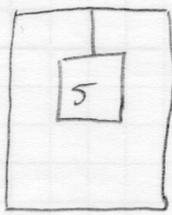
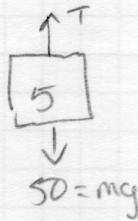


(REMEMBER I USE $g = 10 \frac{m}{s^2}$)

1)



$a \downarrow 2 \frac{m}{s^2}$

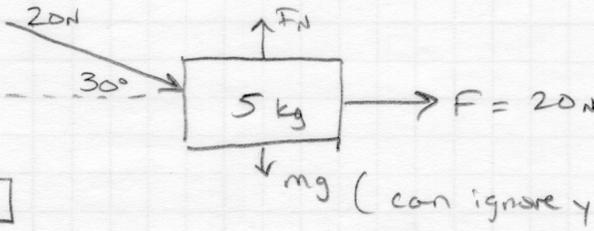


$\Sigma F = ma$
 $50 - T = ma$

$50 - 5(2) = T$

$40 = T$ [B]

2)



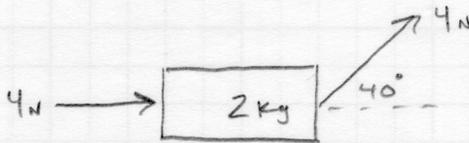
$\Sigma F_x = max$

$20 \cos 30 + 20 = 5a$

$\frac{37.3}{5} = a = 7.5 \frac{m}{s^2}$

[C]

3)



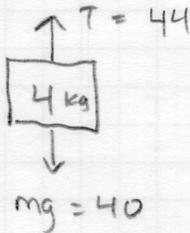
$\Sigma F_x = max$

$4 + 4 \cos 40 = 2a$

$\frac{7.06}{2} = a = 3.53 \frac{m}{s^2}$

[C]

4)



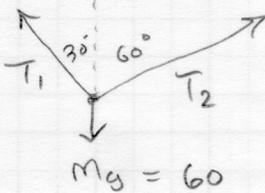
$\Sigma F = ma$

$44 - 40 = 4a$

$\frac{4}{4} = a = 1 \frac{m}{s^2}$

[B]

5)



$a = 0$

[E]

$\Sigma F_x = 0$

$T_1 \sin 30 = T_2 \sin 60$

$T_2 = T_1 \frac{\sin 30}{\sin 60}$

$T_2 = \frac{T_1}{\sqrt{3}}$

$\Sigma F_y = 0$

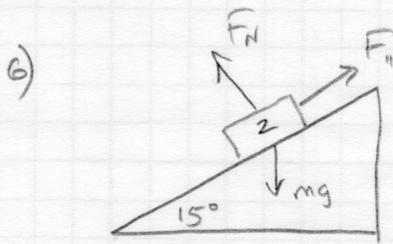
$\Sigma F_y = 0$

$T_1 \cos 30 + T_2 \cos 60 = Mg$

$T_1 \left(\frac{\sqrt{3}}{2}\right) + \frac{T_1}{\sqrt{3}} \left(\frac{1}{2}\right) = 60$

$1.15 T_1 = 60$

$T_1 = 51.96 N$



w/o $F_{||} \Rightarrow a = g \sin \theta$
 $a = 10 \sin(15)$
 $a = 2.6 \frac{m}{s^2}$

So $F_{||}$ must point up ramp

$\Sigma F = ma$
 $mg \sin \theta - F_{||} = ma$

$20 \sin 15 - F_{||} = 2(1.5)$

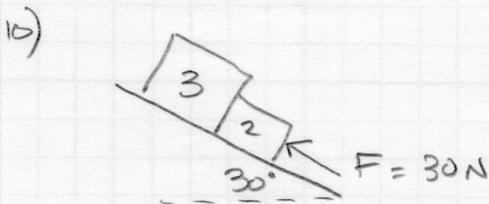
$20 \sin 15 - 3 = F_{||} = 2.18 \text{ N} \quad \boxed{C}$

7) \boxed{C} THE FLOOR ONLY TOUCHES THE CHAIR

B) $N_L = mg$; $N_R = mg \cos \theta$ or mg (fraction) $\therefore < mg$

\boxed{C} UNLESS YOU INCLUDE DIRECTION, THE NO ANSWER IS CORRECT

9) \boxed{B} both moving SAME WAY IN ELEVATOR



$\Sigma F_x = ma_x$

$50 \sin 30 - 30 = 5a$

$\frac{25 - 30}{5} = a = -1 \frac{m}{s^2}$ (So up the ramp)

F_{23} (push from 2 on 3)

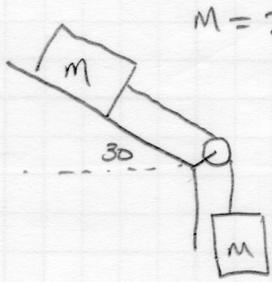


$\Sigma F = ma$

$F_{23} - 30 \sin 30 = 3(1)$

$F_{23} = 3 + 15 = 18 \text{ N} \quad \boxed{A}$

11)

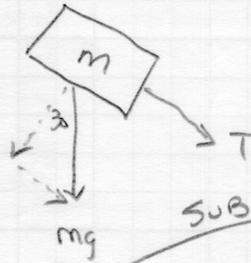


$M = 2.2 \text{ kg}$



$\Sigma F_y = ma_y$

$Mg - T = Ma$



$\Sigma F_x = ma_x$

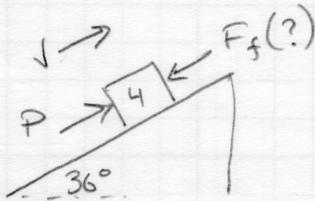
$T + Mg \sin 30 = ma$

$Mg - T = T + Mg \sin 30$

$\frac{Mg - 0.5Mg}{2} = \frac{2T}{2}$

$\boxed{c} \quad \frac{Mg}{4} = T = \frac{2.2(10)}{4} = \boxed{5.5 \text{ N}}$

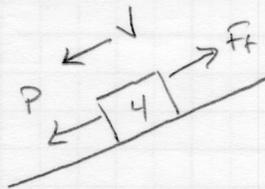
12)



$\Sigma F = ma$

$P - mg \sin \theta - F = ma^{\rightarrow 0}$

$31 - 40 \sin 36 = F = 7.5 \text{ N}$



$\Sigma F = ma$

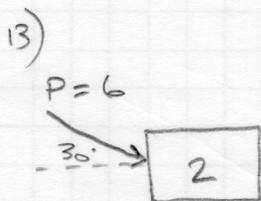
$P + mg \sin \theta - F = ma^{\rightarrow 0}$

$P = F - mg \sin \theta = 7.5 - 40 \sin 36$

\boxed{B}

$P = -16 \text{ N}$

So up ramp, not down, I guessed the wrong direction



$$\Sigma F_x = ma_x$$

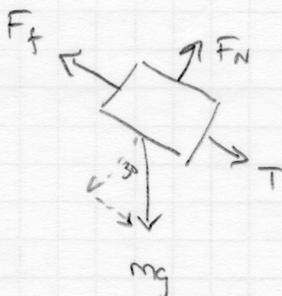
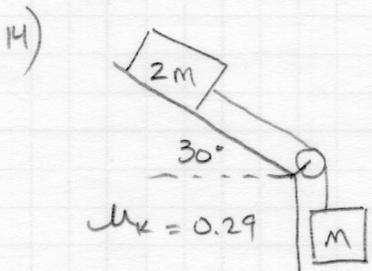
$$P \cos 30 - F_f = ma$$

$$a \rightarrow 1.2 \frac{m}{s^2}$$

$$6 \cos 30 - F_f = 2(1.2)$$

D

$$6 \cos 30 - 2.4 = F_f = 2.8 \text{ N}$$



$$\Sigma F_x = ma_x$$

$$T + mg \sin 30 - \mu F_N = ma$$

$$T + (2m)g(\frac{1}{2}) - (.29)(2mg) \cos 30 = (2m)a$$



$$Mg - T = Ma$$

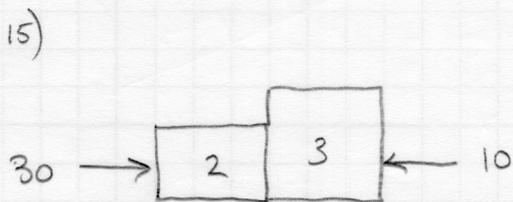
add eqs.

$$+ Mg - T = Ma$$

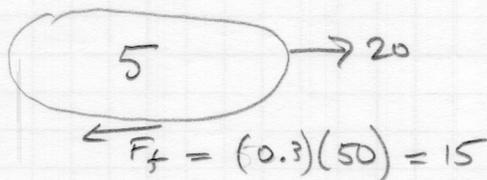
$$2Mg - (.29)2Mg(\cos 30) = 3Ma$$

C

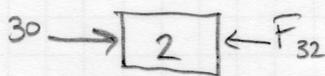
$$\frac{20 - 5.5}{3} = a = 5 \frac{m}{s^2}$$



BLACK
BAG



$$a = 1 \rightarrow$$



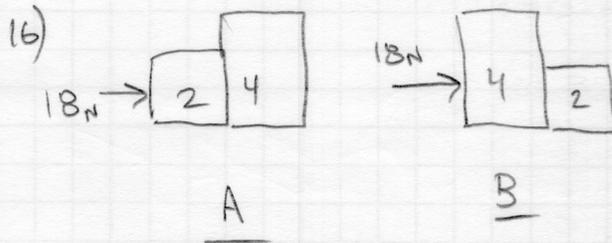
$$F_f = (.3)(20) = 6$$

$$F_{NET} = 5 \rightarrow$$

$$a = \frac{5}{5} = 1 \frac{m}{s^2} \rightarrow$$

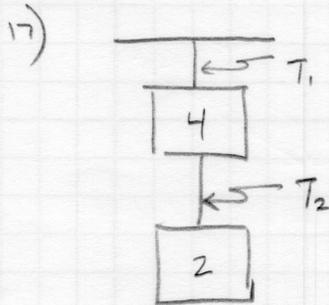
$$F_{32} + 6 - 30 = 2(-1)$$

$$F_{32} = 22 \quad \text{D}$$



BOTH ARE 18N PUSHING 6 kg

So $a = \frac{18}{6} = \underline{\underline{3 \frac{m}{s^2}}}$ for both
A A + B



For T_1 $\Sigma F = ma$

$$T_1 - (M_{TOT})g = (M_{TOT})a$$

$$T_1 = 6(2.2) + 6(10) = \underline{\underline{73.2 \text{ N}}}$$

For T_2 $\Sigma F = ma$

$$T_2 - m_2g = m_2a$$

$$T_2 = 2(2.2) + 2(10) = \underline{\underline{24.4}}$$

E

18)
 SAME AS ABOVE
 ON $a = 2.2 \downarrow$
 \therefore same equations
 but w/ a as negative
 2.2

$$T_1 = 6(-2.2) + 6(10) = \underline{\underline{46.8 \text{ N}}}$$

$$T_2 = 2(-2.2) + 2(10) = \underline{\underline{15.6 \text{ N}}}$$

C