$\sqrt{}$ 1 4 9 16 25 36 49 64 81 100 121 144 169 196

Name __Key__   Date _____ Pd ___

9.3 WS from the WB

In Exercises 1–18, solve the equation using square roots.

1. $x^2 + 49 = 0$
$ -49 \quad -49$
$\sqrt{x^2} = \sqrt{-49}$
$\boxed{X = \text{no real solutions}}$

2. $x^2 - 25 = 0$
$ +25 \quad +25$
$\sqrt{x^2} = \sqrt{25}$
$\boxed{X = \pm 5}$

3. $x^2 + 6 = 6$
$ -6 \quad -6$
$\sqrt{x^2} = \sqrt{0}$
$\boxed{X = 0}$

4. $2x^2 + 84 = 0$
$ -84 \quad -84$
$\dfrac{2x^2}{2} = \dfrac{-84}{2}$
$\sqrt{x^2} = \sqrt{-42}$
$\boxed{X = \text{no real solutions}}$

5. $2x^2 - 72 = 0$
$ +72 \quad +72$
$\dfrac{2x^2}{2} = \dfrac{72}{2}$
$\sqrt{x^2} = \sqrt{36}$
$\boxed{X = \pm 6}$

6. $-x^2 - 12 = -12$
$ -1$
$x^2 + 12 = 12$
$ -12 \quad -12$
$\sqrt{x^2} = \sqrt{0}$
$\boxed{X = 0}$

7. $8x^2 - 49 = 151$
$ +49 \quad +49$
$\dfrac{8x^2}{8} = \dfrac{200}{8}$
$\sqrt{x^2} = \sqrt{25}$
$\boxed{X = \pm 5}$

8. $-3x^2 + 16 = -11$
$ -16 \quad -16$
$\dfrac{-3x^2}{-3} = \dfrac{-27}{-3}$
$\sqrt{x^2} = \sqrt{9}$
$\boxed{X = \pm 3}$

9. $81x^2 - 49 = -24$
$ +49 \quad +49$
$\dfrac{81x^2}{81} = \dfrac{25}{81}$
$\sqrt{x^2} = \sqrt{\dfrac{25}{81}}$
$\boxed{X = \pm \dfrac{5}{9}}$

10. $16x^2 - 1 = 0$
$ +1 \quad +1$
$\dfrac{16x^2}{16} = \dfrac{1}{16}$
$\sqrt{x^2} = \sqrt{\dfrac{1}{16}}$
$\boxed{X = \pm \dfrac{1}{4}}$

11. $25x^2 + 9 = 0$
$ -9 \quad -9$
$\dfrac{25x^2}{25} = \dfrac{-9}{25}$
$\sqrt{x^2} = \sqrt{-\dfrac{9}{25}}$
$\boxed{X = \text{no real solution}}$

12. $16 - 2x^2 = 16$
$ -16 \quad -16$
$\dfrac{-2x^2}{-2} = \dfrac{0}{-2}$
$\sqrt{x^2} = \sqrt{0}$
$\boxed{X = 0}$

13. $\sqrt{(x-4)^2} = \sqrt{0}$
$x - 4 = 0$
$ +4 \quad +4$
$\boxed{X = 4}$

14. $\sqrt{(x+2)^2} = \sqrt{196}$
$x + 2 = \pm 14$
$ -2 \quad -2$
$x = -2 \pm 14$
$= -2 + 14 = 12$
$= -2 - 14 = -16$
$\boxed{X = -16, 12}$

15. $\sqrt{(2x+7)^2} = \sqrt{49}$
$2x + 7 = \pm 7$
$ -7 \quad -7$ $\boxed{X = 0, -7}$
$\dfrac{2x}{2} = \dfrac{-7 \pm 7}{2}$
$X = \dfrac{-7+7}{2} = \dfrac{0}{2} = 0$
$= \dfrac{-7-7}{2} = \dfrac{-14}{2} = -7$

16. $16(x - 3)^2 = 25$

$\dfrac{16}{16} \qquad \dfrac{25}{16}$

$\sqrt{(x-3)^2} = \sqrt{\dfrac{25}{16}}$

$x - 3 = \pm\dfrac{5}{4}$
$+3 \qquad +3$

$x = \pm\dfrac{5}{4} + 3 = \dfrac{12}{4} \pm \dfrac{5}{4} \rightarrow \boxed{\begin{array}{c}\frac{17}{4}\\\frac{7}{4}\end{array}}$

17. $81(3x + 1)^2 = 49$

$\dfrac{81}{81} \qquad \dfrac{49}{81}$

$\sqrt{(3x+1)^2} = \sqrt{\dfrac{49}{81}}$

$3x + 1 = \pm\dfrac{7}{9}$

$\dfrac{3x}{3} = -1 \pm \dfrac{7}{9}$

$x = \dfrac{-1 + \frac{7}{9}}{3} = \boxed{\dfrac{-2}{27}}$

$= \dfrac{-1 - \frac{7}{9}}{3} = \boxed{\dfrac{-16}{27}}$

18. $\sqrt{(4x - 3)^2} = \sqrt{64}$

$4x + 3 = \pm 8$
$+3 \qquad +3$

$\dfrac{4x = 3 \pm 8}{4} \qquad \dfrac{}{4}$

$x = \dfrac{3+8}{4} = \dfrac{11}{4}$

$ = \dfrac{3-8}{4} = \dfrac{-5}{4}$

$\boxed{x = -\dfrac{5}{4}, \dfrac{11}{4}}$

In Exercises 19–24, solve the equation using square roots. Round your solutions to the nearest hundredth.

19. $x^2 + 6 = 8$
$-6 \quad -6$

$\sqrt{x^2} = \sqrt{2}$

$\boxed{\begin{array}{c}x = \pm\sqrt{2}\\ \approx \pm 1.41\end{array}}$

20. $x^2 - 12 = 3$
$+12 \quad +12$

$\sqrt{x^2} = \sqrt{15}$

$\boxed{\begin{array}{c}x = \pm\sqrt{15}\\ \approx \pm 3.87\end{array}}$

21. $x^2 + 25 = 49$
$-25 \quad -25$

$\sqrt{x^2} = \sqrt{24} \ \ \begin{array}{c}④\\6\end{array}$

$\boxed{\begin{array}{c}x = \pm 2\sqrt{6}\\ \approx \pm 4.90\end{array}}$

22. $3x^2 - 4 = 14$
$+4 \quad +4$

$\dfrac{3x^2}{3} = \dfrac{18}{3}$

$\sqrt{x^2} = \sqrt{6}$

$\boxed{x = \pm\sqrt{6} \approx \pm 2.45}$

23. $6x^2 + 5 = 20$
$-5 \quad -5$

$\dfrac{6x^2}{6} = \dfrac{15}{6}$

$\sqrt{x^2} = \sqrt{\dfrac{15}{6}}$

$\boxed{x = \pm\sqrt{\dfrac{15}{6}} \approx \pm 1.58}$

24. $20 - 4x^2 = 18$
$-20 \qquad -20$

$\dfrac{-4x^2}{-4} = \dfrac{-2}{-4}$

$\sqrt{x^2} = \sqrt{\dfrac{1}{2}}$

$\boxed{x = \pm\sqrt{\dfrac{1}{2}} \approx \pm 0.71}$

25. A ball is dropped from a window at a height of 81 feet. The function $h = -16x^2 + 81$ represents the height (in feet) of the ball after x seconds. How long does it take for the ball to hit the ground?
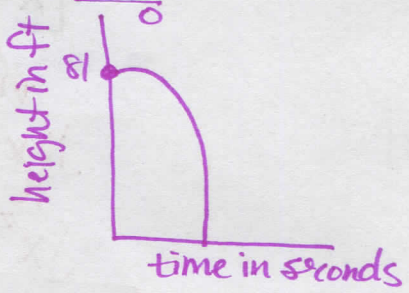
$0 = -16x^2 + 81$
$-81 \qquad\quad -81$

$\dfrac{-81}{-16} = \dfrac{-16x^2}{-16}$

$\sqrt{\dfrac{81}{16}} = \sqrt{x^2}$

$\pm\dfrac{9}{4} = x \qquad x = \dfrac{9}{4} \approx 2.25$

$\boxed{\text{It takes the ball 2.25 seconds to hit the ground.}}$

height in ft — time in seconds

26. The volume of a cone with height h and radius r is given by the formula $V = \dfrac{1}{3}\pi r^2 h$. Solve the formula for r. Then find the radius of a cone with volume 27π cubic inches and height 4 inches.

$\dfrac{V}{\pi h} = \dfrac{\frac{1}{3}\pi r^2 h}{\pi h} \rightarrow r^2 = \dfrac{3V}{\pi h}$

$r = \pm\sqrt{\dfrac{3(27\pi)}{\pi(4)}} = \pm\sqrt{\dfrac{81}{4}} = \pm\dfrac{9}{2}$

$3 \cdot \dfrac{V}{\pi h} = \dfrac{1}{3}r^2 \cdot 3$

$\boxed{r = \pm\sqrt{\dfrac{3V}{\pi h}}}$

$\boxed{\text{The radius of the cone is } \dfrac{9}{2} \text{ or } 4.5 \text{ in.}}$