Checking a Decay Signal After Dilution

Scoring guide · one credit per question · review written work against each rubric

Checking a Decay Signal After Dilution

Question 1

Choice (1)

The liquid now fills 400 mL. An even 20 mL portion contains 20/400 = 1/20 of the parent particles.

Question 2

The whole container still gives an expected 120 events per interval. A 20 mL portion represents 1/20 of the particles, giving 120/20 = 6 expected events per interval.

Question 3

Dilution changes the fraction of the total population in a 20 mL sample from 1/10 to 1/20. It leaves the whole population unchanged, so the expected whole-container count remains 120. A half-life would halve the number of parents and reduce the expected whole-container count to 60 at the same efficiency.

Question 4

The portion still contains 1/20 of the whole, so it gives 60/20 = 3 expected events per interval. Now the whole-container activity has fallen with parent decay. The earlier step changed the sampled fraction while leaving the whole-container activity unchanged.