

Objective: Use exponential functions to model growth and decay in applied problems.

Radioactive radium has a half-life of approximately 1620 years. If the initial quantity is 5 grams, how much remains after 600 years?

ANSWER:

Remember: $y = Ce^{kt}$

$$C = 5, t = 1620, y = \frac{5}{2} = 2.5$$

$$\text{so, } \frac{5}{2} = 5e^{1620k}$$

$$\frac{1}{2} = e^{1620k}$$

$$\ln \frac{1}{2} = \ln e^{1620k}$$

$$\ln \frac{1}{2} = 1620k$$

$$\frac{1}{1620} \ln \frac{1}{2} = k$$

$$k \approx -0.000427869$$

$$y \approx 5e^{-0.000427869t}$$

$$y \approx 5e^{-0.000427869(600)}$$

$$y \approx 3.867918521$$