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.

$$U = KY$$

$$12 = K(30)$$

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

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.

$$Y = \frac{KS}{t}$$

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

$$K = -14$$

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.

$$\frac{Y = KX^{2}}{25} \qquad 25 = \frac{25K}{27}$$

$$K = 27$$

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.

$$Z = K \chi^{2} \gamma^{3}$$

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

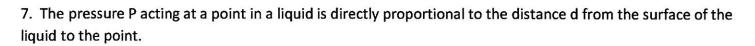
$$K = -\frac{2}{49}$$

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

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.

$$Y = \frac{KX}{\sqrt{2}}$$

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



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

(b) In a certain oil tank, the pressure at a depth of 2 feet is 118 lb/ft³. Find the value of k in part (a).

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

- 8. The electrical resistance R of a wire varies directly as its length I and inversely as the square of its diameter d.
- (a) Express R in terms of I, d, and a constant of variation k. $R = \frac{K l}{l^2}$
- (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).

01 inch has a resistance of 25 ohms. Find the value
$$25 = \frac{K(100)}{(.01)^2}$$

$$K = \frac{1}{40,000}$$
of the same material that has a diameter of 0.015 in

(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.

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

- The period P of a simple pendulum is directly proportional to the square root of its length I.
- (a) Express P in terms of I and a constant-of proportionality k.

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

1.5 =
$$K\sqrt{2}$$
 (c) Find the period of a pendulum 6 feet long.