

# Friction Lab

Friction is a force that occurs when two surfaces TOUCH. In this lab you will investigate the factors that affect friction. You will measure **frictional forces** using a spring scale to measure the force. The factors being tested will include the effect of **surface texture**, **weight** and **surface area** contact on friction. In addition you will investigate the difference between “Static” and “Kinetic” friction.

**Materials:** wood block with foam rubber side and sandpaper side, one bare wood block, a 200 N spring scale, 3 equal size books, wood strip to act as surface

## *Surface Texture and Friction*

**Hypothesis for Part A:** \_\_\_\_\_

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**Procedure: Part A-Surface Texture and Friction**

- 1.) Attach a 20N spring scale to the hook. All measurements are to be done in NEWTONS.
- 2.) Lay the wood block **sandpaper** side down on the paper. **Place one book on top of the block.**
- 3.) VERY VERY slowly and evenly pull on the spring scale horizontal to the table while watching the measurement. Record the **maximum** force applied in Newton’s to the block BEFORE it begins to move.
- 4.) When the block starts to move pull it across the paper strip AT A CONSTANT RATE.
- 5.) Record the force needed to keep the setup moving AT A CONSTANT RATE. Repeat 3 times.
- 6.) Repeat steps 1 through 6 using the **bare wood** side and **foam rubber** side

**Table 1. Effect of Surface Texture on Friction**

Type of Friction	Sandpaper		Bare Wood		Foam Rubber	
	Static	Kinetic	Static	Kinetic	Static	Kinetic
<b>Trial #1</b>						
<b>Trial #2</b>						
<b>Trial #3</b>						
<b>Average</b>						

**Conclusion:** \_\_\_\_\_

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## *Weight and Friction*

**Hypothesis for Part B:** \_\_\_\_\_

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**Procedure:: Part B-Weight and Friction**

- 1.) Attach a 10N spring scale to the wood block.
- 2.) Lay the wood block flat side down on the bare table. Place **one book** on the top of the wood block..
- 3.) Pull on the spring scale slowly and gently increasing the force used until the block just starts to move. Record the maximum amount of force needed to get the block moving. Repeat 3 times.
- 4.) Put **two books** on top of the wood block. Pull on the scale and record the maximum force needed to just get the block moving. Repeat 3 times.
- 5.) Put **three books** on top of the wood block. Pull on the scale and record the maximum force needed to get the block moving. Repeat 3 times.

**Table 2: Affects of Weight on Friction STATIC FRICTION**

	<b>One Book</b>	<b>Two Books</b>	<b>Three Books</b>
<b>Trial #1</b>			
<b>Trial #2</b>			
<b>Trial #3</b>			
<b>Average</b>			

**Conclusion:** \_\_\_\_\_  
\_\_\_\_\_  
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## ***Affects of Surface Area Contact on Friction***

**Hypothesis for Part C:** \_\_\_\_\_  
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### ***Part C: Affects of Surface Area Contact on Friction***

- 1.) Place the **bare wood** block with the attached spring scale flat on the wood strip.
- 2.) Place **two books** on the top of the block.
- 3.) Slowly pull on the 10N spring scale until the block just starts to move.
- 4.) Record the maximum force needed to just get the block moving. Repeat the trial 3 times.
- 5.) Turn the block onto its edge and place two books on top of the block. Balance the books with your hands.
- 6.) Slowly pull on the spring scale until the block just starts to move.
- 7.) Record the maximum force needed to just get the block moving. Repeat the trial 3 times.

**Table 3: Affects of Surface Area Contact on Friction**

<b>Position of Block</b>	<b>Trial #1</b>	<b>Trial #2</b>	<b>Trial #3</b>	<b>Average</b>
<b>On Flat Side</b>				
<b>On Edge</b>				

**Conclusion:** \_\_\_\_\_  
\_\_\_\_\_  
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### **Questions:**

- 1.) In Part A describe how the force of friction changes between smooth and rough surfaces.
- 2.) In Part A describe the difference between Kinetic Friction and Static Friction.
- 3.) In Part A explain why Kinetic Friction is less than Static Friction
- 4.) In Part B explain how the force of Friction changes as the weight pushing the surfaces together changes.
- 5.) Looking at the trend in the data you obtained what would the force of Friction between two objects if the force pushing the objects together was reduced to zero?
- 6.) Part C How does the amount of surface area affect the force of Friction between the two objects.