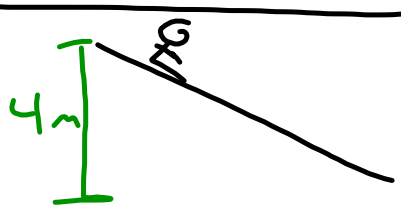
COE PS #1

1)



$E_g = mgh$

$= (40\,kg)(9.8\,m/s^2)(4\,m)$

$= 1568\,J$

$E_g = E_k$

$E_g = \frac{1}{2}mv^2$

$2E_g = mv^2$

$\frac{2E_g}{m} = v^2$

$\sqrt{\frac{2E_g}{m}} = v$

$v = \sqrt{\frac{2E_g}{m}}$

$= \sqrt{\frac{2(1568\,J)}{(40\,kg)}}$

$= 8.85\,m/s$

2)

$E_{el} = \frac{1}{2} k (\Delta x)^2$

$= \frac{1}{2} (650 N/m)(0.6 m)^2$

$= 117 J$

$E_{el} = E_k$

$E_{el} = \frac{1}{2} m v^2$

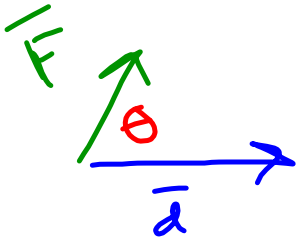
$v = \sqrt{\frac{2E_{el}}{m}}$

$= \sqrt{\frac{2(117 J)}{55 kg}}$

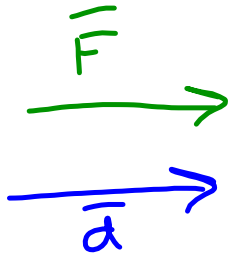
$= 2.06 m/s$

Work

- $W = F\,d\cos(\theta)$

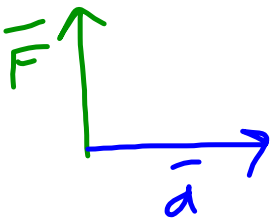


W = work, F = force, d = displacement, θ = angle between $\vec{F}$ and $\vec{d}$

1. 

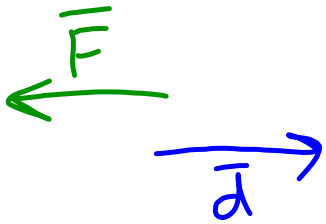
$\theta = 0^\circ$

$\cos(0^\circ) = 1$

2. 

$\theta = 90^\circ$

$\cos(90^\circ) = 0$

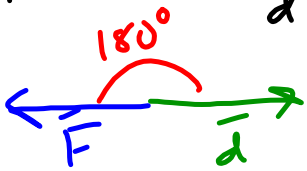
3. 

$\theta = 180^\circ$

$\cos(180^\circ) = -1$

WORK SCENARIOS PS

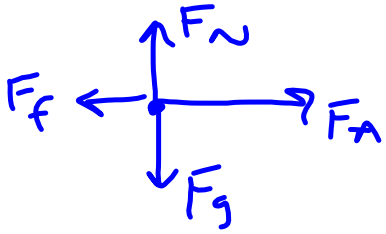
System/Source	Vectors	+/- / 0	θ	W =
1) system: chair source: person	$\vec{F}$ → $\vec{d}$ →	+	0°	300 J
2) system: car source: brakes	$\vec{F}$ ← $\vec{d}$ →	−	180°	−1800 J
3) system: ball source: person	$\vec{F}$ ↑ $\vec{d}$ ↑	+	0°	14.4 J
4) system: ball source: person	$\vec{F}$ ↑ $\vec{d}$ →	0	90°	0 J
5) system: parachute source: air	$\vec{F}$ ↑ $\vec{d}$ ↓	−	180°	−4200 J



Net Work

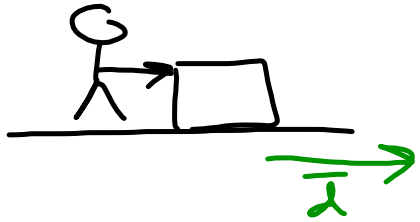
$$\Sigma W = (\Sigma F)\, d \cos\theta$$

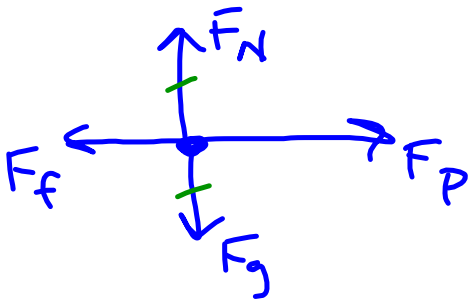
net force from the FBD



Part C

1)





$F_f = 330\,N$

a. $W_p = F_p\, d \cos\theta$

$= (345\,N)(24\,m)\cos(0°)$

$= 8280\,J$

b. $W_f = F_f\, d \cos\theta$

$= (330\,N)(24\,m)\cos(180°)$

$= -7920\,J$

c. $\Sigma W = W_p + W_f$

$= 8280\,J - 7920\,J$

$= 360\,J$