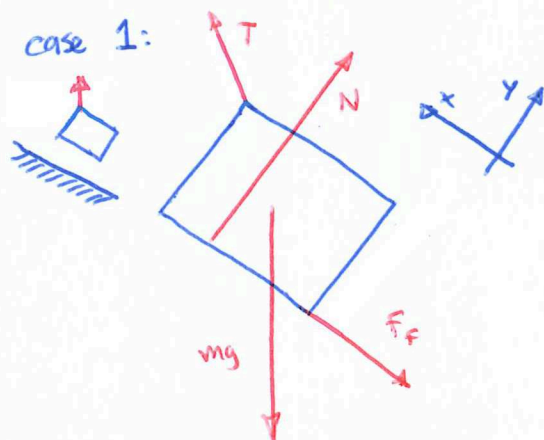
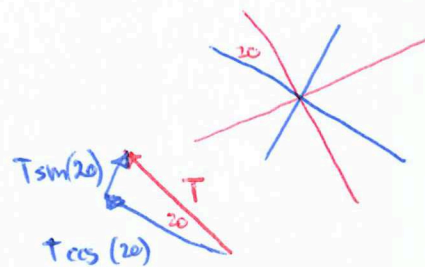
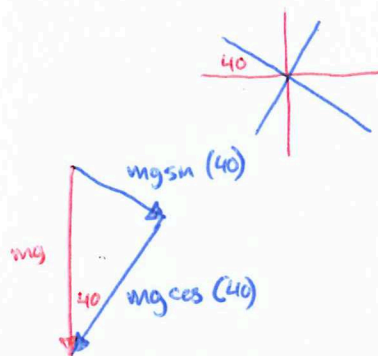
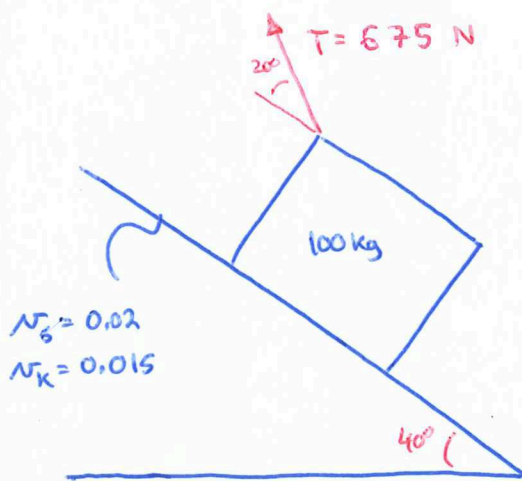




$$\sum F_x = ma_x = T \cos 20 - mg \sin 40 - F_f \quad (1)$$

$$\sum F_y = ma_y = N + T \sin 20 - mg \cos 40 \quad (2)$$

assume $a_y = 0$

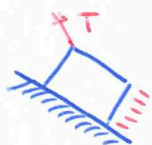
solve (2):

$$N = mg \cos 40 - T \sin 20$$

$$N = mg \cos 40 - T \sin 20 = 521 \text{ N} \quad \checkmark$$

not lift.

case 2:



solve (1) for a_x :

$$a_x = \frac{T}{m} \cos(20) - g \sin 40 - \frac{F_f}{m} \quad (1a)$$

$$\text{assume } F_f = \mu N \quad (3)$$

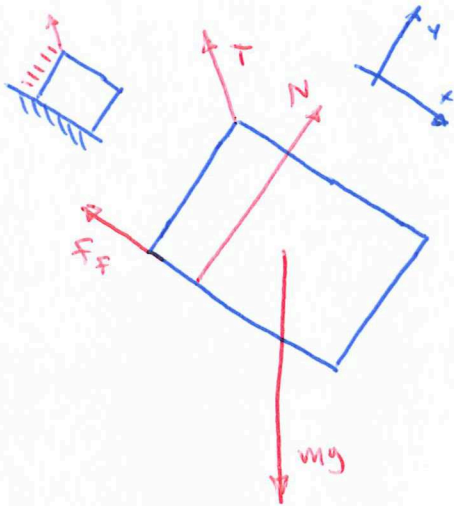
sub (3) into (1a):

$$a_x = \frac{T}{m} \cos(20) - g \sin 40 - \frac{\mu N}{m}$$

$$\text{use } \mu_s = 0.02 \Rightarrow a_x = -0.1 \text{ m/s}^2$$

not moving up

case 3:



$$\sum F_x = m a_x = m g \sin 40 - T \cos 20 - f_f \quad (4)$$

$$\sum F_y = m a_y = N + T \sin 20 - m g \cos 40 \quad (2 \text{ copy})$$

solve (4) for a_x :

$$a_x = g \sin 40 - \frac{T}{m} \cos 20 - \frac{f_f}{m} \quad (4a)$$

assume $f_f = \mu N$

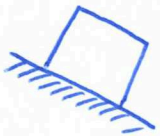
(3 copy)

sub (3) into (4a):

$$a_x = g \sin 40 - \frac{T}{m} \cos 20 - \frac{\mu N}{m}$$

use $\mu_s = 0.02 \Rightarrow a_x = -0.14 \text{ m/s}^2$
 not moving down

case 4:



solve (4) for f_f w $a_x = 0$:

$$m a_x = m g \sin 40 - T \cos 20 - f_f$$

$$f_f = m g \sin 40 - T \cos 20$$

$$= -3.72 \text{ N}$$

final:

