Direct Variation Encyclopedia Article

Direct Variation

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Direct Variation

If one quantity increases (or decreases) each time another quantity increases (or decreases), the two quantities are said to vary together. The most common form of this is direct variation in which the ratio of the two amounts is always the same. For example, speed and **distance** traveled vary directly for a given time. If you travel at 4 mph (6.5 kph) per hour for three hours, you go 12 mi (19.5 km), but at 6 mph (9.5 kph) you go 18 mi (28.5 km) in three hours. The ratio of distance to speed is always 3 in this case.

The common ratio is often written as a constant in an equation. For example, if s is speed and d is distance, the relation between them is direct variation for d = ks, where k is the constant. In the example above, k = 3, so the equation becomes d = 3s. For a different time **interval**, a different k would be used.

Often, one quantity varies with respect to a power of the other. For example, of $y = kx^2$, then y varies directly with the **square** of x. More than two variables may be involved in a direct variation. Thus if z = kxy, we say that z is a joint (direct) variation of z with x and y. Similarly, if $z = kx^2/y$, we say that z varies directly with x^2 and inversely with y.