

EXERCISES

Simplify the expression.

8. $\sqrt{98}$

$$\sqrt{49 \cdot 2}$$

$$\boxed{7\sqrt{2}}$$

9. $\sqrt{121x^3}$

$$\boxed{11x\sqrt{x}}$$

Radicals with a variable with an odd exponent will have a hanging variable under the radical.

10. $\sqrt{7} \cdot \sqrt{21}$

$$\sqrt{147} =$$

$$\sqrt{49 \cdot 3} =$$

$$\boxed{7\sqrt{3}}$$

11. $\sqrt{7x} \cdot 7\sqrt{x}$

$$7\sqrt{7x^2} =$$

$$\boxed{7x\sqrt{7}}$$

Radicals with a variable with an even exponent are perfect squares. Remove the variable by dividing the exponent by 2.

12. $\sqrt{\frac{5}{x^2}}$

$$\boxed{\frac{\sqrt{5}}{x}}$$

13. $\frac{2}{\sqrt{5}}$ $\sqrt{\frac{5}{5}} =$

$$\boxed{\frac{2\sqrt{5}}{5}}$$

No radicals in the denominators. You must rationalize the denominator

14. $3\sqrt{2} - \sqrt{128}$

$$\begin{array}{l} \downarrow \quad \downarrow \\ \sqrt{64} \sqrt{2} \\ \downarrow \\ 3\sqrt{2} - 8\sqrt{2} \\ \boxed{1-5\sqrt{2}} \end{array}$$

Simplify both radicals
Then combine like radicals
the same way you combine
like variables ($3x - 8x = -5x$)

15. $\sqrt{2(7 - \sqrt{6})} =$

$$7\sqrt{2} - \sqrt{12}$$

$$= \boxed{7\sqrt{2} - 2\sqrt{3}}$$

16. **GEOMETRY** The lateral surface area L of a square pyramid with height h and base length ℓ is given by $L = 2\ell\sqrt{0.25\ell^2 + h^2}$. Find L (in square feet) for a square pyramid that has a height of 4 feet and a base length of 4 feet.

$$L = 2(4)\sqrt{0.25(4)^2 + 4^2} = 8\sqrt{20} = 8\sqrt{4 \cdot 5} = 16\sqrt{5} \text{ ft}^2$$

EXERCISES

Solve the equation. Check for extraneous solutions.

17. $\sqrt{x} - 28 = 0$

$$(\sqrt{x})^2 = (28)^2$$

$$\boxed{x = 784} \checkmark$$

Remember to always check your answer(s) in the original equation. If it does NOT check then make sure to state it is an "Extraneous Solution."

18. $8\sqrt{x-5} + 34 = 58$

$$\frac{8\sqrt{x-5}}{8} = \frac{24}{8}$$

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

$$x-5=9$$

$$\boxed{x=14} \checkmark$$

19. $(\sqrt{5x-3})^2 = (\sqrt{x+17})^2$

$$5x-3 = x+17$$

$$4x = 20$$

$$\boxed{x=5} \checkmark$$

20. $\sqrt{5x+6} = 5$

$$\frac{-6 \quad -6}{\sqrt{5x} = (-1)^2}$$

$$\frac{5x}{5} = \frac{1}{5}$$

$$\boxed{x = 1/5 \text{ OR } .2}$$

C: $\sqrt{5(1/5)} + 6 = 5$

$$1+6=5$$

$$7 \neq 5$$

$$x = \text{NO SOL}$$

$$1/5 \text{ EXTRA SOL}$$

21. $\sqrt{x} + 36 = 0$

$-36 \quad -36$

$(\sqrt{x})^2 = (-36)^2$

$x = 1296$

C: $\sqrt{1296} + 36 = 0$
 $72 \neq 0$

X = NO SOL.
1296 is an EXTRA SOLUTION

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

$x^2 = 2 - x$

$x^2 + x - 2 = 0$

$(x+2)(x-1) = 0$

$x = -2, 1$

C: $x = 1$
 $1 = \sqrt{2-1}$
 $1 = 1 \checkmark$

C: $x = -2$
 $-2 = \sqrt{2-(-2)}$
 $-2 = \sqrt{4}$
 $-2 \neq 2$

Answer: $x=1$ and -2 is an extraneous solution

24

$a = 10 \quad c = 21$

$10^2 + b^2 = 21^2$

$b^2 = 441 - 100$

$b = \sqrt{341}$ (the exact solution)
 $b \approx 18.47$ (approximate solution)

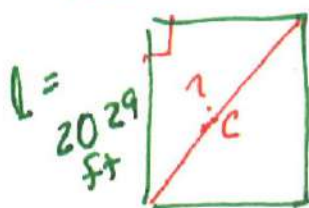
28 $b = 6 \quad c = 6.5$

$a^2 + 6^2 = 6.5^2$

$\sqrt{a^2} = \sqrt{6.25}$

$a = 2.5$

29 K.I:



$w = 167 \text{ ft}$

$2029^2 + 167^2 = c^2$

$c^2 = 4144730$

$c \approx 2035.9$

The diagonal of the pool is approx. 2,036 ft.

5. $\sqrt{72m^6}$

$$m^3 \sqrt{36} \sqrt{2}$$

$$\boxed{6m^3 \sqrt{2}}$$

6. $\sqrt{8z^3} \cdot \sqrt{6z^3} =$

$$\sqrt{48z^6} =$$

$$z^3 \sqrt{16} \sqrt{3} =$$

$$\boxed{4z^3 \sqrt{3}}$$

7. $\sqrt{\frac{20}{3n^3}}$

$$\frac{\sqrt{20}}{\sqrt{3n^3}} \cdot \frac{\sqrt{3n^3}}{\sqrt{3n^3}} = \frac{\sqrt{60n^3}}{3n^3}$$

$$\rightarrow \frac{n \sqrt{4} \sqrt{15n}}{3n^3} = \frac{2n \sqrt{15n}}{3n^3} = \boxed{\frac{2\sqrt{15n}}{3n^2}}$$

8. $7\sqrt{6} - 2\sqrt{12} + \sqrt{24}$

$$\begin{array}{ccc} & \downarrow & \downarrow \\ & -2\sqrt{4} \sqrt{3} & \sqrt{4} \sqrt{6} \\ \downarrow & \downarrow & \downarrow \end{array}$$

$$7\sqrt{6} - 4\sqrt{3} + 2\sqrt{6}$$

$$\boxed{-4\sqrt{3} + 9\sqrt{6}}$$

9. $\sqrt{3(7 - \sqrt{15})}$

$$7\sqrt{3} - \sqrt{45}$$

$$\begin{array}{c} \downarrow \quad \downarrow \\ \downarrow \quad \downarrow \end{array}$$

$$\boxed{7\sqrt{3} - 3\sqrt{5}}$$

10. $(8 - \sqrt{7})(1 + \sqrt{7})$

$$8 + 8\sqrt{7} - \sqrt{7} - 7 =$$

$$\boxed{1 + 7\sqrt{7}}$$

$$\textcircled{13} \quad -4\sqrt{3x} - 6 = 30$$

$$\quad \quad \quad +6 \quad +6$$

$$\frac{-4\sqrt{3x} = 36}{-4 \quad -4}$$

$$(\sqrt{3x})^2 = (-9)^2$$

$$3x = 81$$

$$x = 27$$

$$C: -4\sqrt{3 \cdot 27} - 6 = 30$$

$$-4(9) - 6 = 30$$

$$-42 \neq 30$$

$X = \text{No Solution}$

27 is an extraneous solution

$$\textcircled{15} \quad (\sqrt{x+7})^2 = (\sqrt{2x-3})^2$$

$$\frac{x+7 = 2x-3}{-x+3 \quad -1 \quad +3}$$

$$10 = x$$

$$C: \sqrt{10+7} = \sqrt{2(10)-3}$$

$$\sqrt{17} = \sqrt{17} \checkmark$$

$$\textcircled{16} \quad (x)^2 = (\sqrt{12-x})^2$$

$$x^2 = 12-x$$

$$x^2 + x - 12 = 0$$

$$(x+4)(x-3) = 0$$

$$x+4=0$$

$$x = -4$$

$$x-3=0$$

$$x = 3$$

$$C: -4 = \sqrt{12-(-4)}$$

$$-4 \neq 4$$

-4 is an extraneous sol

$$C: 3 = \sqrt{12-3}$$

$$3 = 3 \checkmark$$

$$x = 3$$