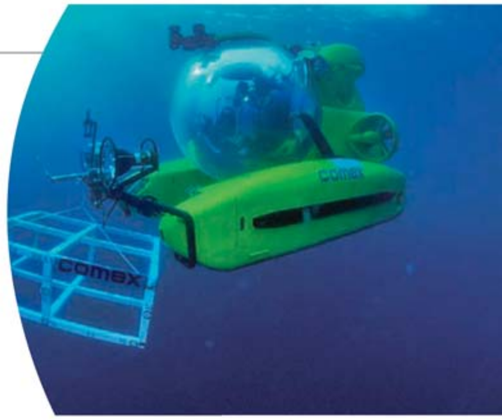
EXAMPLE 5 Use a linear model



SUBMERSIBLES A submersible designed to explore the ocean floor is at an elevation of −13,000 feet (13,000 feet below sea level). The submersible ascends to the surface at an average rate of 650 feet per minute. The elevation e (in feet) of the submersible is given by the function

$$e = 650t - 13{,}000$$

where t is the time (in minutes) since the submersible began to ascend.

- Find the intercepts of the graph of the function and state what the intercepts represent.
- Graph the function and identify its domain and range.

Solution

STEP 1 **Find** the intercepts.

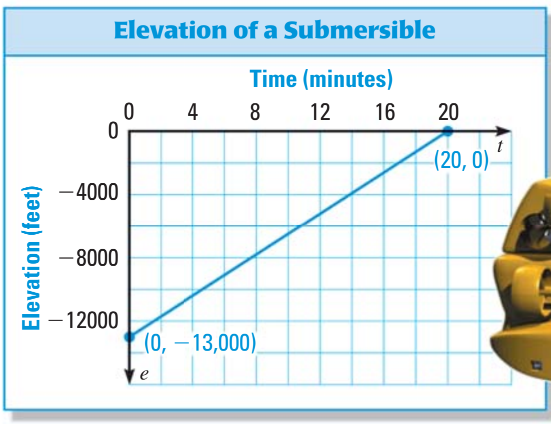
$0 = 650t - 13{,}000$	$e = 650(0) - 13{,}000$
$13{,}000 = 650t$	$e = -13{,}000 \leftarrow$ **e-intercept**
$20 = t \leftarrow$ **t-intercept**	

NAME INTERCEPTS

Because t is the independent variable, the horizontal axis is the t-axis, and you refer to the "t-intercept" of the graph of the function. Similarly, the vertical axis is the e-axis, and you refer to the "e-intercept."

The t-intercept represents the number of minutes the submersible takes to reach an elevation of 0 feet (sea level). The e-intercept represents the elevation of the submersible after 0 minutes (the time the ascent begins).

STEP 2 **Graph** the function using the intercepts.



The submersible starts at an elevation of −13,000 feet and ascends to an elevation of 0 feet. So, the range of the function is $-13{,}000 \le e \le 0$. From the graph, you can see that the domain of the function is $0 \le t \le 20$.

✓ GUIDED PRACTICE for Example 5

7. **WHAT IF?** In Example 5, suppose the elevation of a second submersible is given by $e = 500t - 10{,}000$. Graph the function and identify its domain and range.