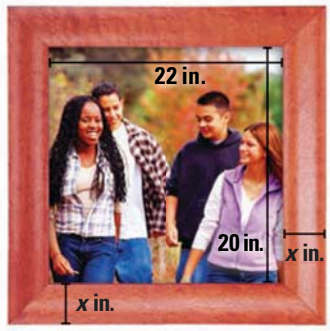
PROBLEM SOLVING

EXAMPLE 7 on p. 564 for Exs. 49–50

49. PICTURE FRAME You are designing a frame to surround a rectangular picture. The width of the frame around the picture is the same on every side, as shown.



a. Write a polynomial that represents the total area of the picture and the frame.

b. Find the combined area of the picture and the frame when the width of the frame is 4 inches.

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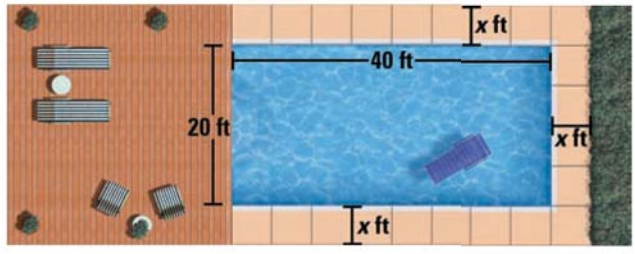
50. SWIMMING POOL A rectangular swiming pool is bordered on one side by a deck. A contractor is hired to build a walkway along the remaining three sides of the pool. The width of the walkway is the same on every side, as shown.



a. Write a polynomial that represents the total area of the pool and the walkway.

b. Find the combined area of the pool and the walkway when the width of the walkway is 5 feet.

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51. SOUND RECORDINGS During the period 1997–2002, the amount of money R (in millions of dollars) spent on sound recordings in the U.S. and the percent P (in decimal form) of this amount spent by people who are between 15 and 19 years old can be modeled by

$$R = -336t^2 + 1730t + 12{,}300 \text{ and } P = 0.00351t^2 - 0.0249t + 0.171$$

where t is the number of years since 1997.

a. Find the values of R and P for $t = 0$. What does the product $R \cdot P$ mean for $t = 0$ in this situation?

b. Write an equation that models the amount spent on sound recordings by people who are between 15 and 19 years old as a function of the number of years since 1997.

c. How much money did people between 15 and 19 years old spend on sound recordings in 2002?

52. TAKS REASONING During the period 1980–2002, the number H (in thousands) of housing units in the U.S. and the percent P (in decimal form) of housing units that were vacant can be modeled by

$$H = 1570t + 89{,}000 \quad \text{and} \quad P = 0.0013t + 0.094$$

where t is the number of years since 1980.

a. Write an equation that models the number (in thousands) of vacant housing units as a function of the number of years since 1980. *Explain* how you found this equation.

b. How many housing units were vacant in 2002?