86. We take the original height of the box to be the $y = 0$ reference level and observe that, in general, the height of the box (when the box has moved a distance d downhill) is $y = -d \sin 40°$.

(a) Using the conservation of energy, we have

$$K_i + U_i = K + U \implies 0 + 0 = \frac{1}{2}mv^2 + mgy + \frac{1}{2}kd^2 \ .$$

Therefore, with $d = 0.10$ m, we obtain $v = 0.81$ m/s.

(b) We look for a value of $d \neq 0$ such that $K = 0$.

$$K_i + U_i = K + U \implies 0 + 0 = 0 + mgy + \frac{1}{2}kd^2$$

Thus, we obtain $mgd \sin 40° = \frac{1}{2}kd^2$ and find $d = 0.21$ m.

(c) The uphill force is caused by the spring (Hooke's law) and has magnitude $kd = 25.2$ N. The downhill force is the component of gravity $mg \sin 40° = 12.6$ N. Thus, the net force on the box is $25.2 - 12.6 = 12.6$ N uphill, and the acceleration is uphill with magnitude $12.6/2 = 6.3$ m/s^2.