Half-Life from Data

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

A half-life is the time for half the radioactive nuclei in a large sample to decay. Use the fraction of the original sample remaining after each interval.

1 A sample initially has 600 radioactive nuclei. About how many remain after one half-life?

(1) 150

(2) 200

(3) 300

(4) 600

2 A radioactive sample begins with 80.0 mg of its parent isotope. How much parent isotope remains after two half-lives? Show your work. [1]

Answer and work

3 What fraction of the original radioactive nuclei remains after three half-lives?

(1) 1/2

(2) 1/3

(3) 1/6

(4) 1/8

4 Explain why knowing the half-life does not tell you when a particular radioactive nucleus will decay. [1]

Answer and work

Tracking a Model Isotope

Use the information below to answer the questions.

A simulation records the number of undecayed parent nuclei in a model sample. The table gives the expected counts for this isotope.

Time (h)	Undecayed nuclei
0	1,600
6	800
12	400
18	200

5 What is the half-life of the modeled isotope?

(1) 3 h

(2) 6 h

(3) 12 h

(4) 18 h

6 Predict the number of undecayed nuclei after 24 hours. Use the data to show your reasoning. [1]

Answer and work

7 How many of the original nuclei have decayed after 12 hours in this model?

(1) 200

(2) 400

(3) 800

(4) 1,200

8 A second sample of the same isotope starts with twice as many parent nuclei. Explain how its half-life and expected count after 6 hours compare with the first sample. [1]

Answer and work