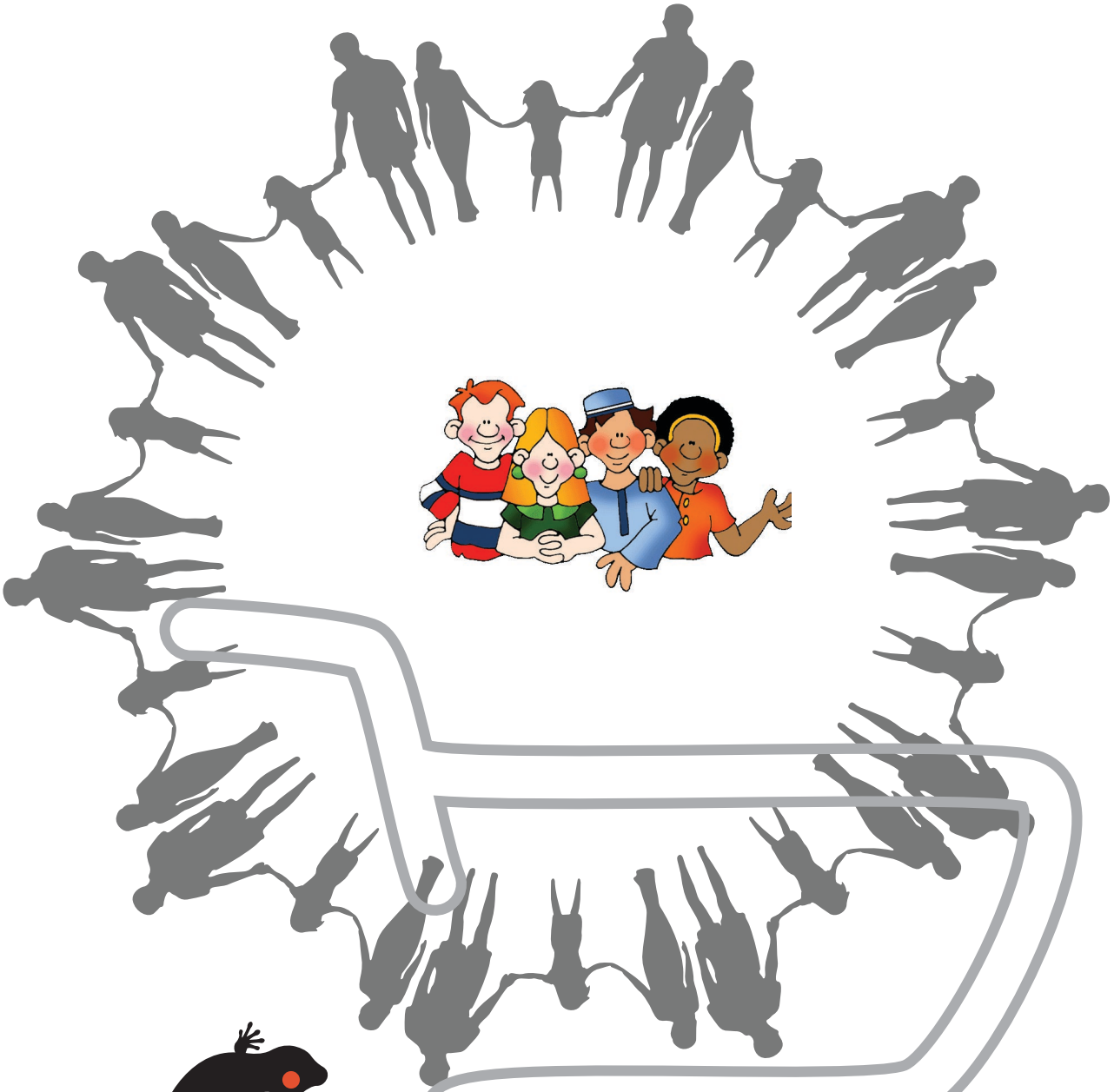
PARENT HELPER GUIDE



supermarket science

TEACH

Introduction to Supermarket Science Materials

How to Use This Book

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.

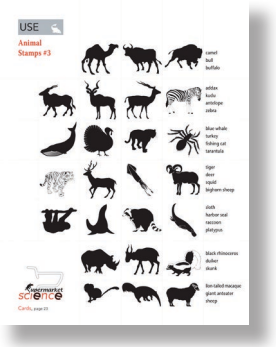
On some pages, there are icons of animals. For example, an activity about elephants might have an elephant icon next to it. These icons can be used as keys to link information between all of the Supermarket Science Materials.

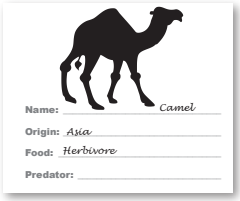
Most DO pages have a What You Need list of items in the margin under the title of the activity. This is a quick reminder for what children should have while doing the activity. It might look something like a list on the right: Animal Stamps pages, Animal Cards pages, research books, pencil, scissors,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

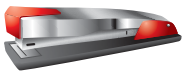
Some of the activities in this set use of cards from the Supermarket Science Cards or Stamps USE pages. Creating taxonomies is part of the scientific process. Card games and activities allow kids an opportunity to practice this skill.

There are many activities which can be done using information about animals and habitats. This set shows some possibilities. We encourage you to come up with others. Think of these activities as inspirational examples, jumping off points.

What You Need:

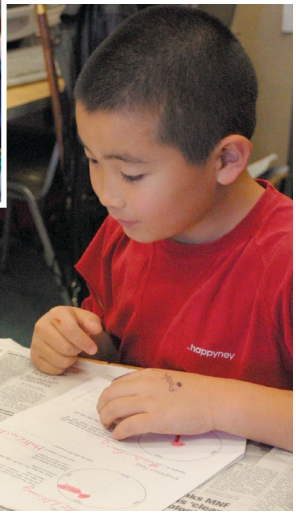






Parent Helpers

Volcanoes in the classroom: a 4th grader is making a map of his volcanic flow.



Every student works with a partner on this Dynamic Earth Supermarket Science Activity. The school tables are covered by news papers to prevent staining. Each student gets a cup of vinegar, good for several volcanic eruptions.

TEACH

Introduction to Supermarket Science Dynamic Earth Materials

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

Summary

These activities introduce the idea of dynamic Earth—a planet with continuously moving surface. Kids get to build a mental model of Earth's interior and reconceptualize continents as fragments of the planet's outer shell floating on top of the molten interior (a shift from the static and solid representation of Earth as promoted by the classical maps and atlases of the world). Children will create a flip book illustrating continental drift and link the continental positions to geological epochs. The activities introduce the concepts of plate tectonics, volcanism, "Ring of Fire," planetary evolution, and the effects of large scale geologic transformations have on human populations.

Kids start by considering the history of scientific explorations relating to above theories. They proceed with building and "exploding" a volcano model. And they will make contour maps of their volcano islands and write fictional stories about the life on that island.

Main Ideas

Research

- Research is the basic tool of well-educated people. While engaging with Supermarket Science Activities, kids learn how to conduct and think about research in general and how to look up basic information about the rock formation, continental movements, the deep geologic history of our planet, and how humans deal with natural disasters in a library or the Internet.

Precision

- Each label, name, or word has a specific meaning that all scientists in the same field understand to mean exactly the same thing.
- Descriptions of objects and events need to be precise enough to limit misunderstanding or misinterpretation by the readers as much as possible.
- "Fuzzy thinking" is not allowed!

Logical Thinking

- There two pathways in science: deduction and induction. Deduction is a process that puts together bits of data and evidence to build a theory—it's bottom up reasoning. Induction is the process that starts with an idea and then looks for data and evidence to support it—it's top down reasoning.
- Logical reasoning is a formal way of thinking (usually deductive) where each successive thought is built upon the previous one; as long as each link is a chain of logical reasoning is true, the end conclusion is true.

Geological Processes

- Geology is the study of the Earth and its composition. The word "geology" is a compound word, composed of "geo" meaning "Earth" and "logy" meaning "study." Geology literary means "a study of the Earth."
- "Ring of Fire" is an imaginary line on the earth atlas connecting the volcanoes on the edges of the continental plates. The ring includes the volcanoes on the west side of South and North Americas, the volcanoes of Alaska, and the volcanoes of Japan and the Pacific Rim. The "center" of this ring is the Hawaiian Archipelago, which itself has a group of active volcanoes.
- Continental drift is a theory about the movement of continents.
- Plate Tectonics is a theory which describes the movements of the Earth's upper crust. According to this theory, the Earth's surface is broken into large plates. The position and size of these plates change over very long periods of time. Where these plates rub against each other, there is intense geological activity: earthquakes, volcanoes, and mountain building.
- "Hot Spot" is a theory that tries to account for volcanoes that exist in the middle of tectonic plates rather than on the edges. A hot spot is a fixed spot in the Earth's mantle that, for currently unexplained reasons, is hotter than the surrounding areas. As the continental or oceanic plates move over such spots, a volcano develops. Hawaiian Archipelago is an example of volcanic islands formed over a hot spot.

Supermarket science

TEACH

Dynamic Earth

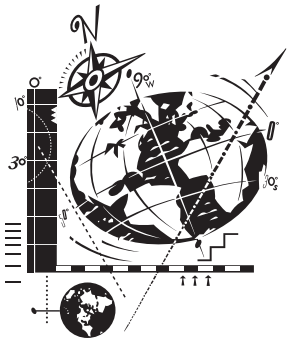
- Geologists classify rocks in three groups according to how they were formed. The three rock groups are ***igneous***, ***sedimentary***, and ***metamorphic*** rocks. ***Igneous*** rocks are formed from melted rock that has cooled and solidified.
- ***Sedimentary*** rocks are formed through accumulations of sediments of rocks, minerals, or animal and plant matter.
- When igneous or sedimentary rocks are transformed by pressure into a new kind of rock, they are called ***metamorphic*** rocks.

Working in pairs encourages students to collaborate, negotiate, and explain ideas to each other. It also allows weaker students to fully participate in an activity. At home, older students can help their younger siblings—teaching others is a great way of fully synthesize information and commit it to memory.

Supermarket science

TEACH

Mapping Our Planet Earth



Geographical Notation

- Mountains, lakes, oceans, rivers, roads, forests, cities, and other features on the Earth's surface can be represented graphically on a map.
- There are different kinds of maps designed to show different geographical features. A *geopolitical map* reveals the boundaries between countries, location and size of cities, population distribution, roads and other surface transportation features. A *habitat map* focuses on the distribution of water and temperature and their effects on plant and animal populations. An *elevation map* highlights the earth terrain above and below the sea level. Different types of maps are used for different purposes.

Science History

- Scientists are people and are not always right.
- Sometimes, it takes a long time for an idea to become excepted by the scientific community (even if it is right).
- The history of science is an interesting field of study.

Parent helpers covered the tables with news papers, distributed cups of vinegar, and loaded the volcanoes with the baking soda mixture. At the end of the activity, parents' help was greatly appreciated during clean up!

Short Descriptions of the Major Habitats of Earth

Temperate Forests: Temperate forests get enough moisture each year to allow big trees to grow (20 to 40 inches per year). While the temperature variation between night and day is not great, seasonal temperature variations are: freezing cold in the winter and very warm in the summer. Animals need special adaptations to seasonal variations in food, temperature, and environment.

Deserts: Deserts get less than 10 inches of rain per year, and some years get none. There are severe temperature variations between night and day. Animals that live in a desert habitat must have special adaptations to deal with these conditions.

Grasslands: Grasslands are transitional areas between forests and deserts. The seasonal variations are between times of severe drought and heavy rains. Grasslands are wide, flat, open spaces with few places for animals to hide.

Oceans: Oceans cover almost three fourth of our planet's surface. Oceans are not just one single habitat but many, like kelp forests, sandy bottoms, reefs, etc.

Polar Regions: These are regions around the north and south poles. During half of the year, these habitats don't get any sun light. And plants and animals that live there have do deal with extreme cold as well.

Tropical Forests: Tropical rainforests have a constant warm temperature and high humidity year round. They receive 100 to 400 inches of rain per year.

Wetlands: Wetlands are areas with shallow standing water, like marshes, swamps, or bogs. Some wetlands have saltwater and are connected to the ocean. The water level in these wetlands rises and falls with the tide.

Supermarket Science

TEACH

What You Need to Conduct These Activities: Volcano Model

Parent Helpers

What You Need

Each child will need a set of LEARN, SHOW, DO, and USE pages from this book. Each group of children (students can work in pairs, small groups, or individually) will need a set of materials listed here. Each student will need Map Symbols Stamps USE page and large sheet of paper for map making. To give children a kinesthetic feel for conceptual idea behind elevation maps, use the last activity in this book and slowly submerge a couple of rocks in milk—milk is opaque and non-toxic, so works well.

There is a lot of work prior to making the volcanoes and "erupting" them. There are several TEACH pages that describe how to make papier-mache for the volcano models, the baking soda goo, and the paint cover for the volcano models. In elementary schools, parents should take on the tasks of preparing the necessary materials for this experiment. It takes several weeks from the initial prep work to the final *Explode Your Volcano* experiment day—you need to plan accordingly. You can get all of the materials for the volcano model from your local hardware store. Ask your school to collect old homework assignments for shredding—students can organize a "volcano" paper recycling drive in their class. When we did it, the use of the paper shredder machine was a reward for good classwork.

These volcano experiments and activities are designed for pairs of kids to work together, although they can be performed by individuals. We recommend that parents be on hand to help out during the *Explode Your Volcano* activity. There is significant clean up work afterward, but it is worth it!

Makes sures to have adequate time set aside for discussions about the nature of scientific work prior to the experiment.

These are the materials you will need to make volcanoes:

- Approximately one pound of shredded recycled paper—this is enough for about three regular volcanoes or one giant one (five pounds of shredded recycled paper is enough for a whole class of 15 volcanoes—there will be shrinkage)
- One gallon of white glue—you will have leftovers, but it is a necessary ingredient in lots of fun projects, like goo-making
- Several newspapers to cover the table top for protection (a nice waterproof tablecloth or a plastic sheet UNDER the newspapers is strongly recommended)
- One box of baking soda
- Liquid soap
- One cup of mouth wash
- Red food coloring
- Half a cup of salt
- Access to boiling water

- A big plastic tub to mix papier-mache
- A long stick or broom handle for mixing the ingredients together
- Plastic cups to serve out the papier-mache mixture to kids
- Smaller plastic tub for "lava" mixture and a big spoon to ladle it out
- An apron—food coloring can stain
- Half inch plastic pipes long enough to be cut into four inch segments for each volcano model and a pipe cutter (or have the hardware store cut the pipe into four inch segments)—for lava shafts. Alternatively, you can use large pill bottles or other tall, waterproof plastic containers (but we found that for several class-full of volcano models, plastic pipes were the cheapest way to go)
- Several sheets of news paper—to make the volcano base
- Pencils, scissors, masking tape, paper plates
- Semi-gloss spray paint—some beige, browns, and greens to paint the volcano model

Supermarket Science

TEACH

How to Make the Papier-mache Mixture and the Volcano Model

Parent Helpers

Fake lava is a mixture of red food coloring, white vinegar, baking soda, and liquid soap. White vinegar is added at the last moment to trigger the "explosion."

For a class of 30 students, you will need to make about eight pounds of papier-mache mixture, which needs to be made about four days in advance of the actual activity date. To make the papier-mache mixture, you will need one gallon of white glue, approximately five pounds of shredded recycled paper (do NOT use new papers), and a half a cup of salt and one cup of mouth wash (to keep mold and fungus from growing in the mixture).

Use a big plastic tub and pour salt and mouth wash into it. Shred about five pounds of writing paper—use old homework or other papers recycled from the office. Don't use newspapers for the papier-mache mixture—newspaper ink will dissolve into the mixture, making it toxic and black. Boil water. Pour a gallon or so (a whole kettle-full) of boiling water into the tub. Stir. Boiling-hot water will help the paper fibers to start dissolve. Keep adding water until the mixture becomes the thickness of sour cream. Add one gallon of glue. Mix. Cover and let it sit for several days until you are ready to make volcano models.

Plastic cups are a good way of giving each student a small amount of papier-mache mixture. One model needs about 3 cups.

At a hardware store, get enough 1/2 inch plastic pipe length to be able to cut 4 inch segments for each student in your class or kid in your family. Get pipe ends to cap all of the 4 inch segments—one for each volcano model. Make the "volcano tubes" out of the pipe segments and caps for all children. You can also use old prescription bottles (these can be bought new on Amazon.com, if need be).

Kids can use paper shopping bags or newspapers to create the base for their volcano models (see right and left). Masking tape will secure the paper to the pipe. The pipe and paper should have a rough conical shape of a volcano, forming a base for the volcano model. These bases will need to be taped to the paper plates. Some younger children might have difficulties doing this step and might need a bit of help.

The papier-mache mixture will go on top of these bases. Allow two weeks for drying. While it's possible to use only papier-mache for making volcano models, it not advisable. The mixture takes a long time to dry and might get moldy despite the precautions. And an all papier-mache volcano model would require a lot more papier-mache.

Use three colors of semi-gloss spray paint to color the volcano models: beige, brown, and forest green. You can add black for the tip. This step needs to be done by adults, in well-ventilated rooms—paint fumes are toxic. Wear a mask and rubber gloves to protect you lungs and hands.

Lava is simulated by a "lava goo"—a mixture of baking soda, red food coloring, and liquid soap which reacts when in contact with vinegar, forming bubbling lava flow. Only the baking soda and vinegar are need for the reaction. Red food coloring just adds color. Liquid soap helps keep the mixture more liquid.

Supermarket Science

TEACH

What You Need to Conduct These Activities: Rock Elevation

Parent Helpers

These are the materials you will need for Rock Elevation Activity:

- A gallon of milk—you will need an opaque liquid and milk is non-toxic and does the job
- A cup
- A few interesting-shaped rocks (large) or you can use bowls and cups placed upside-down
- A deep, glass backing pan
- A ruler
- Color pencils and paper
- A cookie cooling rack or a metal grate
- A large sheet of paper for map making
- And a little lava rock sample—found in any gardening supply store or backyard

The lava rock sample can be obtained from a gardening supply store. Lava rocks are used for decoration and for laying on top of ground in places where grass is undesirable. A small bucket of half inch lava rocks can supply a whole school with enough rock samples for each student. To minimize rock throwing behavior, lava rocks should be placed in individual zip lock bags—make them look like science samples not garden supplies. A one inch by one inch zip lock bags come in packages of 100 or more and cost about 3¢ each.

Supermarket science

TEACH

Volcanoes in Classrooms

36 volcano models are drying on top of a bookcase. It takes at least a week to properly dry out the models.

Supermarket science

TEACH

Additional Fun with Geology

Do More

Teaching writing, math, and reading is easier in a context rather than in isolation. Ask your children to write a short story about what they've learned or to draw an illustration or both. There are infinite number of ways of expanding these activities to meet the needs of different kids at different stages of their development. We hope teachers, parents, and students will make more activities using the materials found in these sets.

Science is more memorable when embedded into people stories. There are several documentaries that students can watch as a class or with their families to get a feel for how volcanoes affect the lives of individuals through out the world. The tsunamis that devastated the communities on the Indian Ocean's rim and those of Japan bring real world context to the havoc the movements of earth's crust can cause. Depending on the age of the students, newspaper articles and books about those events can extend the science taught in this section to its consequences in the real world. You might consider doing a research project about the tsunamis and their effects on people through out the world and history. Encourage your children to discuss the following questions:

1. Would the changing positions of the continents on the globe affect the average summer and winter temperature and rain fall?
2. Why is it so difficult to accept a new theory, even if it is proven to be correct?

You'd be surprised how many other ideas your children will have after doing these activities. Please share those. For example, if your kids make their own connect the dots drawings, email them to us and we will post them. Such recognition would make children proud and encourage them to make more.

Movies and Documentaries

Different kids learn in different ways. Supermarket Science Materials try to accommodate all types of learners. To that end, we recommend a few documentaries that might serve as excellent resources: "Ring of Fire" and "Hidden Hawaii."

"Ring of Fire" (40 minutes) is visually beautiful and packed with information. This is a good start to the activities and experiments in this book. "Hidden Hawaii" (35 minutes) is the story of destruction and renewal. We recommend watching it after the kids explode their volcanoes. There other videos and movies that might extend these activities for your children.

4th graders work in a group to explode their volcanoes.

Supermarket Science