Algebra II B 4.8-4.9 Quiz Review

1. Use the quadratic formula to solve: $x^2 + 3x + 1 = 0$

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

$$\frac{-3 \pm \sqrt{9-4}}{2}$$

$$\boxed{\frac{-3 \pm \sqrt{5}}{2}}$$

2. Use the quadratic formula to solve: $2x^2 + 5x + 1 = 0$

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

$$\frac{-5 \pm \sqrt{25-8}}{4} = \boxed{\frac{-5 \pm \sqrt{17}}{4}}$$

Solve.

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

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

$$\frac{-3 \pm \sqrt{9-132}}{22} = \frac{-3 \pm \sqrt{-123}}{22} = \boxed{\frac{-3 \pm i\sqrt{123}}{22}}$$

4. $x^2 + 6x = -9$
   $x^2 + 6x + 9 = 0$
   factor: $(x+3)^2 = 0$
   $x = -3$

$$\frac{-(6) \pm \sqrt{(6)^2 - 4(1)(9)}}{2(1)}$$

$$\frac{-6 \pm \sqrt{36-36}}{2} = \frac{-6 \pm \sqrt{0}}{2} = \frac{-6 \pm 0}{2}$$

$$\frac{-6+0}{2} = \frac{-6}{2} = \boxed{-3}$$

$$\frac{-6-0}{2} = \frac{-6}{2} = \boxed{-3}$$

5. A rock is thrown from the top of a tall building. The distance, in feet, between the rock and the ground t seconds after it is thrown is given by $d = -16t^2 - 2t + 633$. How long after the rock is thrown is it 430 feet from the ground?

$$430 = -16t^2 - 2t + 633$$
$$-430 \qquad\qquad -430$$
$$0 = -16t^2 - 2t + 203$$
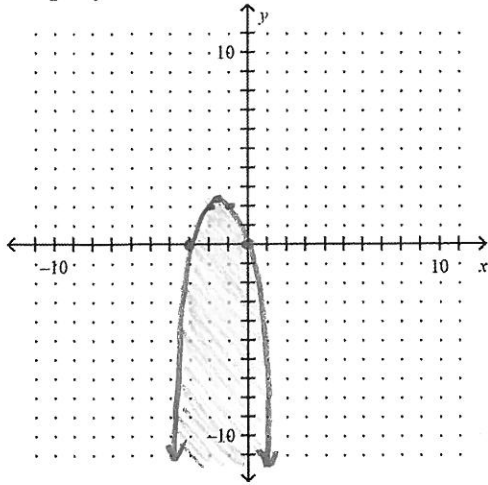
$$\frac{-(-2) \pm \sqrt{(-2)^2 - 4(-16)(203)}}{2(-16)}$$

$$\frac{2 \pm \sqrt{4 + 12992}}{-32}$$

$$\frac{2 \pm \sqrt{12996}}{-32}$$

$$\frac{2 \pm 114}{-32}$$

$$\frac{2+114}{-32} = -3.625 \text{ sec}$$

$$\frac{2-114}{-32} = \boxed{3.5 \text{ sec}} \checkmark$$

Graph.

6. Graph: $y \leq -x^2 - 3x$

1. opens down

2. $x = \dfrac{-b}{2a} = \dfrac{-(-3)}{2(-1)} = \dfrac{3}{-2} = -1.5$

3. $y = -(-1.5)^2 - 3(-1.5)$
   $= -2.25 + 4.5$
   $= 2.25$

   $(-1.5, 2.25)$

4.
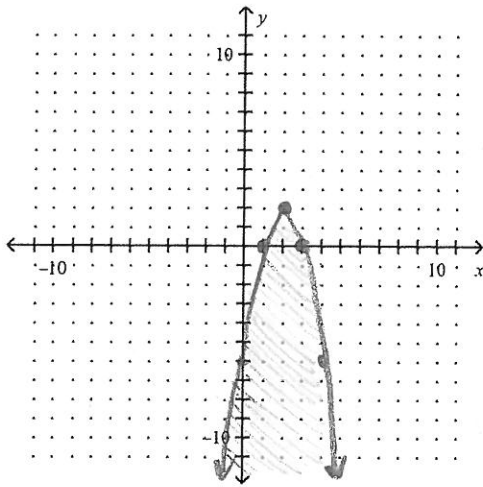| x	-1	0
y	2	0

5. solid

6. $1 \leq -(1)^2 - 3(1)$
   $1 \leq -1 - 3$
   $1 \leq -4$ false

7. Sketch the graph of the inequality. $y \leq -2x^2 + 8x - 6$

1. opens down

2. $x = \dfrac{-b}{2a} = \dfrac{-(8)}{2(-2)} = \dfrac{-8}{-4} = 2$

3. $y = -2(2)^2 + 8(2) - 6$
   $= -8 + 16 - 6$
   $= 2$
   $(2, 2)$

4.
x	3	4
y	0	-6

5. solid

6. $0 \leq -2(0)^2 + 8(0) - 6$
   $0 \leq -6$ false

What are the solutions of the quadratic equation?

8. $x^2 + 8x = -15$

$x^2 + 8x + 15 = 0$

factor

$(x+5)(x+3) = 0$

$x = -5 \quad x = -3$

$\dfrac{-(8) \pm \sqrt{(8)^2 - 4(1)(15)}}{2(1)}$

$\dfrac{-8 \pm \sqrt{64 - 60}}{2} = \dfrac{-8 \pm \sqrt{4}}{2} = \dfrac{-8 \pm 2}{2}$

$\dfrac{-8+2}{2} = \dfrac{-6}{2} = \boxed{-3}$

$\dfrac{-8-2}{2} = \dfrac{-10}{2} = \boxed{-5}$

9. $x^2 - 11x + 30 = 0$

factor

$(x-5)(x-6)=0$

$x=5 \quad x=6$

$\dfrac{-(-11)\pm\sqrt{(-11)^2 - 4(1)(30)}}{2(1)}$

$\dfrac{11\pm\sqrt{121-120}}{2}$

$\dfrac{11\pm\sqrt{1}}{2} = \dfrac{11\pm1}{2}$

$\dfrac{11+1}{2} = \dfrac{12}{2} = \boxed{6}$

$\dfrac{11-1}{2} = \dfrac{10}{2} = \boxed{5}$

10. $4x^2 + 45x + 50 = 0$

factor

$(x+10)(4x+5)=0$

$x=-10 \quad x=\dfrac{-5}{4}$

$\dfrac{-(45)\pm\sqrt{(45)^2 - 4(4)(50)}}{2(4)}$

$\dfrac{-45\pm\sqrt{2025-800}}{8}$

$\dfrac{-45\pm\sqrt{1225}}{8} = \dfrac{-45\pm35}{8}$

$\dfrac{-45+35}{8} = \dfrac{-10}{8} = \boxed{\dfrac{-5}{4}}$

$\dfrac{-45-35}{8} = \dfrac{-80}{8} = \boxed{-10}$

11. $2x^2 - 19x + 42 = 0$

factor

$(x-6)(2x-7)=0$

$x=6 \quad x=\dfrac{7}{2}$

$\dfrac{-(-19)\pm\sqrt{(-19)^2 - 4(2)(42)}}{2(2)}$

$\dfrac{19\pm\sqrt{361-336}}{4} = \dfrac{19\pm\sqrt{25}}{4} = \dfrac{19\pm5}{4}$

$\dfrac{19+5}{4} = \dfrac{24}{4} = \boxed{6}$

$\dfrac{19-5}{4} = \dfrac{14}{4} = \boxed{\dfrac{7}{2}}$

Solve the equation.

12. $x^2 + 10x + 25 = 36$

$x^2 + 10x - 11 = 0$

factor

$(x+11)(x-1)=0$

$x=-11 \quad x=1$

$\dfrac{-(10)\pm\sqrt{(10)^2 - 4(1)(-11)}}{2(1)}$

$\dfrac{-10\pm\sqrt{100+44}}{2}$

$\dfrac{-10\pm\sqrt{144}}{2} = \dfrac{-10\pm12}{2}$

$\dfrac{-10+12}{2} = \dfrac{2}{2} = \boxed{1}$

$\dfrac{-10-12}{2} = \dfrac{-22}{2} = \boxed{-11}$

13. $x^2 - 12x + 36 = 100$

$x^2 - 12x - 64 = 0$

factor

$(x-16)(x+4)=0$

$x=16 \quad x=-4$

$\dfrac{-(-12)\pm\sqrt{(-12)^2 - 4(1)(-64)}}{2(1)}$

$\dfrac{12\pm\sqrt{144+256}}{2}$

$\dfrac{12\pm\sqrt{400}}{2} = \dfrac{12\pm20}{2}$

$\dfrac{12+20}{2} = \dfrac{32}{2} = \boxed{16}$

$\dfrac{12-20}{2} = \dfrac{-8}{2} = \boxed{-4}$

Use the Quadratic Formula to solve the equation.

14. $4x^2 - 2x - 2 = 0$

factor

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

$x = -\frac{1}{2} \quad x = 1$

$\dfrac{-(-2) \pm \sqrt{(-2)^2 - 4(4)(-2)}}{2(4)}$

$\dfrac{2 \pm \sqrt{4 + 32}}{8}$

$\dfrac{2 \pm \sqrt{36}}{8} = \dfrac{2 \pm 6}{8}$

$\dfrac{2 + 6}{8} = \dfrac{8}{8} = \boxed{1}$

$\dfrac{2 - 6}{8} = \dfrac{-4}{8} = \boxed{-\dfrac{1}{2}}$

15. $-x^2 - x + 7 = 0$

$\dfrac{-(-1) \pm \sqrt{(-1)^2 - 4(-1)(7)}}{2(-1)}$

$\dfrac{1 \pm \sqrt{1 + 28}}{-2} = \boxed{\dfrac{1 \pm \sqrt{29}}{-2}}$

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

$\dfrac{-(-9) \pm \sqrt{(-9)^2 - 4(1)(-8)}}{2(1)}$

$\dfrac{9 \pm \sqrt{81 + 32}}{2} = \boxed{\dfrac{9 \pm \sqrt{113}}{2}}$

17. $x^2 - x = 3$

$x^2 - x - 3 = 0$

$\dfrac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-3)}}{2(1)}$

$\dfrac{1 \pm \sqrt{1 + 12}}{2} = \boxed{\dfrac{1 \pm \sqrt{13}}{2}}$

What is the number of real solutions?

18. $12x^2 - 10x + 7 = 0$

$b^2 - 4ac \qquad (-10)^2 - 4(12)(7)$

$100 - 336 = -236$

$\boxed{None}$

5

19.

$$12x^2 - 4x = 3$$

$12x^2 - 4x - 3 = 0$

$b^2 - 4ac$ $(-4)^2 - 4(12)(-3) = 16 + 144 = 160$

two

20. $-10x^2 = -9x + 2$

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

$b^2 - 4ac$ $(-9)^2 - 4(10)(2) = 81 - 80 = 1$

two

21. $x^2 + 1 = 2x$

$x^2 - 2x + 1 = 0$

$b^2 - 4ac$ $(-2)^2 - 4(1)(1) = 4 - 4 = 0$

one

22. Find the solutions of the equation.

$$\frac{1}{2}x^2 + x + 2 = 0$$

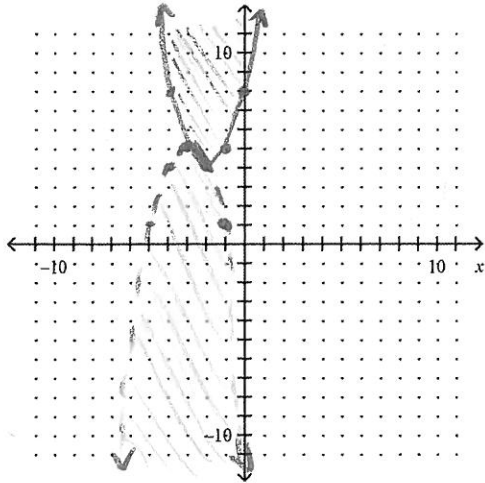$$\frac{-(1) \pm \sqrt{(1)^2 - 4(\frac{1}{2})(2)}}{2(\frac{1}{2})}$$

$$\frac{-1 \pm \sqrt{1-4}}{1}$$

$$\frac{-1 \pm \sqrt{-3}}{1} = -1 \pm i\sqrt{3}$$

What is the solution of the system of inequalities?

23.

$$\begin{cases} y \ge x^2 + 4x + 8 \\ y < -x^2 - 6x - 4 \end{cases}$$

$y \ge x^2 + 4x + 8$

1. up

2. $x = \dfrac{-b}{2a} = \dfrac{-(4)}{2(1)} = \dfrac{-4}{2} = -2$

3. $y = (-2)^2 + 4(-2) + 8$
   $= 4 - 8 + 8$
   $= 4$
   $(-2, 4)$

4.
x	-4	0
Y	5	8

5. solid

6. $0 \ge (0)^2 + 4(0) + 8$
   $0 \ge 8$ false

$y < -x^2 - 6x - 4$

1. down

2. $x = \dfrac{-b}{2a} = \dfrac{-(-6)}{2(-1)} = \dfrac{6}{-2} = -3$
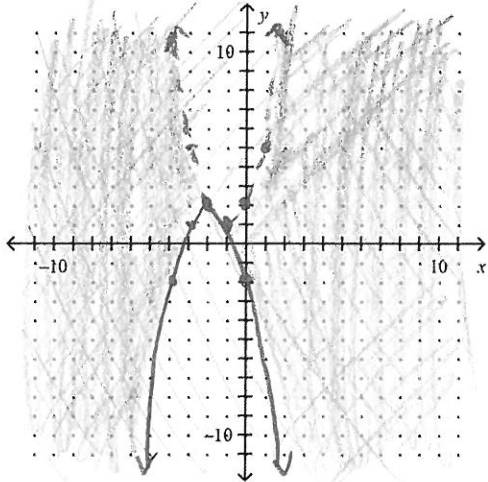
3. $y = -(-3)^2 - 6(-3) - 4$
   $= -9 + 18 - 4$
   $= 5$

4.
x	-2	-1
Y	4	1

5. dashed

6. $0 < -(0)^2 - 6(0) - 4$
   $0 < -4$ false

24.

$$\begin{cases} y < x^2 + 2x + 2 \\ y \geq -x^2 - 4x - 2 \end{cases}$$

$y < x^2 + 2x + 2$

1. up

2. $x = \dfrac{-b}{2a} = \dfrac{-(2)}{2(1)} = \dfrac{-2}{2} = -1$

3. $y = (-1)^2 + 2(-1) + 2$
   $= 1 - 2 + 2$
   $= 1$
   $(-1, 1)$

4.
x	0	1
y	2	5

5. dashed

6. $0 < (0)^2 + 2(0) + 2$
   $0 < 2$ true

$y \geq -x^2 - 4x - 2$

1. down

2. $x = \dfrac{-b}{2a} = \dfrac{-(-4)}{2(-1)} = \dfrac{4}{-2} = -2$

3. $y = -(-2)^2 - 4(-2) - 2$
   $= -4 + 8 - 2$
   $= 2$
   $(-2, 2)$

4.
x	-1	0
y	1	-2

5. solid

6. $0 \geq -(0)^2 - 4(0) - 2$
   $0 \geq -2$ true

Use the quadratic formula to solve the equation.

25. $x^2 - 14x + 53 = 0$

$\dfrac{-(-14) \pm \sqrt{(-14)^2 - 4(1)(53)}}{2(1)}$

$\dfrac{14 \pm \sqrt{196 - 212}}{2} = \dfrac{14 \pm \sqrt{-16}}{2} = \dfrac{14 \pm i\sqrt{16}}{2} = \dfrac{14 \pm 4i}{2} = \boxed{7 \pm 2i}$

26. $2p^2 + 16p = -2p^2 + 3$

$4p^2 + 16p - 3 = 0$

$\dfrac{-(16) \pm \sqrt{(16)^2 - 4(4)(-3)}}{2(4)}$

$\dfrac{-16 \pm \sqrt{256 + 48}}{8}$

$\boxed{\dfrac{-16 \pm \sqrt{304}}{8}}$

Tell whether the equation has *two solutions*, *one solution*, **or** *no solution*.

27. $x^2 - 7x + 11 = 0$

$b^2 - 4ac$ $(-7)^2 - 4(1)(11) = 49 - 44 = 5$

two solutions