

Converting between the forms (1-3)

#26

1. Convert $y = 3(x+5)(x-4)$ to standard form.
2. Check your answer to #1 by converting it to intercept form.
3. Convert $y = -4x^2 + 16x - 5$ to vertex form.
4. Check your answer to #3 by converting it to standard form.
5. Convert $y = x^2 - 13x + 30$ to intercept form.
6. Check your answer to #5 by converting it to standard form.
7. Convert $y = -(x+8)^2 - 22$ to standard form.
8. Check your answer to #7 by converting it to vertex form.

$$\begin{aligned} \textcircled{1} \quad y &= 3(x+5)(x-4) \\ &= 3(x^2 - 4x + 5x - 20) \\ &= 3(x^2 + x - 20) \\ &= \boxed{3x^2 + 3x - 60} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad y &= 3x^2 + 3x - 60 \\ &+ \underline{15} - \underline{12} = -180 \\ &+ \underline{15} + \underline{-12} = 3 \\ &\therefore y = 3x^2 + 15x - 12x - 60 \end{aligned}$$

	x	5		3x	15	
3x	$3x^2$	$15x$		x	$3x^2$	$15x$
-12	$-12x$	-60		-4	$-4x$	-60

$$\begin{aligned} &= \boxed{y = (3x-12)(x+5)} \\ &= \boxed{y = (x-4)(3x+15)} \end{aligned}$$

$$\begin{aligned} y &= 3(x^2 + x - 20) \\ &- \underline{4} \cdot \underline{5} = -20 \\ &- \underline{4} + \underline{5} = 1 \\ &y = 3(x^2 - 4x + 5x - 20) \end{aligned}$$

	x	-4
x	x^2	$-4x$
5	$5x$	-20

$$\boxed{y = 3(x-4)(x+5)}$$

$$\begin{aligned} \textcircled{3} \quad y &= -4x^2 + 16x - 5 \\ V: (2, 11) \quad x &= \frac{-(-16)}{2(-4)} = \frac{-16}{-8} = 2 \\ h &= 2 \\ k &= 11 \\ a &= -4 \\ y &= -4(2)^2 + 16(2) - 5 \\ &= -16 + 32 - 5 = 11 \\ &= \boxed{y = -4(x-2)^2 + 11} \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad y &= -4(x-2)^2 + 11 \\ &= -4(x-2)(x-2) + 11 \\ &= -4(x^2 - 2x - 2x + 4) + 11 \\ &= -4(x^2 - 4x + 4) + 11 \\ &= -4x^2 + 16x - 16 + 11 \\ &= \boxed{y = -4x^2 + 16x - 5} \end{aligned}$$

$$\textcircled{5} y = x^2 - 13x + 30$$

$$\underline{-10} \cdot \underline{-3} = 30$$

$$\underline{-10} + \underline{-3} = -13$$

$$y = x^2 - 10x - 3x + 30$$

	x	-10
x	x^2	$-10x$
-3	$-3x$	30

$$\textcircled{y = (x-10)(x-3)}$$

$$\textcircled{6} y = (x-10)(x-3)$$

$$= x^2 - 3x - 10x + 30$$

$$\textcircled{y = x^2 - 13x + 30}$$

$$\textcircled{7} y = -(x+8)^2 - 22$$

$$= -(x+8)(x+8) - 22$$

$$= -(x^2 + 8x + 8x + 64) - 22$$

$$= -(x^2 + 16x + 64) - 22$$

$$= -x^2 - 16x - 64 - 22$$

$$\textcircled{y = -x^2 - 16x - 86}$$

$$\textcircled{8} y = -x^2 - 16x - 86$$

$$x = \frac{-(-16)}{2(-1)} = \frac{16}{-2} = -8$$

$$y = -(-8)^2 - 16(-8) - 86$$

$$= -64 + 128 - 86 = -22$$

$$v: (-8, -22)$$

$$h = -8, k = -22, a = -1$$

$$\textcircled{y = -(x+8)^2 - 22}$$