# 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]

$A = 864/(1.2)^2 = 864/1.44 = 600$.

**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]

$b^2 = 320/500 = 0.64$.

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]

$t = \log(1.5)/\log(1.1) \approx 4.2542$.

The first integer at or above this time is 5.

**Answer:** About 4.25 intervals; first whole interval 5.