

EXAMPLE 4 Solve an equation with an extraneous solutionSolve $\sqrt{6-x} = x$.

$$\sqrt{6-x} = x$$

Write original equation.

$$(\sqrt{6-x})^2 = x^2$$

Square each side.

$$6-x = x^2$$

Simplify.

$$0 = x^2 + x - 6$$

Write in standard form.

$$0 = (x-2)(x+3)$$

Factor.

$$x-2 = 0 \text{ or } x+3 = 0$$

Zero-product property

$$x = 2 \text{ or } x = -3$$

Solve for x .**CHECK** Check 2 and -3 in the original equation.

If $x = 2$: $\sqrt{6-2} \stackrel{?}{=} 2$

If $x = -3$: $\sqrt{6-(-3)} \stackrel{?}{=} -3$

$$2 = 2 \checkmark$$

$$3 = -3 \times$$

► Because -3 does not check in the original equation, it is an extraneous solution. The only solution of the equation is 2. at classzone.com**REVIEW FACTORING**

For help with factoring, see pp. 583, 593, 600, and 606.

EXAMPLE 5 Solve a real-world problem**SAILING** The hull speed s (in nautical miles per hour) of a sailboat can be estimated using the formula $s = 1.34\sqrt{\ell}$ where ℓ is the length (in feet) of the sailboat's waterline, as shown. Find the length (to the nearest foot) of the sailboat's waterline if it has a hull speed of 8 nautical miles per hour.**Solution**

$$s = 1.34\sqrt{\ell} \quad \text{Write original equation.}$$

$$8 = 1.34\sqrt{\ell} \quad \text{Substitute 8 for } s.$$

$$\frac{8}{1.34} = \sqrt{\ell} \quad \text{Divide each side by 1.34.}$$

$$\left(\frac{8}{1.34}\right)^2 = (\sqrt{\ell})^2 \quad \text{Square each side.}$$

$$35.6 \approx \ell \quad \text{Simplify.}$$

► The sailboat has a waterline length of about 36 feet.

 at classzone.com**GUIDED PRACTICE** for Examples 4 and 5

5. Solve $\sqrt{3x+4} = x$.

6. **WHAT IF?** In Example 5, suppose the sailboat's hull speed is 6.5 nautical miles per hour. Find the sailboat's waterline length to the nearest foot.