Complete the Square I
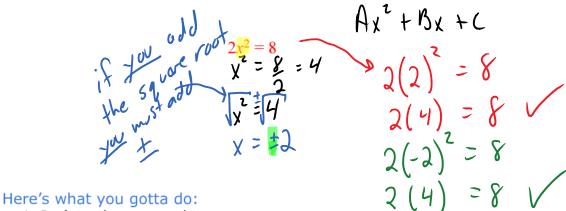
Completing the Square:

It's baaaack...

If you have an equation that does not have an x term, only an x^2 term, we can take the square root and solve directly.

$$Ax^2 + Bx + C$$

if you add the square root you must add ±

$$2x^2 = 8$$
$$x^2 = \frac{8}{2} = 4$$
$$\sqrt{x^2} = \pm\sqrt{4}$$
$$x = \pm 2$$

$$2(2)^2 = 8$$
$$2(4) = 8 \checkmark$$
$$2(-2)^2 = 8$$
$$2(4) = 8 \checkmark$$

Here's what you gotta do:
1. Isolate the squared term.
2. Square root both sides
   ➢ Remember if you add the square root there are two possible answers ± must be taken into account.
3. Solve it.

$$18 - 5x^2 = -27$$
$$-5x^2 = -27 - 18$$
$$x^2 = \frac{-27 - 18}{-5}$$
$$\sqrt{x^2} = \pm\sqrt{9}$$
$$x = \pm 3$$

$$(2x+3)^2 - 25 = 0$$

$$\sqrt{(2x+3)^2} = \pm\sqrt{25}$$

$$2x+3 = \pm 5$$

$$2x+3 = 5 \quad \text{or} \quad 2x+3 = -5$$

$$2x = 5-3 \qquad\qquad 2x = -5-3$$

$$x = \frac{5-3}{2} = 1 \qquad x = \frac{-5-3}{2} = -4$$

Does this look familiar?

$$(x+3)^2 - 9 = 0$$

$$\sqrt{(x+3)^2} = \pm\sqrt{9}$$

$$x+3 = \pm 3$$

$$x+3 = 3 \quad \text{or} \quad x+3 = -3$$

$$x = 3-3 \qquad\qquad x = -3-3$$

$$= 0 \qquad\qquad\qquad = -6$$

You do these two:

$x^2 + 9 = 0$	$3x^2 = 8$
D.N.E.	$\sqrt{x^2} = \pm\sqrt{\dfrac{8}{3}}$
	$x = \pm\dfrac{\sqrt{8}}{\sqrt{3}} = \dfrac{\sqrt{2\cdot2\cdot2}}{\sqrt{3}} = \dfrac{\sqrt{4}\sqrt{2}}{\sqrt{3}}$
	$= \pm\dfrac{2\sqrt{2}}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}}$
	$= \pm\dfrac{2\sqrt{2}\sqrt{3}}{\sqrt{3}\cdot\sqrt{3}} = \pm\dfrac{2\sqrt{6}}{3}$

$$\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$= \frac{\sqrt{2}}{\sqrt{2\cdot2}} = \frac{\sqrt{2}}{2}$$

$$\frac{3x^2 - 2}{6} = 0 \qquad 3x^2 - 2 = 0$$

$$3x^2 = 2$$

$$\sqrt{x^2} = \pm\sqrt{\frac{2}{3}}$$

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

$$= \pm\frac{\sqrt{2}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \pm\frac{\sqrt{6}}{3}$$

Given the roots, find the equation:

$$(x)^2 (\pm\sqrt{5})^2$$

$$x^2 = 5$$

$$x^2 - 5 = 0$$

$$(3x - 2)(3x - 2)$$

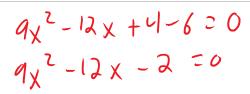$$x = \frac{2 \pm \sqrt{6}}{3}$$

$$3x = 2 \pm \sqrt{6}$$

$$(3x - 2)^2 = (\pm\sqrt{6})^2$$

$$(3x - 2)^2 = 6$$

$$9x^2 - 6x - 6x + 4 = 6$$

$$9x^2 - 12x + 4 - 6 = 0$$
$$9x^2 - 12x - 2 = 0$$

HW: pg240
#4,5ace,13,18