Energy, Force & Machines
Circuit of Inquiry Lab

Warm Up: Write what you know about Energy, Forces and Machines?

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_____

_____

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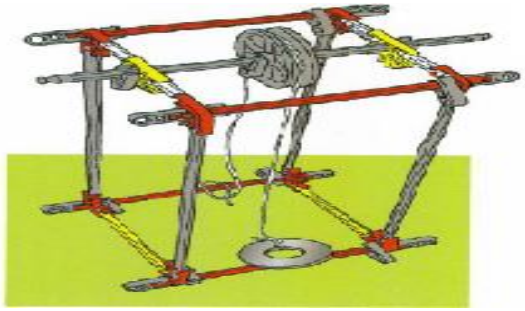
Safety Alert: GOGGLES MUST BE WORN AT ALL TIMES!
If you take them off, you will not be able to participate.

DIRECTIONS: ***In order to get credit for completing this 8 station lab, you must follow all safety directions and fill out the lab sheets completely. DO NOT fill out the boxes that are dotted stating to leave this box blank until later. We will come back to these lab sheets as we go through the unit to discuss things you have learned and reflect on this lab.***

****You only have 10 minutes per lab station, so use your time wisely. When time is up, you should have all materials back in order and rotate to the next station. Failure to do these things will result in a lowered grade and possible disciplinary actions. Labs are meant to be enjoyable, but we must be safe and tidy.***



Station 1.1-The Single Pulley

Pull on the string and observe what happens. Describe what you observe: "I observe . . .

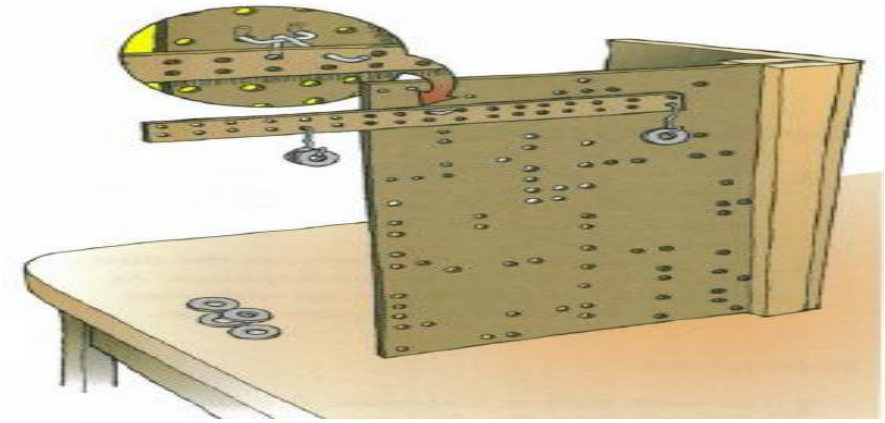
_____

_____."

Describe two real life situations where you have seen pulleys being used:

a. _____ **b.**_____

Leave this box blank, we will answer these questions at a later time.
Now that we have learned about pulleys, what can you say in reflection to what actually occurred in Station 1.1-The Single Pulley Lab?



Station 1.2-The Pegboard Lever

Examine the lever. It should have one washer on the right arm and two on the left, and it should be balanced.

Draw a diagram showing the balanced lever.

Leave the washer on the right arm, but remove the paper clip and washers from the left arm. Use the paper clip to attach a different number of washers to the left arm, and try to balance the lever (or nearly balance it).

Draw a diagram of your new arrangement.

In addition to the number of washers, what else did you change to balance the lever?

_____

_____

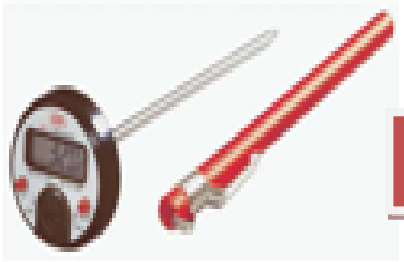
Describe something else you can balance:

_____

_____

Leave this box blank, we will answer these questions at a later time.
Now that we have learned about pulleys, what can you say in reflection to what actually occurred in Station 1.2-The Pegboard Lever Lab?

Goggles!



Safety Alert: When using a digital thermometer, be careful with the pointed end!

Station 1.3-The Hand Warmer

Put the digital thermometer's shaft (metal part) between the palms of your two hands for one minute (time the minute using the stopwatch).

What was the temperature when the thermometer was in your hands?

_____° degrees (Circle one) *Fahrenheit* (°F) or *Celsius* (°C)

Now, rub your hands together back and forth for 30 seconds and then hold the thermometer for one minute and record the temperature.

What was the temperature when the thermometer was in your hands?

_____° degrees (Circle one) *Fahrenheit* (°F) or *Celsius* (°C)

What happens to the temperature when you rub your hands together?

_____

_____

Write down another example of how you can produce heat.

_____

_____

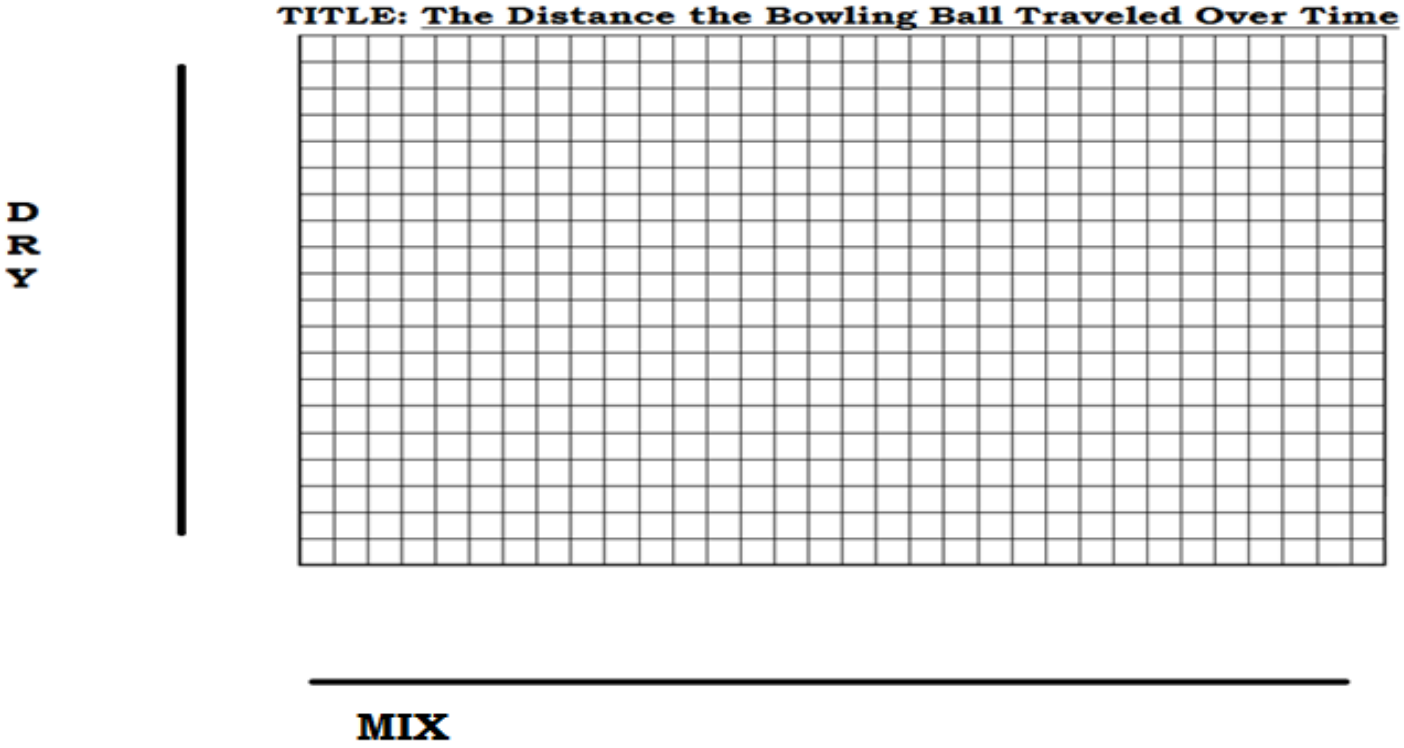
Leave this box blank, we will answer these questions at a later time.
Now that we have learned about heat, what can you say in reflection to what actually occurred in Station 1.3-The Hand Warmer Lab?

Station 1.4-Constructing a Graph

The situation: SpongeBob, Patrick and Squidward went bowling. SpongeBob rolled a bowling ball, Patrick timed SpongeBob with a stopwatch and Squidward measured the ball's distance at the end of 5, 10 and 15 seconds. Squidward then wrote the following data table. Using the measurements in Squidward's Table 1, draw/label a graph below of the distance the bowling ball travels over time.

Table 1-Distance the Bowling Ball Traveled Over Time

Time (seconds)	Distance (meters)
5	15
10	25
15	30



What does this graph show about the bowling ball's motion?

_____

_____

What can be said about how SpongeBob needed to roll the ball each time?

_____

Leave this box blank, we will answer these questions at a later time.
Now that we have learned all about graphing, what can you say in reflection to what you did on your graph that should have been different in Station 1.4-Constructing a Graph? Go back to your graph above and fix those issues.

Goggles!

Inquiry 1.5: Transforming Energy

Rapidly move the shaft (metal point) of the generator (motor) back and forth over the stretched rubber band wrapped around the book. All members of the group need to watch the light bulb.

Describe what happens when you move the generator (motor) shaft back and forth over the stretched rubber band.

_____

_____

What energy transformations are taking place?

_____

_____

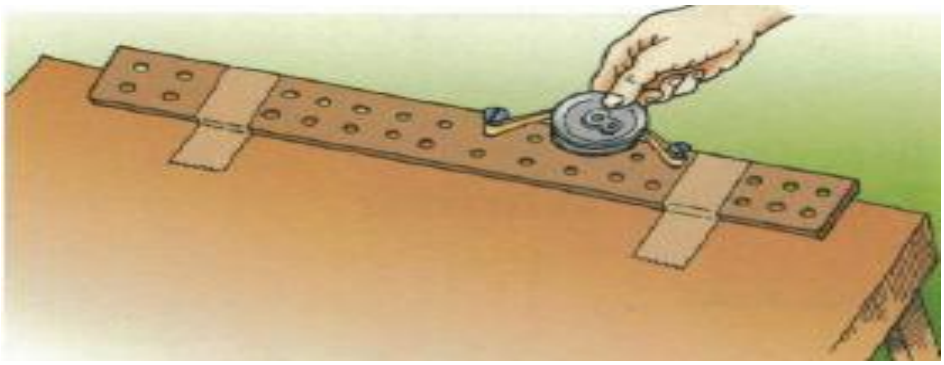
Give an example of another way to generate electricity.

_____

_____

Leave this box blank, we will answer these questions at a later time.
Now that we have learned about energy transformations, motors and generators, what can you say in reflection to what actually occurred in Station 1.5-Transforming Energy Lab?

Goggles!



Inquiry 1.6: The Puck Launcher

Using a ruler to measure, put the puck in the rubber band and pull the band back 2 centimeters (2 cm) and release the puck.

Describe the puck's motion when you pull the rubber band back 2.0 cm and release it.

_____

_____

Describe the puck's motion when you pull the rubber band back 4.0 cm and release it.

_____

_____

Table 2-Distance the Puck Traveled

Puck Pulled Back	Distance (meters)
2 cm	
4 cm	

What force acts on the puck each time? _____

Describe how the puck's motion is different and how it is the same in the two trials.

_____

_____

Give an example of a force that acts on an object. What is the force's effect?

_____

_____

Leave this box blank, we will answer these questions at a later time.
Now that we have learned about forces at work, what can you say in reflection to what actually occurred in Station 1.6-The Puck Launcher?

Inquiry 1.7: Up the Incline

Goggles!

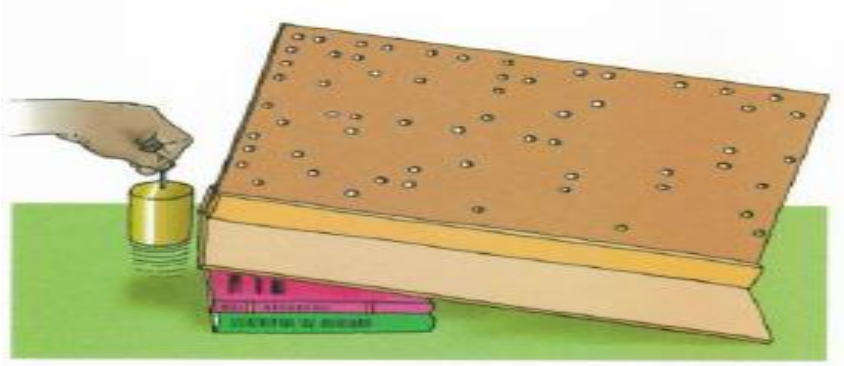


Figure A

Lift the 1.0 kg (Kilogram) mass directly up to the top of the ramps high end as shown in Figure A.
Describe the size of the force when you lift the mass directly onto the books (example: small, medium or large).

_____

_____

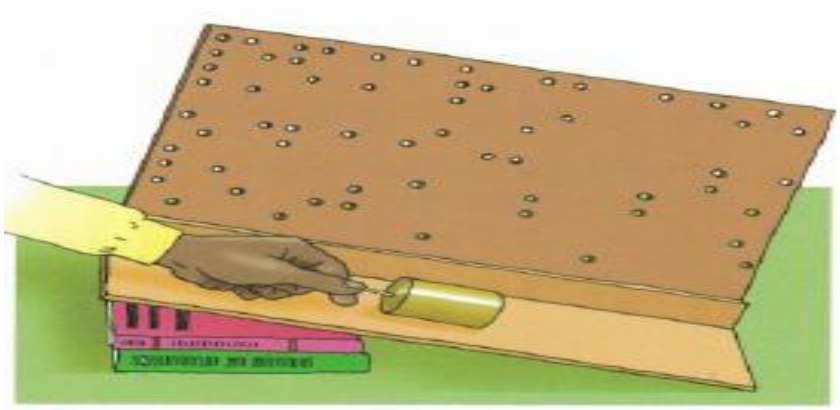


Figure B

Now, put the same 1.0 kg mass on its side on the bottom of the inclined plane and pull it with a steady force up the incline to the top. Describe the size of the force when you pull the mass up the incline.

_____

_____

How do the force sizes—lifting the mass and pulling the mass up the incline—compare?

_____

_____

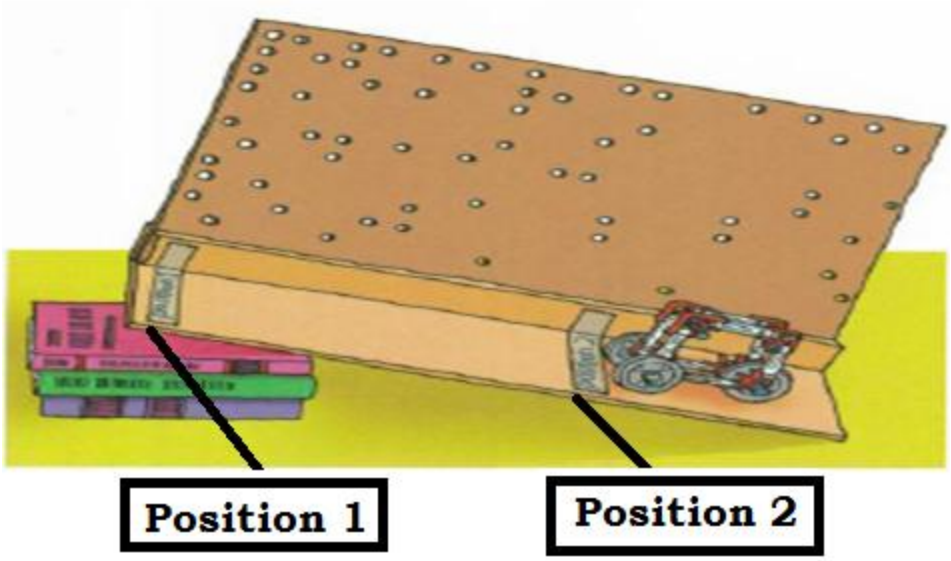
Describe another situation where people use inclined planes.

_____

_____

Leave this box blank, we will answer these questions at a later time.
Now that we have learned about forces at work and inclined planes, what can you say in reflection to what actually occurred in Station 1.7-The Up the Incline?

Goggles!



Inquiry 1.8: Down the Ramp

Get the blue matchbox car (not the car pictured above) and hold it at the ramp's high end that is lifted by the books (Position 1) and release it. Describe your observations of the car's motion when it is released at the ramp's high end that is lifted by the books (Position 1).

_____

_____

Now, Get the blue matchbox car and hold it at Position 2 and release it. Describe the car's motion when it is released at the ramp's lower end (Position 2).

_____

_____

Compare the motion of the car's two positions and explain why they are different.

_____

_____

Leave this box blank, we will answer these questions at a later time.

Now that we have learned about forces at work and inclined planes, what can you say in reflection to what actually occurred in Station 1.8-Down the Ramp?