1a) $(T_A - m_A g)s = \frac{1}{2} m_A v^2$

$(T_A - 12 \times 9.81) \times 1.5 = \frac{1}{2}(12)(1.4)^2$

$T_A = 125.56 N$

$(m_B g - T_B)s = \frac{1}{2} m_B v^2$

$(15 \times 9.81 - T_B)(1.5) = \frac{1}{2}(15)(1.4)^2$

$220.725 - 1.5 T_B = 14.7$

$1.5 T_B = 206.025$

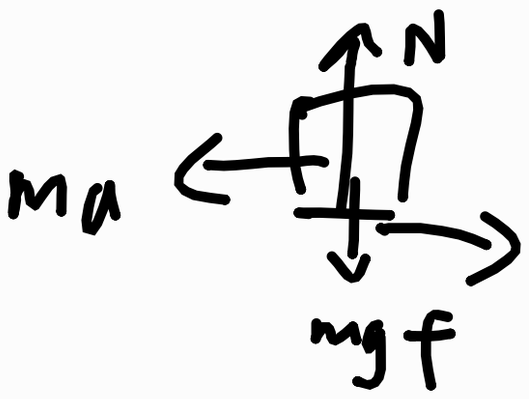
$T_B = 137.35 N$

b) $WD_f = 15 \times 9.81 \times 1.5 - \frac{1}{2}(12)(1.4)^2 - 12 \times 9.81 \times 1.5$

$- \frac{1}{2}(15)(1.4)^2$

$= 17.685 Nm$

2) For the load to not shift, $f = ma$



$f = ma$

$\mu_s N = ma$

$\mu_s mg = ma$

$a = \mu_s g$

$= 0.4(9.81)$

$= 3.924 ms^{-2}$

$v = u + at$

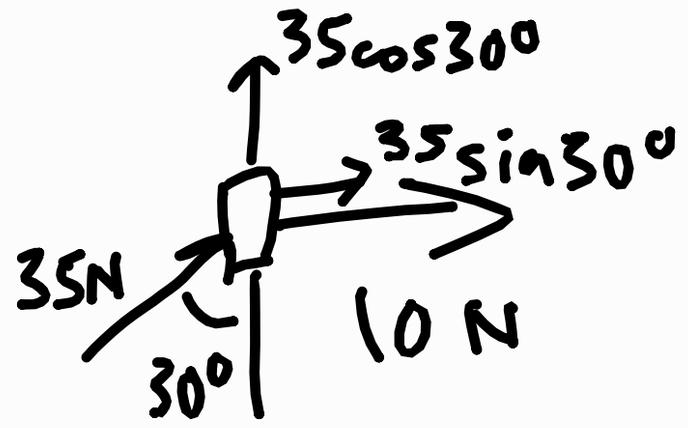
$0 = 90 \div 60 \div 60 \times 1000 - 3.924t$

$t = 6.371049949$

$\simeq 6.371s$

3) $mrw^2 = 150 - 35\sin 30^\circ - 10$

$$w^2 = \frac{122.5}{\frac{50}{9.81}(1.2)}$$



$w = 4.475349148 rads^{-1}$

$\therefore v = rw$

$= 1.2 \times 4.475349148$

$= 5.370418978 ms^{-1}$

$\approx 5.37 ms^{-1}$

$v = u + at$

$$5.37 = 0 + \frac{35\cos 30^\circ}{\frac{50}{9.81}} t$$

$t = 0.903047282s$

$\approx 0.903s$