

PP/221

3. $m = 0.100 \text{ kg}$

$\Delta d = 10.0 \text{ cm}$

$W = 0.0230 \text{ J}$

$a = ?$

$W = \bar{F}_{||} \Delta d$

$F_{||} = \frac{W}{\Delta d}$

$F_{||} = \frac{0.0230 \text{ J}}{0.100 \text{ m}}$

$F_{||} = 0.23 \text{ N}$

$F = ma$

$a = \frac{F}{m}$

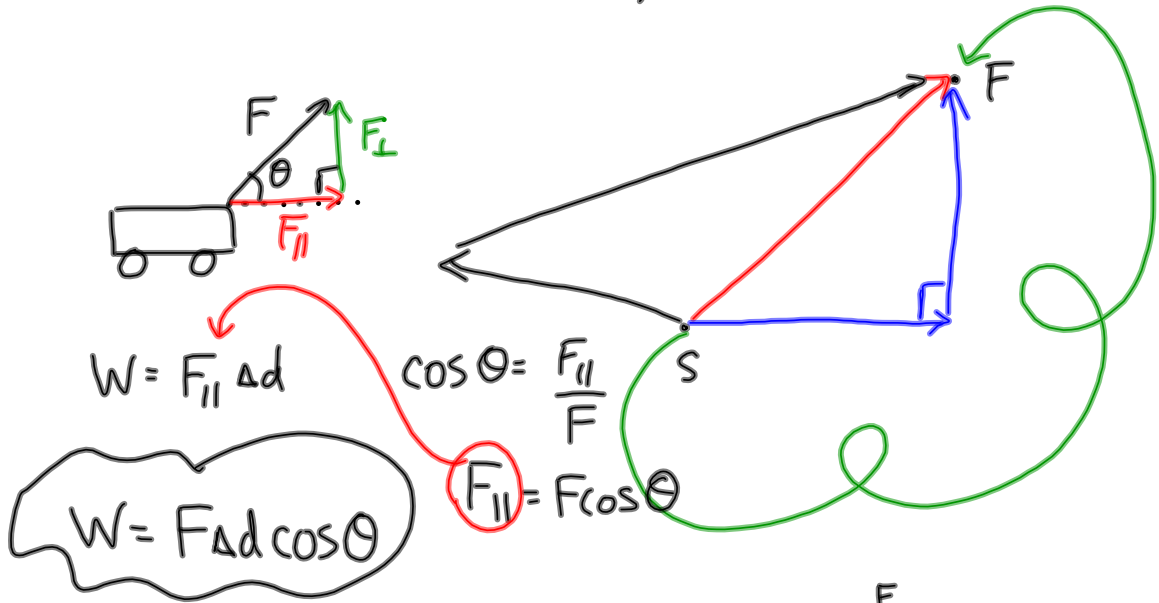
$a = \frac{0.23 \text{ N}}{0.100 \text{ kg}}$

$a = 2.3 \text{ m/s}^2$

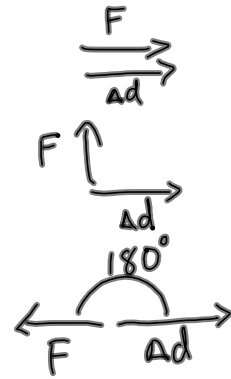
$W = \bar{F}_{||} \Delta d \quad \text{but} \quad \bar{F}_{||} = ma$

$W = ma \Delta d$

Work when the Force acts at an Angle



- You get maximum work when $\theta = 0^\circ$
- there is no work when $\theta = 90^\circ$
- there is negative work when $\theta = 180^\circ$



Example

Calculate the work done by a horse that exerts an applied force of 100N on a sleigh, if the harness makes an angle of 30° with the ground and the sleigh moves 30m across flat, level ground.



$W = F \Delta d \cos \theta$
 $W = (100\text{N})(30\text{m})(\cos 30^\circ)$
 $W = 2.6 \times 10^3 \text{ J}$

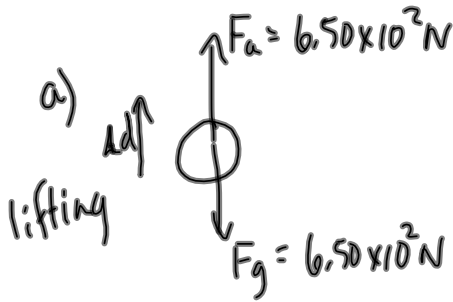
MP/233

$$F_g = 6.50 \times 10^2 \text{ N}$$

$$\Delta d = 0.55 \text{ m}$$

a) $W = ?$ (lifting)

b) $W = ?$ (lowered)

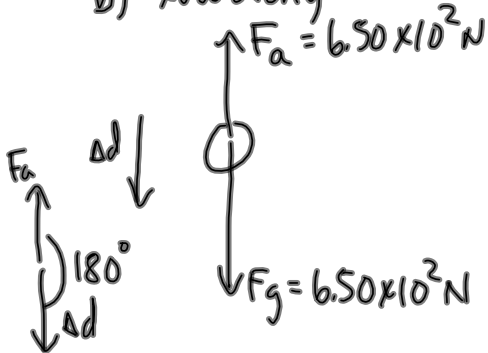


$$W = F \Delta d \cos \theta$$

$$W = (6.50 \times 10^2 \text{ N})(0.55 \text{ m})(\cos 0^\circ)$$

$$W = 3.6 \times 10^2 \text{ J}$$

b) lowering



$$W = F \Delta d \cos \theta$$

$$W = (6.50 \times 10^2 \text{ N})(0.55 \text{ m})(\cos 180^\circ)$$

$$W = -3.6 \times 10^2 \text{ J}$$

TDDU

① PP/235

② Assignment (due Thurs)

p275/15-22

Note about #15

a) Draw a FBD and label all forces on car

b) Which forces do positive work? negative work? no work?