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Vertex Form

Type 1

There is only one x within squared bracect

Step 1: Factor out #'s with "x"

Step 2: Get "y" alone

Ex 1: $2y+4=(3x+6)^2$

$$2y+4=[3(x+2)]^2$$

$$2y=[3(x+2)]^2-4$$

$$y=\frac{1}{2}[3(x+2)]^2-2$$

Ex 2: $3(y+2)=(6x-6)^2$

$$3(y+2)=[6(x-1)]^2$$

$$y+2=\frac{1}{3}[6(x-1)]^2$$

$$y=\frac{1}{3}[6(x-1)]^2-2$$

Ex 3: $\frac{1}{3}y + 1 = (3x-4)^2$

$$\frac{1}{3}y + 1 = (3(x - \frac{4}{3}))^2$$

$$\frac{1}{3}y = (3(x - \frac{4}{3}))^2 - 1$$

$$y = 3(3(x - \frac{4}{3}))^2 - 3$$

Ex 4: $6y - 1 = (x+1)^2$

$$6y = (x+1)^2 + 1$$

$$y = \frac{1}{6}(x+1)^2 + \frac{1}{6}$$

Ex 5: $-3y - 2 = (4x+6)^2$

$$y = -\frac{1}{3}[4(x + \frac{3}{2})]^2 - \frac{2}{3}$$

Ex 6: $6(y-1) = (2x-3)^2$

$$y = \frac{1}{6}[2(x - \frac{3}{2})]^2 + 1$$

Type 2 - Complete Square

There is two x's

1. Complete square
2. Put in vertex form
3. Put in $y = a(x-h)^2 + k$

} All means the same.

Step 1: Separate the x's and #'s

$y = 3x^2 + 12x \quad -2$

Step 2: Factor out leading coefficient from x terms

$y = 3(x^2 + 4x \quad) - 2$

Step 3: Complete square inside the bracket, then undo what you've done outside bracket.

half the # then square ($\#^2$) gives you

$y = 3(x^2 + 4x + 4) - 2 - 12$

Step 4: Write as prefect square and simplify

$y = 3(x+2)^2 - 14$

Ex 1: $y = 2x^2 + 8x - 1$

$y = 2(x^2 + 4x \quad) - 1$

$y = 2(x^2 + 4x + 4) - 1 - 8$

$y = 2(x+2)^2 - 9$

Ex 2: $y = -2x^2 + 5x + 1$

$y = -2(x^2 - \frac{5}{2}x \quad) + 1$

$y = -2(x^2 - \frac{5}{2}x + \frac{25}{16}) + 1 + \frac{25}{8}$

$y = -2(x - \frac{5}{4})^2 + \frac{33}{8}$

$\frac{5}{2} \cdot \frac{1}{2} = \frac{5}{4}$