
Experiment M-7

Forms and Sources of Energy



Objectives

- To learn about different forms of energy and identify energy sources.
- Measure the light intensity and temperature near a LED light bulb.

Modules and Sensors

- PANDA-1 Panda Multi-sensor 

Materials

- A lamp with a LED light bulb (an incandescent light bulb can be used but because it creates a large amount of heat it should be handled very carefully. Do not leave the Panda near an incandescent lamp for extended periods of time as it may over heat.)

Introduction

Energy makes change possible. We use energy to move cars, bake cakes and light our homes.

Scientists define energy as the ability to do work. Modern civilization is possible because people have learned how to use energy for work and learned how to change energy from one form to another.

There are many forms of energy: chemical energy (stored in the bonds of atoms and molecules), mechanical energy (stored in objects by tension, like a compressed spring), nuclear energy (energy stored in the nucleus of an atom), gravitational energy (stored in an object's height), radiant energy (includes visible light, x-rays, gamma rays, and radio waves), thermal energy (heat), motion energy (stored in the movement of objects, like wind), sound (sound is produced when a force causes an object or substance to vibrate) and electrical energy (delivered by tiny particles called electrons that are moving through a wire).











In this experiment we will focus on the energy of light (which is radiant energy) and the energy of heat (thermal energy). We will use a light bulb (LED) as a light and a heat source and measure the temperature and light around it before and after turning it on.

Procedure


Experiment setup

1. Make sure you have a lamp that you have access to with a LED light bulb.

Settings

2. Press on the **Sound sensor** icon  on the top left of the screen.
3. Use the arrows   to select the temperature sensor.
4. If a “°C” button is seen on the top right of the screen, press it and choose “°F”.
5. Press on the **Temperature sensor** icon .
6. Use the arrows   to select the light sensor.
7. Press on the “lx” button on the top right of the screen.
8. Press on the **0-60,000 lx** button.
9. Click on the **Record** icon .
10. Set the duration of 2 minutes using the arrows  .
11. Press on the **Add sensor** icon  on the top right of the screen.
12. Select the temperature sensor. The light and temperature sensors will measure together.

Testing and measurements

13. Put the Panda next to the light bulb (do not turn it on yet).
14. Click on the **Record** icon  to start the measurement.
15. Wait around 10 seconds and turn on the lamp. If it is a LED light bulb you can get the Panda very close to the bulb.



If you are using an incandescent light bulb you should place the Panda a few inches from the bulb and make sure it does not get too much heat, or you can also conduct a shorter experiment. Be careful not to touch the light bulb with your hand.

16. Put your hands a few inches from the LED bulb and feel the heat.
17. Your graph should be similar to the following:



18. We can see that after turning on the lamp, light intensity immediately increased. Fluctuations in the light measurements can occur because of slight movements of the hand during the measurement. The temperature also increased a bit, but that change is a lot slower.

Summary questions

1. Explain your results.
2. Give an example of a source of heat (other than a light bulb). How can this source be used?
3. Give an example of a source of light (other than a light bulb). How can this source be used?
4. Give an example of another source of light and heat, other than a lamp. How can this source be used?