# SINGING TUBE

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.
2. Set up the singing tube with a Bunsen underneath
3. Light the Bunsen on a half and half flame.
4. Place under the singing tube
5. Count to 10 and remove from the flame
6. The singing tube should produce a note
7. Record the energy changes for this energy transformation
8. Repeat for different flames
9. BEWARE OF THE POTENTIAL TO BURN YOURSELF. DO NOT TOUCH THE TUBE.

# TORCH & LED

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.
2. Connect the 1 cell to the switch and bulb as shown in the circuit diagram
3. What is the energy transformation, if any, when the switch is open?
4. Close the switch and note down the energy transformations
5. Where is energy wasted?
6. Turn the cell around and note any changes.
7. Is there any difference in the energy transformation?
8. Add a further cell and note any changes.
9. Does it matter which way the cells are added?
10. Repeat the whole process but use an LED instead of a bulb.
11. Write all the similarities and differences between the LED and bulb.
12. Make sure all the energy transformations are recorded.

1.5 V

1.5 V

# Bells and buzzers

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.
2. Connect the bell to the power supply and turn the voltage to 0 V. Ensure that the bell is correctly connected (red to red and black to black)
3. Increase the voltage in 1V increments and note what happens?
4. At what voltage does the bell sound?
5. Look carefully at the bell and try to write down how the bell works
6. Record the energy changes.
7. Reduce the voltage by 1V does the bell still work?
8. Reverse the power supply connections to the bell.
9. Does the bell still work?
10. Record your observations
11. Repeat the procedures for the buzzer
12. Record the similarities and differences
13. For both the bell and the buzzer record all the energy transformations

# Clockwork toys

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.
2. Collect the clockwork toys
3. Can you tell by looking at them what the energy transformation would be?
4. Wind the clockwork toy up for 2s and place on the desk
5. Record how long the toy will move
6. Repeat for other lengths of winding.
7. DO NOT OVERWIND THE TOY
8. Create a table with winding time and moving time.
9. Record the energy changes for the wind-up toy
10. Repeat the experiment but place the toy on a ramp.
11. Does this make a difference to the winding time and the moving time?
12. Are there any other energy changes to consider when the toy is placed on a ramp?

# Swinging tube

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.
2. Place the tube in your hands carefully making sure there is plenty of space around you.
3. Swing the tube slowly around your head.
4. Does the tube make a sound?
5. Increase the speed of the tube, when does the tube make the best sound?
6. Get a friend to time for 10 swings.
7. Change the speed of the swing and see if this makes a difference to the note produced.
8. Record the energy changes for this experiment
9. Is there any difference if you hold the other end of the tube?

# LDR /THERMISTOR

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.

com

10A

V/Ω

Ω

1. Connect the LDR to the Ohmmeter. The diagram is shown to the side.
2. The LDR is a Light Dependent Resistor. Take the LDR to various places around the room where the light level is high or low. Record the light level with a light level meter and the resistance on the Ohmmeter. Repeat for at least 5 different light levels. If time plot a graph of the light level against the resistance. Watch the meter to check the setting doesn’t change (for example it might record in Ω ,kΩ or MΩ
3. Record the energy transformations for this experiment
4. Repeat the experiment with a thermistor.
5. A thermistor is a temperature dependent resistor.
6. Place the thermistor is a beaker of boiling water.
7. Add a thermometer to the beaker
8. Wait until the thermometer stops recording a huge change in temperature.
9. Reocrd the temperature and the resistance on the thermistor.
10. Again check that the settings do not change during the experiment. Watch for Ω ,kΩ or MΩ

# Balloon

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.
2. Collect a balloon and a balloon pump.
3. Blow up the balloon, being careful not to blow it up too far.
4. Remove from the pump and raise it above your head.
5. Release the balloon and note all the energy changes
6. Repeat the experiment but instead of releasing the balloon carefully open up the top of the balloon and slowly release the air.
7. How are the energy transformations different for these two experiments
8. Can you produce other energy changes from a balloon?

# ELASTIC BAND CATAPULT

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.
2. Use the elastic bands and produce two catapults.
3. Make a target for the wall, well away from other students
4. Make paper pellets from scrap paper.
5. Fire these at the target and record the number of points you score.
6. In groups measure the stretch and the distance that the catapult fires the pellet.
7. Is there a relationship between the stretch and the distance that the pellet will go?
8. Record the energy transformations for this experiment.

# Solar cell and motor

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.
2. Connect the solar cell to the motor
3. Place the solar cell in various parts of the room in different light levels.
4. Notice the speed of the motor, if possible try and record how many rotations it makes in 10 s
5. Cover parts of the solar cell with dark paper and note the speed of the motor
6. Keep covering more and more of the solar cell and see what happens
7. Record the energy transformations for this experiment.

# Peltier effect

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.

A Peltier cooler can also be used as a [thermoelectric generator](http://en.wikipedia.org/wiki/Thermoelectric_generator). When operated as a cooler, a voltage is applied across the device, and as a result, a difference in temperature will build up between the two sides. When operated as a generator, one side of the device is heated to a temperature greater than the other side, and as a result, a difference in voltage will build up between the two sides (the [Seebeck effect](http://en.wikipedia.org/wiki/Seebeck_effect)). However, a well-designed Peltier cooler will be a mediocre thermoelectric generator and vice versa, due to different design and packaging requirements.

1. Collect two beakers and fill one with hot water and one with ice
2. Place the thermoelectric generator in the two beakers (one leg in each) and switch it to the right setting
3. Note what happens to the motor
4. Record the energy changes
5. Carefully connect the device to a power supply (the voltage will be set for you. DO NOT ADJUST THE SETTINGS)
6. Gently feel the temperature difference between the two plates. BEWARE THESE DEVICES CAN GET VERY HOT

# Trolley, ramp and collisions

# V

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.
2. Collect a trolley and a ramp.
3. Place a block at the bottom of the ramp.
4. Measure the height of the ramp and release the trolley from the top of the ramp.
5. Measure how far the block moves after the trolley has collided with it at the bottom of the slope.
6. Increase the height of the ramp and keep recording the height of the ramp and the distance moved by the block
7. Plot a graph of the results.
8. What can you conclude?
9. Record the energy transformations for this experiment

# Whistles

1. LOOK AT THE EXPERIMENT, READ THE INSTRUCTIONS AND CHECK FOR ANY SAFETY CONCERNS. RECORD SAFETY CONCERNS IN YOUR JOTTER.
2. Remove the whistles from the cleaning fluid and gentle blow
3. How can you produce different notes?
4. Record the energy changes for this experiment.