

SHOW ALL WORK TO RECEIVE FULL CREDIT. NO CALCULATORS.

1. Write a general formula to describe each variation (3 points each).

(a) v varies directly with t ; $v = 16$ when $t = 2$

$$v = kt$$
$$\frac{16}{2} = \frac{k \cdot 2}{2}$$
$$8 = k$$
$$v = 8t$$

(b) y varies inversely with x ; $y = 4$ when $x = 4$

$$y = \frac{k}{x}$$
$$4 = \frac{k}{4}$$
$$k = 4 \cdot 4 = 16$$
$$y = \frac{16}{x}$$

(c) A varies directly with the square of r ; $A = 4\pi$ when $r = 2$

$$A = kr^2$$
$$\frac{4\pi}{4} = \frac{k \cdot 2^2}{4}$$
$$A = \pi r^2$$
$$\pi = k$$

(d) V varies jointly with h and the square of r with constant of proportionality $\frac{\pi}{3}$

$$V = khr^2$$
$$k = \pi/3 \text{ (constant of proportionality)}$$

$$V = \frac{\pi}{3} hr^2$$

Quiz #1

2. (8 points) The volume V of an ideal gas varies directly with the temperature T and inversely with the pressure P . Write an equation relating V , T , and P using k as the constant of proportionality. If a cylinder contains oxygen at a temperature of 300K and a pressure of 15 atmospheres in a volume of 100 liters, what is the constant of proportionality k ? If a piston is lowered into the cylinder, decreasing the volume occupied by the gas to 80 liters and raising the temperature to 320K, what is the gas pressure?

$$V = \frac{kT}{P}$$

$$100 = \frac{k \cdot 300}{15} = k \cdot 20$$

$$k = 5$$

$$V = \frac{5T}{P}$$

$$80 = \frac{5 \cdot 320}{P} \quad P = \frac{5 \cdot 320}{80} = 5 \cdot 4 = 20 \text{ atmospheres}$$

3. (1 point) EXTRA CREDIT. Does the relation $\{(1, 4), (2, 3), (3, 1), (1, 6)\}$ represent a function? Why or why not?

No, because the input 1 corresponds to more than one output (4 and 6).