EXAMPLE 6 Solve a rational equation given a function

VIDEO GAME SALES From 1995 through 2003, the annual sales S (in billions of dollars) of entertainment software can be modeled by

$$S(t) = \frac{848t^2 + 3220}{115t^2 + 1000}, \quad 0 \le t \le 8$$

where t is the number of years since 1995. For which year were the total sales of entertainment software about $5.3 billion?

Solution

$S(t) = \dfrac{848t^2 + 3220}{115t^2 + 1000}$	**Write given function.**
$5.3 = \dfrac{848t^2 + 3220}{115t^2 + 1000}$	**Substitute 5.3 for $S(t)$.**
$5.3(115t^2 + 1000) = 848t^2 + 3220$	**Multiply each side by $115t^2 + 1000$.**
$609.5t^2 + 5300 = 848t^2 + 3220$	**Simplify.**
$5300 = 238.5t^2 + 3220$	**Subtract $609.5t^2$ from each side.**
$2080 = 238.5t^2$	**Subtract 3220 from each side.**
$8.72 \approx t^2$	**Divide each side by 238.5.**
$\pm 2.95 \approx t$	**Take square roots of each side.**

Because -2.95 is not in the domain ($0 \le t \le 8$), the only solution is 2.95.

▶ So, the total sales of entertainment software were about $5.3 billion about 3 years after 1995, or in 1998.

✓ **GUIDED PRACTICE** for Example 6

11. **WHAT IF?** Use the information in Example 6 to determine in which year the total sales of entertainment software were about $4.5 billion.

8.6 EXERCISES

HOMEWORK KEY

○ = **WORKED-OUT SOLUTIONS**
   on p. WS1 for Exs. 5, 15, and 35

🔻 = **TAKS PRACTICE AND REASONING**
   Exs. 13, 28, 29, 34, 36, 39, and 40

SKILL PRACTICE

1. **VOCABULARY** Copy and complete: When you write $\dfrac{x}{3} = \dfrac{x+2}{5}$ as $5x = 3(x+2)$, you are __?__ .

2. **WRITING** A student solved the equation $\dfrac{5}{x-4} = \dfrac{x}{x-4}$ and got the solutions 4 and 5. Which, if either, of these is extraneous? *Explain.*

3. **REASONING** *Describe* how you can use a graph to determine if an apparent solution of a rational equation is extraneous.