How to Determine the Slope

The scenario so far:
Your data points suggest a straight-line relationship, so you have drawn a line of best fit through the data points. Now you are ready to determine the slope of the line you drew. The slope reveals the constant relationship between the two quantities being plotted.

(1) **Select two convenient points *on* the line for the slope calculation.** The graph paper consists of a grid of horizontal and vertical lines. At some point, your line of best fit will pass through an intersection of these lines on the graph paper. Points like this are convenient to use in slope calculations because it's easy to precisely determine the coordinates of the point. Select two such points, not too close to each other, and mark them with some sort of symbol, like "+".

(2) **Draw a slope triangle.** Draw a line down from one point and over from the other until you have a right triangle.

(3) **Determine the "rise" of the triangle**, making use of the vertical scale of the graph (the y-axis). Subtract the y-coordinates of the two points. The answer is the change in y, or Δy.

(4) **Determine the "run" of the triangle,** using the horizontal scale of the graph (the x-axis). Subtract the x-coordinates of the two points *in the same order as you did in Step 3.* The answer is the change in x, or Δx.

(5) **Calculate the slope.** Divide the "rise" from Step 3 by the "run" from Step 4.
$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x}$ Be sure to express this as a single value, not as a fraction or repeating decimal.

(6) **Determine the units of the slope.** Use the units of the values from the slope calculation: $\text{units of slope} = \frac{\text{units plotted on y-axis}}{\text{units plotted on x-axis}}$

NOTE

If the quantity plotted on the horizontal axis was time (t), then it is customary to call it the t-axis.

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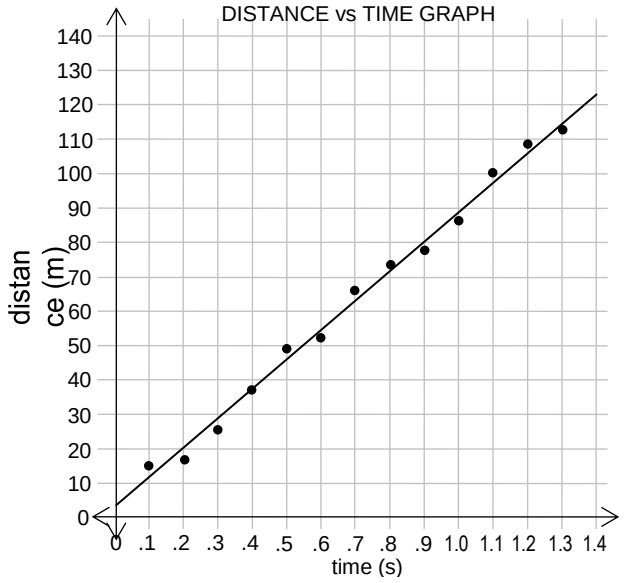
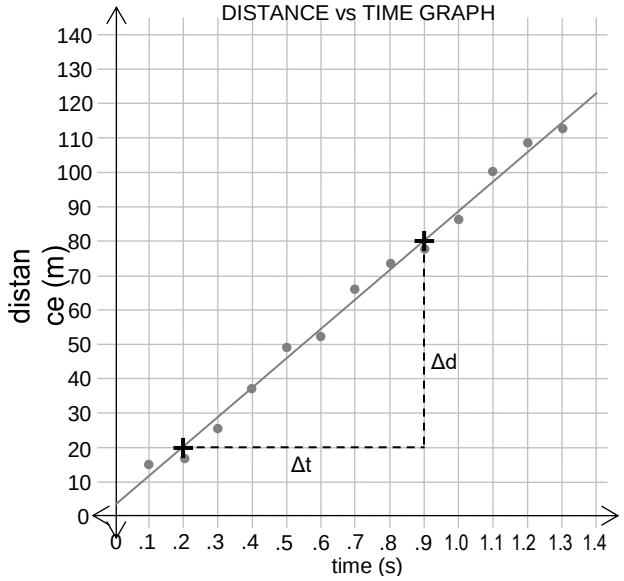
Example 1: Determine the slope of the following graph:



Solution: Here is one possible slope triangle:



$$\text{slope} = \frac{\Delta d}{\Delta t} = \frac{80.0 - 20.0}{0.900 - 0.200}$$

$$= \frac{60.0}{0.700}$$

$$= 85.7 \ ^{m}/_{s}$$

Because the units are in $^{m}/_{s}$, we expect this answer to represent a constant velocity.