NAME _____ DATE _____

Practice with Examples

For use with pages 264–270

GOAL **Solve quadratic equations by finding square roots and use quadratic equations to solve real-life problems**

VOCABULARY

If $b^2 = a$, then b is a **square root** of a. A positive number a has two square roots, $\sqrt{a}$ and $-\sqrt{a}$. The symbol $\sqrt{\ }$ is a **radical sign,** a is the **radicand,** and $\sqrt{a}$ is a **radical.**

Rationalizing the denominator is the process of eliminating square roots in the denominator of a fraction.

EXAMPLE 1 Using Properties of Square Roots

Simplify the expression.

a. $\sqrt{99} = \sqrt{9} \cdot \sqrt{11} = 3\sqrt{11}$

b. $\sqrt{6} \cdot \sqrt{8} = \sqrt{48} = \sqrt{16} \cdot \sqrt{3} = 4\sqrt{3}$

c. $\sqrt{\frac{3}{25}} = \frac{\sqrt{3}}{\sqrt{25}} = \frac{\sqrt{3}}{5}$

d. $\sqrt{\frac{36}{5}} = \frac{\sqrt{36}}{\sqrt{5}} = \frac{6}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{6\sqrt{5}}{5}$

Exercises for Example 1

Simplify the expression.

1. $\sqrt{60}$

2. $\sqrt{2} \cdot \sqrt{18}$

3. $\sqrt{\frac{81}{121}}$

EXAMPLE 2 Solving a Quadratic Equation

Solve $\frac{x^2}{6} - 4 = 10$.

SOLUTION

$\frac{x^2}{6} - 4 = 10$	Write original equation.
$\frac{x^2}{6} = 14$	Add 4 to each side.
$x^2 = 84$	Multiply both sides by 6.
$x = \pm\sqrt{84}$	Take square roots of both sides.
$x = \pm 2\sqrt{21}$	Simplify.

The solutions are $2\sqrt{21}$ and $-2\sqrt{21}$.

NAME _____ DATE _____

Practice with Examples

For use with pages 264–270

Exercises for Example 2

Solve the equation.

4. $4x^2 - 5 = -1$ **5.** $12 - 2y^2 = 4$ **6.** $\frac{p^2}{4} - 3 = 33$

EXAMPLE 3 Solving a Quadratic Equation

Solve $5(x - 7)^2 = 135$.

$5(x - 7)^2 = 135$	Write original equation.
$(x - 7)^2 = 27$	Divide both sides by 5.
$x - 7 = \pm\sqrt{27}$	Take the square roots of both sides.
$x - 7 = \pm 3\sqrt{3}$	Simplify.
$x = 7 \pm 3\sqrt{3}$	Add 7 to both sides.

The solutions are $7 + 3\sqrt{3}$ and $7 - 3\sqrt{3}$.

Exercises for Example 3

Solve the equation.

7. $(y + 3)^2 = 9$ **8.** $(w - 1)^2 = 196$ **9.** $-2(x - 3)^2 = -12$

10. $(r - 8)^2 = 50$ **11.** $5(x - 3)^2 = 50$ **12.** $\frac{1}{3}(z + 3)^2 = 5$

NAME _____ DATE _____

Practice with Examples

For use with pages 264–270

EXAMPLE 4 Modeling a Falling Object's Height with a Quadratic Function

A person is trapped in a building 120 feet above the ground and wants to land on a rescue team's air cushon. How long before the person reaches safety?

SOLUTION

Use the falling object model $h = -16t^2 + h_0$, where h is the height (in feet) of the object after t seconds and h_0 is the object's initial height.

$0 = -16t^2 + 120$	Substitute 120 for h_0 and 0 for h.
$-120 = -16t^2$	Subtract 120 from each side.
$\frac{120}{16} = t^2$	Divide each side by -16.
$\sqrt{\frac{120}{16}} = t$	Take positive square root.
$2.7 \approx t$	Use a calculator.

The person will reach safety in about 2.7 seconds.

Exercises for Example 4

13. A coyote is standing on a cliff 254 feet above a roadrunner. If the coyote drops a boulder from the cliff, how much time does the roadrunner have to move out of its way?

14. An apple falls from a branch on a tree 30 feet above a man sleeping underneath. When will the apple strike the man?