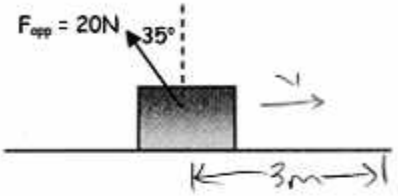
Smith's Key

WORK, ENERGY, AND MOMENTUM

In-Class Example Problems

WORK:

1. A 3kg block is sliding across a frictionless surface when a 20N applied force begins to act, as shown in the diagram. If the force acts as the block moves 3m to the right, calculate the work done by the applied force during the slide.



$W_{app} = F_{app} \cdot d \cdot \cos\theta$ ← angle between F & d)

$= (20)(3m)(\cos 125°) = -34.4\,J$

2. A 20kg block slides down a 30° incline at a constant velocity. ~~If the coefficient of friction between the block and incline is 0.4~~, calculate the following as block slides through 2.1m.

a. the work done by ~~friction~~ grav.

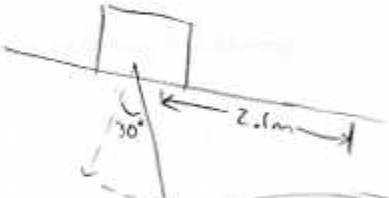
$W_g = (F_g)(d)\cos\theta = 20(9.8)(2.1)(\cos 60°)$

$= 205.8\,J$

b. the work done by the normal force.

$W_N = F_N d \cos\theta = 0\,J$

friction, 90°



c. the work done by ~~gravity~~.

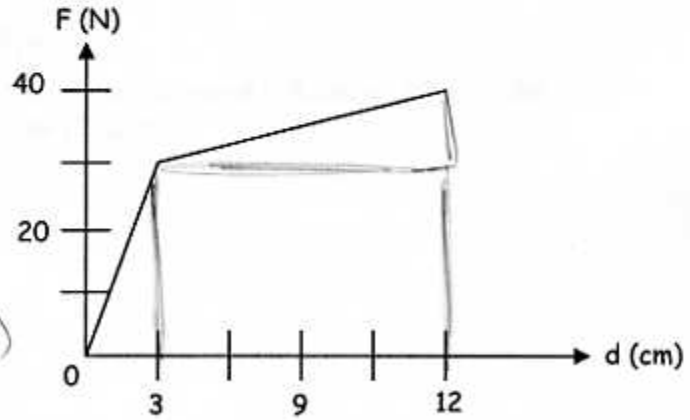
$W_{fric} = F_{fric} d \cos\theta = (98)(2.1)(\cos 180°) = -205.8\,J$

d. the net work done on the block.

$F_{fric} = F_{gx} = 20(9.8)(\sin 30°) = 98N$

$W_{net} = 0\,J$

3. The given graph shows force versus distance compressed for a pillow exerting a force on an egg in bringing it to a stop. Use the graph to calculate the work done by the pillow during the entire 12cm stopping distance.



W = Area under

$= \frac{1}{2}(.03)(20) + (.09)(30) + \frac{1}{2}(.09)(10)$

$= (.30) + (2.70) + (0.45)$

$= 3.45\,J$