Thermal Systems HW 3

1/ a) $M = 750\ kg$, $a = 10\ m/s^2$ | Neglecting air resistance and any other friction on the car causing an acceleration against the velocity of the car

$$F = ma \rightarrow F = 750\ kg\left(10\ \frac{m}{s^2}\right) = \boxed{7500\ N}$$

b) $$P = \frac{W}{s} = \frac{F \cdot d}{s} = \frac{(10\ kN)(50\ meters)}{1\ second} = \boxed{500\ kW}$$

c) $$E = W = F \cdot d = (10\ kN)(100{,}000\ m) = 1{,}000{,}000\ kJ$$
$$= 1\ GJ$$

d) $$E = Pt = 500\ kW\,(60 \cdot 60) = \boxed{1.8\ GJ}$$

2/ a) $10\ m^3$ of air to cm^3

$$1\ m^3 = 100\ cm \cdot 100\ cm \cdot 100\ cm = 1{,}000{,}000\ cm^3$$

b) $$\rho_{air} = \frac{m}{V} = \frac{12\ kg}{10\ m^3} = \boxed{1.2\ \frac{kg}{m^3}}$$

c) $$v = \frac{V}{m} = \frac{10\ m^3}{12\ kg} = \boxed{.833\ \frac{m^3}{kg}}$$