What Kind of Function Is This?

- What is **changing** in this situation?
- What is **staying the same**?
- What is the **input**? What do we control or know?
- What is the **output**? What are we trying to find or measure?
- How do the inputs and outputs **relate**?
- Could we represent this situation with a **table or graph**?
- What **pattern or shape** do we notice when we plot it?
- Can we give this rule a **name**? (**linear**, **exponential**, etc.)
- Why does this type of function make sense for this context?

Function Notation: If $f(x) = 2x + 3$, then $f(4) = 2(4) + 3 = 11$. This is asking: *what is the **output** when the **input** is 4?*

*The **value of the function** is the **output**—looking for the output in a problem helps you know what shape it is.*

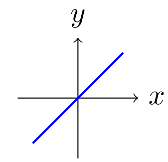
Somewhere along the way, math changed—instead of just finding the missing value or solving for x, we started **modeling problems** and talking about **multiple ways to represent a situation. That shift is what makes Algebra feel harder—and that's exactly what we're going to learn.**

Ask yourself: what's changing, and how? That's the first step.

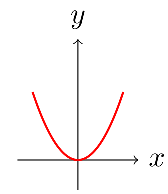
Common Function Types on the Regents

Many Regents Questions:

Linear — Constant rate of change. Used in cost, distance, and table problems.



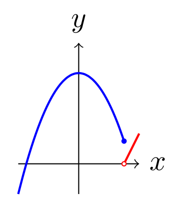
Quadratic — Parabola shape. Used in height, area, and max/min problems.



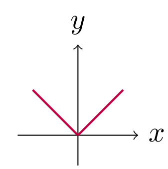
Some Regents Questions:

Piecewise — Different **rules** for different inputs. Graph changes shape.

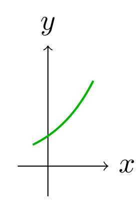
$$f(x) = \begin{cases} 2x - 3, & x > 3 \\ -x^2 + 15, & x \leq 3 \end{cases}$$



Absolute Value — V-shape. Used in comparisons or minimum distance questions.



Exponential — Grows or shrinks fast. Used in population or finance.



*Knowing the **shape** helps you know what to do.*

Identifying Change in a Problem Situation

When you see a word problem, look for these clues to identify the type of change:

- What quantity increases or decreases independently?
- What quantity changes based on something else?
- Is the change steady (same every time) or changing (faster, slower)?
- Are we multiplying or adding to get to the next value?
- Is there a turning point, a break, or a rule change?

Try identifying what is changing in each scenario:

1. A coffee maker brews one cup every 3 minutes.
   What quantity is changing?
2. A YouTube video gains 500 views every hour.
   Identify the input in this situation.
3. A population of bacteria doubles every 6 hours.
   What is the varying quantity?
4. A bus ride costs $2 for the first trip, then $1 for each additional transfer.
   What drives the total cost?
5. A washing machine takes 40 minutes per load. A person washes 3 loads back-to-back.
   What's the independent variable?
6. A drone rises, hovers for a few seconds, then descends—all over a span of 15 minutes.
   Describe what's changing over time.
7. A person's step count is recorded by a smartwatch throughout the day.
   What's the domain?
8. A student earns $10 for each math worksheet they complete, but gets a bonus after 5.
   Which quantity is the input?
9. A remote-controlled car follows a square path around a field, returning to its start.
   What would the graph of this motion look like?
10. A medicine's concentration in the bloodstream decreases at a rate that depends on body weight and metabolism.
    Identify all potential inputs. Which one is being treated as the domain in most models?