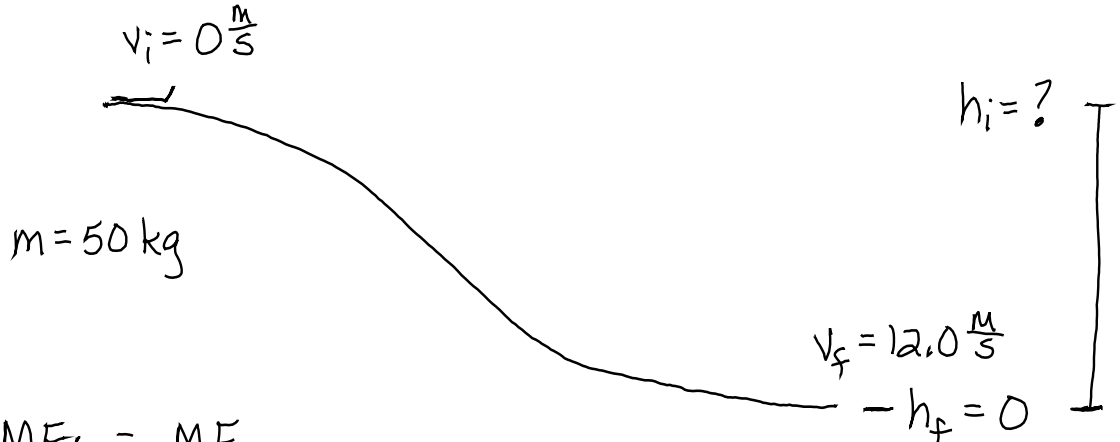
Chapter 5 Review - Work and Energy

p. 195 #27

A child and sled with a combined mass of 50.0 kg slide down a frictionless hill. If the sled starts from rest and has a speed of 12.0 $\frac{m}{s}$ at the bottom, what is the height of the hill?



$ME_i = ME_f$

$KE_i + PE_{gi} = KE_f + PE_{gf}$

$\frac{1}{2} m v_i^2 + mgh_i = \frac{1}{2} m v_f^2 + mgh_f$

$0 + mgh_i = \frac{1}{2} m v_f^2 + 0$

$\frac{mgh_i}{mg} = \frac{\frac{1}{2} m v_f^2}{mg}$

$h_i = \frac{v_f^2}{2g} = \frac{(12.0 \frac{m}{s})^2}{2(9.81 \frac{m}{s^2})} = \boxed{7.33\ m = h_i}$