Name Key

Math 8E

Date

Unit 8

Solving Non-Factorable Quadratics
REVIEW

Study Guide Information

Simplify Radicals

$\sqrt{75}$

$\sqrt{25}\sqrt{3}$

$5\sqrt{3}$

Quadratic Formula

$f(x) = x^2 + 6x - 3$

$0 = x^2 + 6x - 3$

$a = 1$

$b = 6$

$c = -3$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(6) \pm \sqrt{(6)^2 - 4(1)(-3)}}{2(1)}$$

$$x = \frac{-6 \pm \sqrt{48}}{2} \rightarrow \sqrt{48} \quad \sqrt{16}\sqrt{3} \quad 4\sqrt{3}$$

$$x = \frac{-6 \pm 4\sqrt{3}}{2}$$

$x = \frac{-6+4\sqrt{3}}{2}$ | $x = \frac{-6-4\sqrt{3}}{2}$

$x = -3 + 2\sqrt{3}$ | $x = -3 - 2\sqrt{3}$

Completing the Square

Exercise 2- Solve the following quadratic equation, $x^2 + 8x - 4 = 0$, by completing the square. Express all answers in simplest radical form.

To get the "blank" $\left(\frac{b}{2}\right)^2$ $\left(\frac{8}{2}\right)^2$

$x^2 + 8x + \underline{16} = 4 + \underline{16}$

$(x+4)(x+4) = 20$

$\sqrt{(x+4)^2} = \sqrt{20}$

$\sqrt{20}$

$\sqrt{4}\sqrt{5}$

$2\sqrt{5}$

$x + 4 = \pm 2\sqrt{5}$

$-4 \quad -4$

$$x = -4 \pm 2\sqrt{5}$$

$x = -4 + 2\sqrt{5}$ $\quad$ $x = -4 - 2\sqrt{5}$

* Use Quadratic Formula + Complete the Square when you CAN'T Factor *

Simplifying Radicals:

$\sqrt{200}$	$\sqrt{32}$	$\sqrt{169}$
$\sqrt{100}\sqrt{2}$ $10\sqrt{2}$	$\sqrt{16}\sqrt{2}$ $4\sqrt{2}$	13 It's a perfect square so there should be <u>no</u> radical

Quadratic Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$2x^2 + x = 28$

$2x^2+x-28=0$

$a=2$
$b=1$
$c=-28$

$$x=\frac{-(1)\pm\sqrt{(1)^2-4(2)(-28)}}{2(2)}$$

$$x=\frac{-1\pm\sqrt{225}}{4} \quad \sqrt{225}=15$$

$$x=\frac{-1\pm 15}{4}$$

$x=\frac{-1+15}{4}$ | $x=\frac{-1-15}{4}$

$x=\frac{7}{2}$ or 3.5 | $x=-4$

Completing the Square:

Find the roots of the following equation: $x^2 + 2x = 15$

$\left(\frac{b}{2}\right)^2$

$\left(\frac{2}{2}\right)^2$

1

$x^2+2x+\underline{1}=15+\underline{1}$

$\sqrt{(x+1)^2}=\sqrt{16}$

$x+1=\pm\sqrt{16}$

$x+1=\pm 4$

$-1 \quad -1$

$x=-1\pm 4$

$x=-1+4$ | $x=-1-4$

$x=3$ | $x=-5$

Mixed Practice:

$x = \frac{-(5) \pm \sqrt{(5)^2 - 4(2)(-1)}}{2(2)}$

$x = \frac{-5 \pm \sqrt{33}}{4}$

1. The solutions to the quadratic equation $2x^2 + 5x - 1 = 0$ is

Answer choices look like

$a = 2$
$b = 5$
$c = -1$

(1) $\frac{5 \pm \sqrt{17}}{4}$

(2) $\frac{5 \pm \sqrt{33}}{4}$

(3) $\frac{-5 \pm \sqrt{17}}{4}$

(4) $\frac{-5 \pm \sqrt{33}}{4}$

C.T.S. set up

2. What is the solution set of the equation $x^2 - 4x - 1 = 0$

(1) $\{2 \pm \sqrt{3}\}$

(2) $\{4 \pm \sqrt{12}\}$

(3) $\{2 \pm \sqrt{5}\}$

(4) $\{4 \pm \sqrt{5}\}$

$\left(\frac{b}{2}\right)^2$

$\left(-\frac{4}{2}\right)^2$

$(-2)^2 = 4$

$x^2 - 4x + 4 = 1 + 4$

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

$x - 2 = \pm\sqrt{5}$

$+2 \quad +2$

$x = 2 \pm \sqrt{5}$

C.T.S set up

3. Which equation has the same solution as $x^2 - 6x - 12 = 0$

$x^2 - 6x + 9 = 12 + 9$

$(x-3)^2 = 21$

(1) $(x + 3)^2 = 21$

(2) $(x + 3)^2 = 3$

(3) $(x - 3)^2 = 21$

(4) $(x - 3)^2 = 3$

Simplify Radicals

4. When $\sqrt{75}$ is expressed in simplest $a\sqrt{b}$ form, what's the value of a and the value of b?

$\sqrt{75}$

$\sqrt{25}\sqrt{3}$

$5\sqrt{3}$

$a\sqrt{b}$

a = 5, b = 3

5. For the following examples, be sure to solve using both the quadratic formula and by completing the square:

$f(x) = x^2 + 8x - 10$, solve if $f(x) = 0$.

By Quadratic Formula

$a=1$, $b=8$, $c=-10$

$$x = \frac{-8 \pm \sqrt{8^2 - 4(1)(-10)}}{2(1)}$$

$$x = \frac{-8 \pm \sqrt{104}}{2}$$

$\sqrt{104}$

$\sqrt{4}\sqrt{26}$

$2\sqrt{26}$

$$x = \frac{-8 \pm 2\sqrt{26}}{2}$$

$$x = \frac{-8 + 2\sqrt{26}}{2} \qquad x = \frac{-8 - 2\sqrt{26}}{2}$$

$$x = -4 + 1\sqrt{26} \qquad x = -4 - 1\sqrt{26}$$

By Completing the Square

$\left(\frac{b}{2}\right)^2$

$\left(\frac{8}{2}\right)^2$

16

$$x^2 + 8x + 16 = 10 + 16$$

$$(x+4)^2 = 26$$

$$x + 4 = \pm\sqrt{26}$$

$-4 \quad -4$

$$x = -4 \pm \sqrt{26}$$

6. Given the function $f(x) = -x^2 + 8x + 9$, state the roots of the function, by completing the square.

$\left(\frac{b}{2}\right)^2$

$= \left(\frac{-8}{2}\right)^2$

$= (-4)^2$

16

$$-x^2 + 8x + 9 = 0$$

$$x^2 - 8x - 9 = 0$$

$$x^2 - 8x + 16 = 9 + 16$$

$$\sqrt{(x-4)^2} = \sqrt{25}$$

$$x - 4 = \pm\sqrt{25}$$

$$x - 4 = \pm 5$$

$+4 \quad +4$

$$x = 4 \pm 5$$

$x = 4 + 5$ | $x = 4 - 5$

$\boxed{x = 9}$ | $\boxed{x = -1}$

7. Find the solution, to the *nearest tenth*, of the function $x^2 - 6x + 3 = 0$

type in calc

$x = 3 + \sqrt{6}$ → $x = 5.4$

$x = 3 - \sqrt{6}$ → $x = .6$

$\left(\frac{6}{2}\right)^2$

$x^2 - 6x + 9 = -3 + 9$

$\sqrt{(x-3)^2} = \sqrt{6}$

$x - 3 = \pm\sqrt{6}$

$+3 \quad +3$

$x = 3 \pm \sqrt{6}$

Must "T" off b/c your answer is to the nearest tenth

8. What are the solutions to the equation $x^2 - 8x = 10$, in *simplest radical form*.

$x^2 - 8x + 16 = 10 + 16$

$\sqrt{(x-4)^2} = \sqrt{26}$

$x - 4 = \pm\sqrt{26}$

$+4 \quad +4$

$x = 4 \pm \sqrt{26}$ ← can't simplify further, so it's your final answer.

9. Solve the equation $0 = 2x^2 + 3x - 10$

$a = 2$

$b = 3$

$c = -10$

$x = \frac{-(3) \pm \sqrt{(3)^2 - 4(2)(-10)}}{2(2)}$

$x = \frac{-3 \pm \sqrt{89}}{4}$ ← can't simplify so you're done