

# Proportionalities

21 c

	T	R
3.947 ( → )	7.6	5.8 ( ← )
	30	15 ( ← )
	380	78
	930	143

$2.586$

$$2.586^x = 3.947$$

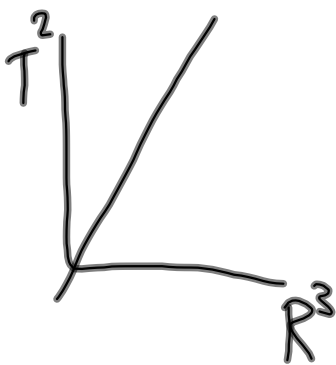
$$\log 2.586^x = \log 3.947$$

$$x \log 2.586 = \log 3.947$$

$$x = \frac{\log 3.947}{\log 2.586}$$

$$x = 1.44$$

$$x \approx 1.5 \quad \frac{3}{2}$$



$$T \propto R^{3/2}$$

$$T^2 \propto R^3$$

## Using Proportioning Techniques in Physics

① Form an Equation from a proportionality

$$y \propto x^2$$

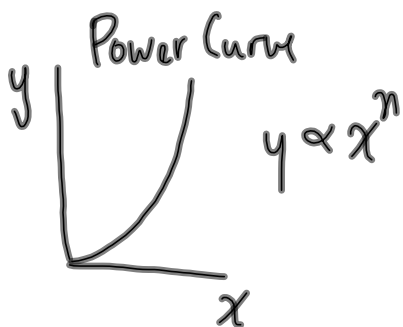
$$y = kx^2$$

② Form a Proportionality from an equation

$$a = \frac{4\pi^2 R}{T^2} \Rightarrow a \propto R$$

$$a \propto \frac{1}{T^2}$$

③ Using Logs to find the eq.



$$y \propto x^n$$

$$y = kx^n$$

$$\log y = \log(kx^n)$$

$$\log y = \log k + \log x^n$$

$$\log y = \log k + n \log x$$

$$y = b + mx$$

A plot of  
 $\log y$  vs  $\log x$   
 will be linear  
 with a slope of  $n$   
 and a y-intercept of  
 $\log k$

Sample Problems

1.  $F \propto v^2$

let  $F'$  be the new  $F$

$3v$  be the new  $v$

compare  $\rightarrow$

$$F = kv^2$$

$$F' = k(3v)^2$$

$$F' = k(9v^2)$$

$$F' = 9(kv^2)$$

$$F' = 9F$$

The force increased by a factor of 9  
when the speed increased by a factor of 3.

2.  $V = \pi r^2 h$

let  $V'$  be the new  $V$

$2r$  be the new  $r$

$2h$  be the new  $h$

$$V' = \pi(2r)^2(2h)$$

$$V' = \pi(4r^2)(2h)$$

$$V' = 8\pi r^2 h$$

$$V' = 8V \quad 2^3$$

$$V' = 8(1.0 \times 10^5 L)$$

$$V' = 8.0 \times 10^5 L$$

To DO:

① PP/30

② Assignment

p38 | 28 - 34

35 + 36

ADV

DUE WED

③ QUIZ - Tues