CTS Fun!

$a=1$ $x^2+bx+c=0$

CTS

Steps:

1. add in parenthesis & blanks
2. in the blanks goes $\left(\frac{b}{2}\right)^2$
3. factor the parenthesis & combine like terms
4. solve if necessary

ex. 1: put into vertex form & find the vertex $y=x^2+10x-7$

① $y=(x^2+10x+\_\_)-\_\_-7$

② $y=(x^2+10x+25)-25-7$

③ $y=(x+5)(x+5)-32$

$y=(x+5)^2-32$ ✓

V: $(-5,-32)$ min

ex. 2: solve by completing the square $0=x^2-8x+2$

① $0=(x^2-8x+\_\_)-\_\_+2$

② $0=(x^2-8x+16)-16+2$

③ $0=(x-4)^2-14$

$14=(x-4)^2$

④ $\pm\sqrt{14}=x-4$

$4\pm\sqrt{14}=x$

$a\neq1$ ax^2+bx+c

Steps:

1. divide the a-value out of the x^2 & x only!
2. add in parenthesis & blanks
3. in the blank in the parenthesis goes $\left(\frac{b}{2}\right)^2$
4. the other blank is $a\cdot\left(\frac{b}{2}\right)^2$
5. factor the parenthesis & combine like terms
6. solve if necessary

ex. 3: put into vertex form $y=3x^2+18x-7$

①② $y=3(x^2+\underset{b}{6}x+\_\_)-\_\_-7$

$\left(\frac{b}{2}\right)^2$ $\left(\frac{b}{2}\right)^2\cdot a$

③④ $y=3(x^2+6x+9)-27-7$

⑤ $y=3(x+3)(x+3)-34$

$y=3(x+3)^2-34$ ✓

V: $(-3,-34)$

More examples!!

Put the following into vertex form & name the vertex.

1. $y = -2x^2 + 12x - 5$

$y = -2(x^2 - 6x + \_\_) - \_\_ - 5$

$y = -2(x^2 - 6x + 9) - 18 - 5$

$y = -2(x-3)^2 + 18 - 5$

$y = -2(x-3)^2 + 13$

$V: (3, 13)$ max

2. $y = 4x^2 + 32x + 17$

$y = 4(x^2 + 8x + \_\_) - \_\_ + 17$

$y = 4(x^2 + 8x + 16) - 64 + 17$

$y = 4(x+4)(x+4) - 47$

$y = 4(x+4)^2 - 47$

$V: (-4, -47)$ min

Solve for x by completing the square

3. $x^2 + 40 = 4x$

4. $-3x^2 - 24x - 156 = 0$

5. $2x^2 - 4x - 14 = 50$

6. $4x^2 - 7x + 44 = 3x^2 + x$

$-3x^2 \quad -x \qquad -3x^2 \quad -x$

$x^2 - 8x + 44 = 0$

$(x^2 - 8x + 16) - 16 + 44 = 0$

$(x-4)^2 + 28 = 0$

$\sqrt{(x-4)^2} = \sqrt{-28}$

$x - 4 = \pm\sqrt{-28}$

$x = 4 \pm \sqrt{-28}$ $\sqrt{4}\sqrt{7}\sqrt{-1}$

$x = 4 \pm 2i\sqrt{7}$ $\sqrt{4}\sqrt{7}$