LESSON 10–4 Radical Equations

$x + 4$
-4

$5 \cdot \frac{x}{5}$

Then

You added, subtracted, and multiplied radical expressions.

Now

- Solve radical equations.
- Solve radical equations with extraneous solutions.

KeyConcept Power Property of Equality

Words If you square both sides of a true equation, the resulting equation is still true.

Symbols If $a = b$, then $a^2 = b^2$.

Examples If $\sqrt{x} = 4$, then $(\sqrt{x})^2 = 4^2$.

You must get the radical by itself!

Check Your Understanding

= Step-by-Step Solutions begin on page R13.

Example 1 1. **GEOMETRY** The surface area of a basketball is x square inches. What is the radius of the basketball if the formula for the surface area of a sphere is $SA = 4\pi r^2$? $r = \frac{\sqrt{\pi x}}{2\pi}$

Examples 2–3 **Solve each equation. Check your solution.**

2. $\sqrt{10h} + 1 = 21$ **40**
3. $\sqrt{7r + 2} + 3 = 7$ **2**
4. $5 + \sqrt{g - 3} = 6$ **4**
5. $\sqrt{3x - 5} = x - 5$ **10**
6. $\sqrt{2n + 3} = n$ **3**
7. $\sqrt{a - 2} + 4 = a$ **6**

(3)

$\sqrt{7r+2} + 3 = 7$

$-3 \quad -3$

get it by itself!

$(\sqrt{7r+2})^2 = (4)^2$

$7r + 2 = 16$

$-2 \quad -2$

$\frac{7r}{7} = \frac{14}{7}$

$r = 2$

"I need to make this go away..."

Today's key idea!!!

If $a = b$ then $a^2 = b^2$

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$\sqrt{9-5} = 3-5$

(2) $\sqrt{10h} + 1 = 21$
$-1 \quad -1$

$(\sqrt{10h})^2 = (20)^2$

$\frac{10h}{10} = \frac{400}{10}$

$h = 40$

(5) $(\sqrt{3x-5})^2 = (x-5)^2$

$(x-5)(x-5)$

$3x - 5 = x^2 - 10x + 25$
$-3x + 5 \qquad -3x + 5$
$0 = x^2 - 13x + 30$

$0 = (x-3)(x-10)$

$x = 3, 10$

4. $5+\sqrt{g-3}=6$ **4**

$$\begin{array}{rcl} -5 & & -5 \\ \hline (\sqrt{g-3})^2 & = & (1)^2 \end{array}$$

$$\begin{array}{rcl} g-3 & = & 1 \\ +3 & & +3 \\ \hline g & = & 4 \end{array}$$

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Example 1 1. **GEOMETRY** The surface area of a basketball is x square inches. What is the radius of the basketball if the formula for the surface area of a sphere is $SA = 4\pi r^2$?

$r = \frac{\sqrt{\pi x}}{2\pi}$

$$SA = 4\pi r^2$$

$$\frac{x}{4\pi} = \frac{4\pi r^2}{4\pi}$$

$$\sqrt{\frac{x}{4\pi}} = \sqrt{r^2}$$

$$\frac{\sqrt{x}}{2\sqrt{\pi}} \cdot \frac{\sqrt{\pi}}{\sqrt{\pi}} = r$$

8 $S = \pi \sqrt{\frac{9.8l}{1.6}}$

a. $l = 1.1$

$S = \pi \sqrt{\frac{(9.8)(1.1)}{1.6}}$

b. as "l" increases

"S" increases

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Examples 2–3 **Solve each equation. Check your solution.**

9. $\sqrt{a} + 11 = 21$ **100**
10. $\sqrt{t} - 4 = 7$ **121**
11. $\sqrt{n - 3} = 6$ **39**
12. $\sqrt{c + 10} = 4$ **6**
13. $\sqrt{h - 5} = 2\sqrt{3}$ **17**
14. $\sqrt{k + 7} = 3\sqrt{2}$ **11**
15. $y = \sqrt{12 - y}$ **3**
16. $\sqrt{u + 6} = u$ **3**
17. $\sqrt{r + 3} = r - 3$ **6**
18. $\sqrt{1 - 2t} = 1 + t$ **0**
19. $5\sqrt{a - 3} + 4 = 14$ **7**
20. $2\sqrt{x - 11} - 8 = 4$ **47**