Completing the $\boxed{\text{square}}$

$ax^2+bx+c=0$

WHY?

This method allows us to use the square root method to solve quadratics that cannot be rewritten as $ax^2=c$.

HOW?

Rearrange your equation so it looks like:

$x^2+bx \quad =c$

$x^2+bx+\square=c+\square$

If a ≠ 1, divide every term by a.

In the squares, write $\left(\frac{b}{2}\right)^2$.

Now, you can rewrite the left side as $\left(x+\frac{b}{2}\right)^2$.

* If b is negative $\left(x-\frac{b}{2}\right)^2$

Take the square root of each side. Don't forget the $\pm$.

Solve for x.

EXAMPLE:

Solve by completing the square.

ex1 $x^2+6x=5$

$\left(\frac{6}{2}\right)^2=(3)^2=9$

$x^2+6x\boxed{+9}=5\boxed{+9}$

x^2+6x+9
mult. 9
Add 6
$(x+3)(x+3)$

$(x+3)^2=14$

$\sqrt{(x+3)^2}=\sqrt{14}$

$x+3=\pm\sqrt{14}$
$-3 \quad -3$

$x=-3\pm\sqrt{14}$

ex2 $x^2+8x+9=0$

$$-9 \quad -9$$

$$x^2+8x = -9$$

$$\left(\frac{8}{2}\right)^2 = (4)^2 = 16$$

$$x^2+8x\boxed{+16} = -9\boxed{+16}$$

$$(x+4)^2 = 7$$

$$\sqrt{(x+4)^2} = \sqrt{7}$$

$$x+4 = \pm\sqrt{7}$$

$$-4 \quad -4$$

$$x = -4 \pm \sqrt{7}$$

ex 3 $\dfrac{\boxed{2}x^2}{2} + \dfrac{24x}{2} = \dfrac{26}{2}$

$$x^2 + 12x = 13$$

$$\left(\frac{12}{2}\right)^2 = (6)^2 = 36$$

$$x^2 + 12x \boxed{+36} = 13 \boxed{+36}$$

$$(x+6)^2 = 49$$

$$\sqrt{(x+6)^2} = \sqrt{49}$$

$$x+6 = \pm 7$$

$x+6 = 7$ $\qquad$ $x+6 = -7$

$-6 \quad -6$ $\qquad$ $-6 \quad -6$

$$\boxed{x = 1 \qquad x = -13}$$

ex 4. $x^2 - 7x \quad = 8$

$\left(\frac{-7}{2}\right)^2 = (-3.5)^2 = 12.25$

$x^2 - 7x \boxed{+12.25} = 8 + \boxed{12.25}$

$(x - 3.5)^2 = 20.25$

$x - 3.5 = \pm\sqrt{20.25}$

$+3.5 \quad +3.5$

$x = 3.5 \pm \sqrt{20.25}$

3.5 ± 4.5

$3.5 + 4.5 \qquad 3.5 - 4.5$

$x = 8 \qquad x = -1$

$x^2 + 10x + \_\_\_\_\_$

$\left(\frac{10}{2}\right)^2 = 25$

$(x+5)^2$