

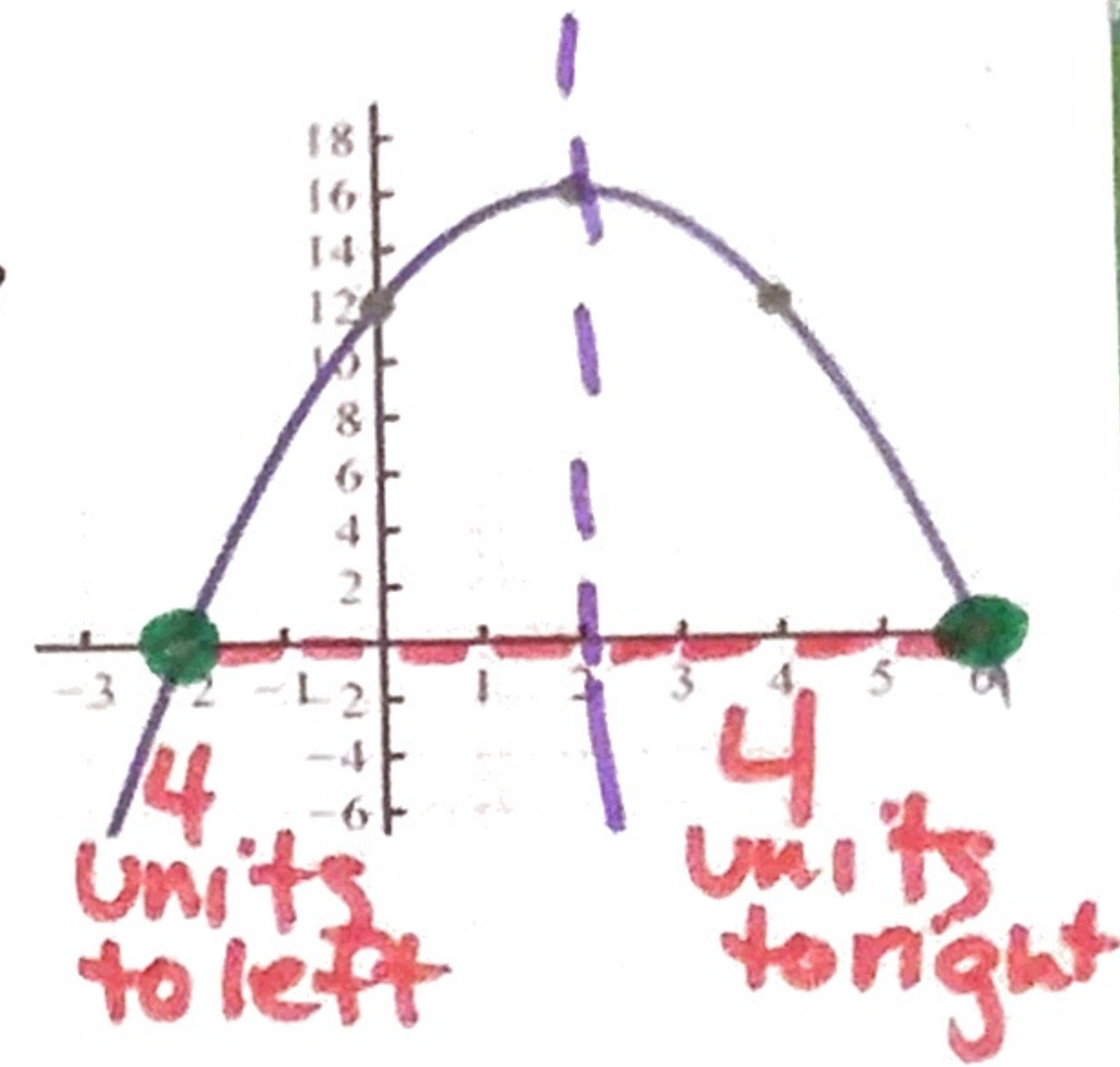
**Unit 7B Day 19: Finding the solutions in standard form**

Focus Question: How do I solve a quadratic in standard form?

A. Review the last two lessons

1. What is the relationship between the axis of symmetry and the solutions?

*The a.o.s. is half way (or equidistant to) the solutions*



2. How did we find the axis of symmetry in standard form?

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

3. How did we find the types of solutions in standard form?

$$b^2 - 4ac$$

B. Quadratics written in standard form can always be solved using the **quadratic formula**. (We'll derive it after we can complete the square.)

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

How am I going to remember that?????

1) The one your math teacher suggests you learn: <http://viewpure.com/08ezDEk3rCg>

### The Quadratic Formula Song

Song is sung to the tune of pop goes the weasel.

Don't like those??????

- 2) Journey fan? Watch on your own time: [http://viewpure.com/VqU\\_2y77\\_el](http://viewpure.com/VqU_2y77_el)
- 3) Adele fan? Watch on your own time: <http://viewpure.com/z6hCu0EPs-o>
- 4) 1-D fan? Own time: <https://www.youtube.com/watch?v=-gwz6d9NYz0> (start at 1:20)

Why do I need it in the first place? I'll just do it like the others.

Solve:  $f(x) = x^2 - 4x - 6$

$$\begin{array}{r} 0 = x^2 - 4x - 6 \\ \quad \uparrow \quad \quad \uparrow \\ \quad +6 \quad \quad +6 \\ \hline 6 = x^2 - 4x \end{array}$$

1. Why can't you just reverse PEMDAS?

*you get stuck*



$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\textcircled{1} f(x) = x^2 - 4x - 6$$

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

$$a = 1$$

$$b = -4$$

$$c = -6$$

$$b^2 - 4ac$$

$$(-4)^2 - 4(1)(-6)$$

$$16 + 24$$

$$40$$

$$x = \frac{-(-4) \pm \sqrt{40}}{2(1)}$$

$$x = \frac{4 \pm 2\sqrt{10}}{2}$$

$$\frac{\sqrt{40}}{2\sqrt{10}}$$

$$x = \frac{4}{2} \pm \frac{2\sqrt{10}}{2}$$

$$\boxed{x = 2 \pm \sqrt{10}} \text{ exact}$$

$$x \approx 2 + 3.16 \text{ or } x \approx 2 - 3.16$$

$$x \approx 5.16$$

$$x \approx -1.16$$

$$\textcircled{2} g(x) = \frac{1}{3}x^2 - 7x - 9$$

$$0 = \frac{1}{3}x^2 - 7x - 9$$

$$a = \frac{1}{3}$$

$$b = -7$$

$$c = -9$$

$$b^2 - 4ac$$

$$(-7)^2 - 4\left(\frac{1}{3}\right)(-9)$$

$$49 + 12$$

$$61$$

$$x = \frac{-(-7) \pm \sqrt{61}}{2\left(\frac{1}{3}\right)}$$

$$x = \frac{7 \pm \sqrt{61}}{\frac{2}{3}}$$

$$x = \frac{3}{2} (7 \pm \sqrt{61})$$

$$x = \frac{21}{2} \pm \frac{3\sqrt{61}}{2}$$

$$x \approx \frac{21 + 23.43}{2} \approx 22.215$$

$$x \approx \frac{21 - 23.43}{2} \approx -1.215$$

$$\boxed{x = \frac{21 \pm 3\sqrt{61}}{2}} \text{ exact}$$



$$\textcircled{3} h(x) = 5x^2 - 4x + 1$$

$$0 = 5x^2 - 4x + 1$$

$$a = 5$$

$$b = -4$$

$$c = 1$$

$$b^2 - 4ac$$

$$(-4)^2 - 4(5)(1)$$

$$16 - 20$$

$$-4$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

$$x = \frac{4 \pm 2i}{10}$$

$$\frac{\sqrt{-4}}{2i}$$

$$x = \frac{4}{10} \pm \frac{2i}{10}$$

$$x = \frac{2}{5} \pm \frac{1i}{5}$$

$$x = \frac{2 \pm i}{5}$$



$$\textcircled{4} j(x) = x^2 - 2x - 24$$

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

$$a = 1$$

$$b = -2$$

$$c = -24$$

$$b^2 - 4ac$$

$$(-2)^2 - 4(1)(-24)$$

$$4 + 96$$

$$100$$

$$x = \frac{-(-2) \pm \sqrt{100}}{2(1)}$$

$$x = \frac{2 \pm 10}{2}$$

$$2$$

$$x = \frac{2+10}{2}$$

$$x = 13/2$$

$$x = 6$$

$$\text{or } x = \frac{2-10}{2}$$

$$x = -8/2$$

$$x = -4$$

$$(6, 0)$$
$$(-4, 0)$$