

$$\int x \cdot \sqrt{a^2 - x^2} \, dx$$

Substitution

$$z = a^2 - x^2$$

$$\frac{dz}{dx} = -2x$$

$$\int -\frac{x}{2x} \sqrt{z} \, dz$$

$$-\frac{1}{2} \int \sqrt{z} \, dz = -\frac{1}{2} \cdot \frac{2}{3} \cdot z^{\frac{3}{2}}$$

Resubstitution

$$-\frac{1}{3} (a^2 - x^2)^{\frac{3}{2}}$$