Expectation

Starter

1. **(Review of last lesson)** Jamal records the colours of the cars passing his school.

Colour	Silver	Black	Red	Blue	Other
Frequency	452	124	237	98	89

Estimate the probability, as a decimal, that the next car passing Jamal's school will be:
(a)   silver   (b)   red or blue   (c)   not red or blue

Working: (a)   Sum of frequencies = 1000

$$P(silver) = \frac{452}{1000} = 0.452$$

(b)   237 + 98 = 335 so P(red or blue) = 0.335

(c)   P(not red or blue) = 1 − 0.335 = 0.665

2. (a)   A coin is flipped 60 times. How many heads would you expect?
   (b)   A 6-sided dice is rolled 42 times. How many sixes would you expect?

Working: (a) $60 \times \dfrac{1}{2} = 30$ heads

(b) $42 \times \dfrac{1}{6} = 7$ sixes

3.   Are you guaranteed to get exactly the values you stated in question 2?

Working: No − these are the numbers we "expect" i.e. the real number will be close to this expected value (unless the coin or dice is biased).

E.g. 1 A bag has 3 red, 4 green and 5 blue cubes. A cube is removed and replaced 72 times.
(a)   How many blue cubes would you expect to remove?
(b)   How many cubes that are not red would you expect to remove?

Working: (a) $\dfrac{5}{12} \times 72 = 30$

(b)   Number of red cubes expected $= \dfrac{3}{12} \times 72 = 18$

Number of not red cubes $= 72 - 18 = 54$

Relative frequency and *expectation* are closely related and can be combined in questions.

E.g. 2 Mary counted the number of cars passing her school.

Colour	Black	Red	Blue
Frequency	17	4	9

If 120 cars passed in front of the school, how many red cars would we expect to see?

Working: Relative frequency of red cars $= \dfrac{4}{17 + 4 + 9} = \dfrac{4}{30} = \dfrac{2}{15}$

Number of red cars expected $= \dfrac{2}{15} \times 120 = 16$

Video: **Expectation**

Solutions to Starter and E.g.s

Exercise
9-1 class textbook: p236 M8.3 Qu 1-10
A*-G class textbook: p206 M8.3 Qu 1-10
9-1 homework book: p80 M8.3 Qu 1-8
A*-G homework book: p58 M8.3 Qu 1-8

Homework book answers (only available during a lockdown)