1)

c. Lena says, "My dice is biased towards 6."
Comment on what Lena says. (2)

(4 marks)

a) 6 scores, all equally likely

$60 \div 6 = 10$

b) 15 sixes out of 60 rolls

$\frac{15}{60} = \frac{1}{4}$

c)

6 came up 15 times

This is more than the 10 expected

so the dice may be biased

60 rolls is not enough to be sure

She should roll it many more times

a) 10 b) $\frac{1}{4}$ c) may be biased, needs more rolls

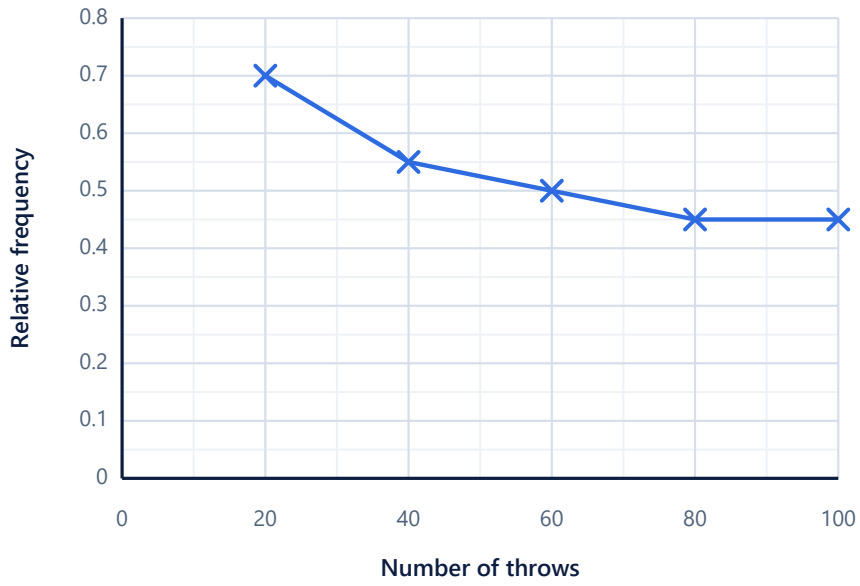
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4 Ali throws a bottle top 100 times. After every 20 throws he works out the relative frequency of the bottle top landing face up. The graph shows his results.

a. Write down the relative frequency of landing face up after 40 throws. (1)

b. Work out the number of times the bottle top landed face up in the first 40 throws. (1)

c. Write down the best estimate of the probability that the bottle top lands face up. Give a reason for your answer. (2)



(4 marks)

a) read up from 40 throws

0.55

b) relative frequency x number of throws

0.55 x 40 = 22

c) use the value after 100 throws

0.45

It is based on the most throws

a) 0.55 b) 22 c) 0.45, most throws

5 A factory makes phone cases. An inspector checks 250 phone cases and finds that 10 of them are faulty.

a. Estimate the probability that a phone case is faulty. (1)

b. The factory makes 6000 phone cases each week.
Work out an estimate for the number of faulty phone cases made each week. (2)

c. The factory buys a new machine. The inspector checks 150 phone cases from the new machine and finds that 3 are faulty.
Has the new machine made a difference? Show how you decide. (2)

(5 marks)

a) 10 faulty out of 250

$\frac{10}{250} = \frac{1}{25}$

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This is the same as 0.04

b) probability x number made

$0.04 \times 6000 = 240$

c) probability for the new machine

$\frac{3}{150} = 0.02$

0.02 is less than 0.04

Yes, fewer cases are faulty with the new machine

a) $\frac{1}{25}$ b) 240 c) yes, 0.02 is less than 0.04

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