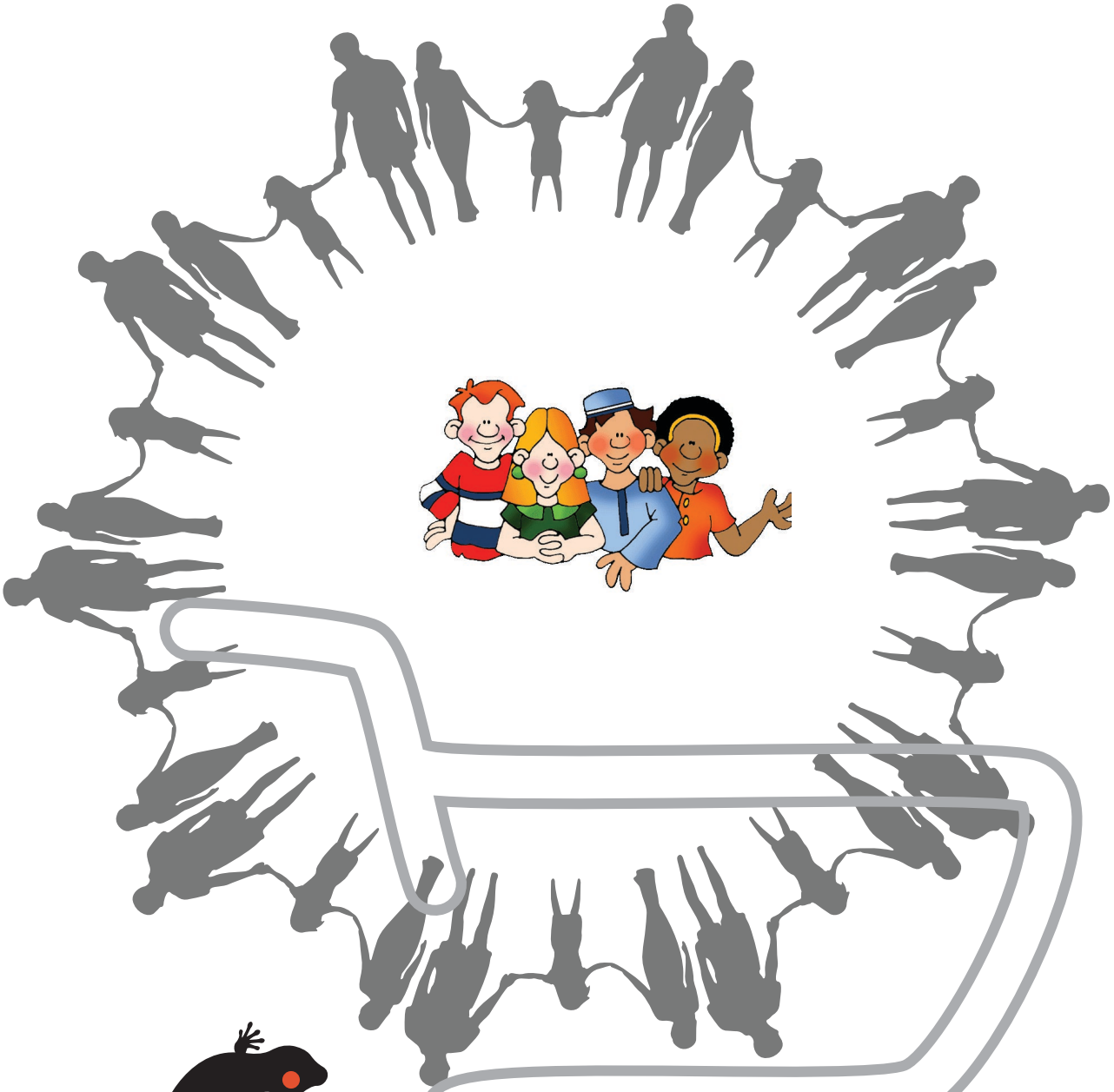
PARENT HELPER GUIDE



supermarket science

TEACH

Introduction to Supermarket Science Materials

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.

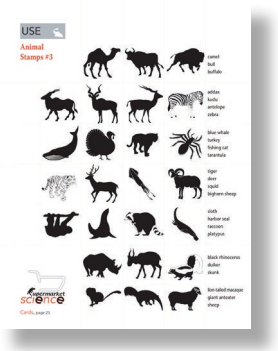
Most DO pages have a What You Need list of items in the margin under the title of the activity. This is a quick reminder for what children should have while doing the activity. It might look something like a list on the right: Animal Stamps pages, Animal Cards pages, research books, pencil, scissors,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

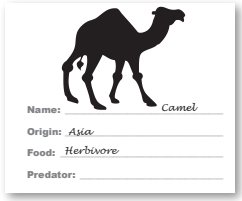
Some of the activities use of cards from the Supermarket Science Cards or Stamps USE pages. Creating taxonomies is part of the scientific process. Card games and activities allow kids an opportunity to practice this skill.

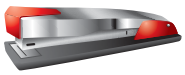
While the Astronomy activities can be done all on their own, consider doing them together with Optics, Electromagnetism, and Impacts—they sort of all go together. But frankly so do the activities about animals—we live in one universe and things tie together. One of the greatest joys in learning is discovering these connections.

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.

What You Need:

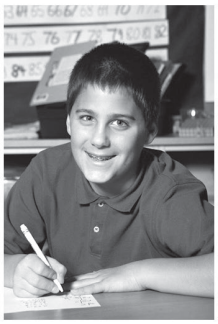






Parent Helpers

Galilean Moons—the largest moons of Jupiter.



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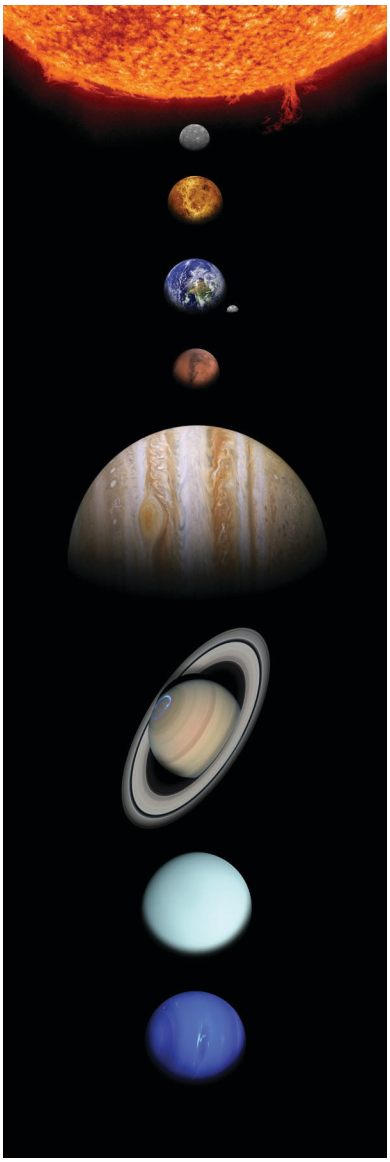
Introduction to Supermarket Science Astronomy Materials

Summary and Introduction to Astronomy

The Solar System is our home. It consists of one star, nine planets (this includes Pluto, the dwarf planet), and numerous moons, asteroids, meteors, comets, and Kuiper Belt objects. While there are many differences among all these objects, there are similarities, too. This section is a brief introduction to our planetary system and the objects within.

Astronomy is the science of the stars. Since the cost of sending probes out to distant planets and neighboring stars is very prohibitive, we have to rely on information arriving to us from those far off locations in the electromagnetic spectrum. It's important to understand the history of Solar System exploration and the tools used to study it. Discoveries never stand alone, scientific progress always builds on what came before.

Language Arts and Science



The activities at the end of this module are designed to extend and apply kids' ideas about astronomy into a language arts curriculum. One of the Supermarket Science Curriculum main educational principles is that knowledge should be both deep and wide—students should have an opportunity to explore the topics they are studying in a wide variety of contexts and to pursue their favorite subjects with depth that usually reserved just for experts. The multiple points of entry into a subject area are of paramount importance to our goal of bringing more science and mathematics into elementary and middle school curriculum.

Advanced Math with Scientific Notation

There's some handy stuff you can do with scientific notation. Multiplying big numbers together is a breeze. It's an amazing tool. So let's start with a definition. The number 2.34 x 10^6 has two parts. The first part is called the mantissa—that's 2.34 in this example. The second part is called the exponent—that's 6 in this example.

So let's say you wanted to multiply 20,000 x 3,000,000. That's 2 x 10^4 times 3 x 10^6. The cool thing is that you multiply the mantissa but you add the exponents. So 2x3 is 6, and 4 + 6 is 10. The answer is 6 x 10^{10}.

It's the same when you divide—except that you divide the mantissa and subtract the exponents. So let's say you wanted to divide 3,000,000 by 20,000. That's times 3 x 10^6 divided by 2 x 10^4. 3 divided by 2 is 1.5, and 6-4 is 2. The answer is 1.5 x 10^2. That's 150. Easy!

Measurement

This section introduces the metric system, measurement, approximation. The goal is to give kids hands-on experience in using mathematics for a scientific purpose.

This section explores the use of mathematics and measurement in the real world of every day science. Depending on the topics your children are currently studying in math and science, you can choose to explore the topics presented here in more depth. For example, kids would benefit from comparing each other's data and creating graphs documenting those differences. Alternatively, students can repeat the experiments multiple times, gathering observational information for each try and graphing the results.

The history of development of measuring systems is a very rich topic—ideal for putting regional politics and history into a mathematical perspective. In particular, you might want to research the movement toward standardization of nuts and bolts around the turn of the last century in Philadelphia. Students can explore economic pressures versus the convenience of a single system from a very unique perspective. The man largely responsible for the standardization movement was William Sellers. On April 21, 1864, he delivered a speech "On a Uniform System of Screw Threads," urging the adaptation of standards. Today, not only do we have (and need) the National Institute of Standards and Technology, but we also have about 800,000 industry standards.

We hope that this section will teach you something new and make this subject enjoyable to your children as well. 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.

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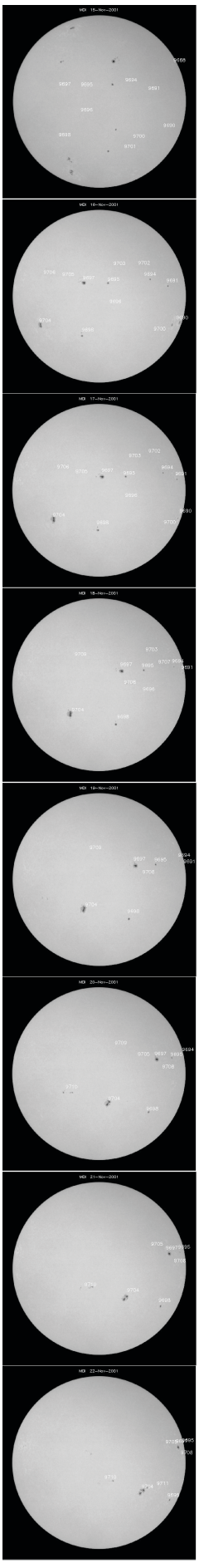
The Main Ideas of These Materials

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



The sunspots captured by the SOHO team in November of 2001.

Main Ideas

History of Science

- What did people know about our planetary system two thousand years ago?
- Who discovered the planets in our Solar System?
- Are there other planetary systems?

Planets and Moons

- What are names of all the planets and where are they located in our Solar System?
- What is the difference between a planet and a moon?
- Classification of planets is based on their composition.

Sun

- The sun is a star. The sun is not one genormous, homogeneous thing; it's complex and structured and interesting inside and out.
- Sun changes over time—it has sunspots that vary with the solar cycle and it experiences changing solar weather.
- The sun is a star. It has a lifespan and it changes as it ages.

Gravity

- What is gravity? What's the difference between weight and mass?
- Why do thing appear to be lighter on the moon then on Earth?

The Metric System

- Explore the history of the Metric System.
- What are the differences between units of measurement in the Metric and Standard Systems?
- Develop an intuition for Metric units of measurement.

Approximation

- When are approximations useful?
- How to use one's own body to make approximations?

Measurement

- There are many different systems of units and measurement.
- How can we choose the appropriate unit of measurement?
- Learn the powers of ten and the scientific notation.

Probability

- Use coin tosses in a simulation of a physical phenomena.

World Puzzles and Poetry

- Language arts and art activities support the learning of new vocabulary through solving word puzzles.
- To learn vocabulary, children need to use those new words in a meaningful and fun way like writing poetry or stories.

Art Puzzles

- Art is an amazing visualization tool for new concepts and helps cement new ideas in memory.

Creating a World

- Children need an opportunity to synthesize all of the ideas and imagery learned in the earlier sections by creating a fantastical world of words and art, all based on real science.

Supermarket Science

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Useful Online Resources and Real World Field Trips

Useful Internet Links

The Internet is a useful research tool, but it is also a source of a lot of misinformation. Teach your students to be critical of their Internet sources. Here are a few links that you might find useful for this section.

To learn more about the planets in our Solar System, visit: pds.jpl.nasa.gov/planets

To learn some interesting facts about our closest star, visit:

astro-tom.com/technical_data/nearest_stars.htm

To see today's sunspots, visit: sohowww.nascom.nasa.gov

Solar System Simulator: space.jpl.nasa.gov/

Visit NASA's site for games, activities, and pictures of far away places: spaceplace.nasa.gov/en/kids/

And please, what ever you do, send us your photos and stories so we can share them with the world!

Modeling Turbulence—Going to a Museum

The swirling, chaotic patterns visible in the Turbulent Orb and the Jovian Cloud Tops Exhibits designed by the artist Ned Kahn. These exhibits demonstrate the swirls and twirls seen in the movement of clouds over the Earth and on other planets like Jupiter and Neptune. These exhibits are widely available around the United States and other parts of the world. To learn more about how to visit these exhibits, please check out the following sites on the Internet:

Exloratorium Museum in San Francisco, CA:
exploratorium.edu/exhibits/turbulent-orb
Questacon, The National Science and Technology Canter in Australia:
questacon.edu.au/visiting/galleries/awesome-earth/exhibits/turbulent-orb
Lafayette Science Museum, LA:
lafayettesciencemuseum.org/turbulent-orb
National History Museum in London, The United Kingdom :
nhm.ac.uk/services/ibd/te/e/tl/2_content.htm

"The Turbulent Orb" by Ned Kahn.

Ned Kahn's exhibits: on left, modeling convection; on right "Jovian Could Tops."

The diameter of the Turbulent Orb Exhibit is approximately half a meter. The diameter of Jupiter is approximately 150,000,000 meters. That's 300,000,000 times bigger than the Turbulent Orb Exhibit.

How big would the turbulence be if it was resized to Jupiter proportions? To find out multiply the width and then the length of the turbulence by 300,000,000. The answer will be in centimeters. To change the answer to kilometers, get rid of the last five zeros in the numbers (there are 100 centimeters in a meter and 1,000 meters in a kilometer). Now the answer is in kilometers. Easy!

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What You Need to Conduct These Activities

Parent Helpers

What You Need

Some of the concepts covered in this section are complex, but humans have spent thousands of years of gazing at the skies and finding poetry and art as well as science up there. Young and old feel the mythical power of the little dots of light that are worlds and entire star systems all onto themselves. So make sure to have adequate time set aside for discussions. Encourage your children to write poetry and draw imagery based on the ideas they learn here. And we haven't met a kid yet that didn't get scientific notation.

The DO pages are appropriate for elementary school children as well as older students. 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.

The Human Solar System activity in this section requires special materials and a lot of open space. Kids pick a planet and decorate a balloon (using permanent ink markers) to represent this world. Younger children can just look at the pictures of the planets and have parents and teachers talk about each of the worlds in our Solar System prior to starting their simulation of our Solar System. Older students should spend time doing research about the planets they will represent in the human model. A large, empty parking lot is a good place to form a model.

While younger students can focus on the order of the planets in the model, older students can introduce other variables. In particular, the width and length of the available open space can be measured and used to set the distance to Pluto, the farthest dwarf planet discussed here. Using data on the actual distances in our Solar System, kids can calculate the appropriate distances from the center (Sun) to create a proportionately more accurate model. And where it's not possible to do, discuss what the difficulty is—our star system is really quite large if we relate planetary distances back to human scale.

The materials you will need for each group of kids:

- Pencils, permanent markers (to decorate the balloons), and gel pens
- Balloons (in several colors and sizes)
- Scissors, stapler, and glue
- Ruler and measuring tape
- Masking tape
- Thumbtack
- Chalk and string (to mark the orbital paths on the pavement)
- Clock or stop watch
- A few pennies and nickels
- Parent Helpers to help kids with setting up, clean up, and organization

Visit Lunar Atlas to find the names of the craters on the Moon at: lpi.usra.edu/resources/cla/

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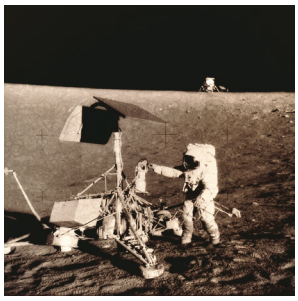
Don't Stop!



Do More

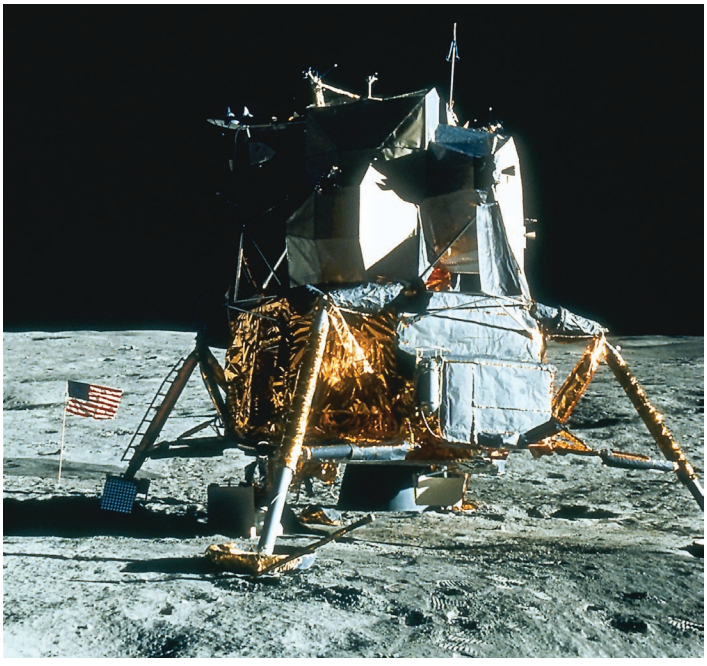
These activities explore the universe around us. There are a lot of materials available in the library and on the Internet about planets, stars, sun, and our galaxy. There have been a lot of discoveries made in the last several years, make sure that the materials your kids are using are up to date. NASA's web site has a large collection of photographs, illustrations, and information, and we strongly encourage you to let your students explore there, if they can.

While most of these activities can be done without access to the Internet, some do require students to look up the latest news and photographs from NASA. In particular, SOHO observatory has pictures of the sun and children can view daily images of the sun's surface. This is great way to introduce students to observational astronomy. Cities are not good places for night sky observation. But one star is very close to us—our sun. And the solar weather has direct impact on human lives—our cell phones and cables might not work well during a particularly strong solar eruption. If your children don't have access to the Internet, you can use images of the sunspots printed in the margins to create the flip books of sunspot movement on the surface. Most newspapers now provide information on solar activity. Ask students to collect "clippings" for a few weeks (digital or from a printed newspaper). Can they relate the solar weather to the sun spot activity?

While there is a LEARN page for the Moon, there is a lot that can be done to make science exploration and discovery more real. In the resent decades, there have been multiple movies that are appropriate for kids in this age group. Consider the following: *The Right Stuff*, *Apollo 13*, *October Skies*, *Hidden Figures*, just to name a few. Not only do these movies accurately depict the science of space exploration, they also provide a historical and social context.

Depending on the age and enthusiasm of your students, we encourage you to spend at least a week working on the creation of the My World DO activity. While students can use the DO pages in this book, we suggest that you might want to turn their efforts into a book and use cardboard and paper appropriate for book making. The more effort the students put into their work, the more they will enjoy their final products. These books can be used as part of their academic portfolios and shared and displayed for other students and classes to admire. We witnessed incredible dedication and creativity among students that engaged in this project in the past.

As part of this exploration, we encourage you to watch *Microcosmos*, a 1996 French documentary about the life of the very small in the county field. The change of perspective, from human to bug-size, allows the viewers to observe time and ordinary objects from a completely alien point of view. This documentary is a good introduction to the part of the My World DO activity where students are asked to describe how their favorite place on the planet looks like and what life forms live there. Here is a review from the Internet Movie Database: imdb.com/title/tt0117040/



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