***AAT**

Chapter 3: 3-9 Variation (IC/HW)-Day 1

Name: Key

Date: _____ Period: _____

Express the statement as a formula that involves the given variables and a constant of proportionality k, and then determine the value of k from the given conditions.

1. u is directly proportional to v. If v = 30, then u = 12.

$u = kv$

$12 = k(30)$

$k = \frac{2}{5}$

2. r varies directly as s and inversely as t. If s = -2 and t = 4, then r = 7.

$r = \frac{ks}{t}$

$7 = \frac{k(-2)}{4}$ $k = -14$

3. y is directly proportional to the square of x and inversely proportional to the cube of z. If x = 5 and z = 3, then y = 25.

$y = \frac{kx^2}{z^3}$ $25 = \frac{25k}{27}$

$k = 27$

4. z is directly proportional to the product of the square of x and the cube of y. If x = 7 an y = -2, then z = 16.

$z = kx^2y^3$

$16 = k(49)(-8)$

$k = \frac{-2}{49}$

5. y is directly proportional to x and inversely proportional to the square of z. If x = 4 and z = 3, then y = 16.

$y = \frac{kx}{z^2}$

$16 = \frac{k(4)}{9}$ $k = 36$

6. y is directly proportional to the square of x and inversely proportional to the square root of z. If x = 5 and z = 16, then y = 10.

$y = \frac{kx^2}{\sqrt{z}}$

$10 = \frac{k(25)}{4}$ $k = \frac{8}{5}$

7. The pressure P acting at a point in a liquid is directly proportional to the distance d from the surface of the liquid to the point.

(a) Express P as a function of d by means of a formula that involves a constant of proportionality k.

$P = kd$

(b) In a certain oil tank, the pressure at a depth of 2 feet is 118 lb/ft^3. Find the value of k in part (a).

$118 = k(2)$

$59 = k$

(c) Find the pressure at a depth of 5 feet for the oil tank in part (b).

$P = 59(5) = 295 \text{ lb/ft}^2$

8. The electrical resistance R of a wire varies directly as its length l and inversely as the square of its diameter d.

(a) Express R in terms of l, d, and a constant of variation k. $R = \frac{kl}{d^2}$

(b) A wire 100 feet long of diameter 0,01 inch has a resistance of 25 ohms. Find the value of k in part (a).

$25 = \frac{k(100)}{(.01)^2}$

$k = \frac{1}{40{,}000}$

(c) Find the resistance of a wire made of the same material that has a diameter of 0.015 inch and is 50 feet long.

$R = \frac{50}{(40{,}000)(.015)^2} = \frac{50}{9} \text{ ohms}$

9. The period P of a simple pendulum is directly proportional to the square root of its length l.

(a) Express P in terms of l and a constant of proportionality k.

$P = k\sqrt{l}$

(b) If a pendulum 2 feet long has a period of 1.5 seconds, find the value of k in part (a).

$1.5 = k\sqrt{2}$

$k = \frac{3}{4}\sqrt{2}$

(c) Find the period of a pendulum 6 feet long.

$P = \frac{3}{4}\sqrt{2}(\sqrt{6}) = \frac{3}{2}\sqrt{3} \text{ sec.}$