Combined Variation

Often in real-life situations, one variable varies as a combination of variables, may include any *combination* of all previously mentioned variations.

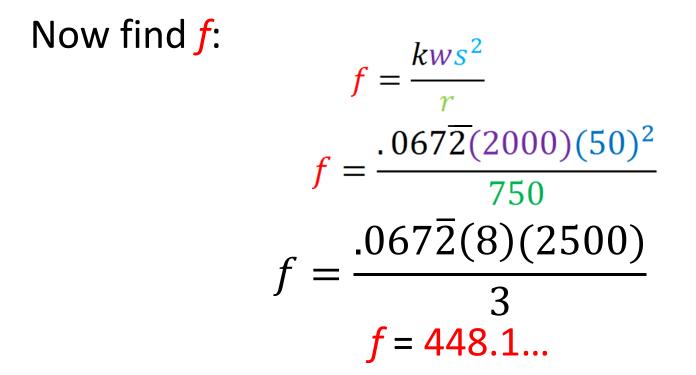
Example

The force needed to keep a car from skidding on a curve varies jointly with the weight of the car and the speed squared, and inversely with the radius of the curve. If 242 pounds of force would keep a 2000 pound car from skidding on a curve with a radius of 500 feet at 30 mph, what force would keep the same car from skidding on a curve with a radius of 750 feet going 50 mph? $=\frac{kws^2}{m}$

Continued: If f = 242 when w = 2000, s = 30, and r = 500, find f when w = 2000, s = 50, and r = 750. Find the constant of proportionality:

$$f = \frac{kws^2}{r} 242 = \frac{k(2000)(30)^2}{500}$$
$$242 = \frac{k(4)(900)}{1}$$
$$\frac{242}{3600} = k$$
$$0.067\overline{2} = k$$

Continued: find f when w = 2000, s = 50, and r = 750.



The amount of force required to keep the car from skidding is approximately 448.1 pounds.