Name:_____

Date:_____

Unit 2: Solving Quadratic Functions

Solve by completing the square

1) $x^2 - 10x + 14 = 0$

$x^2 - 10x = -14$

$x^2 - 10x + 25 = -14 + 25$

$(x-5)^2 = 11$

$x - 5 = \pm\sqrt{11}$

$\boxed{x = \pm\sqrt{11} + 5}$

2) $x^2 + 4x - 12 = 0$

$x^2 + 4x = 12$

$x^2 + 4x + 4 = 12 + 4$

$(x+2)^2 = 16$

$x + 2 = \pm 4$

$x = \pm 4 - 2$

$\boxed{x = 2}$
$x = -6$

Solve by factoring

3) $x^2 + 4x - 5 = 0$

$(x+5)(x-1) = 0$

$\boxed{x = -5 \quad x = 1}$

4) $3x^2 - 17x - 6 = 0$ $\qquad -18$

$\left(x - \frac{18}{3}\right)\left(x + \frac{1}{3}\right) = 0$

$(x-6)(3x+1) = 0$

$\boxed{x = 6} \quad x = -\frac{1}{3}$

Solve by taking square roots

5) $2(x-3)^2 + 10 = 24$

$\quad -10 \quad -10$

$\dfrac{2(x-3)^2}{2} = \dfrac{14}{2}$

$(x-3)^2 = 7$

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

$\boxed{x = \pm\sqrt{7} + 3}$

6) $35 = 5x^2 - 15$

$\quad +15 \qquad +15$

$\dfrac{50}{5} = \dfrac{5x^2}{5}$

$10 = x^2$

$\boxed{x = \pm\sqrt{10}}$

Solve by using the quadratic formula

7) $x^2 + 3x + 1 = 0$

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

$\boxed{x = \dfrac{-3 \pm \sqrt{5}}{2}}$

8) $2x^2 - 28x - 4 = 0$

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

$x = \dfrac{28 \pm \sqrt{36}}{4}$

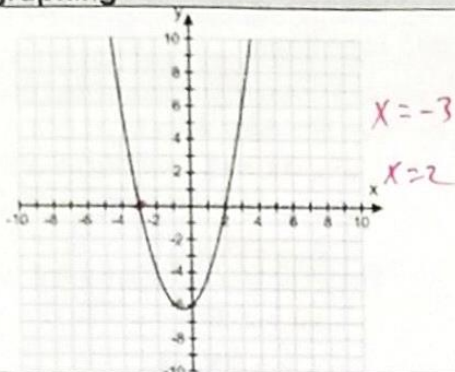$x = \dfrac{28 \pm 6}{4} \quad\nearrow\quad \dfrac{28+6}{4} = \boxed{8.5}$
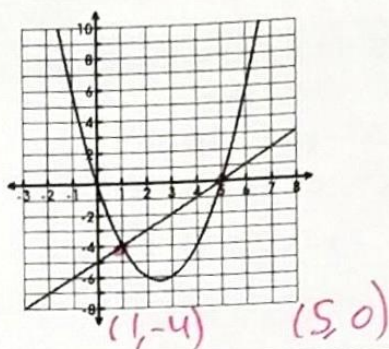
$\qquad\qquad \searrow \dfrac{28-6}{4} = \boxed{5.5}$

Solve by graphing

9)

$X = -3$

$X = 2$

10)

$(1, -4)$ $(5, 0)$

Application problems

11) A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into lake after exploding at its maximum height. The rocket's height above the surface of the lake is given by $h(t) = -16t^2 + 64t + 80$.

a. What is the height of the rocker after 3 seconds?

$h(3) = -16(3)^2 + 64(3) + 80$

$h = 128$ FEET

b. After how many seconds after it is launched will the rocket hit the lake?

$0 = -16t^2 + 64t + 80$

5 SECONDS TO HIT THE LAKE

$X = \dfrac{-64 \pm \sqrt{(64)^2 - 4(-16)(80)}}{2(-16)}$

$X = \dfrac{-64 \pm \sqrt{9216}}{-32}$

$X = \dfrac{-64 \pm 96}{-32}$

$\dfrac{-64 + 96}{-32} = -1$

$\dfrac{-64 - 96}{-32} = 5$

c.

C. HOW MANY SECONDS WILL IT TAKE FOR THE ROCKET TO BE 50 feet above the surface of the lake?

$50 = -16t^2 + 64t + 80$
$-50 \qquad\qquad\qquad -50$

$0 = -16t^2 + 64t + 30$

IT WILL BE AT 50 FEET ABOVE THE LAKE AT AROUND 4.4 SECONDS

$X = \dfrac{-64 \pm \sqrt{(64)^2 - 4(-16)(30)}}{2(-32)}$

$X = \dfrac{-64 \pm \sqrt{6016}}{-32}$

$X = \dfrac{-64 \pm 77.6}{-32}$

$\dfrac{-64 + 77.6}{-32} \approx -.43$

$\dfrac{-64 - 77.6}{-32} \approx 4.4$