

24. From Chapter 4, we know the height  $h$  of the skier's jump can be found from  $v_y^2 = 0 = v_{0y}^2 - 2gh$  where  $v_{0y} = v_0 \sin 28^\circ$  is the upward component of the skier's "launch velocity." To find  $v_0$  we use energy conservation.

(a) The skier starts at rest  $y = 20$  m above the point of "launch" so energy conservation leads to

$$mgy = \frac{1}{2}mv^2 \implies v = \sqrt{2gy} = 20 \text{ m/s}$$

which becomes the initial speed  $v_0$  for the launch. Hence, the above equation relating  $h$  to  $v_0$  yields

$$h = \frac{(v_0 \sin 28^\circ)^2}{2g} = 4.4 \text{ m} .$$

- (b) We see that all reference to mass cancels from the above computations, so a new value for the mass will yield the same result as before.