DIRECTIONS: Half-life and Compound Interest are special types of exponential functions for decay and growth, respectively.

**Compound interest** is interest earned or paid on both the principal and previously earned interest. Its function has the form

\[ A = P \left(1 + \frac{r}{n}\right)^{nt} \]

- \( A \) represents the balance after \( t \) years
- \( P \) represents the principal, or original amount
- \( r \) represents the annual rate of interest expressed as a decimal
- \( n \) represents the number of times interest is compounded per year
- \( t \) represents time in years

The **half-life** of a substance is the time it takes for one-half of the substance to decay into another substance. Its function has the form

\[ A = P \left(0.5\right)^t \]

- \( A \) represents the final amount
- \( P \) represents the original amount
- \( t \) represents the number of half-lives in a given time period

1.) How much money will you earn if you invest $27,000 at a rate of 3.75% compounded quarterly over 3 years. How does this amount change if you compound it monthly?

- \( P = \) _______
- \( r = \) _______
- \( n = \) _____, _____
- Answer = _______, _______

2.) The half-life of strontium-90 is approximately 29 years (actual data). How much of a 500 g sample of strontium-90 will remain after 87 years?

- \( a = \) _______
- \( r = \) _______
- \( t = \) _______
- Answer = __________

3.) The half-life of cobalt-60 (used in radiation therapy) is 5.26 years (actual data). How much of a 200 g sample of cobalt-60 will remain after 50 years?

- \( a = \) _______
- \( r = \) _______
- \( t = \) _______
- Answer = __________
Answers (show your work)

1.) $30,199.12 ; $30,209.65

2.) 62.5 g of strontium-90

3.) .275 g of cobalt-60