EDSTAR ANALYTICS | Deep Dive 5
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# Slope: The Rate of Change Gets Its Name

Slope is the rate of change with a name: rise over run. Top is the change in y (up or down), bottom is the change in x (to the right). Same fraction from a graph, a table, or two points.

## 1 THE VOCABULARY
## Words we use

**Slope** rise over run: how much y changes for each step of x.

**Rise** the change in y, up or down. Second y minus first y. Down is negative.

**Run** the change in x, to the right. Second x minus first x, same order.

**Positive, negative** climbs, falls.

**Zero slope** flat horizontal line: y never changes.

**Undefined** vertical line: run 0, cannot divide by 0, no slope.

**Steeper** bigger size, ignoring the sign.

- Watch out for these.
- Subtracting in different orders on top and bottom: the sign flips.
- Counting the run as negative. Run is to the right; it is the rise that can be negative.
- Saying a flat line has no slope. It has slope 0. The vertical line is the one with none.
- Forgetting to simplify: 6/4 is 3/2, up 3 for every 2 right.

## 2 THE METHOD
## Three ways, one fraction

1. **FROM A GRAPH** pick two grid corners on the line. From the left one, count up or down to the other's height (rise), then right (run). Divide.
2. **FROM A TABLE** x steps by the same amount and y changes by the same amount each time. Slope = change in y over step in x.
3. **FROM TWO POINTS** rise = second y minus first y; run = second x minus first x; divide and simplify.
4. **READ THE NUMBER** positive climbs, negative falls, 0 flat, undefined vertical. Bigger size, steeper.

**WHY ANY TWO POINTS WORK**

A straight line has the same rate of change on every stretch (Unit 2, Lesson 2). So it does not matter which two points you pick: rise over run comes out the same, once simplified.

## 3 TWO POINTS
## The line through (1, 7) and (4, 1)

| | |
|---|---|
| (1, 7) and (4, 1) | two points on the line. Call (1, 7) first and (4, 1) second |
| rise = 1 − 7 = −6 | second y minus first y: the line went down 6 |
| run = 4 − 1 = 3 | second x minus first x, same order: 3 to the right |
| slope = −6/3 = −2 | the fraction, simplified. Down 2 for every 1 to the right |
| negative, size 2 | falling, and steeper than a slope of −1 |

**CHECK BY COUNTING**

Plot both points. From (1, 7), go down 6 to y = 1, then right 3 to x = 4. You land on (4, 1). The staircase matches the fraction.

**SAY IT OUT LOUD**

Rise over run. Top is up or down, bottom is to the right. Same order both times. Simplify.