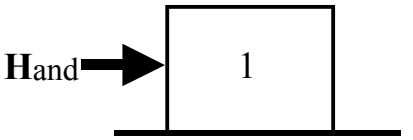
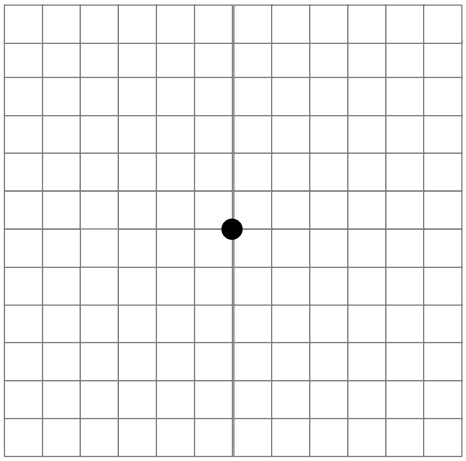
Name: _____

RECITATION HANDOUT #3: **Forces II (add friction)**

1. A 2-kg block at rest is given a quick push by a hand equal to 25 N. The coefficient of kinetic friction between the block and floor is given by μ_s **= 0.5**. The block slides across the floor and slows down until it comes to rest. Draw the free body diagrams for the block at each time interval shown below and label all vectors using the two subscript notation. (Assume g = 10 m/s^2.)

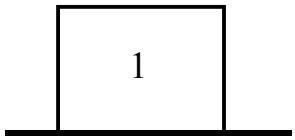
Time #1: Hand pushing

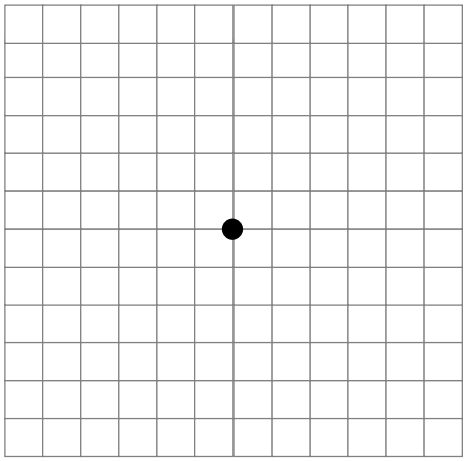




1 div = 5 N

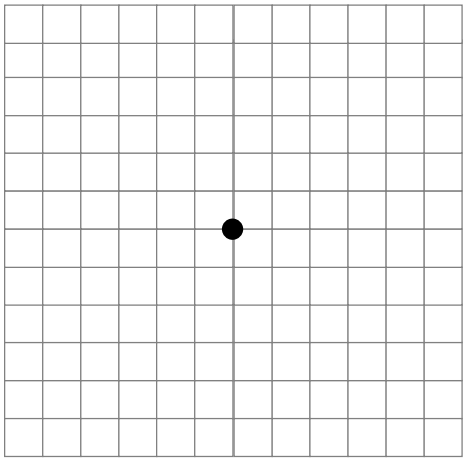
Time #2: Slowing Down





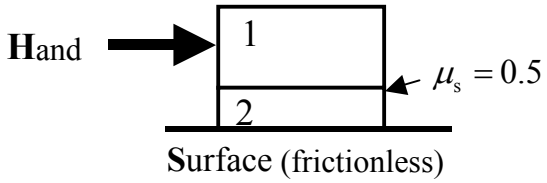
1 div = 5 N

Time #3: Stopped

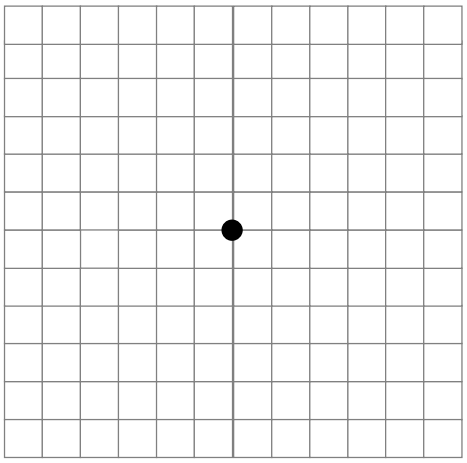


1 div = 5 N

2. Block #1 (2 kg) and block #2 (1 kg) are sitting on a **frictionless** surface. A hand pushes block #1 and the coefficient of static friction between the blocks is given by μ_s **= 0.5**. Draw the **free body diagrams** for both blocks using the two subscript notation, as well as the **net force** on each. Assume that the blocks have the **same acceleration** and that the static friction between them is the **maximum** possible value . (Assume g = 10 m/s^2.)

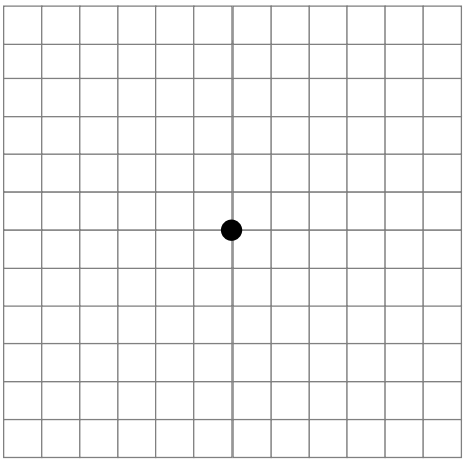


Block #1 FBD



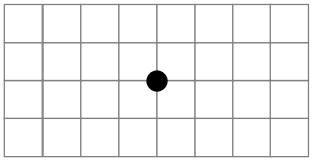
1 div = 5 N

Block #2 FBD

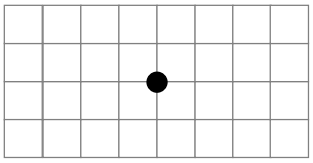


1 div = 5 N

F_{1net}

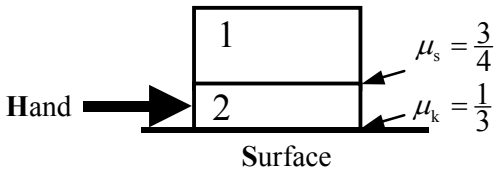


F_{2net}

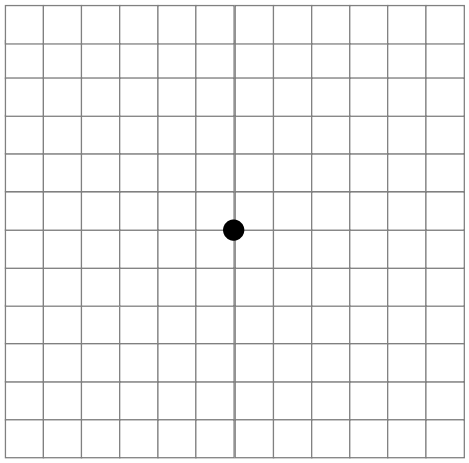


1 div = 5 N

3. Block #1 (2 kg) and block #2 (1 kg) are sitting on a surface as shown below. A hand **pushes block #2** such that the blocks move together with **CONSTANT velocity**. The coefficient of **static** friction between the blocks is given by $\mu_s = ¾$, and the coefficient of **kinetic** friction between block #2 and the surface is given by $\mu_k = 1/3$. Draw the free body diagrams for each block using the two subscript notation, as well as the net force on each. Assume $g = 10\ m/s^2$.

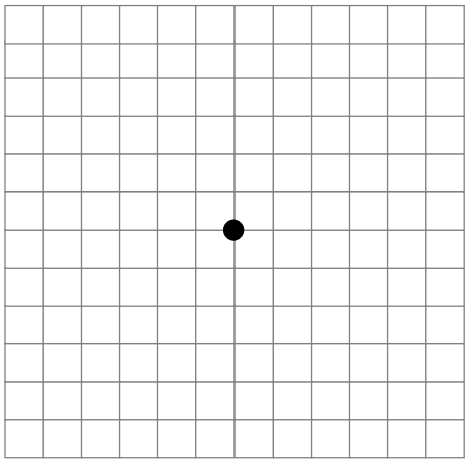


Block #1 FBD



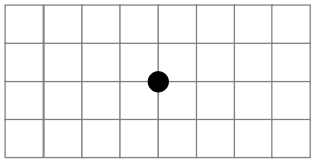
1 div = 5 N

Block #2 FBD

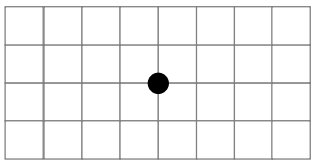


1 div = 5 N

F_{1net}

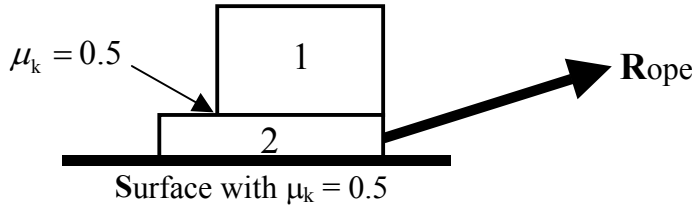


F_{2net}

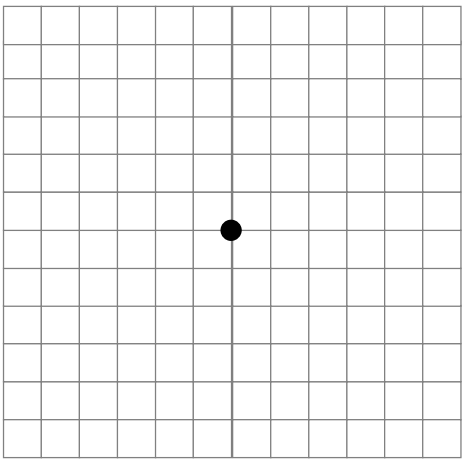


1 div = 5 N

4. Block #1 (2 kg) and block #2 (1 kg) are sitting on a surface with coefficient of kinetic friction $\mu_k = 0.5$. The coefficient of kinetic friction between the blocks is given by $\mu_k = 0.5$. A rope pulls block #2 with a **tension** given by $30\ \text{N}\ \hat{i} + 10\ \text{N}\ \hat{j}$. Draw the **free body diagrams** for both blocks using the two subscript notation, as well as the **net force** on each. In this problem, the blocks DO NOT have the same acceleration, i.e. block #1 slides off block #2 after a short time. (Assume $g = 10\ \text{m/s}^2$.)

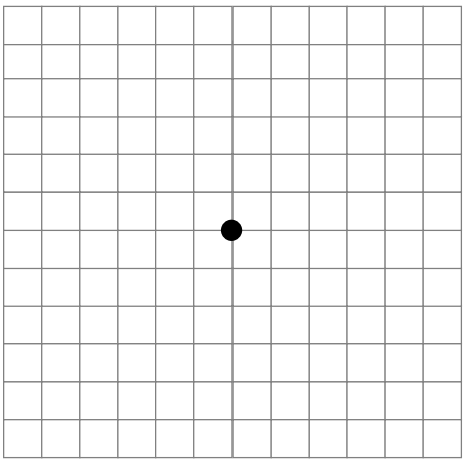


Block #1 FBD



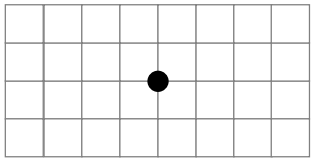
1 div = 5 N

Block #2 FBD

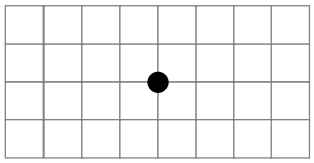


1 div = 5 N

F_{1net}



F_{2net}



1 div = 5 N