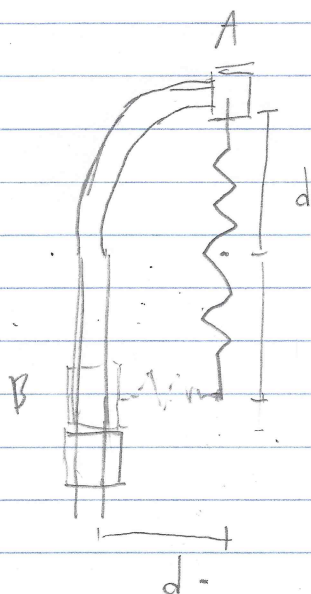


20-P-MOM-DY-15

A collar on a pipe is connected to a spring with spring constant $k = 20 \text{ N/m}$. The collar moves from point A to B as shown and impacts another collar, which is at rest.

Both collars have the same mass and have a coefficient of restitution $e = 0.6$
time of impact = 0.2 s



$$T_1 + V_1 = T_2 + V_2$$

$$\frac{1}{2} k (2d)^2 = \frac{1}{2} m v^2 + \frac{1}{2} k (d)^2$$

$$v = \sqrt{\frac{k (3d)^2}{m}}$$

$$e = \frac{(V_B)_2 - (V_A)_2}{(V_A)_1 - (V_B)_1}$$

$$(V_B)_1 = 0$$

$$(V_A)_1 = v$$

$$ve = (V_B)_2 - (V_A)_2$$

$$m(V_A)_1 + m(V_B)_1 = m(V_A)_2 + m(V_B)_2$$

$$v = (V_A)_2 + (V_B)_2$$

$$v = 2(V_A)_2 + ve$$

$$(V_A)_2 = \frac{v(1-e)}{2}$$

$$(V_B)_2 = ve + (V_A)_2$$

$$m(V_B)_1 + F_{ave} t = m(V_B)_2$$

$$F_{ave} = \frac{m(V_B)_2 - m(V_B)_1}{t}$$