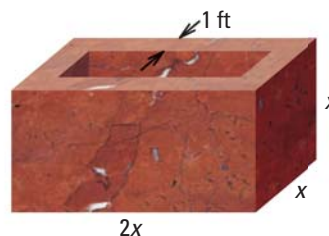**EXAMPLE 6** **Solve a polynomial equation**

CITY PARK You are designing a marble basin that will hold a fountain for a city park. The basin's sides and bottom should be 1 foot thick. Its outer length should be twice its outer width and outer height.

What should the outer dimensions of the basin be if it is to hold 36 cubic feet of water?

ANOTHER WAY

For alternative methods to solving the problem in Example 6, turn to page 360 for the **Problem Solving Workshop**.

Solution

Volume (cubic feet)	=	Interior length (feet)	·	Interior width (feet)	·	Interior height (feet)
36	=	$(2x - 2)$	·	$(x - 2)$	·	$(x - 1)$

$36 = (2x - 2)(x - 2)(x - 1)$ **Write equation.**

$0 = 2x^3 - 8x^2 + 10x - 40$ **Write in standard form.**

$0 = 2x^2(x - 4) + 10(x - 4)$ **Factor by grouping.**

$0 = (2x^2 + 10)(x - 4)$ **Distributive property**

▶ The only real solution is $x = 4$. The basin is 8 ft long, 4 ft wide, and 4 ft high.

✓ **GUIDED PRACTICE**   **for Example 6**

11. WHAT IF? In Example 6, what should the basin's dimensions be if it is to hold 128 cubic feet of water and have outer length $6x$, width $3x$, and height x?

5.4 EXERCISES

HOMEWORK KEY

◯ = **WORKED-OUT SOLUTIONS** on p. WS1 for Exs. 7, 23, and 61

◆ = **TAKS PRACTICE AND REASONING** Exs. 9, 41, 63, 64, 66, and 67

SKILL PRACTICE

1. **VOCABULARY** The expression $8x^6 + 10x^3 - 3$ is in __?__ form because it can be written as $2u^2 + 5u - 3$ where $u = 2x^3$.

2. **WRITING** What condition must the factorization of a polynomial satisfy in order for the polynomial to be factored completely?

EXAMPLE 1
on p. 353
for Exs. 3–9

MONOMIAL FACTORS **Factor the polynomial completely.**

3. $14x^2 - 21x$ 4. $30b^3 - 54b^2$ 5. $c^3 + 9c^2 + 18c$

6. $z^3 - 6z^2 - 72z$ 7. $3y^5 - 48y^3$ 8. $54m^5 + 18m^4 + 9m^3$

9. ◆ **TAKS REASONING** What is the complete factorization of $2x^7 - 32x^3$?

Ⓐ $2x^3(x + 2)(x - 2)(x^2 + 4)$ Ⓑ $2x^3(x^2 + 2)(x^2 - 2)$

Ⓒ $2x^3(x^2 + 4)^2$ Ⓓ $2x^3(x + 2)^2(x - 2)^2$