Name_____ Class_____ Date_____

Lesson 10-3

Solving Quadratic Equations

Lesson Objectives	**NAEP 2005 Strand:** Algebra
Solve quadratic equations by graphing Solve quadratic equations using square roots	**Topic:** Equations and Inequalities **Local Standards:** _____

Key Concepts

Standard Form of a Quadratic Equation

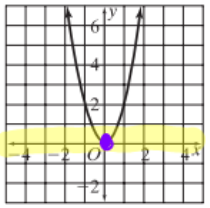
A quadratic equation is an equation that can be written in the form $y = ax^2 + bx + c$ where $a \neq 0$. This form is called the standard form of a quadratic equation.

Example

1 Solving by Graphing Solve each equation by graphing the related function.

a. $2x^2 = 0$

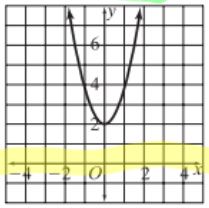
Graph $y = 2x^2$



There is one solution, $x =$ 0.

b. $2x^2 + 2 = 0$

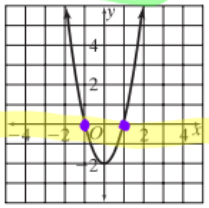
Graph $y = 2x^2 + 2$



There is NO solution.

c. $2x^2 - 2 = 0$

Graph $y = 2x^2 - 2$



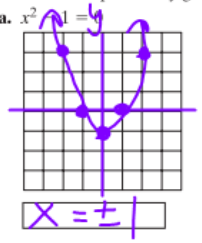
There are two solutions, $x =$ −1 and $x =$ 1.

$x = \pm 1$

Quick Check

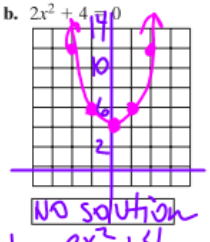
1. Solve each equation by graphing the related function.

a. $x^2 - 1 = 0$



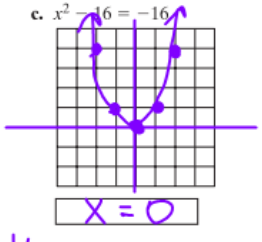
$x = \pm 1$

b. $2x^2 + 4 = 0$



NO solution

c. $x^2 - 16 = -16$



$x = 0$

x	$x^2 - 1$	y
−2	$(-2)^2 - 1$	3
−1	$(-1)^2 - 1$	0
0	$0 - 1$	−1
1	$1^2 - 1$	0
2	$2^2 - 1$	3

x	$2x^2 + 4$	y
−2	$2(-2)^2 + 4$	12
−1	$2(-1)^2 + 4$	6
0	$2(0)^2 + 4$	4
1	$2(1)^2 + 4$	6
2	$2(2)^2 + 4$	12

$x^2 - 16 = -16$

$+16 \quad +16$

$x^2 = 0$

$y = x^2$

x	y
−2	4
−1	1
0	0
1	1
2	4

Name_____ Class_____ Date _____

Examples

❷ Using Square Roots Solve $3x^2 - 75 = 0$.

$3x^2 - 75 + 75 = 0 + 75$ Add 75 to each side.

$\frac{3x^2}{3} = \frac{75}{3}$

$x^2 = 25$ Divide each side by 3.

$x = \pm\sqrt{25}$ Find the square roots.

$x = \pm 5$ Simplify.

❸ Applying Quadratic Equations A museum is planning an exhibit that will contain a large globe. The surface area of the globe will be 315 ft^2. Find the radius of the sphere. Use the equation $S = 4\pi r^2$, where S is the surface area and r is the radius.

$S = 4\pi r^2$

$315 = 4\pi r^2$ Substitute 315 for S.

$\frac{315}{4\pi} = r^2$ Put in calculator-ready form.

$\sqrt{\frac{315}{4\pi}} = r$ Find the principal square root.

$5.001\ldots \approx r$ Use a calculator.

The radius of the sphere is about 5 ft.

Quick Check

2. Solve each equation.

a. $t^2 - 25 = 0$

$+25 \quad +25$

$\sqrt{t^2} = \sqrt{25}$

$t = \pm 5$

b. $3n^2 + 12 = 12$

$-12 \quad -12$

$\frac{3n^2}{3} = \frac{0}{3}$

$\sqrt{n^2} = \sqrt{0}$

$n = 0$

c. $2g^2 + 32 = 0$

$-32 \quad -32$

$\frac{2g^2}{2} = \frac{-32}{2}$

$\sqrt{g^2} = \sqrt{-16}$

NO SOLUTION

3. A city is planning a circular fountain. The depth of the fountain will be 3 ft. The maximum volume will be 1800 ft^3. Find the radius of the fountain using the equation $V = \pi r^2 h$, where V is the volume, r is the radius, and h is the depth.