

## Sample Problem—Calculating Geometric Growth

### Example

Each May, harp seals give birth on pack ice off the coast of Newfoundland. In a hypothetical scenario, an initial population of 2000 seals gives birth to 950 pups, and during the next 12 months, 150 seals die.

- Assuming that the population is growing geometrically, what will the harp seal population be in two years?
- Assuming the same geometric growth rate, calculate the population size after eight years.

### Solution

- In year 1, the population change = 950 seals (births) – 150 seals (deaths)  
= 800 seals

Initial population  $N(0) = 2000$  seals,

Population at end of year 1,  $N(1) = 2000 + 950 + 150$

$$\text{Geometric growth rate } (\lambda) = \frac{N(t+1)}{N(t)} = \frac{2800}{2000} = 1.4$$

Since the growth rate remains constant in geometric growth, the population size at the end of year 2 is as follows:

$$\begin{aligned} N(t+1) &= N(t)\lambda \\ N(2) &= 2800 \times 1.4 \\ &= 3920 \end{aligned}$$

Therefore, after 2 years of geometric growth, the seal population would reach 3920. **Figure 4** graphically illustrates this population growth.

- $N(0) = 2000$ ,  $\lambda = 1.4$ ,  $t = 8$  years

$$\begin{aligned} N(8) &= N(0)\lambda^8 \\ &= 2000 \times (1.4)^8 \\ &= 2000 \times 14.76 \\ &= 29\,520 \end{aligned}$$

With the same growth rate the seal population will have reached 29 520 at the end of 8 years.

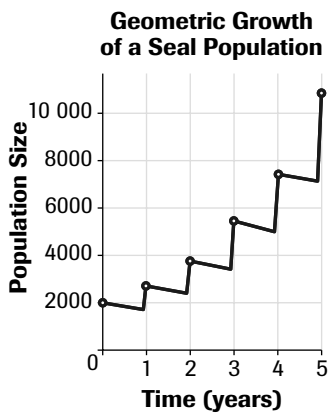


Figure 4