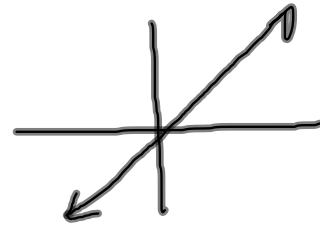§ 6.7   Variation

y varies <u>directly with</u> x

$y = Kx$ for some Konstant K

Your job: Use info on x & y to find K.
Use K to find y when x is given.

Assume y is <u>directly proportional</u> to x.

$$y = Kx$$

if y is 5, when x is 30, what's y
when x is 50?

$$5 = 30K$$

$$\frac{1}{6} = \frac{5}{30} = \boxed{K = \frac{1}{6}}$$

So, when x = 50,

$$y = \left(\frac{1}{6}\right)(50) = \frac{50}{6} = \boxed{\frac{25}{3} = y}$$

Inverse Variation

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

y varies inversely with x

§ $y = 6$, when $x = 5$

Find K & write the variation equation.

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

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

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

$$\boxed{30 = K}$$

Joint Variation

$$y = Kxz$$

y varies jointly with x & z.

§ $y = 20$, when $x = 2$, $z = 3$.

Find K & write variation eq'n.

$$y = Kxz$$

$$20 = (2)(3)K$$

$$\boxed{K = \frac{10}{3}} = \frac{20}{6} = K =$$

$$\boxed{y = \frac{10}{3}xz}$$

Sound intensity varies inversely with the square of the distance from the source.

$$I = \frac{K}{r^2}$$

r = distance from source
I = sound intensity

Force of gravity varies jointly with the mass of the two objects and inversely with the square of the distance between them.

$$F = \frac{K m_1 m_2}{r^2}$$

F = force of gravity between two bodies
m_1 = mass of 1st body
m_2 = " " 2nd body
r = distance between them.

§ 6.7 Due Tomorrow

The weight of a ball varies directly with its radius.

$$y = Kx$$

y = weight

x = radius.

(Like #9)

The weight varies directly with the cube of its radius.

$$y = Kx^3$$

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

Questions over old stuff?

(16) $\dfrac{4x^2-24x}{3x^2-x-2} + \dfrac{3}{3x+2} = \dfrac{-4}{x-1}$

$(3x+2)(x-1) = 3x^2-3x+2x-2 = 3x^2-x-2$ ✓

$LCD = (3x+2)(x-1)$

$$\dfrac{4x^2-24x}{(3x+2)(x-1)} + \left(\dfrac{3}{3x+2}\right)\left(\dfrac{x-1}{x-1}\right) = \left(\dfrac{-4}{x-1}\right)\left(\dfrac{3x+2}{3x+2}\right)$$

$$4x^2-24x+3(x-1) = -4(3x+2)$$

$$4x^2-24x+3x-3 = -12x-8$$

$$4x^2-21x-3 = -12x-8$$

Bealize

$$\underline{+12x+8 = +12x+8}$$

$$4x^2-9x+\underline{5} = 0$$

$(4)(5)=20$

$(-4)(5)=20$ $4x^2-4x-5x+5 = 0$

$-4-5=-9$ $4x(x-1) - 5(x-1) = 0$

$$(x-1)\left(\dfrac{4x\,(x-1)}{(x-1)} - \dfrac{5(x-1)}{(x-1)}\right) = 0$$

$$(x-1)(4x-5) = 0$$

$x-1=0$ OR $4x-5=0$

$x=1$ $4x=5$

                 $x=\dfrac{5}{4}$

$\left\{1, \dfrac{5}{4}\right\}$

But $x=1 \notin \mathscr{D}$.

There's an $x-1$ in the denomina-
tor, in original question.

Final Answer is $\boxed{\left\{\dfrac{5}{4}\right\}}$

$x=-\dfrac{2}{3}$ would also cause
problems, because of $3x+2$ in denom.

$$3x+2=0$$

$$\underline{-2=-2}$$

$$3x=-2$$

$$\dfrac{3x}{3} = \dfrac{-2}{3}$$

$\boxed{x=-\dfrac{2}{3}} \rightarrow$ A problem

Domain of this problem is

$$\left\{x \mid x \text{ is real and } x\neq 1 \text{ and } x\neq \dfrac{-2}{3}\right\}$$

Nov 1-9:39 AM