Compound growth, depreciation and half-life

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Find 5000 dollars compounded annually at 4% for 3 years. [2 marks]

$5000(1.04)^3 = 5624.32$.

Answer: 5624.32 dollars.

2. A 20,000 dollar asset loses 15% yearly. Find its value after 3 years. [2 marks]

$20000(0.85)^3 = 12282.50$.

Answer: 12,282.50 dollars.

3. Write a model for a 96 g sample with a 5-day half-life. [2 marks]

The exponent is the number of five-day half-life periods.

Answer: $M(t) = 96(\frac{1}{2})^{\frac{t}{5}}$, t in days.

4. For the previous sample, find the mass after 15 days. [2 marks]

$96(\frac{1}{2})^3 = 12$.

Answer: 12 g.

5. An account earns 1% each month. Find its effective annual percentage rate. [3 marks]

One year multiplies by 1.01^{12}.

The effective rate is $100(1.01^{12} - 1) \approx 12.68\%$.

Answer: Approximately 12.68%.

6. A saver adds 100 dollars at the end of every month. Explain why $Pb^{\text{number of months}}$ does not describe the whole account balance. [3 marks]

Each deposit earns interest for a different number of periods. The balance requires extra terms or a recurrence, not one initial lump-sum exponential.

Answer: It omits the later deposits.