Chapter 2 Problem 26 [†]

Given
$t = 8.5\ min$
$v = 7.6\ km/s$

Solution
What is the average acceleration compared to gravity?

First convert the velocity into m/s.

$$v = 7.6\ km/s \left(\frac{1000\ m}{1\ km}\right) = 7600\ m/s$$

Also convert the time into seconds.

$$t = 8.5\ min \left(\frac{60\ s}{1\ min}\right) = 510\ s$$

From the definition of acceleration

$$\bar{a} = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i} = \frac{7600\ m/s - 0\ m/s}{510\ s - 0\ s} = 14.9\ m/s^2$$

Compared to gravity

$$14.9\ m/s^2 \left(\frac{1\ g}{9.8\ m/s^2}\right) = 1.52\ g$$

[†]Problem from Essential University Physics, Wolfson