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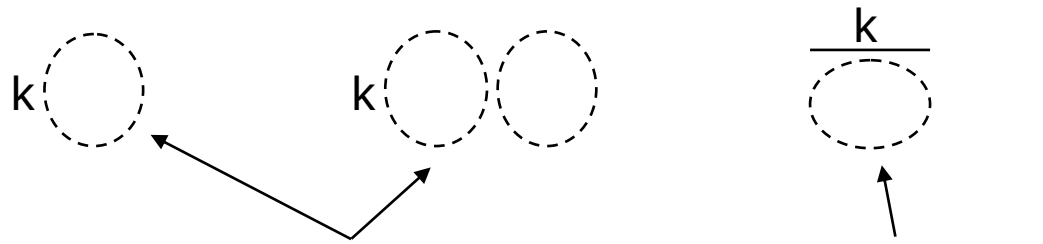
Variation Problems

Three Basic Steps

1. Set up the problem as an equation.
2. Solve for "k".
3. Substitute the value of "k" into the Step 1 equation to solve for the new "unknown".

Three Basic Situations

varies directly | **varies jointly** | **varies inversely**



Something will go either next to "k" . . . or . . . underneath "k"
(indicating multiplication) (indicating division)

A variation problem can also include a *combination* of the three situations:

"w" varies jointly as "x" and "y", and inversely as "z"

$$W = \frac{Kxy}{z}$$

jointly

inversely

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Remember!

Three Steps:

1. Set up an equation
2. Solve for "k"
3. Plug "k" back in

Three Situations:

1. varies directly
2. varies jointly
3. varies inversely

(or some combination)

Note!

Varies directly

can be stated as:
directly proportional

Varies inversely

can be stated as:
inversely proportional

Examples:

"y" varies directly as the square of "x" $\longrightarrow$ $y = kx^2$

"n" varies inversely as the square root of "s" $\longrightarrow$ $n = \frac{k}{\sqrt{s}}$

Simple interest varies jointly as principal and time $\longrightarrow$ $I = kpt$

(use "I" for Interest, "p" for principal, and "t" for time)

Word Problem:

The weight of an object on Earth varies directly to that same weight on the moon. If a 210 - pound man would weigh 30 pounds on the moon, how much would a 50 - pound child weigh on the moon?

Step 1: $\boxed{E = km}$

Use "E" for Earth-weight and "m" for moon-weight.

$(210) = k(30)$

Plug in 210 for the man's Earth-weight and 30 for his moon-weight.

Step 2: $210 = 30k$

$\frac{210}{30} = \frac{30k}{30}$

Solve for "k" (divide by 30).

k = 7

You will always solve for "k" first in variation problems, and then plug it back into the formula to solve for the final question (m, in this case).

Step 3: $(50) = (7)m$

$\frac{50}{7} = \frac{7m}{7}$

Using your original formula, E = km, substitute the value 7 for k, and 50 for the child's Earth-weight to solve the child's moon-weight.

m = 7.14

A child on the moon would weigh about 7.14 pounds.