Name: _____ Date: _____ Unit 5 Class Work

Solving Using the Quadratic Formula Class Work

Objective: *You will be able to solve equations using the quadratic formula.*

★ The quadratic formula:

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

★ Turn & Talk with a Partner:

**Which part of the quadratic formula do you think determines the number (and type) of solutions the equation will have? Why?*

$ax^2+bx+c=0$

★ The Discriminant:

$\pm\sqrt{pos}$ = 2 real solutions

$\pm\sqrt{neg}$ = 2 imag. solutions

$\pm\sqrt{0}$ = 1 real solution

b^2-4ac

Practice: Determine the number and type of solutions each equation will have. Support your answer. Then determine the solutions, as both simplified radicals and decimals rounded to the nearest hundredth where possible.

1. $4x^2 - 5 = 9x$

$-9x \quad -9x$

set = 0

$4x^2-9x-5=0$

$a=4$, $b=-9$, $c=-5$

b^2-4ac

$(-9)^2-80$ (plug into discr.)

$4ac$

$4\cdot4\cdot5$

-80

$81+80$

161

pos → 2 real solutions

2. $x^2 + 8 = -x$

use Quad Form to solve

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

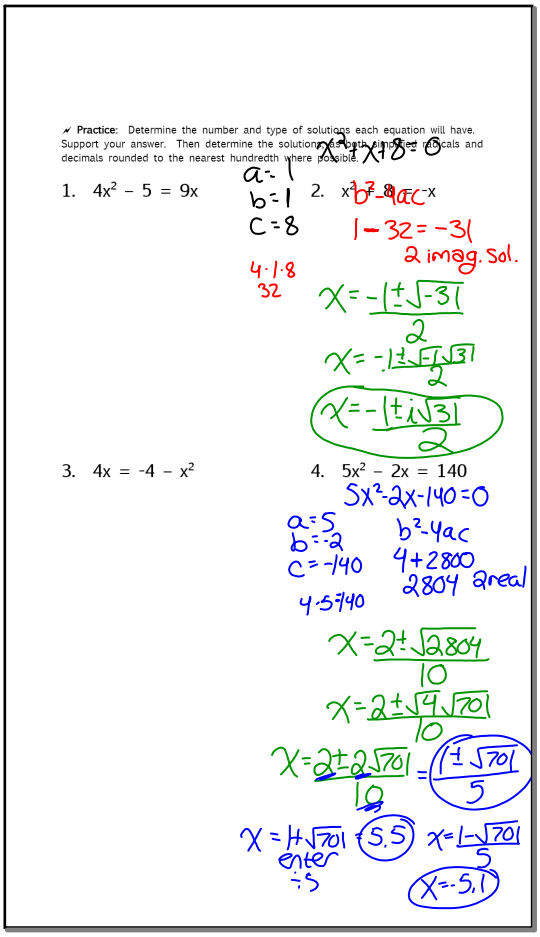
$x=\frac{9\pm\sqrt{161}}{8}$

$x = 9+\sqrt{161}$ enter $\div 8$ enter $= 2.7$

$x = 9-\sqrt{161}$ enter $\div 8 = -.5$

3. $4x = -4 - x^2$

4. $5x^2 - 2x = 140$



✓ **Practice:** Determine the number and type of solutions each equation will have. Support your answer. Then determine the solutions. Express radicals and decimals rounded to the nearest hundredth where possible.

1. $4x^2 - 5 = 9x$

$x^2+x+8=0$

$a=1$ $b=1$ $C=8$

$4 \cdot 1 \cdot 8$ 32

b^2-4ac

$1-32=-31$

2 imag. Sol.

$x=\frac{-1\pm\sqrt{-31}}{2}$

$x=\frac{-1\pm i\sqrt{31}}{2}$

$x=\frac{-1\pm i\sqrt{31}}{2}$

2. $x^2 - 8 = -x$

3. $4x = -4 - x^2$

4. $5x^2 - 2x = 140$

$5x^2-2x-140=0$

$a=5$ $b=-2$ $c=-140$

$4 \cdot 5 \cdot 140$

b^2-4ac

$4+2800$

2804 2 real

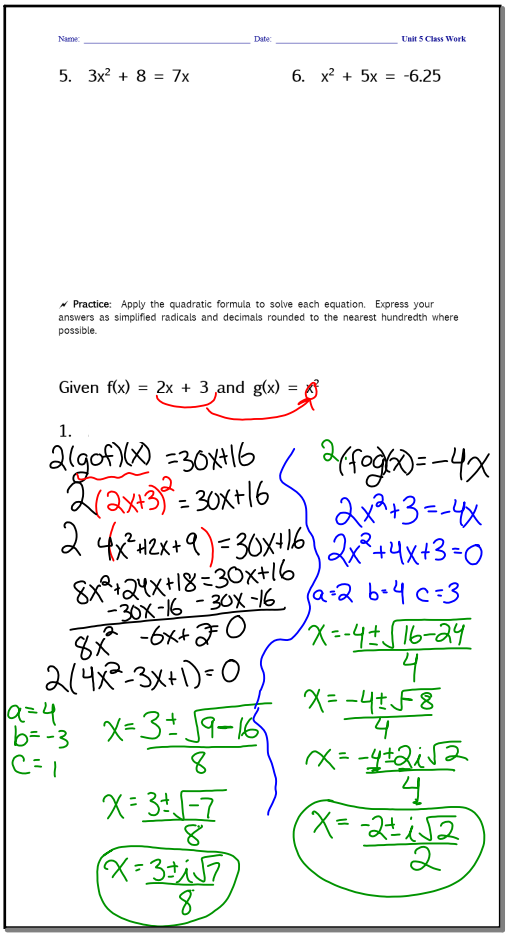
$x=\frac{2\pm\sqrt{2804}}{10}$

$x=\frac{2\pm\sqrt{4}\sqrt{701}}{10}$

$x=\frac{2\pm 2\sqrt{701}}{10}=\frac{1\pm\sqrt{701}}{5}$

$x=\frac{1+\sqrt{701}}{5}$ enter $\div 5$ 5.5

$x=\frac{1-\sqrt{701}}{5}$ $x=-5.1$



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5. $3x^2 + 8 = 7x$

6. $x^2 + 5x = -6.25$

✓ **Practice:** Apply the quadratic formula to solve each equation. Express your answers as simplified radicals and decimals rounded to the nearest hundredth where possible.

Given $f(x) = 2x + 3$ and $g(x) = x^2$

1.

$2(gof)(x)=30x+16$

$2(2x+3)^2=30x+16$

$2(4x^2+12x+9)=30x+16$

$8x^2+24x+18=30x+16$

$-30x-16 \quad -30x-16$

$8x^2-6x+2=0$

$2(4x^2-3x+1)=0$

$a=4$ $b=-3$ $c=1$

$x=\frac{3\pm\sqrt{9-16}}{8}$

$x=\frac{3\pm\sqrt{-7}}{8}$

$x=\frac{3\pm i\sqrt{7}}{8}$

$2(fog)(x)=-4x$

$2x^2+3=-4x$

$2x^2+4x+3=0$

$a=2$ $b=4$ $c=3$

$x=\frac{-4\pm\sqrt{16-24}}{4}$

$x=\frac{-4\pm\sqrt{8}}{4}$

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

$x=\frac{-2\pm i\sqrt{2}}{2}$

d: 0 ⇒ 1 real

3. $x = -2$

d: -47 ⇒ 2 imag

5. $x = \frac{7 \pm i\sqrt{47}}{6}$

d = 0 ⇒ 1 real

6. $x = -2.5$

Jan 12-8:44 AM

$f(x) = x^2$

$g(x) = x - 1$

$(f \circ g)(x)$

$f(g(x))$ plug $g(x)$ in for x in $f(x)$

$(x-1)^2$

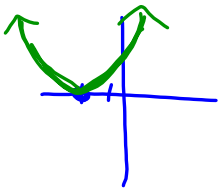
Jan 12-8:57 AM

$x = \frac{-4 \pm \sqrt{0}}{2}$

$x = \frac{-4+0}{2}$ $x = \frac{-4-0}{2}$

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

$x = -2$ (multiplicity 2) happens twice



Jan 12-8:50 AM

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

3. $(f \bullet g)(x) = 6x$

$f(x) \cdot g(x) = 6x$

$(2x+3) \cdot x^2 = 6x$

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

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

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

$x = 0$

$a = 2$ $b = 3$ $c = -6$

$x = \frac{-3 \pm \sqrt{9-48}}{4}$

$x = \frac{3 \pm \sqrt{57}}{4}$ $x \approx$ ~~ $x \approx$ ~~

4. $f(-x) = -g(x) + 6$

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

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

$a = 1$ $b = -2$ $c = -3$

$x = \frac{2 \pm \sqrt{4-12}}{2}$

$x = \frac{2 \pm \sqrt{16}}{2}$

$x = \frac{2+4}{2}$; $\frac{2-4}{2}$

$x = 3$; -1

Given $b(x) = -3x + 4$ and $c(x) = 2x^2$

5. $(c \circ b)(x) = 28 - 40x + 8x^2$

$(c \circ b)(x) = 28-40x+8x^2$

6. $(b \circ c)(x) = 9x$

$(b \circ c)(x) = 9x$

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7. $2(c \bullet b)(x) = 10x$

8. $b(x) = -c(x)$

9. Challenge! Solve $x^4 - 4x^2 = 21$

⑤ $x = \frac{2 \pm i\sqrt{6}}{5}$

⑥ $x = \frac{9 \pm \sqrt{177}}{-2}$ $x \simeq -1.86$; -4.30

⑦ $x = \frac{4 \pm i\sqrt{14}}{6}$

⑧ $x = \frac{3 \pm i\sqrt{23}}{4}$

☾ **Creative Practice:** On a blank sheet of paper, create each of the following, along with an answer key. Then rewrite your problems (in a mixed order ☺) on a blank sheet of paper.

~ Any quadratic function that will have one solution

~ Any quadratic function that will have two real solutions.

~ Any quadratic function that will have two imaginary solutions.

~ Any quadratic function that is factorable.

For each problem, first hypothesize about the number and type of solutions the equation will have. Then solve each equation.

☾ **Reflect:** Write about how your knowledge of quadratics has improved, what you are still wondering about related to quadratics, and how you feel regarding your work with quadratics. Include any other ideas related to quadratics and the quadratic formula as you wish as well. ☺

Homework: Online

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p. 288-290
#3, 7, 11, 13, 19, 25, 29, 31, 33, 35, 41, 43, 47, 57, 61, 73, and 77

Check your answers with the back of the book, and be prepared to ask me any questions you have. ☺