Phy 2A 5/10

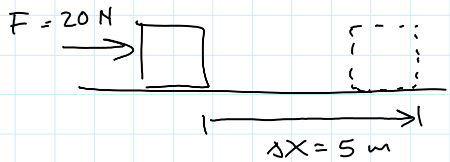
Wednesday, May 10, 2017 11:05 AM

Goals for the Lecture:

1) Be able to calculate work done by constant forces
2) Be able to calculate the scalar product (dot product) of two vectors
3) Understand how defining your system can affect the work done on the system or by the system

Work:

1)

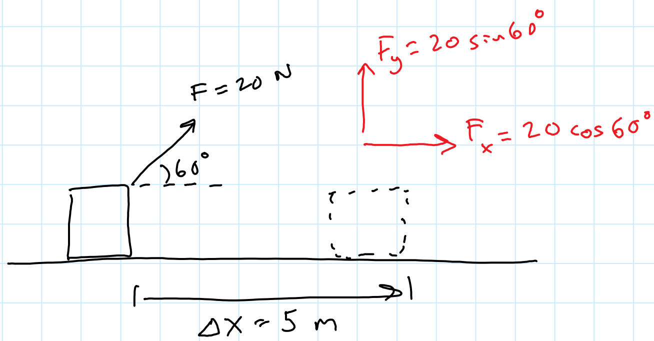


$$W = F\,\Delta X$$
$$= (20\ N)(5\ m)$$
$$= 100\ N\,m$$
$$= 100\ J$$

↑ joule

← only if $\vec{F}$ is constant and in same direction as $\vec{\Delta X}$

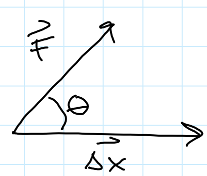
2)



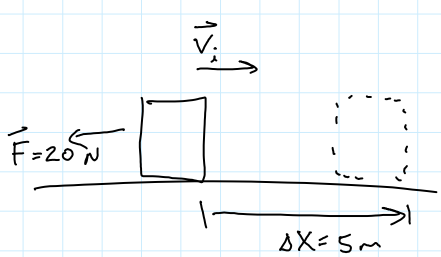
$$W_{by\ F_y} = 0$$
$$W_{by\ F_x} = F_x\,\Delta X$$
$$= (20 \cos 60°)(5)$$
$$= 50\ J$$

Work done by a constant force:

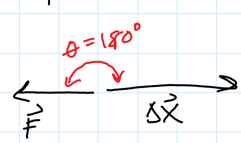
$$W = \vec{F} \cdot \vec{\Delta X}$$
$$= |\vec{F}|\,|\vec{\Delta X}| \cos\theta$$



3)



$$W = \vec{F} \cdot \vec{\Delta X}$$
$$= |\vec{F}|\,|\vec{\Delta X}| \cos\theta$$

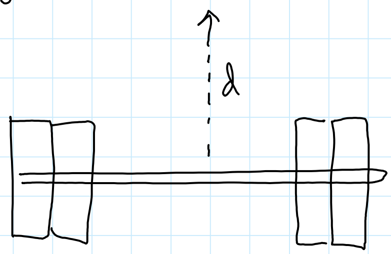


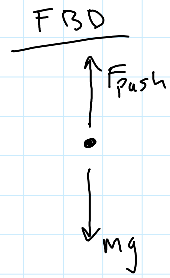
$$= (20\ N)(5\ m)(-1)$$
$$= -100\ J$$

Lifting weights:

Lift at constant speed

Lifting

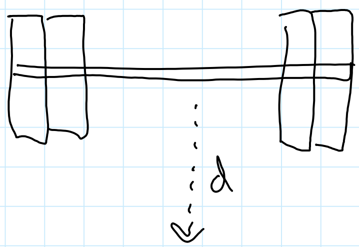


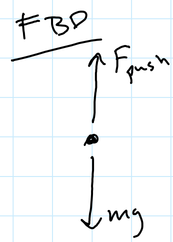


$F_{push} = mg$

$$W = F_{push}\, d \cos 0^\circ = mg\,d$$

Lowering





$F_{push} = mg$

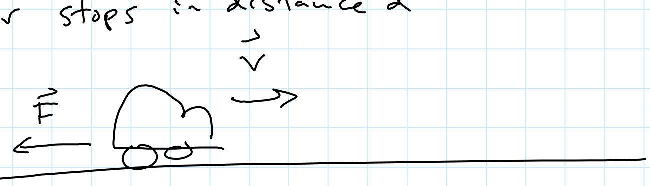
$$W = F_{push}\, d \cos 180^\circ = -mg\,d$$

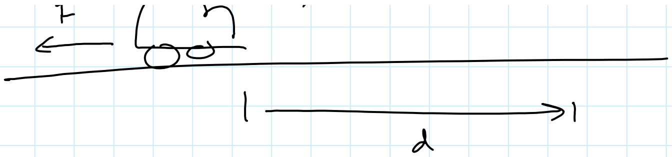
$$W_{net} = 0$$

Kinetic Energy: energy of motion

$$K = \frac{1}{2} m v^2$$

Car stops in distance d





What is the work done on the car by the friction force, $\vec{F}$?

$$W = -Fd$$

Work-Kinetic Energy Theorem:

$$W_{Net} = \Delta K$$