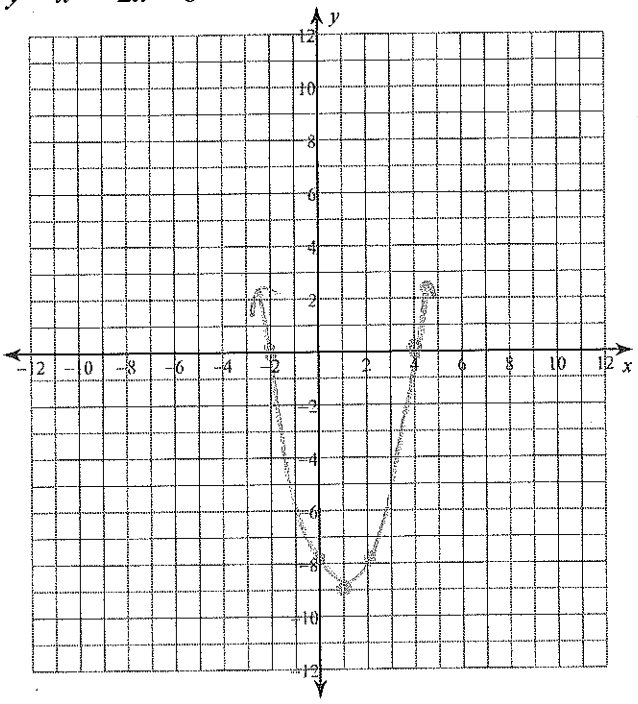
Algebra 2 Name_____ ID: 1

4.3 Solving Quadratic Functions Homework

Sketch the graph of each function. Be sure to have 5 critical points, label the axis of symmetry, vertex, y-intercept and x-intercepts.

1) $y = x^2 - 2x - 8$



Axis of symmetry: $\frac{2}{2}$ $x = 1$

Vertex: $(1, -9)$

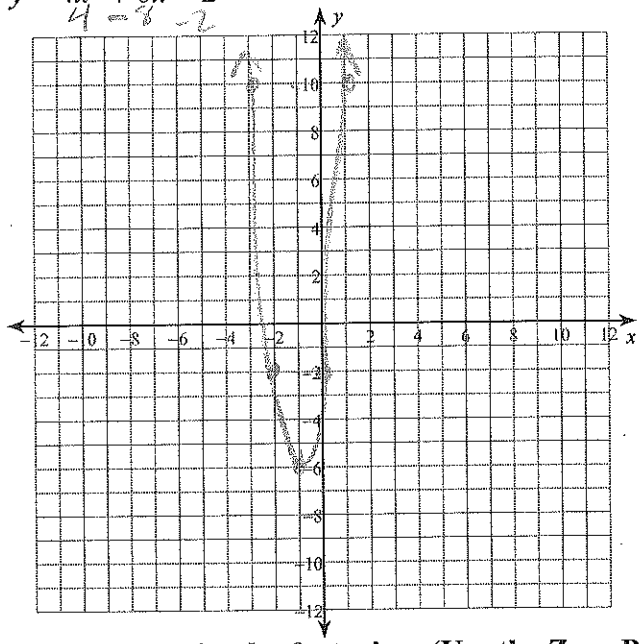
y-intercept: $(0, -8)$

x-intercept: $(x-4)(x+2) = 0$
$(4,0)$ $(-2,0)$

other point) $(2, -8)$

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

4 −8 −2



Axis of symmetry: $\frac{-8}{2(4)}$ $x = -1$

vertex: $(-1, -6)$

y-intercept: $(0, -2)$

x-intercept:

other points:
$(-2, -2)$
$(1, 10)$

Solve each equation by factoring. (Use the Zero Product Property)

3) $2x^2 + 5x = 12$

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

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

$x = \frac{3}{2}$	$x = -4$

4) $7b^2 + 35b = -28$

$7b^2 + 35b + 28 = 0$

$7(b^2 + 5b + 4) = 0$

$7(b + 4)(b + 1) = 0$

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

Solve each equation by taking square roots.

5) $4x^2 + 9 = 205$

$-9 \quad -9$

$\frac{4x^2}{4} = \frac{196}{4}$

$x^2 = 49$

$\sqrt{x^2} = \sqrt{49}$

$\boxed{x = \pm 7}$

6) $x^2 + 6 = 2$

$-6 \quad -6$

$x^2 = -4$

$\sqrt{x^2} = \sqrt{-4}$

no real solution

7) $\frac{5(m-8)^2}{5} = \frac{125}{5}$

$(m-8)^2 = 25$

$\sqrt{(m-8)^2} = \sqrt{25}$

$m - 8 = \pm 5$

$m - 8 = 5 \qquad m - 8 = -5$

$\boxed{m = 13 \quad | \quad m = 3}$

8) $(2x-3)^2 - 8 = 41$

$+8 \quad +8$

$(2x-3)^2 = 49$

$\sqrt{(2x-3)^2} = \sqrt{49}$

$2x - 3 = \pm 7$

$2x - 3 = 7 \qquad 2x - 3 = -7$

$2x = 10 \qquad +3 \quad +3$

$2x = -4$

$\boxed{x = 5 \quad | \quad x = -2}$

Solve each equation with the quadratic formula. Round your answet to the nearest hundredth.

9) $2x^2 - 75 = -5x$

$2x^2 + 5x - 75 = 0$

$a = 2$

$b = 5$

$c = -75$

$\frac{-5 \pm \sqrt{(5)^2 - 4(2)(-75)}}{2(2)}$

$\frac{-5 \pm \sqrt{625}}{4}$

$\frac{-5 \pm 25}{4}$

$\frac{-5+25}{4} \qquad \frac{-5-25}{4}$

$\frac{20}{4} \qquad \frac{-30}{4}$

$\boxed{5 \quad | \quad -7.5}$

10) $2n^2 - 3n = 14$

$2n^2 - 3n - 14 = 0$

$a = 2$

$b = -3$

$c = -14$

$\frac{3 \pm \sqrt{(-3)^2 - 4(2)(-14)}}{2(2)}$

$\frac{3 \pm \sqrt{121}}{4}$

$\frac{3 \pm 11}{4}$

$\frac{3+11}{4} \qquad \frac{3-11}{4}$

$\frac{14}{4} \qquad \frac{-8}{4}$

$\boxed{3.5 \quad | \quad -2}$

Quadratic Application Problems

11. The height of a flare can be approximated by the function $h = -16t^2 + 95t + 6$, where h is the height in feet and t is the time in seconds. Find the time it takes the flare to hit the ground.

↳ height = 0

$0 = -16t^2 + 95t + 6$

$0 = -1(16t^2 - 95t - 6)$

$0 = -1(4t \quad)(4t \quad)$

$(8t \quad)(2t \quad)$

$(16t + 1)(1t - 6)$

$t = -1/16 \qquad t = 6$ → 6 seconds

12. A tree box is 48 feet above its fairway. Starting with an initial elevation of 48 feet at the tree box and an initial velocity of 32 ft/s, the quadratic equation $0 = -16t^2 + 32t + 48$ gives the time t in seconds when a golf ball is at height 0 feet on the fairway.

(a) Solve the quadratic equation by factoring to see how long the ball is in the air.

$0 = -16(t^2 - 2t - 3)$

$0 = -16(t - 3)(t + 1)$

$t = 3 \qquad t = -1$ → 3 seconds

(b) What is the height of the ball at 1 second? (just replace the t in the original function with 1)

$-16(1)^2 + 32(1) + 48$

$-16 + 32 + 48$

$16 + 48$

64 feet

(c) Is the ball at its maximum height at 1 second? Explain

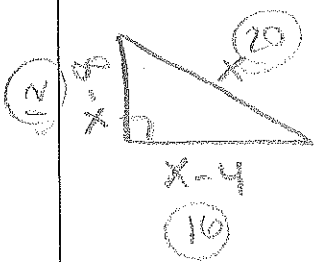
maximum height = vertex

vertex = (1, 64)

t h

Yes the vertex is (1 second, 64 feet)

13. The legs of a right triangle have lengths (x – 4) units and (x – 8) units. The hypotenuse has a length of x units. What is the value of the perimeter of the right triangle. Hint: Apply the Pythagorean Theorem and Factor!



$(x-8)^2 + (x-4)^2 = x^2$

$(x-8)(x-8) + (x-4)(x-4) = x^2$

$x^2 - 16x + 64 + x^2 - 8x + 16 = x^2$

$2x^2 - 24x + 80 = x^2$

$-x^2 \qquad -x^2$

$x^2 - 24x + 80 = 0$

$(x - 4)(x - 20) = 0$

$x = 4 \qquad x = 20$

$20 + 12 + 16$

48 units