Growth/decay models

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Write a model for 600 increasing by 8% per year. [2 marks]

Convert 8% to 0.08; use factor 1.08.

Answer: $P = 600(1.08)^n$.

2. A machine worth 20000 dollars depreciates 10% annually. Find its value after 3 years. [2 marks]

$20000(0.9)^3 = 14580.$

Answer: 14580 dollars.

3. A quantity reaches 864 after two steps of 20% growth. Find its start. [2 marks]

$A = \frac{864}{(1.2)^2} = \frac{864}{1.44} = 600.$

Answer: 600.

4. A quantity starts at 40 and doubles every 3 h. Find it after 9 h. [2 marks]

9 h contains three doubling intervals.

$40(2)^3 = 320.$

Answer: 320.

5. A quantity changes from 500 to 320 over two equal steps. Find its positive step factor and percentage decrease. [3 marks]

$b^2 = \frac{320}{500} = 0.64.$

Thus $b = 0.8$.

Answer: Factor 0.8; decrease 20%.

6. Use a scientific calculator to find when $100(1.1)^t$ reaches 150. Give continuous time and first whole interval. [3 marks]

$t = \frac{\log(1.5)}{\log(1.1)} \approx 4.2542.$

The first integer at or above this time is 5.

Answer: About 4.25 intervals; first whole interval 5.