

Area 1

$$f(x) = x^3 \quad [-2, 2]$$

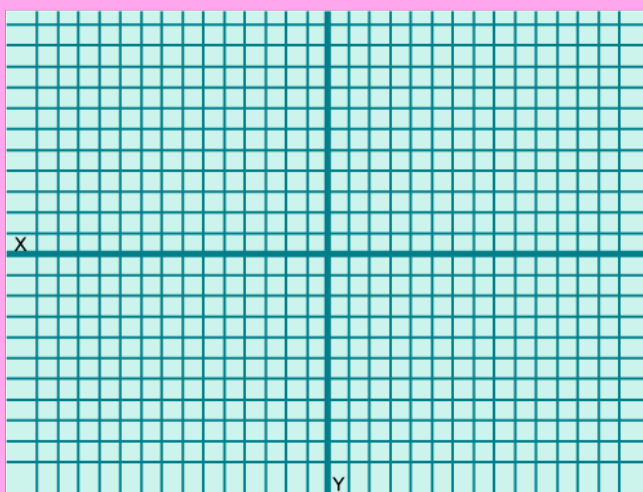
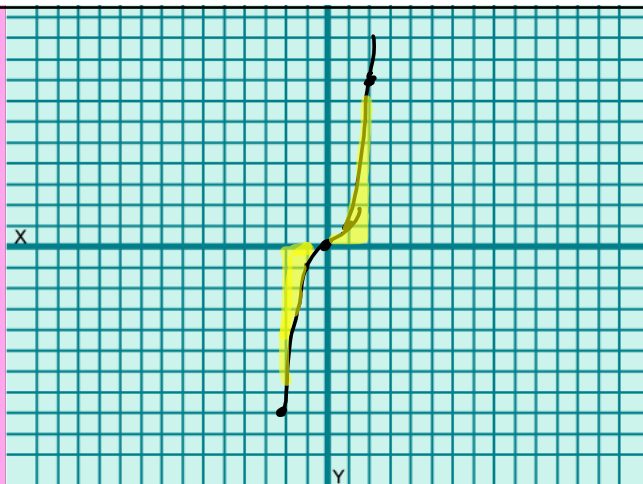
$$\int_{-2}^2 x^3 dx \quad \begin{array}{r|l} 0 & 0 \\ \hline 1 & 1 \\ 2 & 8 \end{array}$$

$$= \left. \frac{x^4}{4} \right|_{-2}^2 = 4 - 4 = 0$$

$$-\int_{-2}^0 x^3 dx + \int_0^2 x^3 dx$$

$$-\left. \frac{x^4}{4} \right|_{-2}^0 + \left. \frac{x^4}{4} \right|_0^2$$

$$0 + 4 + 4 - 0 = 8 \text{ Units}^2$$



$$H(x) = x^2 - 6x + 5 \quad [0, 7]$$

$$\text{Vertex: } x = \frac{-b}{2a} = \frac{6}{2(1)} = 3$$

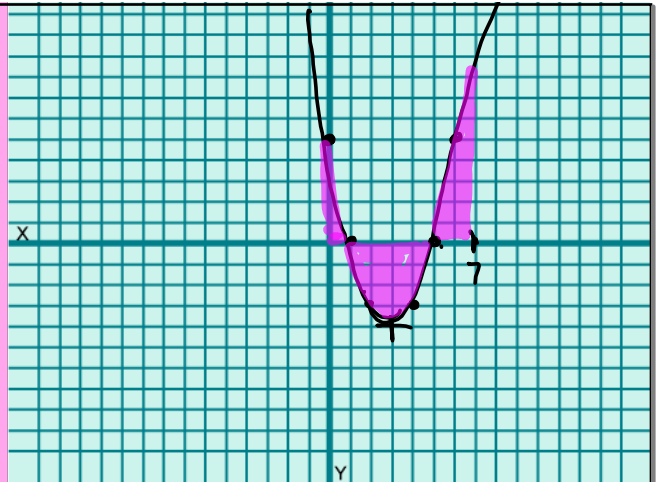
$$y = 3^2 - 6(3) + 5$$

$$= 9 - 18 + 5 \quad (3, -4)$$

$$= -4$$

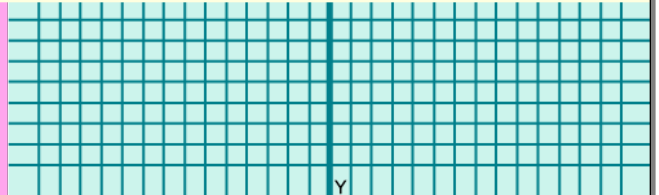
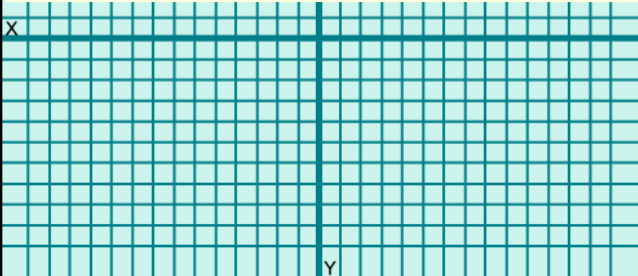
$$y = x^2$$

0	0
1	1
2	4
3	9



$$\int_0^1 (x^2 - 6x + 5) dx - \int_1^5 (x^2 - 6x + 5) dx$$

$$+ \int_5^7 (x^2 - 6x + 5) dx = \frac{71}{3} \text{ Units}^2$$



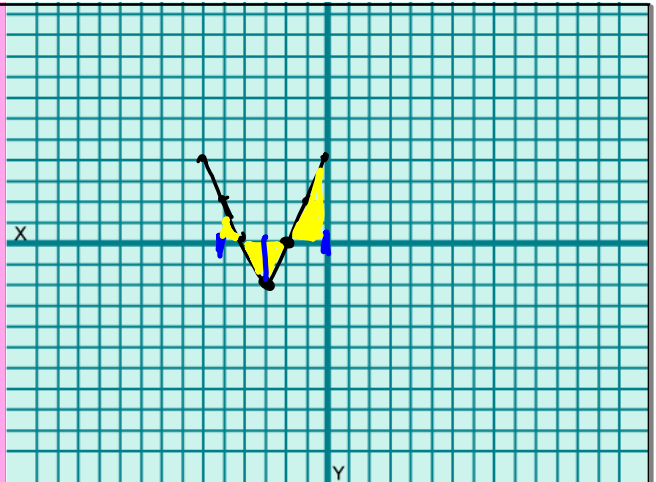
$$f(x) = 2|x+3| - 2 \quad [-5, 0]$$

↑ slope

$$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$

$$2(x+3) - 2 = 2x + 6 - 2 = 2x + 4$$

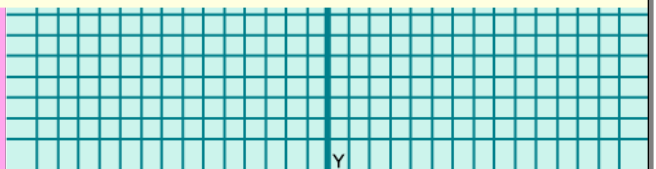
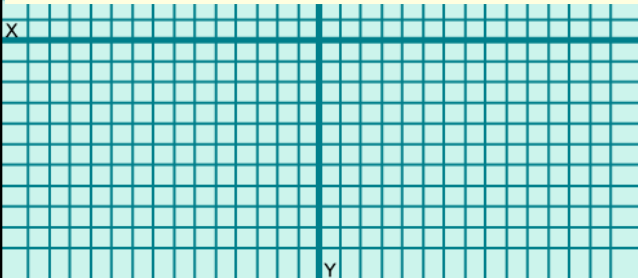
$$-2(x+3) - 2 = -2x - 6 - 2 = -2x - 8$$



$$\int_{-5}^{-4} (-2x-8) dx - \int_{-4}^{-3} (-2x-8) dx$$

$$- \int_{-3}^{-2} (2x+4) dx + \int_{-2}^0 (2x+4) dx$$

$$= 7 \text{ units}^2$$



$$f(x) = \begin{cases} x^2 + 4x + 3 & -3 \leq x \leq 0 \\ x - 2 & 0 < x < 4 \\ \sqrt{8-x} & 4 \leq x \leq 8 \end{cases}$$

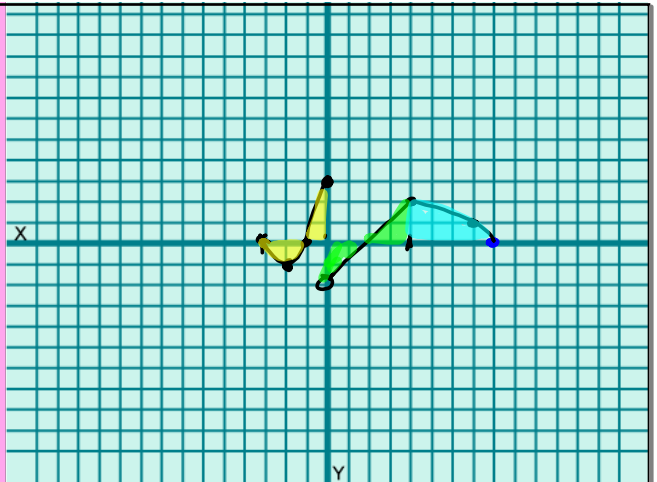
$$[-3, 8]$$

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

$$y = 4 + -8 + 3 = -1$$

$$\begin{array}{r|l} 0 & 0 \\ -1 & 1 \\ -4 & 2 \\ -9 & 3 \end{array}$$

$$\begin{array}{r|l} 0 & 0 \\ 1 & 1 \\ 2 & 4 \end{array}$$



$$\begin{aligned} & -\int_{-3}^{-1} (x^2 + 4x + 3) dx + \int_{-1}^0 (x^2 + 4x + 3) dx \\ & -\int_0^2 (x-2) dx + \int_2^4 (x-2) dx \\ & + \int_4^8 \sqrt{8-x} dx = 12 \text{ units}^2 \end{aligned}$$

