# 4.7. More Applications of Exponential Functions.

$f(x) = a\,b^x$ $\quad b = 1 + r$ growth

$b = 1 - r$ decay

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Steve invests $\$3500$ (a) into the bank at a rate of 4% per year. If he invests for 20 years, how much money will he have? ($r = 0.04$)

$$f(x) = 3500(1.04)^x$$

$$f(20) = 3500(1.04)^{20}$$

$$f(20) = \$7668.93$$

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400 g (a) of a radioactive rock has a half-life (decay, $r = \frac{1}{2}$) of 10 years. How much of the rock will be left after:

$$f(x) = 400\left(\frac{1}{2}\right)^{x/10}$$

a) 10 years

$$f(10) = 400\left(\frac{1}{2}\right)^{10/10=1}$$

$$f(10) = 400\left(\frac{1}{2}\right) = 200$$

b) 30 years

$$f(30) = 400\left(\frac{1}{2}\right)^{\frac{30}{10}}$$

$$f(30) = 400\left(\frac{1}{2}\right)^3 = 50$$

c) 6 years $6/10 = 0.6$

$f(6) = 400\left(\frac{1}{2}\right)$

$f(6) = 263.9$

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Some bacteria doubles every 4 hours. If you started with 8 bacteria, how much will you have in: ($b = 2$, $a = 8$)

$$f(x) = 8(2)^{x/4}$$

a) 4 hours

$f(4) = 8(2)^{4/4}$

$f(4) = 16$

b) 20 hours $20/4 = 5$

$f(20) = 8(2)^{5}$

$f(20) = 256$

c) 3 days = 72 hours

$f(72) = 8(2)^{72/4}$

$f(72) = 8(2)^{18}$

$f(72) = 2,097,152$

A population of 600 sloths grows at a rate of 6% every 7 years.

$$f(x) = 600(1.06)^{x/7}$$

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The population of a town is decreasing at a rate of 12% every 15 years. There are 500,000 people living there now.

$r = 0.12$

$$f(x) = 500000(0.88)^{x/15}$$

Homework: pg 261 # 1–8, 11, 12, 15, 16