SECTION 2.5 HW VARIATIONS

(EX): y varies jointly as x & z

$y = k \cdot x z$

(EX): Inversely $y = \frac{k}{x}$

(9) 3 parts: procedure

↳ ① write the equation w/ k
② Find k
③ use the equation with a # substituted for k to find any requested info.

$y = kx$ ← general form

$z = k(x^2 + y^2)$

$z = 5$
$x = 3$
$y = 4$

$5 = k(3^2 + 4^2)$
$5 = k(9+16)$
$5 = k(25)$
$\frac{5}{25} = k$
$\frac{1}{5} = k \rightarrow \boxed{z = \frac{1}{5}(x^2 + y^2)}$ ← formula

(11) using → $y = kx$ and $y = \frac{k}{x}$

$M = \frac{kd^2}{\sqrt{x}}$ } M varies directly w/ the square of d and inversely w/ the square root of x.

$m = 24$
$x = 9$
$d = 4$

$24 = \frac{k(4)^2}{\sqrt{9}}$

$\frac{3}{2\cancel{16}_{1}\cancel{3}} \cdot \frac{\cancel{24}^{8}}{1} = \frac{k \cdot \cancel{16}}{3} \quad \frac{3}{\cancel{16}} = \frac{9}{2} = k$

$\cancel{128} = k$

$M = \frac{9}{2}\cancel{128}\frac{d^2}{\sqrt{x}}$

$\boxed{M = \frac{9d^2}{2\sqrt{x}}}$

* (15) The volume V of a sphere varies directly with the cube of its radius r. The constant of proportionality is $\frac{4\pi}{3}$.

V varies directly as r^3

$y = kx$

$V = kr^3$

$\boxed{V = \frac{4\pi}{3} r^3}$

$K = \frac{4\pi}{3}$

* (23) Physics: Falling Objects

situation → $y = kx$

distance is directly proportional to the square of the time.

$s = kt^2$ (equation)

$s = 16$ ft.

$t = 1$ sec.

$16 = k \cdot (1)^2$

$16 = k$

$\boxed{s = 16t^2}$

How long for 64 ft?

$64 = 16t^2$

$4 = t^2$

$\pm 2 = t$

$\boxed{2 \text{ sec} = t}$

* time is always positive

How far in 3 seconds?

$t = 3$

$s = 16(3)^2$

$s = \boxed{144 \text{ ft}}$