

2 Online practice assessment task for AS91268 (2.13)

A large white rectangular area with rounded corners, containing 30 horizontal orange lines for writing.

ANSWERS

Answers will vary, an outline solution follows.

A simulation is designed to estimate the number of bottles that needs to be purchased in order to collect the four letters F, I, Z, Z:

- Random numbers: 1, 2, 3 and 4 are generated (by calculator) corresponding to the letters F, I, Z and Z, respectively.
- Trial: Generate random numbers until one 1(F), one 2(I) and two of 3 and/or 4 (Z's) occur, or there are 6 random numbers (whichever occurs sooner). Count the number of random numbers (bottles purchased) in each trial. Tick the trials which resulted in an eligible entry for Dan.
- Carry out at least thirty trials as described, recording results in a table or graph, for example the first few lines of the table shown below:

Trial	Ran# 1 letter	Ran# 2 letter	Ran# 3 letter	Ran# 4 letter	Ran# 5 letter	Ran# 6 letter	Number bought	Eligible
1	2 I	3 Z	1 F	2 I	4 Z		5	✓
2	2 I	4 Z	3 Z	2 I	1 F		5	✓
3	3 Z	4 Z	3 Z	2 I	3 Z	1 F	6	✓
4	2 I	3 Z	1 F	1 F	1 F	2 I	6	–

- Calculate the mean (or median) number of random numbers generated (bottles purchased); or calculate the proportion of trials that resulted in an eligible competition entry (divide the number of ticks by the number of trials).

For higher grades the following may be included:

- Explaining why the random numbers were allocated as they were (using the ratio, 1 in 4 letters is an F, 1 in 4 letters is an I, 2 in 4 letters are Z; large numbers produced of each letter so likelihood of each letter stays same throughout simulation).
- Observing relevant aspects of the distribution of a visual display of results (such as a dot plot) relating it to the population distribution.
- Acknowledging the variability of simulations so that averages/proportions produced are only estimates and would vary each time a simulation was run.
- Discussion of assumptions made (letters well mixed without 'runs' of one letter; constant availability of drinks for purchase; Dan's strategy of stopping after six purchases remains in place, etc.)
- Considering strengths/weaknesses of the simulation (how realistic are the assumptions under which the simulation was run; how well does the simulation model the situation?). The random number function produces a statistically random selection of numbers (letters) in the long run, but if the number of trials is small some unlikely sequences of numbers may occur;
- Further investigations suggested (such as two or more friends working together so that letters could be swapped; or varying the total number of bottles Dan is prepared to buy (or removing this restriction altogether) etc.).