Chapter 3 Problem 38 [†]

Given
$v_0 = 0\ m/s$
$t_0 = 0\ s$
$v_1 = 282\ m/s$
$t_1 = 5.00\ s$
$v_2 = 0\ m/s$
$t_2 = 6.40\ s$
(Notice this time is $1.4\ s$ more than t_1.)

Solution
a) Find the acceleration as the sled is increasing in velocity.

The average acceleration is the change in velocity divided by the change in time.

$$a_{avg} = \frac{v_1 - v_0}{t_1 - t_0} = \frac{282\ m/s - 0\ m/s}{5.00\ s - 0\ s}$$

$$a_{avg} = 56.4\ m/s^2$$

Converting this into g's gives

$$a_{avg} = 56.4\ m/s \left(\frac{1\ g's}{9.80\ m/s^2} \right) = 5.76\ g's$$

b) Find the acceleration as the sled is decreasing in velocity.

The average acceleration is the change in velocity divided by the change in time.

$$a_{avg} = \frac{v_2 - v_1}{t_2 - t_1} = \frac{0\ m/s - 282\ m/s}{6.40\ s - 5.00\ s}$$

$$a_{avg} = 201.4\ m/s^2$$

Converting this into g's gives

$$a_{avg} = -201.4\ m/s \left(\frac{1\ g's}{9.80\ m/s^2} \right) = -20.6\ g's$$

[†]Problem from University Physics by Ling, Sanny and Moebs (OpenStax)