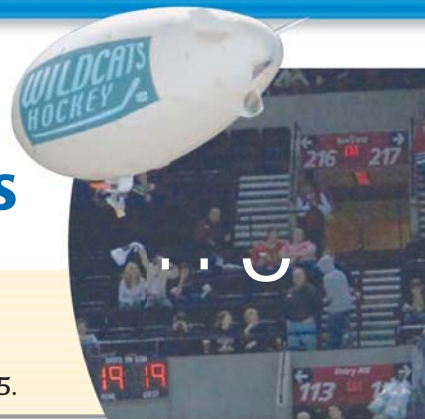


10.4 Use Square Roots to Solve Quadratic Equations

TEKS A.10.A, A.10.B;
2A.6.B, 2A.8.D



Before

You solved a quadratic equation by graphing.

Now

You will solve a quadratic equation by finding square roots.

Why?

So you can solve a problem about a falling object, as in Example 5.

Key Vocabulary

- **square root**, p. 110
- **perfect square**, p. 111

READING

Recall that in this course, *solutions* refers to real-number solutions.

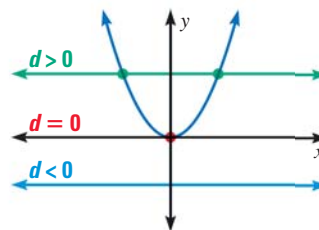
To use square roots to solve a quadratic equation of the form $ax^2 + c = 0$, first isolate x^2 on one side to obtain $x^2 = d$. Then use the following information about the solutions of $x^2 = d$ to solve the equation.

KEY CONCEPT

For Your Notebook

Solving $x^2 = d$ by Taking Square Roots

- If $d > 0$, then $x^2 = d$ has two solutions: $x = \pm\sqrt{d}$.
- If $d = 0$, then $x^2 = d$ has one solution: $x = 0$.
- If $d < 0$, then $x^2 = d$ has no solution.



EXAMPLE 1 Solve quadratic equations

Solve the equation.

a. $2x^2 = 8$

b. $m^2 - 18 = -18$

c. $b^2 + 12 = 5$

Solution

a. $2x^2 = 8$

Write original equation.

$$x^2 = 4$$

Divide each side by 2.

$$x = \pm\sqrt{4} = \pm 2$$

Take square roots of each side. Simplify.

▶ The solutions are -2 and 2 .

b. $m^2 - 18 = -18$

Write original equation.

$$m^2 = 0$$

Add 18 to each side.

$$m = 0$$

The square root of 0 is 0.

▶ The solution is 0.

c. $b^2 + 12 = 5$

Write original equation.

$$b^2 = -7$$

Subtract 12 from each side.

▶ Negative real numbers do not have real square roots. So, there is no solution.

ANOTHER WAY

You can also use factoring to solve $2x^2 - 8 = 0$:

$$2x^2 - 8 = 0$$

$$2(x^2 - 4) = 0$$

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

$x = 2$ or $x = -2$