

Name: Answer Key
Serafino • Algebra II

Per: _____ Date: _____

3A, B, C Quadratics in Vertex & Standard Form

Putting it all together

Fill in the table below. WRITE NEATLY & draw a box around final answers.

	Standard form	Vertex Form	Vertex	x-intercept(s)
1.	$y = -\frac{1}{4}x^2 - x + 1$	$y = \frac{1}{4}(x - 2)^2$	$(2, 0)$	$(2, 0)$
2.	$y = 2x^2 - 8x + 4$	$y = 2(x - 2)^2 - 4$	$(2, -4)$	$(2 + \sqrt{2}, 0)$ $(2 - \sqrt{2}, 0)$
3.	$y = -2x^2 + 16x - 24$	$y = -2(x - 4)^2 + 8$	$(4, 8)$	2 and <u>6</u> $(2, 0)$ $(6, 0)$

4. a. If AOS is $x = 5$, the x-intercepts are

$5 - \sqrt{3}$ and $5 + \sqrt{3}$

b. If vertex is $(-2, 6)$, x-intercepts are

1 and -5

5. Write the standard form equation of the parabola that goes through the points $(-1, -12)$, $(2, -6)$, $(4, -12)$. If you use a calculator, show what you typed in.

Quad Reg

$$\begin{array}{r|l} -1 & -12 \\ 2 & -6 \\ 4 & -12 \end{array}$$

RREF $\begin{bmatrix} 1 & -1 & 1 & -12 \\ 4 & 2 & 1 & -6 \\ 16 & 4 & 1 & -12 \end{bmatrix}$

$y = -x^2 + 3x - 8$

Using factoring to solving ququatics (sort of systems...ish...)

1. $24x^2 = x + 3$

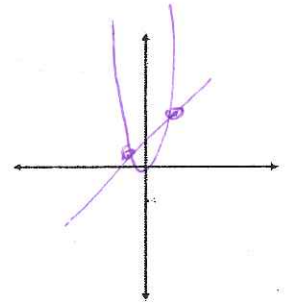
~~ATA~~

$$24x^2 - x - 3 = 0$$

$$(24x - 9)(24x + 8)$$

$$(8x - 3)(3x + 1) = 0$$

$$\boxed{x = \frac{3}{8}, -\frac{1}{3}}$$

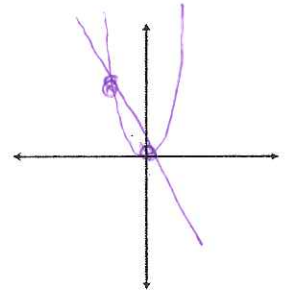


2. $4x^2 = -6x$

$$4x^2 + 6x = 0$$

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

$$\boxed{x = -\frac{3}{2}, 0}$$



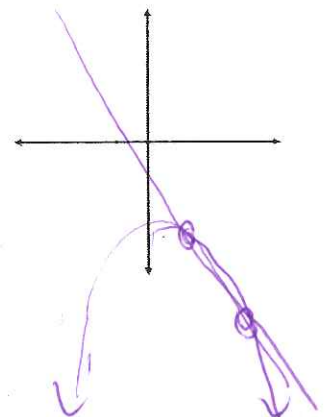
3. $-3x^2 - 45 = -24x$

$$-3x^2 + 24x - 45 = 0$$

$$-3(x^2 - 8x + 15)$$

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

$$\boxed{x = 5, 3}$$



Applications of Factoring

- 1) The population of a city is going to experience a dip. It is estimated that t years from now the population of a particular city will be $P = t^2 - 24t + 96000$.

a) How many people live in the city now?

$$96,000 \quad P(0) = 96000$$

b) What year(s) will it be when the will be exactly 95,865?

$$t^2 - 24t + 96000 = 95865$$

$$t = 9, 15$$

9 yers, 15 yers from now, so 2023, 2029

c) In what year will the city's population be at it's lowest point?

$$\frac{-b}{2a} = \frac{24}{2} = 12$$

12 yers from now, so 2026

- 2) The height above ground h (in feet) of a toy rocket, t seconds after it is launched, is given by $h(t) = -16t^2 + 160t$.

a) How seconds will the rocket be off the ground?

$$-16t^2 + 160t = 0$$

$$-16t(t - 10) = 0$$

10 seconds

b) How high does your rocket go?

$$\frac{-b}{2a} = 5$$

400 ft

$$h(5) = 400$$

- c) The manufacturer issues a warning that the rocket may explode at altitudes higher than 144ft. For what interval of time will everyone be nervous about the rocket exploding?

$$144 = -16t^2 + 160t$$

$$16t^2 - 160t + 144 = 0$$

$$16(t^2 - 10t + 9)$$

$$(t - 9)(t - 1)$$

$$t = 1, 9$$

From $t=1$ to $t=9$
so 8 seconds





6. You do some research and learn that the smell of Rosemary helps boost learning, retention, and memory. This gives you a business idea! You want to go on the show Shark Tank to pitch your idea of rosemary-scented school supplies – and your first product will be erasers.

A. In your preparation, you figure out that the model that represents your monthly production cost, C in thousands, to make n erasers, in thousands, is: $C(n) = 0.04n^2 - 4.56n + 253$

- i. What will your monthly cost be if you make no erasers?

$$C(0) = 253 \quad \text{so } \$253,000$$

- ii. What will your monthly cost be if you make 12,000 erasers?

$$C(12) = 204 \quad \text{so } \$204,000$$

- iii. How many erasers must you make to minimize your monthly cost?

$$n = \frac{-b}{2a} = 57 \quad \text{so } 57,000 \text{ erasers}$$

- iv. What is the lowest possible monthly cost?

$$C(57) = 123 \quad \text{so } \$123,000$$

B. You need to figure out how much to charge for each eraser so that you maximize your revenue. If the eraser is too cheap or too expensive, people won't buy it. Based on your research you see the model that represents your monthly revenue, R , in thousands, based on the price of each eraser, p , in cents, is $R(p) = -0.06p^2 + 9p$

- v. How much money will you make if your eraser is free?

$$R(0) = 0 \quad \text{so } \$0 \text{ no money!}$$

- vi. How much money will you make if each eraser is \$0.25?

$$R(25) = 187 \quad \text{so } \$187,500$$

- vii. How much money will you make if each eraser is \$1?

$$R(100) = 300 \quad \text{so } \$300,000$$

- viii. What should you price each eraser to maximize your revenue?

$$\frac{-b}{2a} = 75 \quad \text{so } 75 \text{ cents}$$

Bonus: If you maximize your revenue and minimize your costs, how much money could you make in one month?

$$\begin{array}{r} 337,500 \\ - 123,000 \\ \hline \$214,500 \end{array}$$