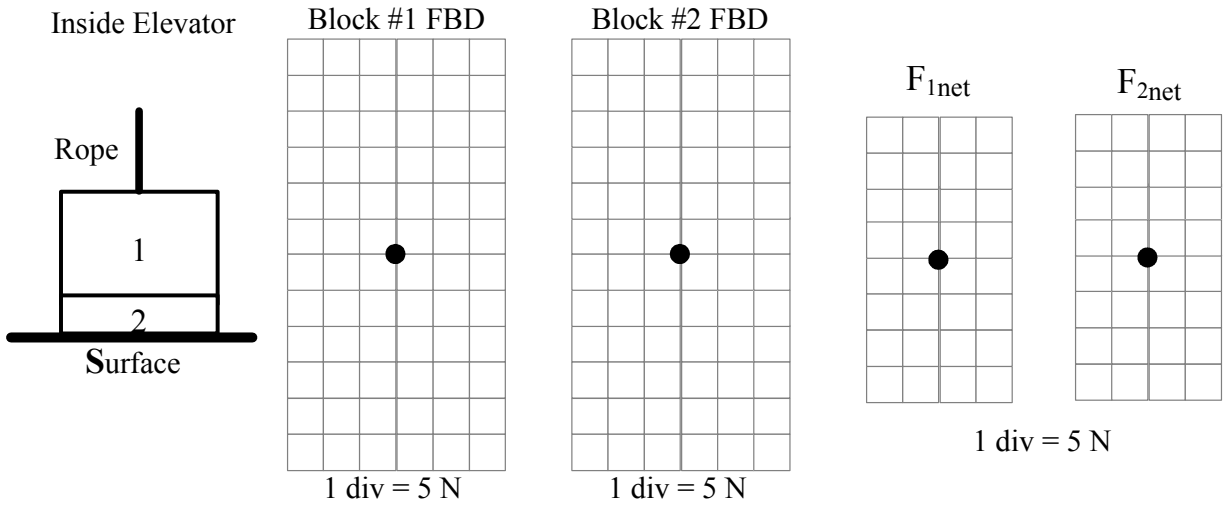
Name: _____

RECITATION HANDOUT #6: Work and Kinetic Energy

Block #1 (3 kg) and block #2 (1 kg) are inside an elevator in the configuration shown below. A rope is pulling up with a tension of 5 N on block #1. The elevator moves **upward** with **decreasing** speed and both blocks have an acceleration of 5 m/s^2. Draw the **free body diagrams** for both blocks using the two subscript notation, and draw the **net force** on each block. (Assume g = 10 m/s^2.)



Identify the individual **forces** (if any) doing **POSITIVE WORK** on **Block #1** and calculate the joules of work $\mathcal{W}_{1x}$ for each force if the elevator travels upward **2 m**, e.g. $\mathcal{W}_{12}$ (work on #1 by #2) = N_{12} (Δy).

Identify the individual **forces** (if any) doing **NEGATIVE WORK** on **Block #1** and calculate the joules of work $\mathcal{W}_{1x}$ for each force if the elevator travels upward **2 m**.

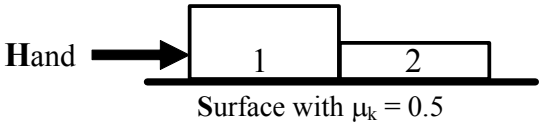
Calculate the **NET WORK** $\mathcal{W}_{1\,net}$ on **Block #1** if the elevator travels upward **2 m**. *Does your positive or negative answer make sense given that the elevator is slowing down?*

Identify the individual **forces** (if any) doing **POSITIVE WORK** on **Block #2** and calculate the joules of work $\mathcal{W}_{2x}$ for each force if the elevator travels upward **2 m**.

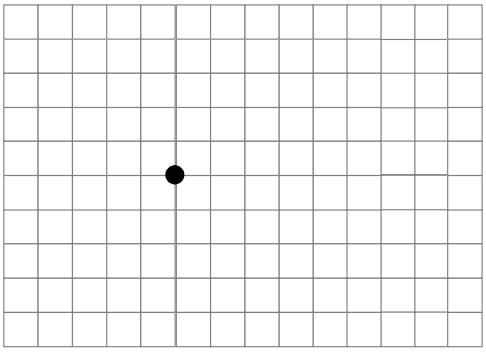
Identify the individual **forces** (if any) doing **NEGATIVE WORK** on **Block #2** and calculate the joules of work $\mathcal{W}_{2x}$ for each force if the elevator travels upward **2 m**.

Calculate the **NET WORK** $\mathcal{W}_{2\,net}$ on **Block #2** if the elevator travels upward **2 m**.

Block #1 (2 kg) and block #2 (1 kg) are being accelerated to the right at **10 m/s^2** by a hand pushing on block #1. The coefficient of kinetic friction between the blocks and the surface is **μ_k = 0.5.** Draw the **free body diagrams** for both blocks using the two subscript notation, and draw the **net force** on each block. (assume g = 10 m/s^2)

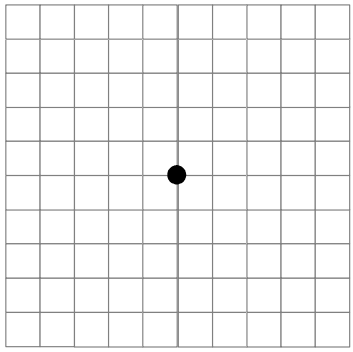


Block #1 FBD



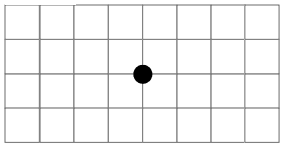
1 div = 5 N

Block #2 FBD

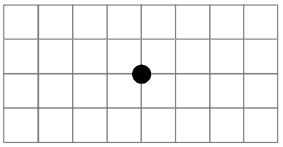


1 div = 5 N

F_{1net}



F_{2net}



1 div = 5 N

Identify the individual **forces** (if any) doing **POSITIVE WORK** on **Block #1** and calculate the joules of work $\mathcal{W}_{1x}$ for each force if the blocks travel **2 m**, e.g. $\mathcal{W}_{12}$ (work on #1 by #2) = N_{12} (Δy).

Identify the individual **forces** (if any) doing **NEGATIVE WORK** on **Block #1** and calculate the joules of work $\mathcal{W}_{1x}$ for each force if the blocks travel **2 m**.

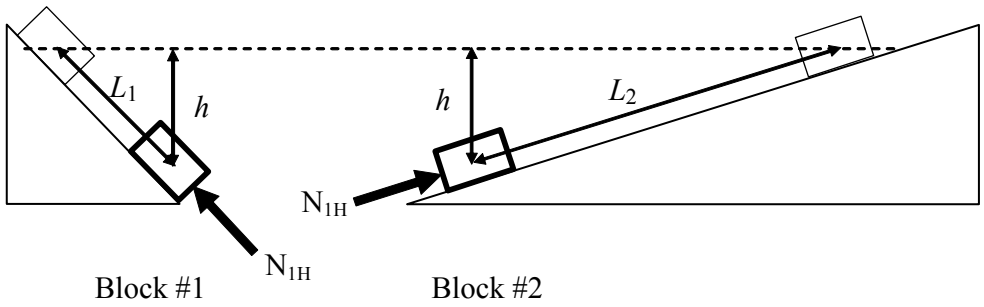
Calculate the **NET WORK** $\mathcal{W}_{1\ net}$ on **Block #1** if the blocks travel **2 m**. *Does your positive or negative answer make sense given that the block is speeding up?*

Identify the individual **forces** (if any) doing **POSITIVE WORK** on **Block #2** and calculate the joules of work $\mathcal{W}_{2x}$ for each force if the blocks travel **2 m**.

Identify the individual **forces** (if any) doing **NEGATIVE WORK** on **Block #2** and calculate the joules of work $\mathcal{W}_{2x}$ for each force if the blocks travel **2 m**.

Calculate the **NET WORK** $\mathcal{W}_{2\ net}$ on **Block #2** if the blocks travel **2 m**.

Block #1 (1 kg) and block #2 (1 kg) are pushed with forces having the **same magnitude** ($N_{1H} = N_{2H}$) up frictionless inclines as shown below. The incline for Block #1 is much steeper than the incline for Block #2, but both blocks are pushed up the same vertical height *h*. The force N_{1H} is chosen such that **Block #1** moves with **constant speed** up the incline. For the questions below, consider the portion of motion for which Block #1 moves a distance L_1 up the incline and Block #2 moves a distance L_2 (i.e., same change in vertical height).



Which block has the **greater** amount of **work** done on it by the **hand force**?

(a) Block #1
(b) Block #2
(c) Same
(d) Insufficient information

Which block has the **greater** amount of **work** done on it by **gravity**?

(a) Block #1
(b) Block #2
(c) Same.
(d) Insufficient information

The work done by gravity and the work done by the hand are **positive/negative** as follows:

(a) $W_{gravity} > 0$; $W_{hand} > 0$
(b) $W_{gravity} > 0$; $W_{hand} < 0$
(c) $W_{gravity} < 0$; $W_{hand} > 0$
(d) $W_{gravity} < 0$; $W_{hand} < 0$

Which block is **moving faster** at the top of the incline?

(a) Block #1
(b) Block #2
(c) Same
(d) Insufficient information