

Functions Cheat Sheet

Skutopia the Success Academy

1 1. Understanding Functions

A **function** is a special relationship where:

- Each input (**domain**) has exactly one output (**range**).
- A function is often written as $f(x)$, meaning f is applied to x .

Example: If $f(x) = x^2$, then:

$$f(2) = 2^2 = 4, \quad f(-3) = (-3)^2 = 9$$

2 2. Types of Relationships

- **One-to-One:** Each input has a unique output.
- **Many-to-One:** Multiple inputs give the same output.
- **One-to-Many:** Not a function! (Fails the vertical line test)

3 3. Mapping Functions with Arrow Diagrams

Domain (Input) Range (Output)

$$1 \longrightarrow 2$$

$$2 \longrightarrow 4$$

$$3 \longrightarrow 6$$

This represents: $f(x) = 2x$

4 4. Domain and Range

The **domain** is the set of all possible input values (x), while the **range** is the set of all possible output values (y).

Example: If $f(x) = x^2$ and $x \in \{-2, -1, 0, 1, 2\}$, then:

Domain: $\{-2, -1, 0, 1, 2\}$

Range: $\{0, 1, 4\}$

5 5. Finding a Function from Ordered Pairs

If given a set of ordered pairs, we can determine a function.

Example:

$$\{(1, 2), (2, 4), (3, 6), (4, 8)\}$$

We see that $y = 2x$, so the function is:

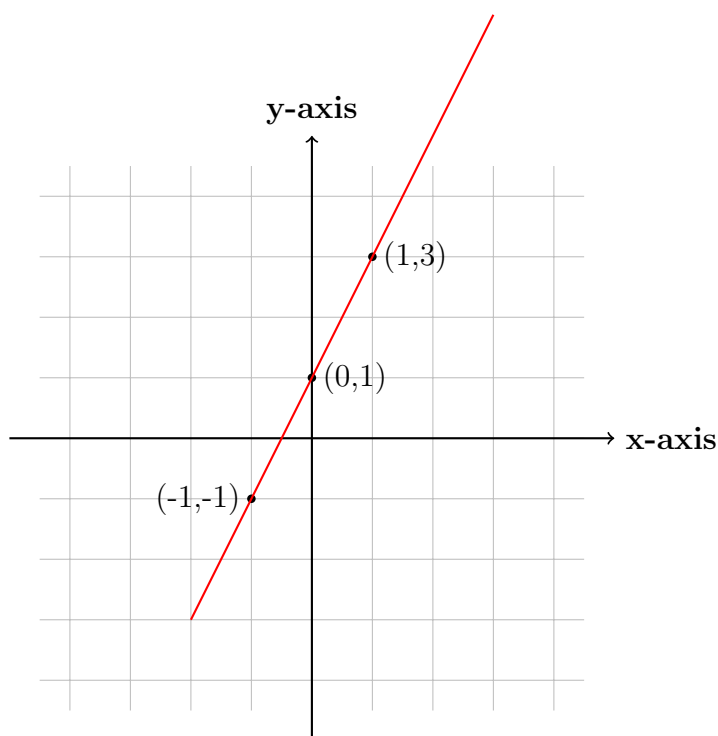
$$f(x) = 2x$$

6 6. Graphing Linear Functions

A function like $y = mx + c$ is a straight line.

Example: Graph $y = 2x + 1$.

- When $x = 0$, $y = 1 \rightarrow (0,1)$
- When $x = 1$, $y = 3 \rightarrow (1,3)$
- When $x = -1$, $y = -1 \rightarrow (-1,-1)$



7 7. Practice Questions

1. Determine if the following sets represent functions:

$$\{(1, 2), (2, 4), (3, 6), (4, 8)\}$$

$$\{(1, 2), (2, 3), (2, 5), (3, 6)\}$$

2. Find the function rule for: $\{(1, 3), (2, 5), (3, 7), (4, 9)\}$.

3. Plot and graph the function $f(x) = -x + 3$.

Functions are the foundation of algebra and calculus! Master them to unlock higher math.