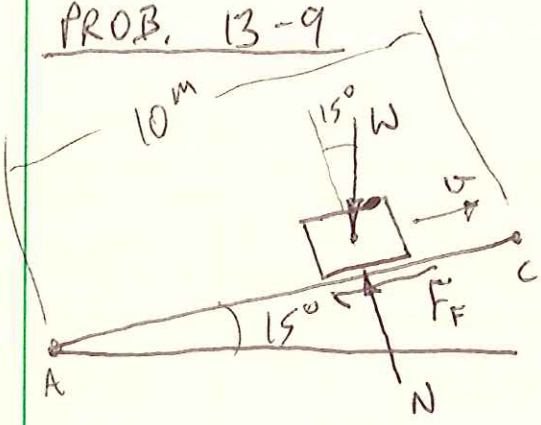
PROB. 13-9



$v_C = 0$, $\Delta x = 10^m$

$\mu_K = 0.12$, FIND v_A

$T_A + {}_A U_C = T_C$

$T_C = 0$ SINCE $v_C = 0$

$T_A = \frac{1}{2} m v_A^2 = \frac{1}{2}\left(\frac{W}{g}\right) v_A^2$ KINETIC ENERGY

${}_A U_C = F \cos\alpha \cdot \Delta x$

${}_A U_C = -F_F \cdot \Delta x - W \sin 15^\circ \cdot \Delta x$

${}_A U_C = -\mu W \cos 15^\circ \cdot \Delta x - W \sin 15^\circ \cdot \Delta x$

${}_A U_C = -W \Delta x (\mu \cos 15^\circ + \sin 15^\circ)$

$\frac{1}{2}\left(\frac{W}{g}\right) v_A^2 - W \Delta x (\mu \cos 15^\circ + \sin 15^\circ) = 0$

$v_A = \sqrt{2g \Delta x (\mu \cos 15^\circ + \sin 15^\circ)}$

$v_A = \sqrt{2\left(9.81 \frac{m}{s^2}\right)(10^m)[(0.12)\cos 15^\circ + \sin 15^\circ]}$

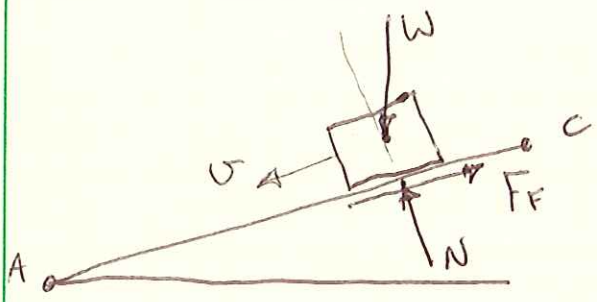
$\boxed{v_A = 8.574 \frac{m}{s}}$

FIND v_A FOR BOX SLIDING DOWN:

$T_C + {}_C U_A = T_A$

$T_C = 0$ SINCE $v_C = 0$

PROB. 13-9 CONT.



$$T_A = \frac{1}{2} m v_A^2 = \frac{1}{2} \frac{W}{g} v_A^2$$

$$_cU_A = -F_F \cdot \Delta x + W \sin 15^\circ \cdot \Delta x$$

$$_cU_A = -\mu W \cos 15^\circ \cdot \Delta x + W \sin 15^\circ \cdot \Delta x$$

$$_cU_A = W \Delta x (-\mu \cos 15^\circ + \sin 15^\circ)$$

$$W \Delta x (-\mu \cos 15^\circ + \sin 15^\circ) = \frac{1}{2} \frac{W}{g} v_A^2$$

$$v_A = \sqrt{2g \Delta x (-\mu \cos 15^\circ + \sin 15^\circ)}$$

$$v_A = \sqrt{2\left(9.81 \frac{m}{s^2}\right)(10^m)\left[-(0.12)\cos 15^\circ + \sin 15^\circ\right]}$$

$$\boxed{v_A = 5.295 \frac{m}{s}}$$