

## Les corps en équilibre

Démontrez tout votre travail.

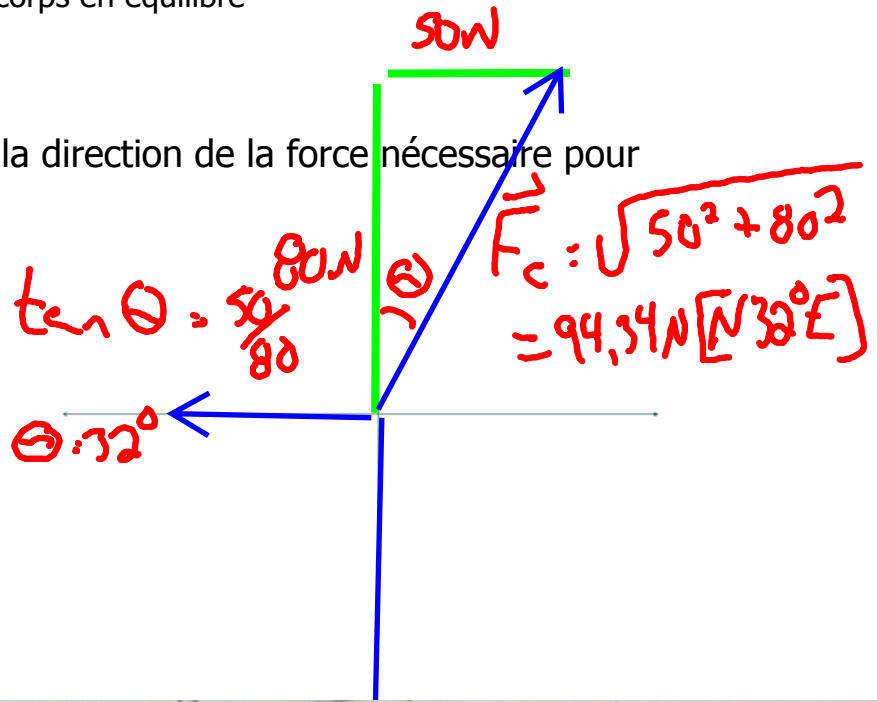
1. Déterminez la grandeur et la direction de la force nécessaire pour garder le corps en équilibre.

a) 50N[W] et 80N[S]

$$F_R = 0N$$

$$0N = \vec{F}_A + \vec{F}_B + \vec{F}_c$$

$$\vec{F}_c = -(\vec{F}_A + \vec{F}_B)$$



b) 100N [E20°N] et 50N [N30°W]

$$A_x = \cos 20 \cdot 100$$

$$A_y = \sin 20 \cdot 100$$

$$B_x = \sin 30 \cdot 50$$

$$B_y = \cos 30 \cdot 50$$

	$F_x$	$F_y$
A	93,97N [E]	34,20N [N]
B	25N [W]	43,30N [N]
$F_R$	68,97N [E]	77,50N [N]

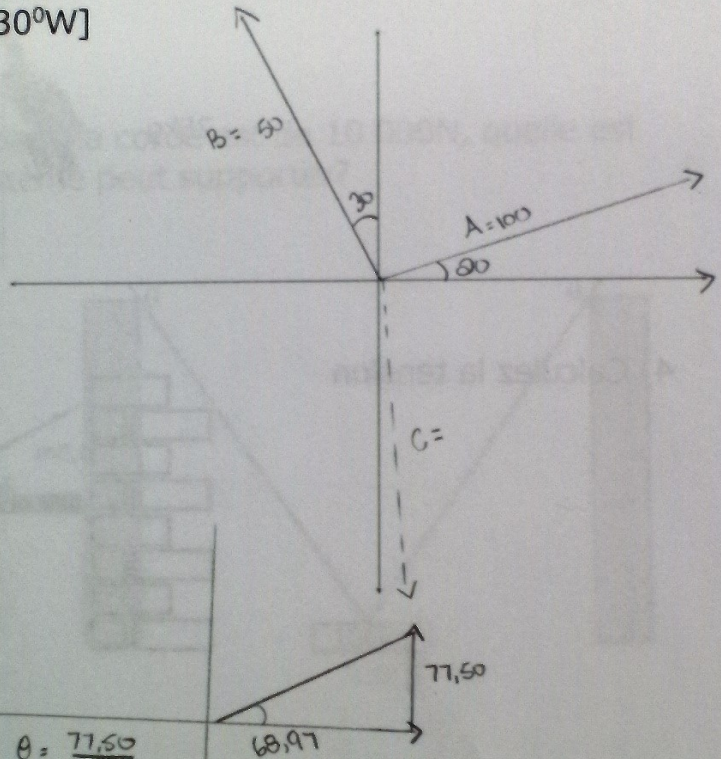
$$\tan \theta = \frac{77,50}{68,97}$$

$$\theta = 48,33^\circ$$

$$F_R = \sqrt{68,97^2 + 77,50^2}$$

$$F_R = 103,76N [E 48,33^\circ N]$$

$$F_R = 103,76N [W 48,33^\circ S]$$



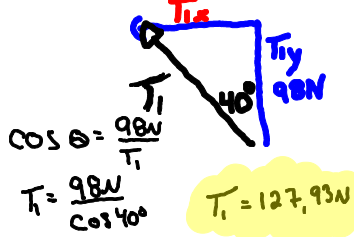
2) Calculez les tensions dans les cordes

Si  $F_R = 0N$

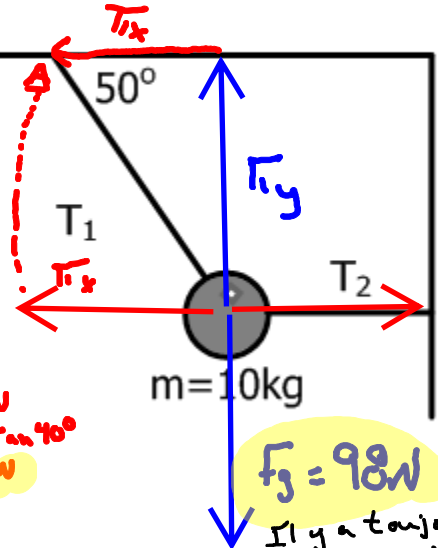
①  $F_g = T_{1y}$

$T_{1x} = T_2$   
et  $F_g = T_{1y}$

② UTILESE  $T_{1y}$  pour trouver  $T_{1x}$  et  $T_2$



$\tan 40^\circ = \frac{T_{1x}}{98N}$   
 $T_{1x} = 98N \cdot \tan 40^\circ = 82,23N$   
 $T_{1x} = T_2$

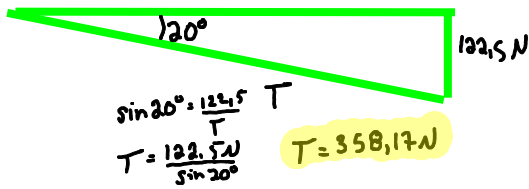
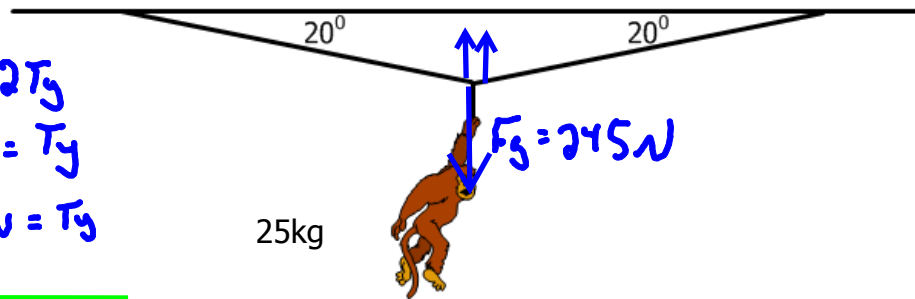


$F_g = 98N$

Il y a toujours un entrée au problème. SOUVENT C'EST LA  $F_g$ .

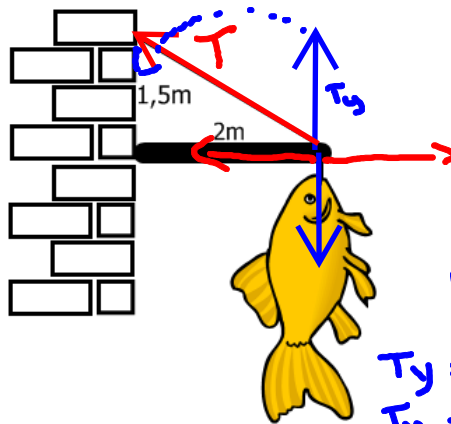
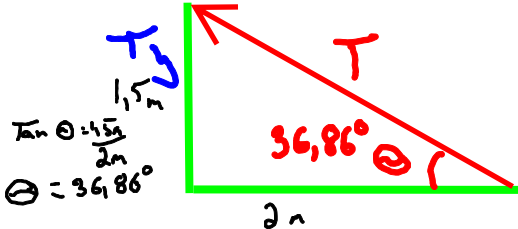
3) Calculez la tension

$F_g = 2T_y$   
 $\frac{245N}{2} = T_y$   
 $122,5N = T_y$



4) Calculez la tension

Il faut trouver l'angle du triangle



$m = 50kg$

$F_g = 490N$

$T_y = F_g$   
 $T_y = 490N$

$\sin 36,86^\circ = \frac{T_y}{T}$

$T = \frac{T_y}{\sin 36,86^\circ}$   
 $T = 816,85N$

5) Calculer les tensions  $T_1$ ,  $T_2$ , et  $T_3$

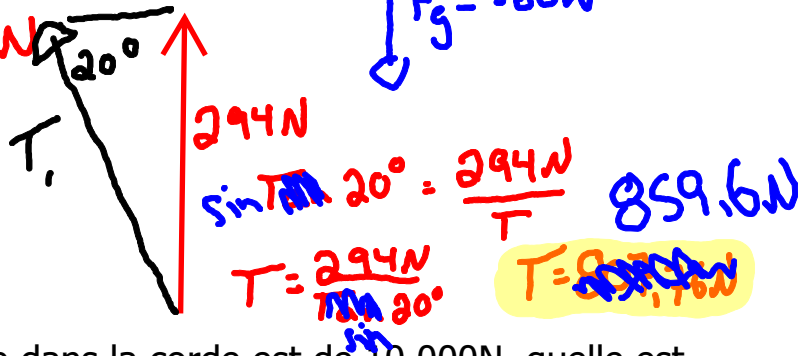
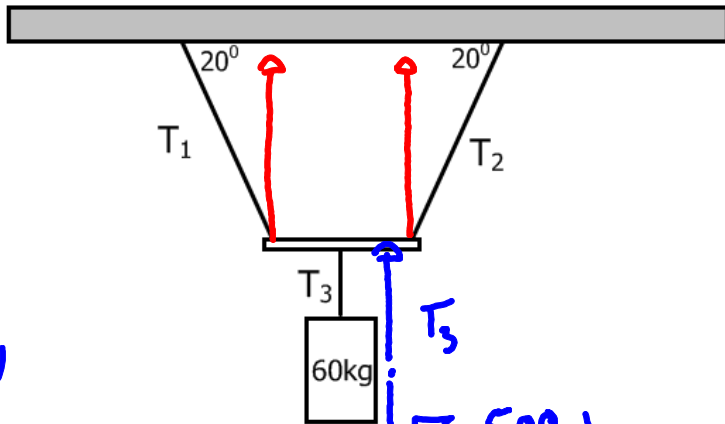
• Ici,  $T_3 = F_g$

et  $T_{1y} + T_{2y} = T_3$

$2T_y = T_3$

•  $2T_y = 588\text{N}$

•  $T_y = 294\text{N}$



6) Si la tension maximale dans la corde est de 10 000N, quelle est l'angle minimale que le système peut supporter?

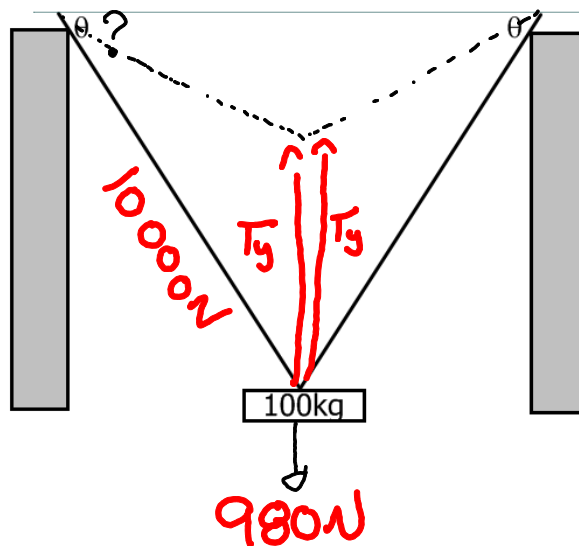
$2T_y = 980\text{N}$

$T_y = 490\text{N}$

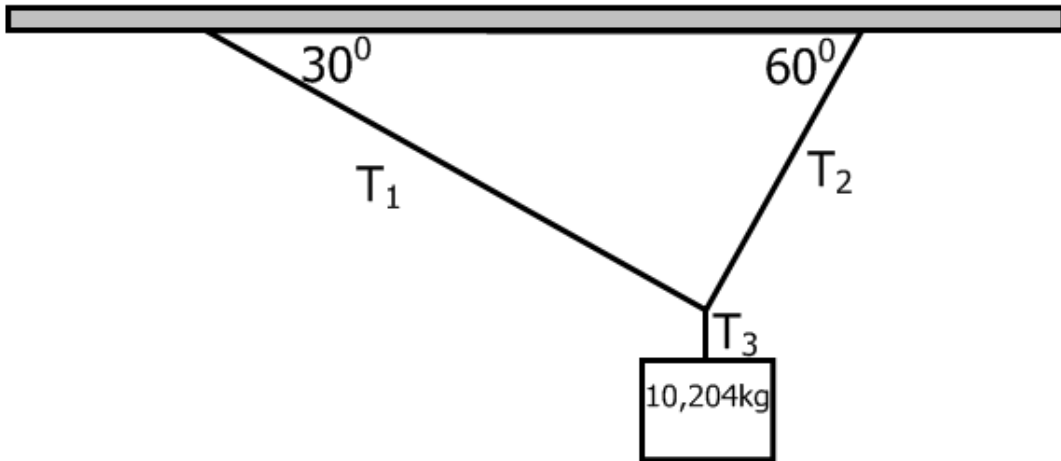


$\sin \theta = \frac{490\text{N}}{10000\text{N}}$

$\theta = 2.81^\circ$



7) Essayez celui-ci si vous êtes expert. Calculez les tensions dans  $T_1$  et  $T_2$ .



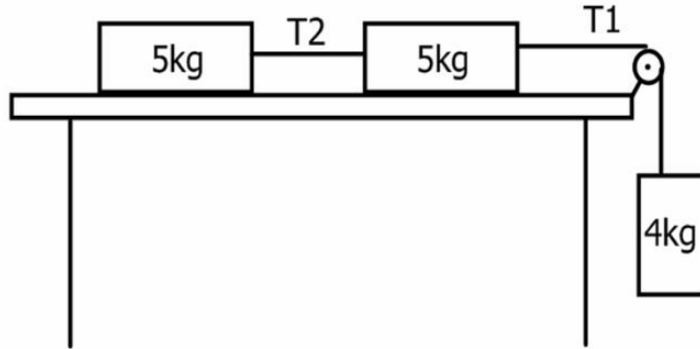
Une tellement bonne question!  
Je vous laisse la figurer.

Pense... Système de deux  
équations.

## Les plans inclinés, les cordes et poulies

1. Résous le système.  $\mu=0,1$

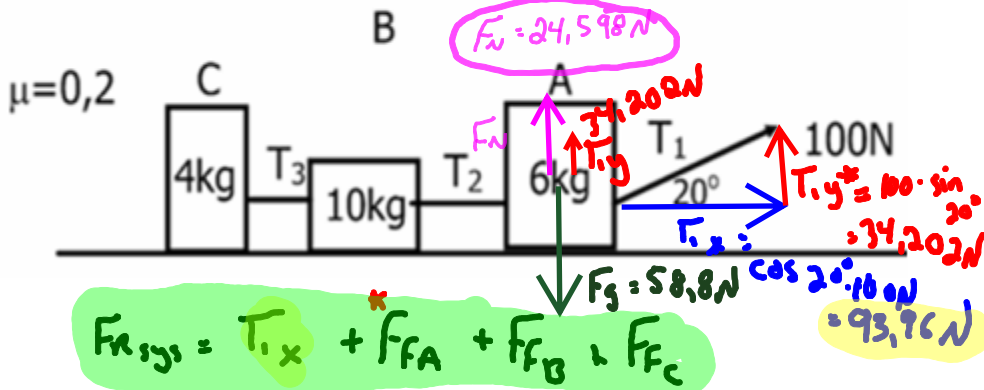
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2. Résous le système

① Détermine les composantes  
de  $T_1$  qui seront  $T_{1x}$ ...  
et  $T_{1y}$ ...

②  $F_n$  est affectée par  $T_{1y}$  ...  $F_n = F_g - T_{1y}$



$$F_n = F_g - T_{1y}$$

$$F_{FA} = \mu \cdot 24,598 \text{ N} = 4,9196 \text{ N}$$

$$F_{FB} = \mu \cdot 98 \text{ N} = 19,6 \text{ N}$$

$$F_{FC} = \mu \cdot 39,2 \text{ N} = 7,84 \text{ N}$$

$$F_{R,sys} = 93,96 \text{ N} + (-4,9196 \text{ N}) + (-19,6 \text{ N}) + (-7,84 \text{ N}) = \underline{\underline{61,6 \text{ N}}}$$

$$T_2 = 74,56 \text{ N}$$

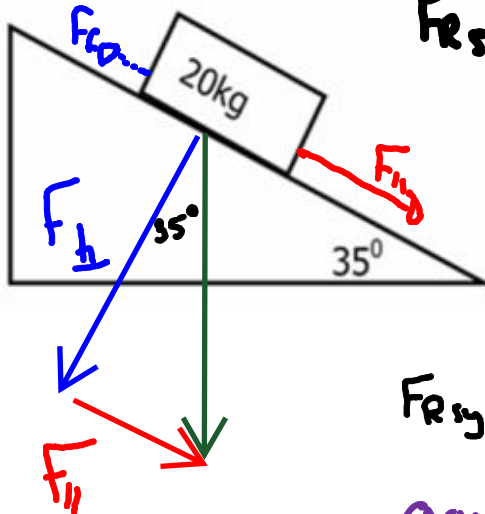
$$T_3 = 20,16 \text{ N}$$

$$a_{sys} = \frac{61,6 \text{ N}}{20 \text{ kg}} = 3,08 \text{ m/s}^2$$

3. Résous le système

$\mu = 0,15$

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$$F_{R\text{sys}} = F_{||} + F_f$$

$$F_{||} = F_g \cdot \sin \theta = 112,40\text{N}$$

$$F_{\perp} = F_g \cdot \cos \theta = 160,55\text{N}$$

$$F_f = 24,083\text{N}$$

$$F_{R\text{sys}} = 112,40\text{N} + -24,083\text{N} = 88,317\text{N}$$

$$a_{\text{sys}} = F_{R\text{sys}} / m = 4,416\text{m/kg}$$

4. Résous le système

$\mu = 0,1$

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$$F_f = \mu \cdot F_N$$

$$F_{R\text{sys}} = F_{g_{10\text{kg}}} + F_{||_{3\text{kg}}} + F_{f_{3\text{kg}}} + F_{||_{2\text{kg}}} + F_{f_{2\text{kg}}}$$

$$3\text{kg } F_{||} = \sin 25^\circ \cdot 29,4\text{N} = 12,42\text{N}$$

$$F_f = 0,1 \cdot \cos 25^\circ \cdot 29,4\text{N} = -2,16\text{N}$$

$$2\text{kg } F_{||} = \sin 25^\circ \cdot 19,6\text{N} = 8,28\text{N}$$

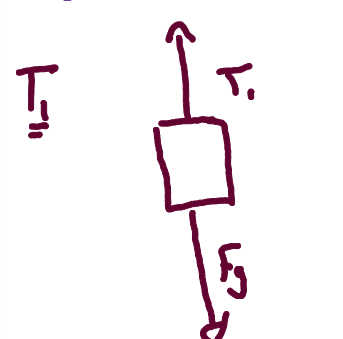
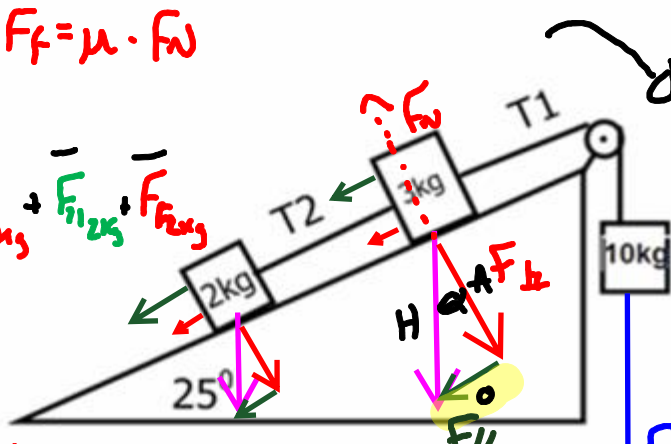
$$F_f = 0,1 \cdot \cos 25^\circ \cdot 19,6\text{N} = -1,78\text{N}$$

$$F_{R\text{sys}} = 98\text{N} + -12,42\text{N} + -2,16\text{N} + -8,28\text{N} + -1,78\text{N}$$

$$= 75,52\text{N}$$

$$a_{\text{sys}} = \frac{75,52\text{N}}{15\text{kg}}$$

$$5,03\text{N/kg}$$



$$F_R = 10\text{kg} \cdot 5,03\text{N/kg} = 50,3\text{N}$$

$$F_R = T_1 + F_g$$

$$50,3\text{N} = T_1 + 98\text{N}$$

$$-47,65\text{N} = T_1$$

$$F_g = 98\text{N}$$



$$F_R = 2\text{kg} \cdot 5,03\text{N/kg} = 10,06\text{N}$$

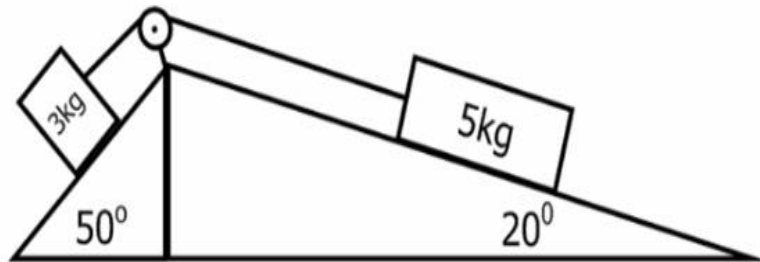
$$F_R = T_2 + F_{||} + F_f$$

$$10,06\text{N} = T_2 + -8,24\text{N} + -1,78\text{N}$$

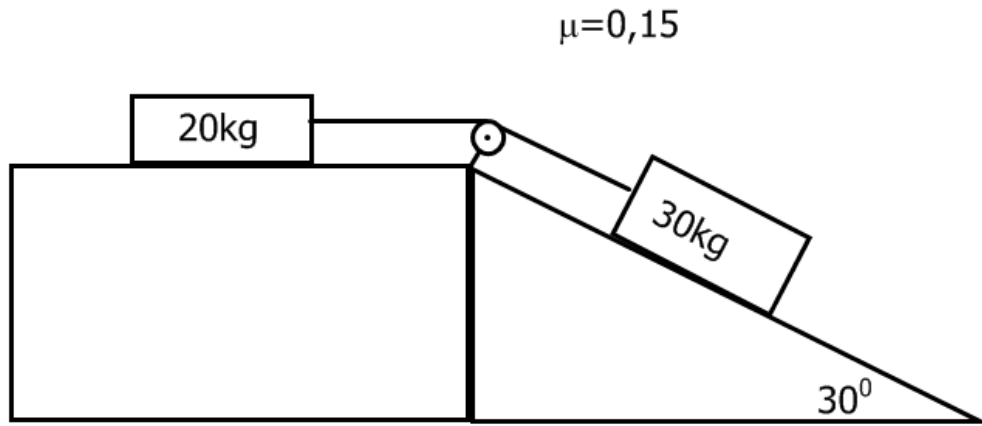
$$20,08\text{N} = T_2$$

5. Résous le système

$$\mu=0,05$$



6. Résous le système.



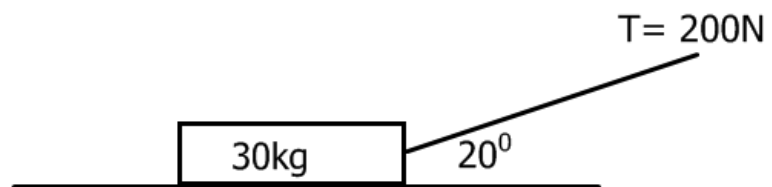


Révision des plans inclinés corps en équilibre  
Devoir formel

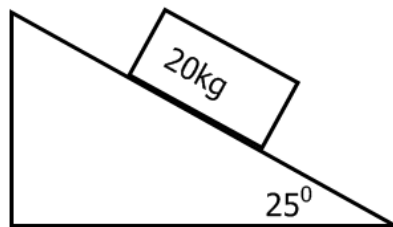
Nom : \_\_\_\_\_

Pour tous les systèmes déterminez la **force résultante**,  
**l'accélération, et les tensions**. Démontrez votre travail.

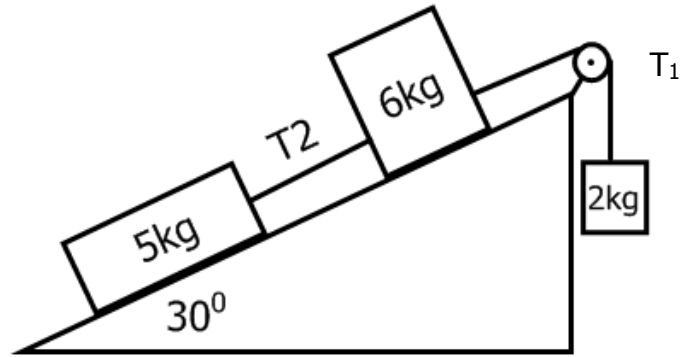
1.  $\mu = 0,05$  (4)



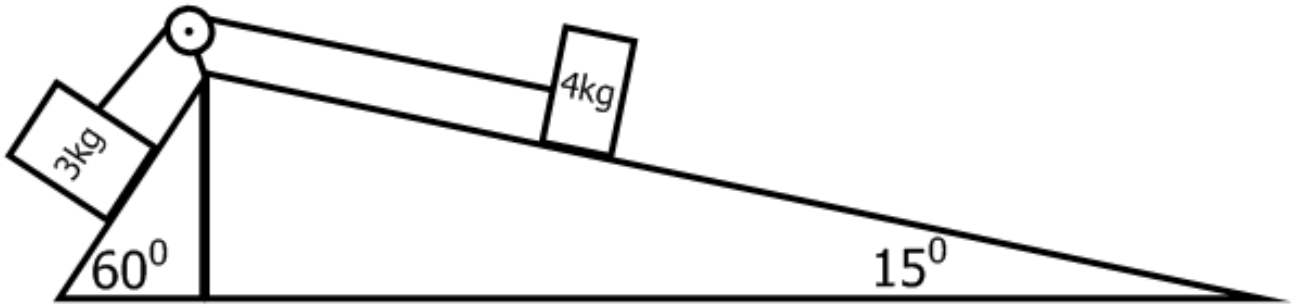
2.  $\mu = 0,15$  (3)



3.  $\mu = 0,2$  (6)

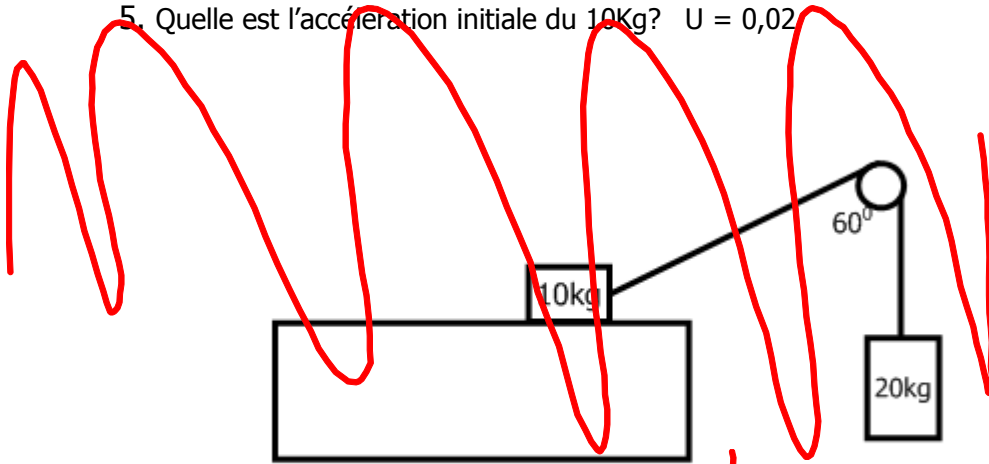


4.  $\mu = 0,1$  (5)



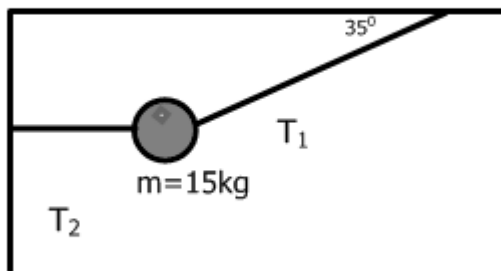
BONI

5. Quelle est l'accélération initiale du 10kg?  $\mu = 0,02$



UGLY

6. Calculez la tension dans les cordes.



7. Si la tension dans le câble est de 300N, quelle est la masse?

