

Grade 6 - Independent and Dependent Variables - Lesson

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In an equation with two variables, the independent variable is the one you choose, and the dependent variable depends on it. For $y = 3x$, each y is 3 times x , and its graph is a line through the origin. For $y = x + 2$, each y is 2 more than x .

Grade 6 · Common Core State Standards: **6.EE.C.9**

Key facts

- The independent variable is the input; the dependent variable is the output.
- In $y = kx$, y is k times x and the graph passes through the origin.
- In $y = x + c$, y is c more than x and the graph crosses the y -axis at c .
- A table, a graph, and an equation can show the same relationship.
- Use substitution to find y from x , and solve an equation to find x from y .

What are independent and dependent variables?

In a relationship between two quantities, the **independent variable** is the one you choose or change. The **dependent variable** is the one whose value depends on it. If a taxi charges \$3 per mile, the number of miles x is independent, and the cost y is dependent.

Equation with two variables

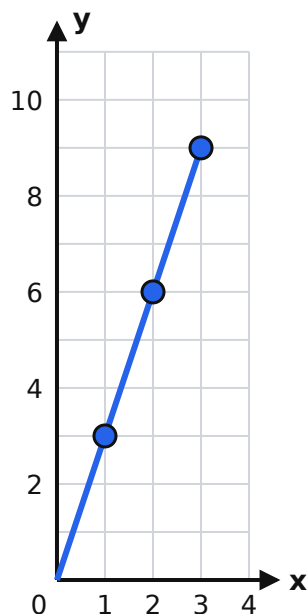
An equation such as $y = 3x$ or $y = x + 2$ shows how the dependent variable y is found from the independent variable x . Each x gives exactly one y .

How do you connect a table, a graph, and an equation?

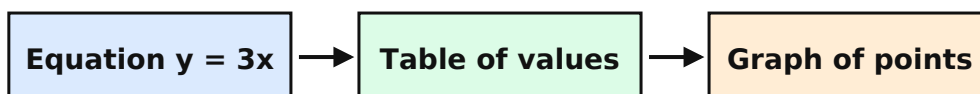
Choose values of x , use the equation to find y , and record the pairs in a table. Then plot the pairs as points. For $y = 3x$, y is always 3 times x .

x (independent)	1	2	3	4
y (dependent)	3	6	9	12

The value of y depends on the value of x .



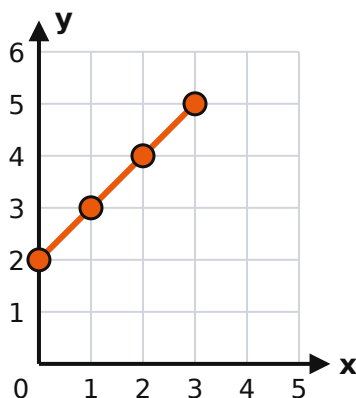
The graph of $y = 3x$ is a line through the origin.



An equation, a table, and a graph describe the same relationship.

What is different about $y = x + 2$?

In $y = x + 2$, you *add* 2 to x . The table has y values 2 more than x , and the graph is a line that crosses the y -axis at 2, not at the origin.



The graph of $y = x + 2$ starts at $(0, 2)$.

1. Name the independent variable and the dependent variable.
2. Look for a pattern: does y multiply x , or add to x ?
3. Write the equation and test it with two table values.
4. Use the equation to find y for any x , or x for any y .

Example: A car travels at 55 miles per hour, so $d = 55t$. To find the time for 275 miles, solve $275 = 55t$ to get $t = 5$ hours. When the unknown is the dependent variable, substitute and compute. When the unknown is the independent variable, solve an equation.

Questions about independent and dependent variables

What is an independent variable?

The independent variable is the input that you choose or change, usually x . In a taxi fare problem it is the number of miles.

What is a dependent variable?

The dependent variable is the output whose value depends on the independent variable, usually y . The cost of a taxi ride depends on the miles.

How do you write an equation from a table?

Look for the pattern between each x and y . If y is always k times x , write $y = kx$; if y is always c more than x , write $y = x + c$.

Why does the graph of $y = 3x$ go through the origin?

When x is 0, $y = 3$ times $0 = 0$, so the point $(0, 0)$ is on the graph.

How do you find x when you know y ?

Substitute y into the equation and solve. For $y = 5x$ and $y = 40$, solve $40 = 5x$ to get $x = 8$.