

SECTION 5.2: THE DEFINITE INTEGRAL

1. **Definition of the Definite Integral:** (abbreviated)

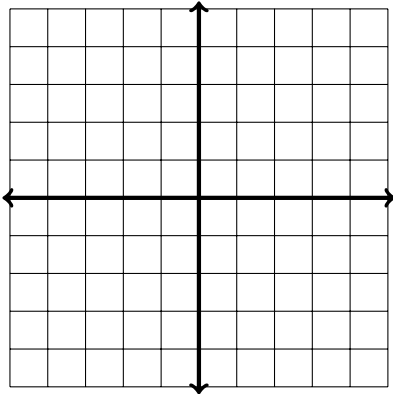
2. Evaluate the definite integrals below using the graph and geometry.

(a) $\int_0^4 (8 - 2x) dx$

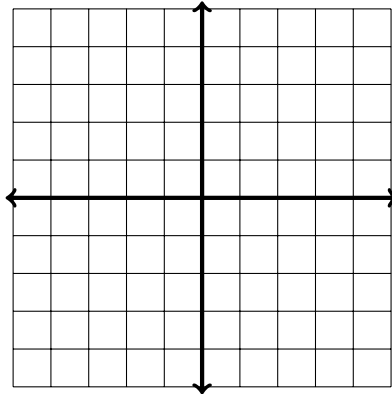
(b) $\int_0^6 (8 - 2x) dx$

3. Evaluate the following definite integrals by drawing the function and interpreting the integral in terms of areas. Shade in the area you are computing with the integral.

(a) $\int_{-\pi}^{\pi} \sin(x) dx = \underline{\hspace{2cm}}$



(b) $\int_{-4}^4 \sqrt{16 - x^2} dx = \underline{\hspace{2cm}}$



4. Definition: average value of a function

Properties of the Definite Integral:

• $\int_a^b f(x) dx =$ _____

• $\int_a^b [f(x) \pm g(x)] dx =$ _____

• $\int_a^a f(x) dx =$ _____

• $\int_a^b f(x) + \int_b^c f(x) dx =$ _____

• $\int_a^b c dx =$ _____

• $\int_b^a f(x) dx =$ _____

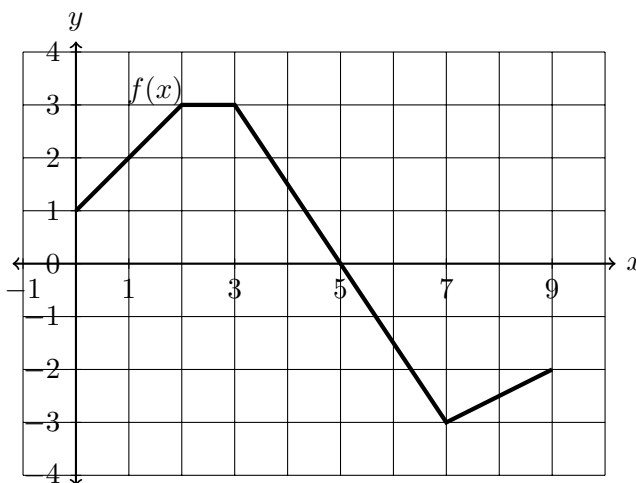
• $\int_a^b cf(x) dx =$ _____

5. The graph of f is shown. Evaluate each integral by interpreting it in terms of areas.

(a) $\int_0^3 8f(x) dx =$

(b) $\int_2^9 f(x) dx =$

(c) $\int_5^3 f(x) dx =$



6. Using the fact that $\int_0^1 x^2 dx = \frac{1}{3}$ and $\int_1^2 x^2 dx = \frac{7}{3}$, evaluate the following using the properties of integrals.

(a) $\int_0^1 5x^2 dx$

(b) $\int_0^1 (4 + 3x^2) dx$

(c) $\int_0^2 x^2 dx$