Name: _____ Date: _____ Period: _____ ID: A

Unit 2 Test 2 Review - Quadratic Equations

Key

1. When solving the equation $x^2 - 8x - 7 = 0$ by completing the square, which equation is a step in the process?

$\left(\frac{-8}{2}\right)^2$ $(-4)^2$ 16

a. $(x-4)^2 = 9$
b. $(x-4)^2 = 23$
c. $(x-8)^2 = 9$
d. $(x-8)^2 = 23$

$x^2 - 8x = 7$
$x^2 - 8x + 16 = 7 + 16$
$(x-4)^2 = 23$

2. Solve the following system of equations for $y = 2x^2 - 3$ and $y = 2x + 1$

$2x^2 - 3 = 2x + 1$
$2x^2 - 2x - 4 = 0$
$2(x^2 - x - 2) = 0$
$2(x-2)(x+1) = 0$
$x = 2$ $x = -1$
$y = 5$ $y = -1$
$(2, 5)$ $(-1, -1)$

3. Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different **methods** Fred could use to solve the equation $f(x) = 0$.

Quadratic Formula
+
Completing the Square

b) Use the quadratic formula to solve the equation.

$a = 4$ $b = 16$ $c = 9$

$x = \frac{-16 \pm \sqrt{(16)^2 - 4(4)(9)}}{2(4)} = \frac{-16 \pm \sqrt{112}}{8}$

$= \frac{-16 \pm \sqrt{16 \cdot 7}}{8} = \frac{-16 \pm 4\sqrt{7}}{8} = \frac{-4 \pm \sqrt{7}}{2}$

4. Write a standard form quadratic equation that has zeros at -5 and 4.

$y = (x+5)(x-4)$
$y = x^2 - 4x + 5x - 20$
$y = x^2 + x - 20$

5. Consider the quadratic function $f(x) = x^2 + 6x - 4$.

a. Rewrite the function rule in vertex form.

$y = x^2 + 6x - 4$
vertex: $(-3, -13)$
$\rightarrow$ $y = (x+3)^2 - 13$

b. Determine the coordinates of the maximum or minimum point of the graph of this function.

$(-3, -13)$ min

c. Solve the equation $x^2 + 6x - 4 = 0$.

$a = 1$ $b = 6$ $c = -4$

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

$= \frac{-6 \pm \sqrt{36 + 16}}{2} = \frac{-6 \pm \sqrt{52}}{2}$

$= \frac{-6 \pm \sqrt{4 \cdot 13}}{2} = \frac{-6 \pm 2\sqrt{13}}{2}$

$= -3 \pm \sqrt{13}$

Name: _____ ID: A

6. Solve the following quadratic equations using the given method.

a. $x^2 + 6x + 38 = 13$
(Completing the Square)

$x^2+6x=-25$

$x^2+6x+9=-25+9$

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

$x+3=\pm 4i$

$x=-3\pm 4i$

b. $5x^2 - 7x + 13 = 10$
(Quadratic Formula)

$5x^2-7x+3=0$

$a=5$, $b=-7$, $c=3$

$x=\frac{7\pm\sqrt{(-7)^2-4(5)(3)}}{2(5)}=\frac{7\pm\sqrt{-11}}{10}$

$=\frac{7\pm i\sqrt{11}}{10}$

c. $2x^2 - 9x + 10 = 0$
(Factoring)

20 → −5, −4 (−5 + −4 = −9)

$2x^2-5x-4x+10=0$

$x(2x-5)-2(2x-5)=0$

$(x-2)(2x-5)=0$

$x-2=0$ $\quad 2x-5=0$

$x=2$ $\quad x=\frac{5}{2}$

d. $x^2 - 64 = 0$
(Factoring)

$(x+8)(x-8)=0$

$x+8=0$ $\quad x-8=0$

$x=-8$ $\quad x=8$

7. Solve the equation $x^2 - 14x = -40$

$x^2-14x+40=0$

$(x-10)(x-4)=0$

$x=10$ $\quad x=4$

8. Write the quadratic function $f(x) = (x-2)^2 + 4$ in standard form. Then describe the transformations from the parent function.

$y=(x-2)^2+4$

$y=(x-2)(x-2)+4$

$y=(x^2-4x+4)+4$

$y=x^2-4x+8$

here → right 2, up 4

9. Find the zeros of the function $f(x) = 2x^2 - 4x - 6$

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

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

$x-3=0$ $\quad x+1=0$

$x=3$ $\quad x=-1$

10. State the discriminant for each equation. How many solutions (and what type) do each of the following functions have? b^2-4ac

a. $x^2 - 6x + 11 = 2$

$x^2-6x+9=0$

$(-6)^2-4(1)(9)$

$0 \rightarrow$ 1 real root

b. $x^2 + x + 1 = 0$

$(1)^2-4(1)(1)=-3 \rightarrow$ 2 imaginary roots

c. $3x^2 + 5x = 12$

$3x^2+5x-12=0$

$(5)^2-4(3)(-12)$

$169 \rightarrow$ 2 real roots

Name: _____ ID: A

Solve:

11. Where does the graph of $x^2 - 6x + 8$ cross the x-axis?

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

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

$x=4$ $x=2$

12. Factor: $x^2 + 14x + 48$

$(x+6)(x+8)$

13. Factor: $5x^2 - 22x - 15$

-75, $-25 \cdot 3$, -22

$5x^2-25x+3x-15$

$5x(x-5)+3(x-5)$

$(5x+3)(x-5)$

14. Factor: $9x^2 - 16$

$(3x+4)(3x-4)$

Solve the quadratic equation.

15. Solve using the quadratic formula: $3x^2 + 5x = 11$

$3x^2+5x-11=0$

$x=\frac{-5\pm\sqrt{(5)^2-4(3)(-11)}}{2(3)}$

$=\frac{-5\pm\sqrt{157}}{6}$

16. Find a quadratic function that has roots at 7 and -2 and the "a" value is 1. Write your final answer in standard form.

$y=(x-7)(x+2)$

$y=x^2+2x-7x-14$

$y=x^2-5x-14$

17. When completing the square, what number would be added to both sides?

$x^2 + 2x + \_1\_ = -3 + \_1\_$

$\left(\frac{2}{2}\right)^2=(1)^2=1$

18. Solve the following system of equations:

$y=x-4$

$y=x^2$

$x^2=x-4$

$x^2-x+4=0$

$x=\frac{1\pm\sqrt{(-1)^2-4(1)(4)}}{2(1)}=\frac{1\pm\sqrt{1-16}}{2}$

$=\frac{1\pm\sqrt{-15}}{2}=\frac{1\pm i\sqrt{15}}{2}$

no real solution

Name: _____ ID: A

Find a quadratic model for the set of values.

19. (–2, –20), (0, –4), (4, –20)

Stat → Edit

L_1	L_2
-2	-20
0	-4
4	-20

Stat → Calc → QuadReg

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

20. Dalco Manufacturing estimates that its weekly profit, P, in hundreds of dollars, can be approximated by the formula $P = -3x^2 + 6x + 10$, where x is the number of units produced per week, in thousands.

a. How many units should the company produce per week to earn the maximum profit?

← x-value

1 unit

b. Find the maximum weekly profit.

$13

21. Identify the vertex of the function $y = -3(x + 2)^2 + 5$

(-2, 5)