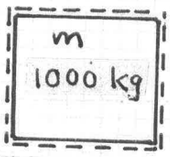
PROBLEM 2.6

KNOWN: An object of known mass decelerates from a given initial velocity to a known final velocity.

FIND: Determine the change in kinetic energy of the object.

SCHEMATIC & GIVEN DATA:



$V_1 = 100$ m/s

$V_2 = 20$ m/s

ENGR. MODEL: The object is a closed system.

ANALYSIS: The change in kinetic energy is

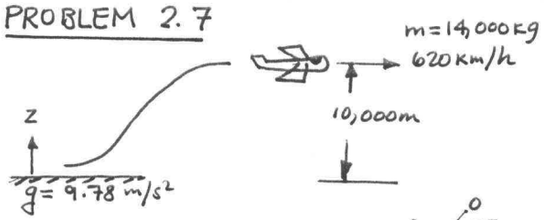
$$\Delta KE = \frac{1}{2} m \left[V_2^2 - V_1^2 \right]$$

Inserting known values and converting units

$$\Delta KE = \frac{1}{2} (1000\ kg) \left[20^2 - 100^2 \right] \frac{m^2}{s^2} \left| \frac{1\ N}{1\ kg \cdot m/s^2} \right| \left| \frac{1\ kJ}{10^3\ N \cdot m} \right|$$

$$= -4800\ kJ \longleftarrow \Delta KE$$

PROBLEM 2.7



$$\Delta KE = \frac{1}{2} m \left[V_2^2 - \cancel{V_1^2}^{\,0} \right]$$

$$= \frac{1}{2} (14000\ kg) \left[620 \frac{km}{h} \left| \frac{1\ h}{3600\ s} \right| \left| \frac{1000\ m}{km} \right| \right]^2 \left| \frac{1\ N}{1\ kg \cdot m/s^2} \right| \left| \frac{1\ kJ}{10^3\ N \cdot m} \right|$$

$$= 207{,}623\ kJ \longleftarrow$$

$$\Delta PE = m g \left(z_2 - \cancel{z_1}^{\,0} \right)$$

$$= (14000\ kg)(9.78\ m/s^2)(10{,}000\ m) \left| \frac{1\ N}{1\ kg \cdot m/s^2} \right| \left| \frac{1\ kJ}{10^3\ N \cdot m} \right|$$

$$= 1{,}369{,}200\ kJ \longleftarrow$$