

Discovering Forces

Name:
Period:
Date:

Directions: Figure out the forces at each station. Move to the next station when asked by your teacher. Don't forget to read each question! Also, use the key vocabulary words to fill in the blanks.

Station 1:

1. **DO NOT TOUCH ANYTHING!** *Observe* the **masses** hanging from the rubber band and the string. *Describe* the **forces** acting on the **masses** by finishing the sentences below.

The two forces acting on the masses are: _____ and _____.
_____ is pointing down and _____ is pointing up. The **masses** have a force of _____ **Newtons**.

2. **Explain** why you think both **masses** have the same **force**. Both masses have the same force because _____.

3. **Draw** a **diagram** (picture) of the **masses** hanging from the rubber band and the string.

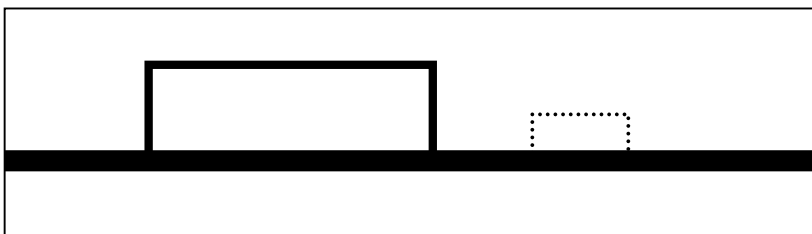
Draw the **vectors** (arrows) and **label** the name and amount of **forces**.



4. The **forces** in the **diagram** are _____ (balanced/unbalanced) because _____.

Station 2:

1. In the box on the right draw the sponge and the textbook sitting separately on the table. **Draw** and **label** the forces using **vectors**.



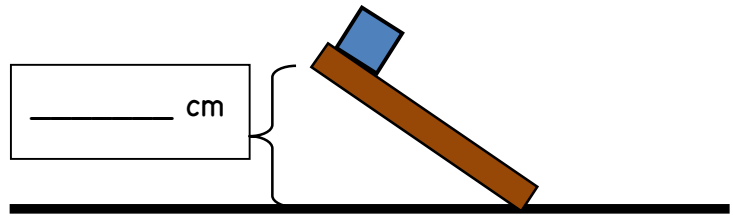
2. Put the textbook on the edge of the sponge (about 1 cm) and draw a side-view of the textbook on top of the sponge. **Draw** the **vectors** (arrows) and **label** the name of the **forces**.



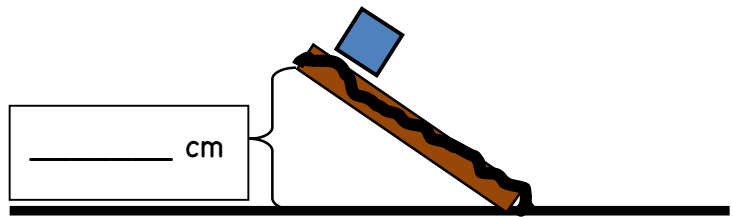
3. The **forces** in the **diagram** are _____ (balanced/unbalanced) because _____.

Station 3:

1. Put a textbook at one end of ramp. Slowly lift one side of the ramp until the book starts to slide and then STOP. **Record the distance** the ramp was lifted in **centimeters** (cm).



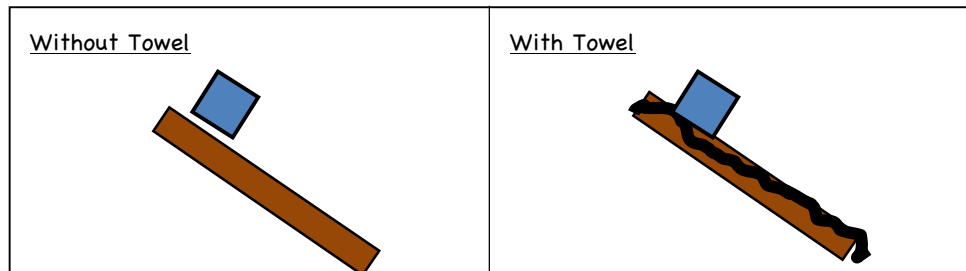
2. Put the towel completely over the ramp so it covers the entire surface. Put the textbook on top of the towel/ramp. Slowly lift the ramp until the textbook begins to slide and then STOP. **Record the distance** the ramp was lifted in **centimeters** (cm).



3. a. When I added the towel, I had to lift the ramp _____ (*higher/lower*) to begin **motion**.
 b. How did putting the towel on the ramp **change** the **physical characteristics** of the surface?

The towel made the surface _____ (*rougher/smoother/stay the same*), therefore there was _____ (*more/less*) friction between the book and the surface.

c. **Draw the vectors** (arrows) and **label** the name of the **forces**.



- d. While the book is **sliding**, the **forces** are _____ (*balanced/unbalanced*) because _____.
- e. When the book **stops** on the table, the **forces** are _____ (*balanced/unbalanced*) because _____.

Station 4:

Find the **amount** of **force** used to **pull** the block for each of the surfaces. Make sure that the **spring scale** is at **zero** before you start and **pull** at **constant speed**!

Type of Surface	Force (N)			Average Force (N) $\frac{\text{trial 1} + \text{trial 2} + \text{trial 3}}{3}$
	Trial 1	Trial 2	Trial 3	
Table				
Wax paper				
Sand paper				

1. The _____ has the **most friction** because it took _____ to pull the block and feels _____ (*smooth/rough*).
2. The _____ has the **least friction** because it took _____ to pull the block and feels _____ (*smooth/rough*).