

# Work and Energy Lab

# Science 10

Names: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

The purpose of this lab is to investigate and compare the forces and the work required to slide a textbook and to lift a textbook.

**Equipment:** Spring scale, string, textbook.

### Procedure and Observations:

1. Using a spring scale and some string, find the weight of your textbook. The weight of the textbook is \_\_\_\_\_ N (Newtons).
2. Without using the spring scale, make a guess of approximately how much force would be required to lift the textbook across at constant speed. Your guess is \_\_\_\_\_ N.

### Lifting a textbook

3. Lift the textbook a distance of 0.50 m at a constant speed. Record the Force it takes to do this. Repeat this four times (a total of 5 measurements) and record the values in the first table below. The force should be approximately the same. Is it?

	Force to lift the Book (N)	Distance (m)	Work Done (J)
		0.50	
		0.50	
		0.50	
		0.50	
		0.50	
<b>Average:</b>		0.50	

4. Calculate the work done ( $W = F \times d$ ) and record the values in the table above.
5. Calculate the average force and the average work done and record them in the table above. Show your calculations in the space below.

## Pulling a textbook

- Without using a scale, estimate (make a guess) about how much force would be required to slide the textbook across the table at constant speed. Your guess is \_\_\_\_\_ N
- Using a spring scale, pull the book across the table 0.50 m at constant speed. (Keep the string parallel to the table). The force actually required to do this is \_\_\_\_\_ N.
- Compare the book's weight with the force required to pull it horizontally at constant speed. (Which one is larger?) \_\_\_\_\_
- Pull the textbook across the table at different constant speeds another four times. Record all five values in the table below. The force required to do each should be about the same. Is it? \_\_\_\_\_

	Force to pull the Book (N)	Distance (m)	Work Done (J)
		0.50	
		0.50	
		0.50	
		0.50	
		0.50	
<b>Average</b>		0.50	

- Calculate the work done ( $W = F \times d$ ) and record the values in the table above.
- Calculate the average force and the average work done and record them in the table above. Show your calculations in the space below.

## Questions

- Which is easier - lifting the book or sliding it? Why?  
 .....  
 .....
- Which requires more work - lifting the book or sliding it? Why?  
 .....  
 .....
- How far would you have to slide the book to do the same amount of work as lifting it?