

Chapter 5 Review - Work and Energy

p.194 #18

A 60 kg skier is at the top of a slope. At the initial point A, the skier is 10.0 m vertically above the final point, B.



- a) Set the zero level for gravitational potential energy at B, and find the gravitational potential energy of the skier at A and at B. Then find the difference in potential energy between these two points.

$$h_B = 0\text{ m}, \quad h_A = 10\text{ m}$$

$$PE_A = mgh_A = (60\text{ kg})(9.81\frac{\text{m}}{\text{s}^2})(10\text{ m}) = 5886\text{ J}$$

$$PE_B = mgh_B = (60\text{ kg})(9.81\frac{\text{m}}{\text{s}^2})(0\text{ m}) = 0\text{ J}$$

$$PE_B - PE_A = (0 - 5886)\text{ J} = -5886\text{ J}$$

- b) Repeat this problem with the zero level at A.

$$h_A = 0\text{ m}, \quad h_B = -10\text{ m}$$

$$PE_A = mgh_A = 0\text{ J}$$

$$PE_B = mgh_B = -5886\text{ J}$$

$$PE_B - PE_A = (-5886 - 0)\text{ J}$$

$$= -5886\text{ J}$$

- c) Repeat this problem with the zero level midway down the slope.

$$h_A = 5\text{ m}, \quad h_B = -5\text{ m}$$

$$PE_A = mgh_A = 2943\text{ J}$$

$$PE_B = mgh_B = -2943\text{ J}$$

$$PE_B - PE_A = (-2943 - 2943)\text{ J}$$

$$= -5886\text{ J}$$