

Unit 2 Test 2 Review - Quadratic Equations

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

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

$$x^2 - 8x + 16 = 7 + 16$$

$$(x-4)^2 = 23$$

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

Calc { or Algebra

$$y_1 = 2x^2 - 3$$

$$y_2 = 2x + 1$$

graph and Trace 5 x 2

$$2x + 1 = 2x^2 - 3$$

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

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

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

$(-1, -1)$ $(2, 5)$

$(2, 5)$ $(-1, -1)$

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 $f(x) = 0$.

- ① graph ③ complete \square
 ② factor ④ quadratic formula

b) Use the quadratic formula to solve the equation.

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

$$x = \frac{-16 \pm \sqrt{112}}{2(4)} = \frac{-16 \pm 4\sqrt{7}}{8}$$

$$\frac{-4 \pm \sqrt{7}}{2}$$

4. Write a standard form quadratic equation that has zeros at -5 and 4. $(x+5)(x-4)$

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

$$y = x^2 + x - 20$$

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

a. Rewrite the function rule in vertex form.

$$h = \frac{-b}{2a} = \frac{-6}{2(1)} = -3$$

$$k = (-3)^2 + 6(-3) - 4 = -13$$

$$y = (x+3)^2 - 13$$

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

$$(-3, -13) \text{ min}$$

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

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

$$x = \frac{-6 \pm \sqrt{52}}{2}$$

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

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

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

a. $x^2 + 6x + 38 = 13$

(Completing the Square)

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

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

$$x+3 = \pm 4i$$

$$x = -3 \pm 4i$$

b. $5x^2 - 7x + 13 = 10$

(Quadratic Formula)

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(5)(13)}}{2(5)}$$

$$x = \frac{7 \pm \sqrt{211}}{2(5)} = \frac{7 \pm i\sqrt{211}}{10}$$

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

(Factoring)

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

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

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

$$\boxed{\frac{5}{2}} \quad \boxed{2}$$

d. $x^2 - 64 = 0$

(Factoring)

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

$$\downarrow \quad \downarrow$$

$$\boxed{-8} \quad \boxed{8}$$

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

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

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

$$\downarrow \quad \downarrow$$

$$\boxed{4} \quad \boxed{10}$$

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

$$x^2 - 2x - 2x + 4 + 4$$

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

$$\begin{array}{l} - \text{Right } 2 \\ - \text{Up } 4 \end{array}$$

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

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

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

$$\downarrow \quad \downarrow$$

$$\boxed{3} \quad \boxed{-1}$$

10. State the discriminant for each equation. How many solutions (and what type) do each of the following functions have?

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

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

$$(-6)^2 - 4(1)(9) = 0$$

$$\boxed{2 \text{ real}}$$

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

$$(1)^2 - 4(1)(1) = -3$$

$\boxed{2 \text{ imaginary}}$

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

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

$$(5)^2 - 4(3)(-12) = 169$$

$$\boxed{2 \text{ real}}$$

rational

Solve:

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

in calc } or algebra

$y_1 = x^2 - 6x + 8$

graph and trace 2 x 2

$(2,0)$ & $(4,0)$

$(x-4)(x-2)$

$(4,0)$ $(2,0)$

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.

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

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

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

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

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

$\frac{48}{6 \times 8}$
 $\frac{14}{14}$

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

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

$\frac{-75}{3 \times -25}$ < $\frac{5}{-5}$

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

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

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

$x^2 + 2x + \underline{\quad} = -3 + \underline{\quad}$

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

18. Solve the following system of equations:

$y = x - 4$

$y = x^2$

in calc } or algebra

$y_1 = x - 4$

$y_2 = x^2$

graph

no solutions

$x - 4 = x^2$

$0 = x^2 - x + 4$

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

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

no real solutions imaginary

Find a quadratic model for the set of values.

19. $(-2, -20), (0, -4), (4, -20)$

In calc!

STAT

1

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

STAT → calc

5

ENT

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

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?

1 unit

- b. Find the maximum weekly profit.

\$13

in calc
max @
(1, 13)

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

(-2, 5)

*inside
opposite,
outside
same*