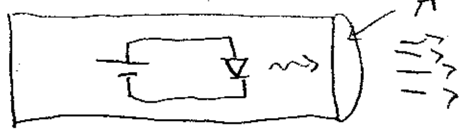
Problem # 2 Solution



$m = 0.1$ Kg

$V = 4V$

$i = 50$ mA

I : intensity

P : power output

P_{rad} : radiation pressure

a.) $P_{rad} = \frac{I}{c}$

$$P_{rad} = \frac{I}{c} = \frac{\left(\frac{P}{A}\right)}{c}$$

$P = iV = 0.2$ W

$F = ma$

$F = P_{rad} A$

$v = at$

$$t = \frac{v}{a} = \frac{mv}{F} = \frac{mv}{P_{rad} A} = \frac{mv}{\left(\frac{P}{cA}\right) A} = \frac{mvc}{P}$$

$$t = \frac{(0.1 \text{ kg})(1 \text{ m/s})(3 \times 10^8 \text{ m/s})}{(0.2 \text{ W})}$$

$1 \text{ W} = 1 \text{ Kg m}^2/\text{s}^3$

$t = 1.5 \times 10^8$ s $= 4.75$ years

b.)

$$ma = P_{rad} A = \frac{P}{c}$$

$$P = mca$$

$$= (0.1 \text{ kg})(3 \times 10^8 \text{ m/s})(9.8 \text{ m/s}^2)$$

$$= 300 \text{ MW}$$

A nuclear power plant yields ~ 1000 MW.