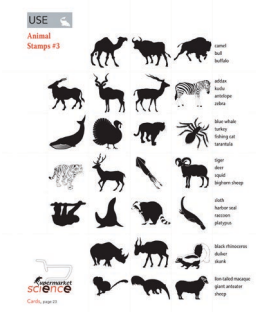



# PARENT HELPER GUIDE



## Introduction to Supermarket Science Materials

### What You Need:





Name: Camel

Origin: Asia

Food: Herbivore

Predator: \_\_\_\_\_



### How to Use These Materials

**Supermarket Science Materials** are organized into thematically linked sets with experiments and activities as well as background information that makes them easier to do. There are also a bunch of simple, fun art and writing projects. All of the activities can be done alone or in conjunction with other project sets. Choose activities that are developmentally appropriate for your children.

All **Supermarket Science Materials** are primarily geared toward students in elementary and secondary schools, as well as their parents and teachers, but can be expanded to higher grades. The activities are designed to advance the understanding of concepts of biology, ecology, geology, and sociology based on local resources like a backyard or a local grocery store. All of the materials in this set and others link the **Core Curriculum Standards**. Use these **Standards** to focus the activities to a particular grade level.

There are also **LEARN**, **SHOW**, **USE**, **DO**, and **TEACH** pages. **LEARN** pages are designed to be printed out and given to the kids. They contain explanations, stories, or diagrams. **SHOW** pages usually present interesting photographs or illustrations that demonstrate specific concepts. **USE** pages are created as supplemental materials for the activities and experiments. **Animal Cards** and **Map Cards** are examples of **USE** pages. And finally, the **DO** pages contain the actual activities and experiments—please print as many copies as you need and give them to your children. Please use the back of these pages as scrap and add additional pages as needed.

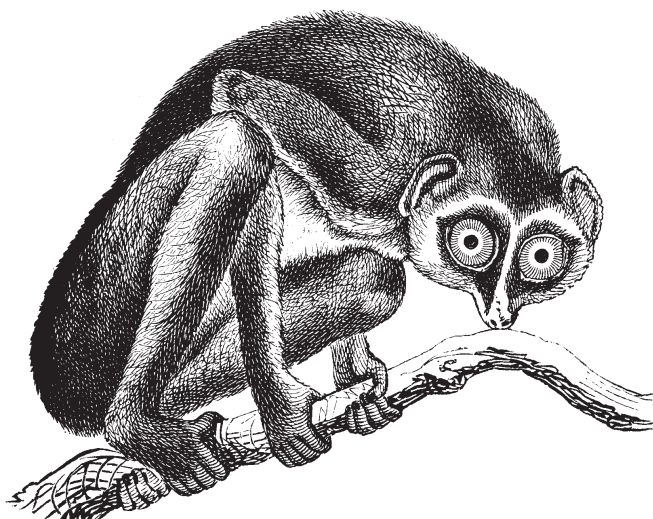
On some pages, there are icons of animals. For example, an activity about elephants might have an elephant icon next to it. These icons can be used as keys to link information between all of the **Supermarket Science Materials**.

Most **DO** pages have a **What You Need** list of items in the margin under the title of the activity. This is a quick reminder for what children should have while doing the activity. It might look something like a list on the right: **Animal Stamps** pages, **Animal Cards** pages, research books, pencil, scissors, glue, etc.

Some of the activities use of cards from the **Supermarket Science Cards** or **Stamps USE** pages. Creating taxonomies is part of the scientific process. Card games and activities allow kids an opportunity to practice this skill.

Optics is the science of properties of light and how it travels in different mediums. We have a lot of intuitive ideas about optics, even if we don't realize we do. We know that glasses help people see distant objects better or improve close-up vision. Binoculars and telescopes do the same. Microscopes and magnifying glasses make things look bigger. Mirrors bounce images back at us. Even our eyes have a lens to focus incoming light. Unfortunately, not all of our intuitions on this subject are accurate. Please read the **TEACH** and **LEARN** pages carefully. Check if some ideas are in conflict with your beliefs. Identifying misconceptions is a step on the road to discovery. And remember, there are as many ways of learning as there are people doing it. We encourage you to come up with other ways of explaining colors and light. Think of these activities as inspirational examples, jumping off points.

For more activities and suggestions by teachers and parents on how to explore this material with kids, visit **Supermarket Science** web site at [SupermarketScience.com](http://SupermarketScience.com).



## Introduction to Supermarket Science Optics Materials



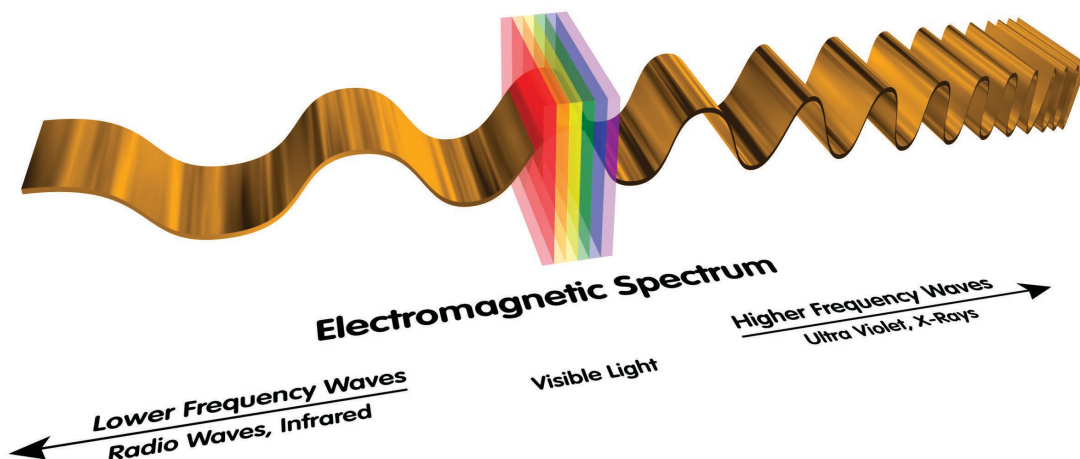
Words in red are vocabulary words. They are used in a word puzzle **DO** pages.

### Summary and Introduction

These activities and experiments introduce students to the science of optics. While some activities seem difficult, most children are able to at least partially complete some of them. Encourage kids to do as much as possible. The accompanying **TEACH** and **LEARN** pages should provide enough information for teachers and parent helpers to assist their students. These pages are for curious adults getting ready to answer those tough questions kids ask just before bed time or while visiting museums. There is a lot of information here and some is quite difficult, but it is all fun.

The science of optics—how light travels through different mediums—requires some understanding of electromagnetic waves and geometry. In fact, optics is a cool way learning geometry in context—while math is fun all on its own (yes, it is), it's good to show that it has real relevance to life. Optics is all around us—our eyes, glasses, magnifying lenses, telescopes, windows, display cases, electronics' screens, etc. Without a good grounding in optics, we wouldn't have good experiences with seeing things clearly.

**Supermarket Silence** has a course on electromagnetism. It might be a good idea to do both at the same time. Both of these courses are aimed at children who are reaching the end of their middle school educational careers and they are easily appropriate for high school students. This is not to say that younger kids should not attempt to play with the concepts presented in these materials. Different kids learn at different rates, and what bores one child might excite another. Give your kids a chance to try something difficult. You might be surprised by what they might accomplish.



### Main Ideas

#### Optics

- Optics is the study of properties of electromagnetic waves (light) as they travel through and interact with different objects and materials.
- Geometry is one of the main tools of examining and predicting the path of an electromagnetic wave.
- We can use *Ray Tracing* to figure out how things look when they get *reflected* in a mirror or *refracted* through substances of different densities. (This is easier than it seems.)
- Humans and other animals evolved special organs to be able to take in visual information—eyes! And what our eyes see is not the same as the visual information our brain prepares for us.



## What You Need to Conduct These Activities



Parent Helpers



### What You Need

The concepts covered in this section are complex. Parents, teachers, and older students should read all of the **LEARN** pages and try to do the suggested activities. Younger students would benefit from having parents or teachers read the **LEARN** pages to them. Makes sure to have adequate time set aside for discussions. For maximum benefit, it might be necessary to spend several days to complete this section.

The **DO** pages are appropriate for elementary school children as well as older students. In elementary school, these activities work well when performed in pairs with plenty of adult supervision. A parent can help students organize their materials and their thinking. In higher grades, such supervisory function can be taken up by the students themselves.

Some of the activities in this section require special materials. Most of these are probably already in your possession, but if not, they are very easy to get.

The materials you will need for each group of students:

- One pencil
- Color pencils—for ray tracing
- Scissors
- Thumbtacks
- Tape
- Paper
- Ruler and protractor
- Magnifying glasses (2)
- Mirrors
- Aluminum foil
- Cardboard rolls
- A glass and water
- Parent Helpers to help kids with setting up, clean up, and organization



One source for cheap hand-held magnifying glasses is: *Utopia Tools*, <http://www.utopiatools.com>. 760/738-0717. We were charged approximately \$3 a piece for magnifying glasses and were told they would be even cheaper in bulk. The same website also offers lenses and prisms for sale.

### Do More

This is a difficult section, but some ideas can be easily extended into other areas of the curriculum. In particular, ray tracing game can be expanded upon and played with multiple players—a while family can get involved. If your kids are very into this, consider getting a small laser pointer (green laser is more powerful than red and can be had for under \$10) and bunch of real lenses. You can make a table-top set up for your game using real light! Hint: a bit of chalk dust or water vapor makes the beams of laser light visible like straight lines in air.

If you happen to live in San Francisco Bay Area, you can visit Chabot Space and Science Center in the East Bay: [chabotspace.org](http://chabotspace.org). Chabot has a large collection of telescopes together with the histories of their makers. In 1883, Anthony Chabot, a successful hydraulic engineer and provider of water to the city of Oakland, agreed to fund an 8" telescope. Chabot subsequently funded the new observatory as well, which opened in downtown Oakland. The 8" refractor was named *Leah*. Chabot's 20" refracting telescope, *Rachel*, was added in 1914. Rachel is in use to this day. When the weather permits, members of the public are invited to come and peer through her eyepiece Friday and Saturday evenings from nightfall to 11 pm. It's free. Rachel is the largest refracting telescope in the western United States which is regularly open to the public.