

# Coefficient of Static Friction

Name \_\_\_\_\_ Instructor's signature \_\_\_\_\_

Partners \_\_\_\_\_

Section # \_\_\_\_\_ Date \_\_\_\_\_



For each combination of contact surface and mass, raise the angle of the inclined track by pushing the lower end of the track gradually, as smoothly as you can to find the angle of repose,  $\theta$ . Use  $\mu_s = \tan \theta$  (= vertical / horizontal) to find coefficients of static friction.

Due to the unevenness of the track, remember the initial position on the track and put the block on the same place for each trial. Use also extreme care since this experiment is very sensitive.

The mass of the block with a balance:  $M_B =$  \_\_\_\_\_ ( )  $\Leftarrow$  units

## 1. Block only

Total mass <i>Write <math>M_B</math> here.</i>	Area of contact surface ( <i>Calculate</i> )	$\theta$	$\mu_s = \tan \theta$
	Small		
	Small		
	Small		
		Average of $\mu_s$ (Small) $\rightarrow$	
	Large		
	Large		
	Large		
		Average of $\mu_s$ (Large) $\rightarrow$	

## 2. Block and extra weight

Total mass	Area of contact surface (Calculate)	$\theta$	$\mu_s = \tan \theta$
$M_B + 0.05\text{kg}$	Large		
$M_B + 0.05\text{kg}$	Large		
$M_B + 0.05\text{kg}$	Large		
		Average of $\mu_s$ (light) →	
$M_B + 0.15\text{kg}$	Large		
$M_B + 0.15\text{kg}$	Large		
$M_B + 0.15\text{kg}$	Large		
		Average of $\mu_s$ (Heavy) →	

### Questions:

- Does the coefficient of static friction depend on contact surface area, i.e. wide or narrow? *(Theoretically, the answer is no. Think about the reason, and compare it with your experimental data.)*
- Does the coefficient of static friction depend on mass, i.e. block alone and block with extra masses? *(Theoretically, the answer is no. Think about the reason, and compare it with your experimental data.)*
- Beyond this lab, do you think that the coefficient of static friction varies with the material of the contact surface? Imagine if the surface is made of rubber, felt, aluminum, etc. Relate this answer to your daily life experiences.

### For the lab write up

- Write the introduction, conclusions and discussions.
- Refer to the questions above.
- Attach this sheet as the data.