

## Replacement Problems

At present there are 10 grizzly bears in a particular National Park. The grizzly bear population grows at a rate proportional to the current bear population and proportional to 100 minus the current bear population. Suppose that the constant of proportionality is 0.001.

121–9 Find an equation that expresses the grizzly bear population as a function of time.

121–10a What will the grizzly bear population be 25 years from now?

b After how many years will the grizzly bear population be 50?

c How many years will it take the grizzly bear population to stabilize?

A particle moves along the x-axis. The velocity of the particle  $\left(\frac{dx}{dt}\right)$  is given by the differential equation  $\frac{dx}{dt} = 0.007x(70 - x)$ .

122–7 What is the position furthest to the right of the origin that the particle ever reaches?

122–8 Find an equation for  $x(t)$ , the position of the particle on the x-axis, at any time  $t$  ( $t \geq 0$ ), if at  $t = 0$  the particle is at  $x = 5$ .

123–5 Find the position of the particle when  $t = 10$ .

124–9 Find an expression for the acceleration of the particle.

125–8 At what value of  $t$  is the particle moving the fastest?