. Equilateral Triangle: Area and Perimeter

Let x represent the side length of the equilateral triangle.

- **Perimeter**: The perimeter $P(x)$ is:

$$P(x) = 3x$$

- **Area**: The area $A(x)$ is given by:

$$A(x) = \frac{\sqrt{3}}{4}x^2$$

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10. Square: Side Length and Area as Functions of Diagonal Length

Let d represent the diagonal length of the square.

- **Side Length**: From the Pythagorean theorem:

$$s(d) = \frac{d}{\sqrt{2}} = \frac{\sqrt{2}}{2}d$$

- **Area**: Using s^2:

$$A(d) = s^2 = \left(\frac{\sqrt{2}}{2}d\right)^2 = \frac{d^2}{2}$$

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11. Cube: Edge Length, Surface Area, and Volume as Functions of Diagonal

Let d represent the diagonal length of the cube.

- **Edge Length**: Using the diagonal relationship in a cube:

$$e(d) = \frac{d}{\sqrt{3}} = \frac{\sqrt{3}}{3}d$$

- **Surface Area**: The surface area $S(d)$ is:

$$S(d) = 6e^2 = 6\left(\frac{\sqrt{3}}{3}d\right)^2 = 2d^2$$

- **Volume**: The volume $V(d)$ is:

$$V(d) = e^3 = (\frac{\sqrt{3}}{3}d)^3 = \frac{\sqrt{3}}{27}d^3$$

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12. Point P on $f(x) = 2x$: Coordinates as Functions of Slope

Let $P(x, y)$ be a point on $f(x) = 2x$, and let m be the slope of the line joining P to the origin.

- The slope is:

$$m = \frac{y}{x}$$

- Since $y = 2x$, substitute y:

$$m = \frac{2x}{x} = 2$$

- Coordinates of P as functions of m:

$$P(m) = (\frac{m}{2}, m)$$

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13. Distance L from a Point on $2x + 4y = 5$ to the Origin

Let (x, y) lie on the line $2x + 4y = 5$. Solve for y in terms of x:

$$y = \frac{5 - 2x}{4}$$

The distance L from (x, y) to the origin $(0, 0)$ is:

$$L = \sqrt{x^2 + y^2}$$

Substitute $y = \frac{5-2x}{4}$:

$$L(x) = \sqrt{x^2 + (\frac{5 - 2x}{4})^2}$$

Simplify:

$$L(x) = \sqrt{x^2 + \frac{(5-2x)^2}{16}}$$

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14. Distance L from (x, y) on $y = 2x - 3$ to $(4, 0)$

Let (x, y) lie on the line $y = 2x - 3$. Solve for x in terms of y:

$$x = \frac{y+3}{2}$$

The distance L from (x, y) to $(4, 0)$ is:

$$L = \sqrt{(x-4)^2 + y^2}$$

Substitute $x = \frac{y+3}{2}$:

$$L(y) = \sqrt{\left(\frac{y+3}{2} - 4\right)^2 + y^2}$$

Simplify:

$$L(y) = \sqrt{\left(\frac{y+3-8}{2}\right)^2 + y^2}$$

$$L(y) = \sqrt{\left(\frac{y-5}{2}\right)^2 + y^2}$$