099 §6.7 #s 1, 5, 9, 13, 15, 21, 23, 37, 39

#s 1-8 y varies directly as x. Find the Konstant of variation and the direct variation eq'n for each situation.

(1) $y = 4$ when $x = 20$

$y = Kx$

$4 = 20K$

$\frac{1}{5} = K$

$\boxed{y = \frac{1}{5}x}$

(5) $y = 7$ when $x = \frac{1}{2}$

$y = Kx$

$7 = \frac{1}{2}K$

$14 = K$

$\boxed{y = 14x}$

(9) The weight of a ball varies directly with the cube of its radius.

$w = Kr^3$

Ball w/ $r = 2$ inches has $w = 1.20$ lbs.

Find the wt. of ball with 3 inch radius.

w = weight (in lbs) of a ball

r = radius (" inches) " " "

$1.20 = 2^3K$

$1.20 = 8K$

$.15 = \frac{1.20}{8} = K$

$w = .15r^3$

when $r = 3$:

$w = (.15)(3)^3 = \boxed{14.05 \text{ lbs} = w}$

#s 13-20 y varies inversely as x. Find Konstant of variation & inverse variation eq'n.

(13) $y = 6$ when $x = 5$

$y = \frac{K}{x}$

$6 = \frac{K}{5}$

$\boxed{30 = K}$

$\boxed{y = \frac{30}{x}}$

099 §6.7 #s 15, 21, 23, 37, 39

(15) $y = 100$ when $x = 7$

$y = \frac{k}{x}$

$100 = \frac{k}{7}$

$700 = k$

$y = \frac{700}{x}$

(21) Pairs of markings for cops to measure speeding.

R = speed of car (mph),

T = time to travel between markers (seconds)

R varies inversely with time T.

$R = \frac{k}{T}$

$R = 45$ when $T = 6$

$45 = \frac{k}{6}$

$(45)(6) = k$

$270 = k$

Find speed when $T = 5$ sec:

$R = \frac{270}{t}$

$= \frac{270}{5} =$ 54 mph = 12

(23) If V = voltage is constant, the current I (in amps) is inversely proportional to resistance R (in Ohms).

$I = \frac{k}{R}$

$I = 40$ when $R = 270$

$40 = \frac{k}{270}$

$(40)(270) = k = 10800$

when $R = 150$ ohms

$I = \frac{10800}{150} =$ 72 amps = I

099 S 6.7 #s 37, 39

#s 31-38 Find Konstant of variation and variation equation.

(37) y varies jointly as x and the cube of z.

$y = 120$ when $x = 5$ & $z = 2$

$\boxed{y = kxz^3}$ $\boxed{y = 3xz^3}$

$120 = (5)(2)^3 k$

$\frac{120}{(5)(8)} = k = 3$

(39) Max weight a beam can support varies jointly with its width & the square of its height AND inversely as its length. A beam $\frac{1}{2}$ ft wide, $\frac{1}{3}$ ft high, and 10 ft long can support 12 tons. How much can a beam that's $\frac{2}{3}$ ft wide, $\frac{1}{2}$ ft high, and 16 ft long support?

M = Max weight it can support (tons)

w = width (ft), h = height (ft), l = length (ft)

$M = \frac{kwh^2}{l}$

$12 = \frac{(\frac{1}{2})(\frac{1}{3})^2 k}{10}$

$120 = \frac{1}{18} k$

$(120)(18) = k$

$\boxed{2160 = k}$

$\boxed{M = \frac{2160wh^2}{l}}$

$w = \frac{2}{3}, h = \frac{1}{2}, l = 16$

$\Rightarrow$

$M = \frac{2160(\frac{2}{3})(\frac{1}{2})^2}{16}$

$\boxed{225 \text{ TONS} = M}$