2. (a) Noting that the vertical displacement is $10.0 - 1.5 = 8.5$ m downward (same direction as $\vec{F}_g$), Eq. 7-12 yields

$$W_g = mgd\cos\phi = (2.00)(9.8)(8.5)\cos 0^\circ = 167 \text{ J} .$$

(b) One approach (which is fairly trivial) is to use Eq. 8-1, but we feel it is instructive to instead calculate this as ΔU where $U = mgy$ (with upwards understood to be the $+y$ direction).

$$\Delta U = mgy_f - mgy_i = (2.00)(9.8)(1.5) - (2.00)(9.8)(10.0) = -167 \text{ J} .$$

(c) In part (b) we used the fact that $U_i = mgy_i = 196$ J.

(d) In part (b), we also used the fact $U_f = mgy_f = 29$ J.

(e) The computation of W_g does not use the new information (that $U = 100$ J at the ground), so we again obtain $W_g = 167$ J.

(f) As a result of Eq. 8-1, we must again find $\Delta U = -W_g = -167$ J.

(g) With this new information (that $U_0 = 100$ J where $y = 0$) we have $U_i = mgy_i + U_0 = 296$ J.

(h) With this new information (that $U_0 = 100$ J where $y = 0$) we have $U_f = mgy_f + U_0 = 129$ J. We can check part (f) by subtracting the new U_i from this result.