



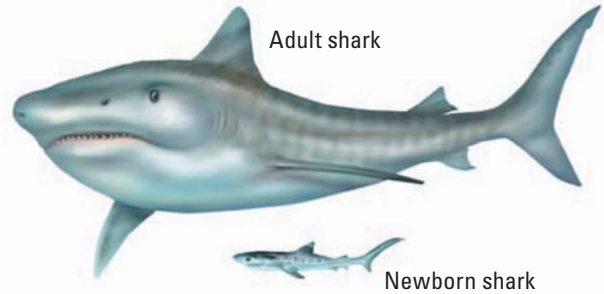
EXAMPLE 4 TAKS REASONING Multi-Step Problem

BIOLOGY The length l (in centimeters) of a tiger shark can be modeled by the function

$$l = 337 - 276e^{-0.178t}$$

where t is the shark's age (in years).

- Graph the model.
- Use the graph to estimate the length of a tiger shark that is 3 years old.



Adult shark

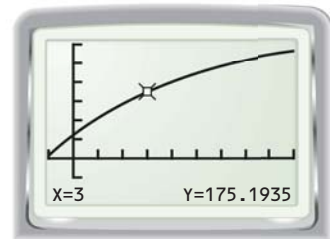
Newborn shark

Solution

STEP 1 Graph the model, as shown.

STEP 2 Use the *trace* feature to determine that $l \approx 175$ when $t = 3$.

- ▶ The length of a 3-year-old tiger shark is about 175 centimeters.



INTERPRET VARIABLES

On a graphing calculator, enter the function

$$l = 337 - 276e^{-0.178t}$$

using the variables x and y , as shown below:

$$y = 337 - 276e^{-0.178x}$$



GUIDED PRACTICE for Examples 3 and 4

Graph the function. State the domain and range.

6. $y = 2e^{0.5x}$

7. $f(x) = \frac{1}{2}e^{-x} + 1$

8. $y = 1.5e^{0.25(x-1)} - 2$

9. **WHAT IF?** In Example 4, use the given function to estimate the length of a tiger shark that is 5 years old.

CONTINUOUSLY COMPOUNDED INTEREST In Lesson 7.1, you learned that the balance of an account earning compound interest is given by this formula:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

As the frequency n of compounding approaches positive infinity, the compound interest formula approximates the following formula.

KEY CONCEPT

For Your Notebook

Continuously Compounded Interest

When interest is compounded *continuously*, the amount A in an account after t years is given by the formula

$$A = Pe^{rt}$$

where P is the principal and r is the annual interest rate expressed as a decimal.