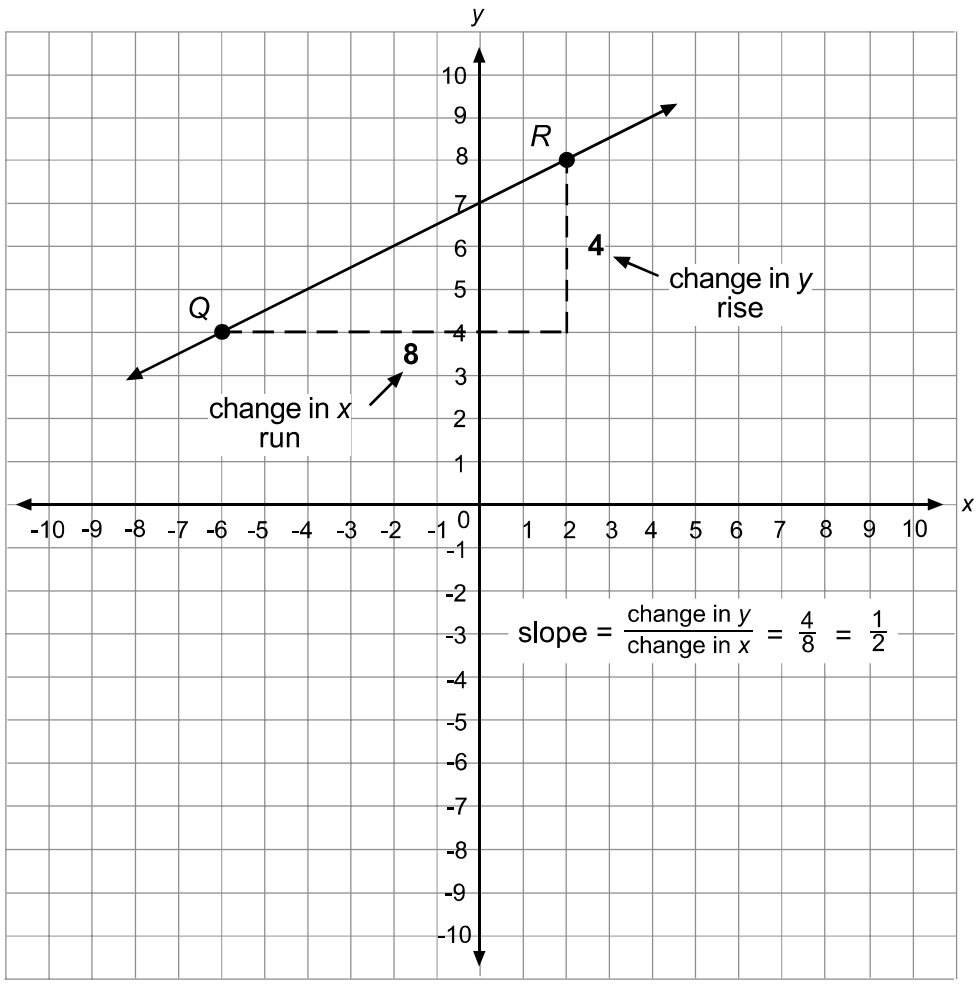
Slope

Slope can be thought of as the slant of a line. It is often defined as $\frac{\text{rise}}{\text{run}}$, which means the change in the *y*-values (**rise**) on the *vertical* axis, divided by the change in the *x*-values (**run**) on the *horizontal* axis. In the figure below we can count to find the *slope* between points *Q* (-6, 4) and *R* (2, 8).

Graph of Points *Q* and *R*



slope of a line

However, we can also use the *slope formula* to determine the slope of a line without having to see a graph of the two points of the line.

slope formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Remember: m is always used to represent slope.

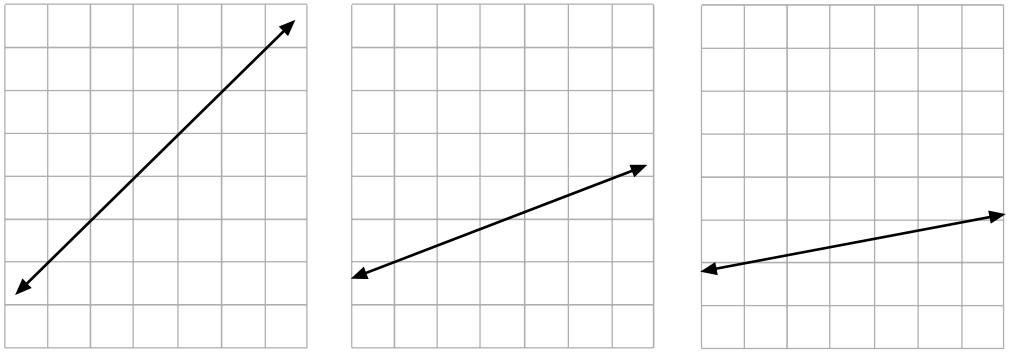
However, we must know the coordinates of two points on a line so that we can use the formula. Refer to points Q and R on the previous page. The coordinates of Q are (-6, 4) and the coordinates of R are (2, 8). Let's see how this works in the slope formula.

$x_1 = -6$
$x_2 = 2$
$y_1 = 4$
$y_2 = 8$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 4}{2 - -6} = \frac{4}{8} = \frac{1}{2}$$

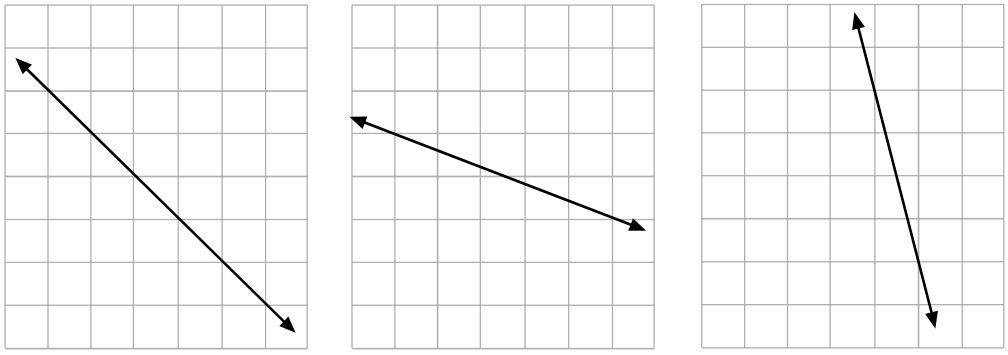
When the slope of a line is *positive*, the line will *rise* from left to right.

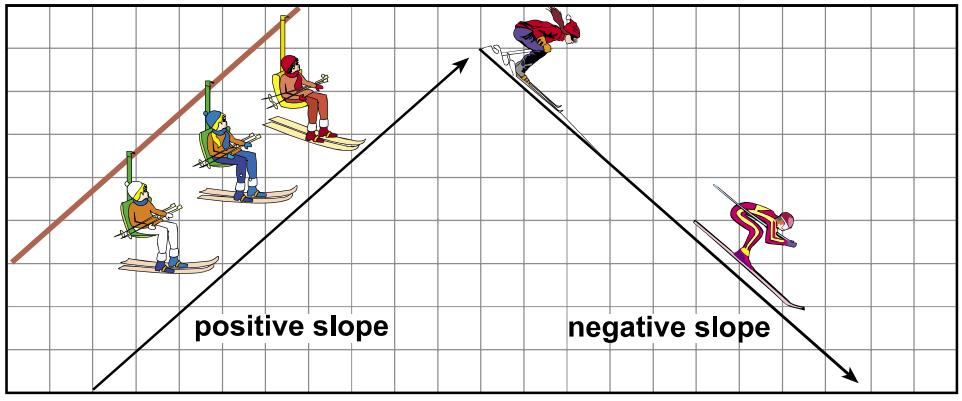
Examples



When the slope of a line is *negative*, the line will *fall* from left to right.

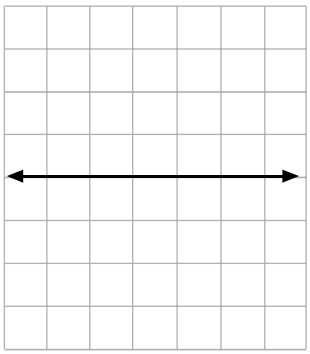
Examples





slope

When the slope has a zero in the **numerator** ($\frac{0}{x}$), the line will be *horizontal* and have a slope of 0.



When the slope has a zero in the **denominator** ($\frac{y}{0}$), the line will be *vertical* and have *no* slope at all. We sometimes say that the slope of a vertical line is *undefined*.