

Variation

Direct Variation:

One variable (y) varies directly as another variable (x) or y is directly proportional to x if there is a nonzero constant k such that $y=kx$.

k is called the constant of proportionality.

If x varies directly as y and $x=10$ when $y=7$, find y when $x=50$.

In the study of electricity, the resistance of a conductor of uniform cross-sectional area is directly proportional to its length. Suppose that the resistance of a certain type of copper wire is .640 ohms per 1000 feet. What is the resistance of 2500 feet of the wire?

Inverse Variation:

y varies inversely as x or y is inversely proportional to x if there is a nonzero constant k such that $xy=k$ or $y=k/x$.

If t varies inversely as s , and $t=3$ when $s=5$, find s when $t=5$.

Pairs of markings a set distance apart are made on highways so that police can detect drivers exceeding the speed limit. Over a fixed distance the speed R varies inversely with the time t . In one particular pair of markings R is 45 mph when t is 6 seconds. Find the speed of a car that travels the given distance in 5 seconds.

Joint Variation:

If the ratio of a variable (y) to the product of two or more variables (possibly raised to powers) is constant, then y varies jointly as or is jointly proportional to the other variables.

If f varies jointly as g^2 and h and $f=50$ when $g=4$ and $h=2$, find f when $g=3$ and $h=1$.

Combining Variations:

The volume of gas varies inversely as the pressure and directly as temperature. If a certain gas occupies a volume of 1.3 liters at 300 degrees Kelvin and a pressure of 15 Newtons per square centimeter, find the volume at 340 degrees Kelvin and a pressure of 24 Newtons per square centimeter.