MODELING REAL-WORLD SITUATIONS When a quantity y changes at a constant rate with respect to a quantity x, you can use the equation $y = mx + b$ to model the relationship. The value of m is the constant rate of change, and the value of b is an initial, or starting, value for y.

EXAMPLE 5 🤠 **TAKS REASONING: Multi-Step Problem**

RECORDING STUDIO A recording studio charges musicians an initial fee of $50 to record an album. Studio time costs an additional $35 per hour.

a. Write an equation that gives the total cost of an album as a function of studio time (in hours).

b. Find the total cost of recording an album that takes 10 hours of studio time.

Solution

a. The cost changes at a constant rate, so you can write an equation in slope-intercept form to model the total cost.

STEP 1 **Identify** the rate of change and the starting value.

> **Rate of change**, m: cost per hour
> **Starting value**, b: initial fee

STEP 2 **Write** a verbal model. Then write the equation.

Total cost (dollars)	=	Cost per hour (dollars per hour)	·	Studio time (hours)	+	Initial fee (dollars)
C	=	35	·	t	+	50

CHECK Use unit analysis to check the equation.

$$\text{dollars} = \frac{\text{dollars}}{\text{hour}} \cdot \text{hours} + \text{dollars} \checkmark$$

▸ The total cost C is given by the function $C = 35t + 50$ where t is the studio time (in hours).

b. Evaluate the function for $t = 10$.

$C = 35(10) + 50 = 400$ **Substitute 10 for t and simplify.**

▸ The total cost for 10 hours of studio time is $400.

✓ **GUIDED PRACTICE**   **for Example 5**

6. WHAT IF? In Example 5, suppose the recording studio raises its initial fee to $75 and charges $40 per hour for studio time.

a. Write an equation that gives the total cost of an album as a function of studio time (in hours).

b. Find the total cost of recording an album that takes 10 hours of studio time.