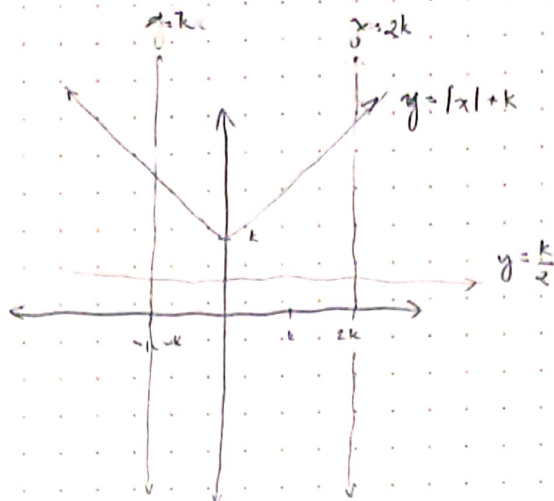


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Question 1.

Solution



$$y = |x| + k = \begin{cases} x + k & \text{if } x \geq 0 \\ -x + k & \text{if } x < 0 \end{cases}, k \in (0, +\infty)$$

$$A = 48 = \int_{-k}^{2k} \left[(|x| + k) - \frac{k}{2} \right] dx$$

$$= \int_{-k}^0 \left(-x + k - \frac{k}{2} \right) dx + \int_0^{2k} \left(x + k - \frac{k}{2} \right) dx$$

$$= \int_{-k}^0 \left(-x + \frac{k}{2} \right) dx + \int_0^{2k} \left(x + \frac{k}{2} \right) dx$$

$$= \left(-\frac{x^2}{2} + \frac{k}{2}x \right) \Big|_{-k}^0 + \left(\frac{x^2}{2} + \frac{k}{2}x \right) \Big|_0^{2k}$$

$$= 0 - \left[\frac{-(-k)^2}{2} + \frac{k}{2}(-k) \right] + \left[\frac{(2k)^2}{2} + \frac{k}{2}(2k) \right] - 0$$

$$= - \left[\frac{-k^2}{2} - \frac{k^2}{2} \right] + (2k^2 + k^2)$$

$$= k^2 + 2k^2 + k^2$$

$$48 = 4k^2$$

$$k^2 = \frac{48}{4} = 12$$

$$k = \sqrt{12} = 2\sqrt{3}$$