a)

Knowns

$V_i = 0$ m/s

$V_f = 7700$ m/s

$t = 11$ min $= 660$ s

$a = ?$

$V_f = V_i + at$

$7700 = 0 + a(660)$

$\frac{7700}{660} = \frac{660a}{660}$

$11.67 = a$

$a = 11.67 \text{ m/s}^2$

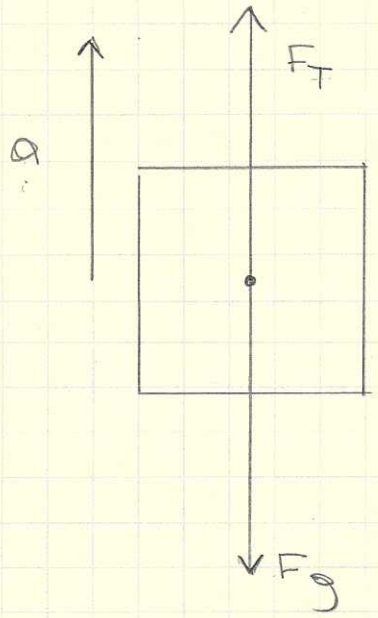
∴ the rocket must have an acceleration of 11.67 m/s^2 to attain orbit around the earth

Over

b)

$M = 3.05 \times 10^5 \text{ kg}$

$a = 11.67 \text{ m/s}^2$



$F_g = ma$

$F_g = 3.05 \times 10^5 (-9.8)$

$F_g = 305{,}000(-9.8)$

$F_g = -2{,}989{,}000 \text{ N}$

$\vec{F_g} = 2{,}989{,}000 \text{ N [D]}$

$\Sigma F = ma$

$F_T - F_g = ma$

$F_T - 2{,}989{,}000 = 305{,}000(11.67)$

$F_T - 2{,}989{,}000 = 3{,}559{,}350$

$F_T = 3{,}559{,}350 + 2{,}989{,}000$

$F_T = 6{,}548{,}350 \text{ N}$

$\vec{F_T} = 6{,}548{,}350 \text{ N [up]}$

$\vec{F_T} = 6.5 \times 10^6 \text{ N [up]}$