



# PLANT POWER UP: ENERGY FROM THE SUN AND ENERGY TRANSFER

**SUBJECT: SCIENCE**

**GRADE LEVEL: 3RD - 6TH**

**NGSS - 4-PS3-4 / 5-PS3-1, Analyzing and Interpreting Data**

**Topics:** Life Science, Energy

**Concepts:**

- Plants need energy to grow, this energy come partially from the sun
- Law of Conservation of Energy
- Scientific Method, specifically using a control group

**Materials:**

- plant seeds (you may choose any kind you like, but seeds that will sprout in a few days to a week are preferred)
- Starter pots or containers
- Soil
- A sunlit place
- A dark place without sun, such as a closet or dark cupboard.
- Name tags
- Water and watering cans

There should be enough materials that each student has two complete sets for themselves.

## TEACHER-LED CLASS DISCUSSION

Energy is the ability to do work. By doing work, we mean a change occurs. Energy can make changes occur - therefore energy has the ability to do work.

There are many kinds of changes that can happen to something. (Have the class point out several things that can change and what changes have happened, see if the class can relate the change to how energy is involved.)

Ask the class if they think the sun has energy. Let them discuss and give their theories about it. Explain that there is energy coming from the sun to Earth and we can observe this energy in many ways. Give examples such as the light we see in the day time, but don't see at night, or

how we can get hot if we stand in the sun a long time. What changes are happening? (More or less light, more or less heat.)

Show the class the plants in the constructive systems outdoor structure. Direct them to observe that the plants are in the sunlight. What kind of change will happen when plants get sunlight? (They grow!) This is because the sun is giving its energy to the plant and the plant can use it to change!

The changing of energy from one kind to another kind, or from one place to another is called the **Law of Conservation - energy is not lost in the material universe, it is only transferred to a different place or form.**

### **ACTIVITY:**

Tell the class they are going to see for themselves if the sun has energy! They are going to use plants to do it. With the class, select a dark space where one set of their seed pots can go (A closet, cabinet with doors, a shelf with a solid cover over it, etc. should do fine for this). Next, select a sunny spot where the second set of seed pots can go.

Do a demonstration for the class, showing the class how to follow the planting instructions for your chosen plants (the depth at which the seeds should be placed in soil should be found at the back of the seed packet you have chosen). Fill two pots with soil and the selected seeds and label each with the teacher's name so the students can see they will do two each as well.

Monitor and guide students as they proceed to plant their own seeds as you have demonstrated. Ensure they label both pots with their names, one to go outside and one to go into your class' chosen dark area.

Point out to students why we would want to have plants in a sunny place as well as in a dark place. When seeing if one thing affects another, we must compare it to a thing of the same kind that is NOT being influenced by what we are attempting to test. In this experiment we are attempting to test if the sun's energy is actually making a change to the plants, and if the energy is really transferring to the plants. Therefore we must also have plants of the same kind which do not have any interaction with the sun, so we can really see the difference in our results. **The items which are not receiving the change, are called the CONTROL GROUP in an experiment.**

Place your class' seeds in the designated areas. They should go undisturbed for the remainder of the experiment, except for watering and student observation.

Water your seeds daily or as directed by the seed packet. Each day on returning to your seeds, (both in the sun and not in the sun) have students fill out that day's section of the below handout.

**NOTE TO THE TEACHER:** As different types of seeds have varying growth rates and sprouting times, the following handout may need to be used for 2 weeks, or 3 weeks in order for students to see a clear distinction between growing with sunlight and without sunlight. It will depend of the type of seeds which the class has selected. For faster growing plants the following are suggested. For veggie type plants, lima, kidney, pinto, navy or black beans, as well as watercress, sweet peas, lettuce and herbs such as basil, oregano, thyme and mint. For flowering plants, sunflowers, sweet alyssum, lavender, cosmos, zinnias, petunias and marigolds.

STUDENT HAND OUT  
PLANT POWER UP PROJECT

NAME \_\_\_\_\_

DATE \_\_\_\_\_

**DAY 1:** Observations about the sun, seeds, plants and energy.

**DAY 2:** Observations about the sun, seeds, plants and energy.

**DAY 3:** Observations about the sun, seeds, plants and energy.

**DAY 4:** Observations about the sun, seeds, plants and energy.

**DAY 5:** Observations about the sun, seeds, plants and energy.

**CONCLUSION:** Do you think the energy from the sun is helping the plants grow? Do you see changes happening? What about the seeds that are not in the sun? What differences to you see? What can be concluded about energy from the sun?