

Step-By-Step Set-Up Instructions

The Light and Waves kit includes contents for 8 student stations (in 2 Large storage boxes).

- 8 lamps
- 1 Large Storage Envelope with following contents:
 - 16 strings with metal ring on one end
 - 35 Rainbow Glasses
 - 16 Emission Line Spectra of Some Elements (reference sheet)
 - 20 “Illumination Recommendations for Activities/Areas” (reference sheet)
 - 10 stacks of white, black, blue cellophane paper, and aluminum foil
- A notebook with all documents (and a memory stick containing all files)

- 18 light meters (in 2 separate small storage boxes)
- Power box for gas tubes
- neon (Ne), helium (He), mercury (Hg), argon (Ar), or Sulphur (S) gas tubes (3 tubes from this selection will be in each kit)
- 3 power strips
- 4 extension cords
- A portable mouse

The following steps should be completed **before** class:

1. Print lab sheets for each student. (or have them download to their computers)
2. Remove covers from light sensors on light meters. The sensor is at the end of the cord on the meter.
3. Make sure there is a light bulb in each lamp. There are 8 lamps to use for Experiment 3.
4. Set up for Experiment 3 in advance, if you have lab space in an area other than the student's desks. If not, you can set up the lamps on the student desks. If you need to use the extension cords and power strips, please be careful of tripping hazard. You can hand out the other materials for Experiment 3 just before the students need them.
5. Experiment 4 requires the power box to be plugged in so that all students can see it. This experiment is a demonstration. Have the three gas tubes near. The gas tubes are **GLASS**, so they are **fragile!**
CAUTION: Do not leave the power box on over 30 seconds at a time.
6. **CAUTION:** TURN the power box off when you are changing the gas tubes.
CAUTION: Power box is high voltage. You must turn switch off when changing gas tubes. Put the gas tube in the bottom of the power box first. Push gently down and then insert top.

The following steps are completed for Experiment 1:

1. Separate the strings (in envelope wrapped around cardboard).
2. Position student's desks so that two students share a string.
3. When the experiment is finished remove the string from the desk.
4. To pack: Wrap the string around cardboard, and put in Exp #1 envelope.

The following steps are completed for Experiment 2:

1. Give one light meter to each two-student group.

2. Give one sheet labeled "Illumination Recommendations for Activities/Areas" to each two-student group.
3. When the experiment is finished, collect **all but 8** light meters. The remaining 8 meters are for Experiment 3.
4. Collect the 'reference' sheets. Return to Exp #2 envelope.

The following steps are completed for Experiment 3:

1. This experiment requires the student groups (now in just 8 groups in class) to have:
 - a. a lamp with a light bulb (teacher distributes if not set up in separate location)
 - b. a light meter (left at their stations after Experiment 2)
 - c. 1 packet of the different kinds of paper/foil (teacher distributes). Each group will receive one piece of: black paper, white paper, blue cellophane, aluminum foil.
2. When the students finish the experiment, ask students to NEATLY return papers/foil to a central location (stack all black paper together, white paper together, blue cellophane together, and aluminum foil together).
3. Students will return Lamps and Light meters to central location, also.

The following steps are completed for Experiment 4 and Experiment 5:

1. Give every student rainbow glasses.
2. Give each group of students a reference sheet with the bright-line spectra of gases.
3. Turn on one Lamp in front of class (turn off classroom lights). Students will observe the light from the Lamp with their rainbow glasses from their desks. They will be able to observe from anywhere in the room.
4. Turn Lamp off.
5. Put Power box in front of class, with the gas tubes nearby for demonstration in Experiment #5.
6. **CAUTION: MAKE SURE Power box is OFF before inserting or removing gas tubes.**
7. Insert each of the 3 gas tubes (but don't tell students what gas tube you are demonstrating)
8. Turn on Power box for <30 sec with switch on side of box, then turn off Power box.
9. Students will observe bright-line spectra with rainbow glasses, and identify the gas element by matching with spectra on reference sheets.

To pack the kit to return to CERT:

1. Wrap strings around cardboard neatly, place in its envelope.
2. Stack rainbow glasses and secure with rubber bands.
3. Reassemble the packages of paper used in Experiment #3 in appropriate envelopes. Aluminum foil is separate from White, Black, Blue cellophane papers.
4. Put Emission Line Spectra of some elements in Exp. #5 envelope.
5. Put all envelopes and rainbow glasses into Large Storage Envelope.
6. Put covers on the light meter sensors. Put 18 light meters in 2 small plastic boxes.
7. Remove power cord from power box. Attach Styrofoam packing to the power box and replace in its storage box. Put power cord inside box.
8. Make sure glass tubes are wrapped with packing material and are secure in the shipping tubes they came in. They are fragile. Handle with care.
9. Repack the two large STORAGE CONTAINERS for this Module (labels of contents is on top of box).
 - a. Lamps, Large Storage Envelope, Light & Waves Notebook in one container.
 - b. Everything else in second container.

Contact CERT for pickup of the Kit

336-256-2406
CERT@ncat.edu