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Patchwork Designs, Inc

DISCOVERING GEOLOGY

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About this 'Discovering' manual

This **manual** was created to assist you or your group in completing the 'Discovering Geology"

Manuals are books written to specifically meet each requirement in a country's patch program and help individuals earn the associated patch.

All of the information has been researched for you already and collected into one place.

Included are maps, crafts, games, stories, recipes, coloring sheets, songs, language sheets, and other educational information. These materials can be reproduced and distributed to the individuals completing the program.

Any other use of these programs and the materials contained in them is in direct violation of copyright laws.

If you have any questions, please feel free to contact Patchwork Designs, Inc. using any of the methods listed below.

Ordering and contact information

After completing the 'Discovering Geology Patch Program', you may order the patch through Patchwork Designs, Incorporated. You may place your order in one of the following ways:

Mail
Checks and Money Order:
Please send checks and money orders, payable to Patchwork Designs, Inc. to:
Patchwork Designs, Inc.
8421 Churchside Drive
Gainesville, VA 20155

Credit Card
Telephone your MasterCard, Discover, or Visa order to (703)743-9948
Leave your order and credit card number on our secure line.

Fax
Using these same card types, you may also fax your order to (703) 743-9942.

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orders@patchworkdesigns.net
Email is not secure to send your credit card information. Though you can email orders if you have any questions about ordering.

Online Store
Effective November 2006, customers may also order online through Patchwork Designs' website at: www.patchworkdesigns.net

All information is secure.

Requirements for Discovering Geology

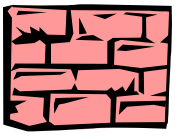
Complete only 3 requirements to earn this patch.

1. Geology is the study of the earth and its life through rocks and minerals. The entire earth is made of rocks and minerals. You need minerals to make rocks, but you don't need rocks to make minerals. Define, locate, or draw, the four layers of the earth; crust, inner core, outer core, and mantle.

2. All rocks contain minerals. There are three basic type of rocks, Igneous Rocks, formed when hot magma (melted rock) from a volcano cools; Sedimentary Rocks, made from the erosion and depositing of other rocks in lakes, streams and rivers (over 75% of the earth are covered with these); Metamorphic Rocks, least common rock, created when igneous or sedimentary rocks are transformed by great heat and/or pressure. Gather small rocks in the front yard or play area and have the participants categorize them by color and shape. There is a guide in our Geology kit to assist them in categorizing the rocks.

3. One of the most well known examples of erosion in the United States is the Grand Canyon. Water and weather cause pieces of rock to break away flow or be carried to a different location. Look for erosion in your neighborhood, waterways, or parks OR collect litter in public areas.

4. A mineral contains the same substance all the way through. Choose 3 minerals to study more closely. This can be from a book, museum or your home. Label the minerals according to color, size and texture. Is it transparent to translucent? For example, aluminum; silver, thin, and shiny. Other examples of minerals you may find in your home are brass, tin, copper, silver, gold, and nickel.



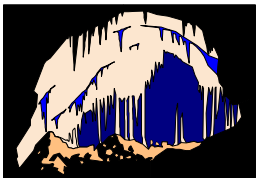
5. Rocks are used to make many things that we use and live in today. Look around your neighborhood and name 3 things that are constructed from a rock substance or visit a quarry. Examples are brick, sidewalk, tiles, or driveway.

6. Gemstones are primarily used for decorations in jewelry. They can be cut into almost any desired shape or size. They are valued according to their rarity, size, and color. The most familiar gem is the diamond. View gems in books or at museums; OR find out what your monthly birthstone is and what it looks like; OR find out the four "C"'s of purchasing the best diamond.

7. Rocks break down and eventually become soil. Soil can be reused to create beautiful art projects. Create an art project using rocks, stones or soil. Examples are clay, make your own pottery; chalk, design a picture on the sidewalk or paper; peat soil, plant a flower in a neighborhood or your own pot; OR create your own sand art design in a bottle or paper. Craft ideas are available in this kit.

8. Mining for silver, gold, and copper started thousands of years ago. Learn more about mining, visit a mine museum or tour, dig for gems, or pan for gold.

9. A common hobby is collecting rocks and minerals. First, you start with collecting shiny, smooth, or special shaped rocks in your driveway. Is collecting rocks or minerals something you would like to do? If so, you should choose a box or object to store your items in. Start a collection or view a collection of rocks and minerals. A bag of rocks and minerals is available through Patchwork Designs, Inc., local suppliers or museums.

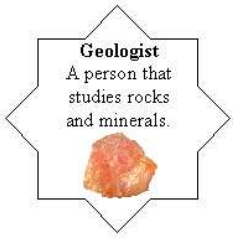


10. Rock formations called stalactites and stalagmites are formed in caves or caverns. What is a stalactite and stalagmite? View them in a book or visit a cavern or cave that offers tours of these formations.

11. Geologists study rocks and minerals. Learn more about being a geologist or research another career in Geoscience such as a Stratigraphers, lapidarist, jeweler**,** Mineralogists, Soil scientists, Geochronologists, mining geologists, Petrologists, and Geochemists.

12. Many Museums have displays of rocks, minerals, and precious gems. Visit a local museum, website, or book to view some of these pieces. Some examples are the Hope Diamond at the Natural History Museum in Washington DC; A.E. Seaman Mineral Museum in Houghton, Michigan; or California State Mining and Mineral Museum in Mariposa, California.

13. Would you like to be a Geologist in your own home or backyard? There are several items that can assist you in getting familiar with rocks and minerals. Choose one piece of equipment to learn more about or use. Examples are: magnifying glass, camera, goggles, geologist hammer, field guides, mineral chart, microscope, and maps. Be careful not to take risks and climb too high, wear protective gear durable for being in a rocky area, take a backpack with your supplies, food and drink, and always let someone know where you are going.



14. Add a twist to your geology discovery and create or purchase editable treats that represent the study of rocks and minerals. Examples are rock candy, dirt cupcakes, rocky road ice cream or cookies, decorated cookies with colored sugar crystals or candy jewelry. Recipes are available in this kit.

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Crafts

Fiery Volcano

Sand Painting

Colored Sand

Decorate a Clay Pot

Gem Encrusted Barrette

Turquoise Necklace

Make Your Own Fossil

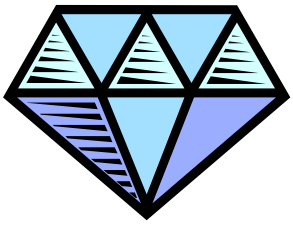
Rainbow Layers of the Earth

Quicksand

Shiny Bangle

Clear Gem Picture Frame

Grow Your Own Crystals



How to make a homemade

volcano

Paper mache or mold clay around the water bottle so it looks like a volcano.

Items needed to create a volcano:
Paper mache
newspaper
12X12 flat piece of cardboard (for the base)
brown paper bag or cardboard strips (to build around the bottle)
masking tape
flour and water
black paint

The ingredients for the eruption:
Small plastic soda or water bottle (washed out thoroughly)
Vinegar (enough until it erupts)
2 tablespoons of baking soda
Dishwashing liquid
Warm water (about a cup)
Red food coloring
Paper and pen to write down their findings

First, you need to make the paper mache' or clay model.

The piece of cardboard will be the base of the volcano. Attach the empty bottle to the middle of the cardboard with the masking tape, securing it well. The interior of your volcano will be made of newspaper crunched into balls. You will need balls of different sizes. Use the balls to shape your volcano. Roll tape and stick it to the underside to secure the balls of newspaper together. Wrap the surface of the volcano in a brown paper bag. Tape the bag to the bottom of the cardboard. Gently cut the bag around the neck of the bottle. Now start applying the strips of newspaper to the formed mountain.

PAPER MACHE--Use a simple mixture of flour and water. Mix one part flour with about 2 parts of water until you get a consistency like thick glue. Add more water or flour as necessary. Mix well to get out all the bumps. Add a few tablespoons of salt to help prevent mold! Dip the newspaper strips in the mixture and apply it to the cardboard form. Apply the strips in a criss cross pattern. Let dry over night and then paint it black.

Participants experiment with the amounts of vinegar, baking soda, water and liquid soap. This should be done in another bottle. Encourage them to record each trial so they know which one works best.

Add 6 drops of liquid dishwashing detergent to the bottle. Using the funnel (make sure it's dry), add **2 tablespoons of baking soda.** Remove the funnel from the neck of the bottle and then add about a cup of water. NOW, **slowly add vinegar to the bottle. The liquid will foam and flow down the sides of the mountain. When you mix vinegar and baking soda together, it creates carbon dioxide. Carbon dioxide is the same gas that causes the lava to bubble and is produced during a volcanic eruption.**

Sand Painting

Cardstock, any color
Pencil
White glue
Disposable cups
Homemade colored sand or purchased sand

Have the participants draw a simple design on the paper. Trace the design with the glue and apply the colored sand on the image. Repeat until the image is completed.

Colored Sand

Sand
Powdered tempera paint (or dry unsweetened kool aid)
Baggies or cups (you may need a glass bowl depending on the amount needed)
Disposable plastic bowls

NOTE: Do not place the sand and tempera paint in your household plastic bowl to mix. It will stain the bowl.

Use a cup, baggie or bowl per color you wish to make. Place the desired amount of sand in the container. Spoon in a tablespoon of tempera paint and mix thoroughly until blended. Continue to mix sand with dry tempera paints until sand reaches the desired color. Store in a resalable container.

Decorate a Clay Pot

Clay pot (available in craft stores)
Markers, stickers, foam pieces, glitter glue, or acrylic paints for decorations

Purchase a clay pot at the craft stores and decorate with the above pieces. Let dry if using glitter glue overnight.

OR Visit your local “paint your own pottery” shop and paint a pottery piece of your own

OR Visit a shop and create something from scratch on the pottery’s wheel or by rolling and cutting the clay out.

Gem Encrusted Barrette

Barrette clip
Rhinestones or gems
Hot glue gun and hot glue sticks
Metallic ribbon

Pick your gems out and arrange them onto the barrette. Form the metallic ribbon in a bow and place on the barrette as desired. Hot glue everything on the barrette one item at a time until completed. Place inside your hair and match with the shiny bracelet.

Turquoise Necklace—did you know that turquoise is a precious gem?

Turquoise beads
Turquoise pendant or large turquoise bead
String, leather cord, or ribbon
Black and/or silver beads

String enough beads for an even amount on the string, leather cord, or ribbon according to the length desired. Next, place the pendant or large bead onto it. String the same amount on the other side of the pendant to complete. Tie the string, leather cord, or ribbon around your neck.

Make Your Own Fossil

Clay
Aluminum foil
Object make a fossil of (ex. Butterfly toy, leaf, animal foot print, bracelet, etc.)
Plaster of Paris (available at craft stores)

Start by rolling your clay into a large ball. Flatten the top of the ball and place in a piece of aluminum foil and crumple it up around the mound. Press the item that you are imprinting into the clay firmly. Take it out after it makes an imprint. If you mess up, it's okay! Just form the ball over again. Smooth over the parts that you don't want in your fossil, if desired. Mix 2 parts of plaster with 1 part water and pour over the entire mold. Gently shake the mold to get rid of bubbles. Wait an hour or more until the plaster dries and remove the aluminum foil. Remove the clay from the mold and you should have a beautiful whitish gray fossil!

Rainbow Layers of the Earth

6 colors of Play-Doh® or clay (red, orange, yellow, green, blue, purple)

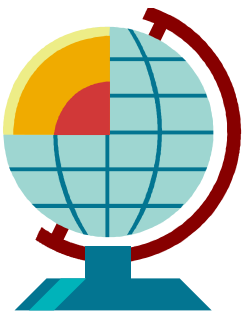
Form the **red** into a small circle. Roll the **orange** into a flat circle or oval that is big enough to place the ball into it. Place the **red** ball in the middle of it.

Make a ball out of the **orange** with the red inside. Make sure you don't squish the red ball. Roll the **yellow** into a flat circle or oval that is big enough to place the ball into it.

Place the **orange** ball in the middle of it. Roll the **purple** into a flat circle or oval that is big enough to place the ball into it.

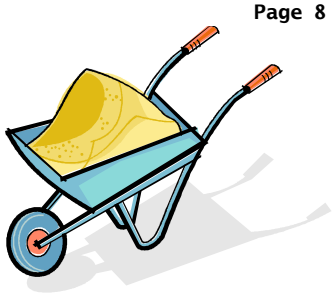
Place the **yellow** ball in the middle of it. Roll the **blue** into a flat circle or oval that is big enough to place the ball into it.

Place the **purple** ball in the middle of it. Decorate the outside with green shapes to represent the Earth if desired. Cut inside and see the layers of the earth!



Red = inner core
Orange = outer core
Yellow = mantle
Purple = crust
Blue and Green = Earth

Quicksand—it's liquid and solid at the same time!



1 cup of maize corn flour
1/2 cup water

Mix the corn flour and water together in a plastic container. Stir slowly to see that it is a liquid. Stir it quickly to show that it is a solid. For extra, try to put toy people into the quicksand!

Shiny Bangle

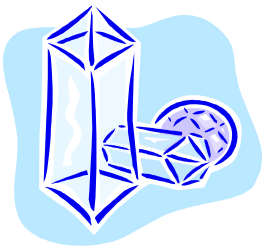
Plastic bangle (available at craft and dollar stores)
Flat back rhinestones
Tacky or hot glue gun with hot glue sticks
Glitter glue (optional)

Pick out the rhinestones that you want. Begin gluing them onto the bangle as desired. Make a design with the glitter glue if you want. Let it dry overnight if you use glitter glue. Wear with the gem encrusted barrette and show your bling!

Clear Gem Picture Frame

Wooden picture frame (available at craft and dollar stores)
Clear or colored clear gems/pebbles that you put in vases
Tacky or hot glue gun with hot glue sticks
Rhinestones
Acrylic paint, any color
Photograph to place inside

Paint the picture frame in any color and let dry completely. Glue the clear or colored clear gems all over to give a nice effect. Glue on rhinestones in between the gems and wait to dry. Place the photograph inside and display or give to someone special.



Grow Your Own Crystals

Glass jar
Salt
String
Pencil

Fill the glass jar halfway with warm water. Stir in salt until you can't stir anymore. Measure a string long enough to be inside of the jar but **don't let it touch the bottom**. Tie the string to the middle of the pencil and hang the string inside the jar. Observe the jar over time and crystals will form. As the water evaporates, you will see them.

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Recipes

Rocky Road Cookies

Rocky Road Ice Cream

Layers of the Earth Cookie Bar

Cup of Dirt

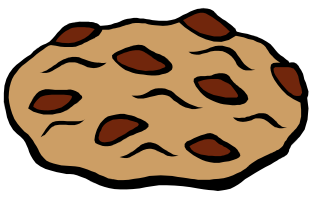
Cup of Dirt Made Easy

Slice and Bake Gemstone Cookies

Make Your Own Rock Candy

Sedimentary Rock Treats

Geology Trail Mix



Rocky Road Cookies-Use this opportunity to have the participants break the cookie in half and observe the inside of the contents. Explain to them that the inside of a real rock will have a variety of minerals and different colored items, including gems (M&M's)

1 1/4 cup of self rising flour
1/2 cup of butter (and for greasing pans)
1/4 cup brown sugar
1 teaspoon of vanilla
1 egg
1/2 cup of chocolate chips
1/2 cup of chopped walnuts
1/2 cup M&M's® (miniature)
1/2 cup of white chocolate chips
1/2 cup of miniature marshmallows

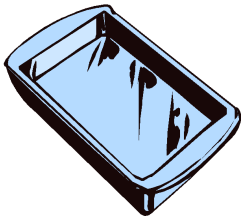
Place flour, butter, sugar, vanilla, and egg in large mixing bowl. Beat with electric mixer until well blended. Stir in nuts, M & M's®, chocolate, and white chocolate chips.

Preheat oven to 375 F. Drop by large spoonfuls on a greased baking pan about two inches apart. Bake for 10-12 minutes. Remove cookie sheet from the oven and place 2-3 marshmallows on each cookie. You may choose to omit marshmallow from some cookies for those that don't care for marshmallows. Place the cookies back in the oven for an additional two minutes or until marshmallows are slightly melted. Let cool and serve.

Rocky Road Ice Cream

You can purchase Rocky Road ice cream at your local grocer or you can create your rocky road creation by adding toppings to vanilla ice cream.

Layers of the Earth Cookie Bar



1 can (14 oz) condensed milk (molten lava)
1/2 cup of butter (stick of butter)
1/2 cup of chocolate chips (igneous rocks)
1/2 cup of butterscotch or white chocolate chips (metamorphic rocks)
1/2 cup of coconut flakes (grass)
1 cup of chopped walnuts (sedimentary rocks)
1 1/2 cups graham cracker crumbs (earth's crust)
1/2 cup of miniature M&M's (gems or minerals)

Preheat oven to 350 F. (325 F. for glass dish.) Place stick of butter inside the 13x9-inch baking pan. Place in oven while it is preheating to melt the butter. Once the butter has melted remove it from the oven and sprinkle the graham cracker crumbs over butter. Press down in the pan and slightly around the edges to create a crust. Pour condensed milk evenly over crumbs. Spread the chocolate chips (igneous rocks) over the condensed milk (lava). Sprinkle the butterscotch or white chocolate chips (metamorphic rocks) and miniature M&M's (gems or minerals) evenly across the pan. Top with coconut; press down firmly. Bake 25 to 30 minutes or until lightly browned. Cool thoroughly before cutting. Store loosely covered at room temperature. Makes 20 bars.

Cup of Dirt

1 package of Oreo® or chocolate sandwich cookies
1 large package of instant chocolate pudding
1 box of graham cracker crumbs (optional)
1 small bag of miniature M&M's® (optional to represent hidden gems)
Gummy worms (optional)
Cups (clear cups work better if you would like to see the layers of the dirt)
Spoons

Prepare instant pudding as directed on package, refrigerate.

Remove the cream from the chocolate sandwich cookie and discard. Place the black halves of the cookies on a firm, clean, surface and crush well. Set aside in a bowl. Place graham cracker crumbs in a bowl.

Remove pudding from refrigerator and place a generous helping at the bottom of the cup. Tap the cup on the counter to level the pudding in the cup. If you choose not to use the the optional layers then simply layer the pudding and Oreo® crumbs until the cup is full as desired. Make sure you top with cookie crumbs.

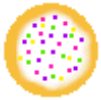
Otherwise, layer as follows with optional items: Begin with chocolate pudding, place graham cracker crumbs, pudding, a worm, chocolate crumbs, M&M's®, pudding and continue with items until your creation is complete. Refrigerate until ready to serve.

Cup of Dirt Made Easy

1 package of Oreo® or chocolate sandwich cookies
Chocolate pudding cups
Gummy worms (optional)
Spoons
Cup (to place excess pudding in)

Peel off the top cover of the pudding cup and discard. Spoon out a enough pudding from the cup to sprinkle some cookie crumbs on top. If you are placing gummy worms in the pudding do so before placing the crumbs on top. Be creative and have the worms hanging over the edge. *Serve your creations and dig in!*

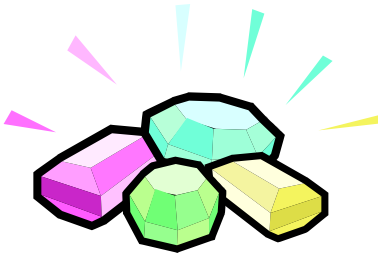
Slice and Bake Gemstone Cookies



Slice and bake sugar cookie roll (prepare according to instructions on label)
White frosting and plastic knives
Assorted sugar crystals for decorations

Slice and bake enough sugar cookies for everyone. Let cool. Offer everyone a chance to frost the top of the cookie with white frosting. Let them sprinkle colored sugar crystals on top of cookie to create their favorite gem color. If you have a variety of sugar crystal colors, then they can make there birthstone. Opal, diamond, and pearl birthstones can use white sugar.

Make Your Own Rock Candy



Wooden skewer or chopstick
A clothespin
1 cup of water
2-3 cups of sugar
A tall and narrow glass jar

Pour the water in a large pot until it boils After it is boiling, pour the sugar in it. Stir the sugar until it is completely dissolved. Keep on stirring sugar in until you can't stir anymore. This may take a long time until it is to this point. Remove it from the heat and let it cool for 20 minutes. While cooling, dip half of the skewer in the mixture and then roll it into plain sugar. Let it cool completely.

Pour the mixture into the jar until it is almost full. Clip the wooden skewer or chopstick to the jar so it is 1 1/2 inches from the bottom. Make sure it doesn't touch the sides. Let the jar to fully cool and keep in a place where it won't be disturbed. Your rock candy will be grown in 3-7 days!

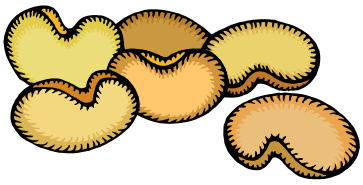
You can also purchase rock candy from Patchwork Designs, Inc or local vendors. We offer bulk pricing candy sticks start at .75 cents and get lower as you order larger quantities.

Sedimentary Rock Treats—these treats represent the layers of sedimentary rocks!

1/2 cup of butter
1 1/2 cups of vanilla wafer cookie crumbs
1 (14 oz.) can of sweetened condensed milk
1 (6 oz.) package of chocolate chips
1 (6 oz.) package of peanut butter chips
1 cup of chopped walnuts
13 x 9 glass pan

Preheat the oven to 350 F. Place the butter in the glass pan and melt the butter in the oven. After it is melted, pour over the vanilla wafer cookie crumbs over the melted butter and press down with a spatula gently until even. Pour the condensed milk over top of this layer. Then pour the chocolate chips over that and then the peanut butter chips. Top it off with the chopped walnuts. Press the layers down with the spatula again. Bake for 25-30 minutes and cut into bars when cooled.

Geology Trail Mix



2 cups of chopped mixed nuts ("fragments")
1 cup of raisins ("small rocks")
1 cup of M&Ms® ("gems")
1 1/2 cups of Chex cereal ("rocks")
1 cup of chocolate chips ("crystals")
1 cup of marshmallows ("geodes")

Combine all the ingredients in a bowl and mix well. Eat while you're digging for rocks!

Requirements that are covered in this kit

Not all of the requirements in the patch program are covered in this kit. We chose eight items to present in this kit. You only need to choose **three requirements** to complete to earn this patch. If you wish to complete all the items in the kit you may.

We are now offering a bag of assorted tumbled stones for only $5.00 to compliment this kit and patch program. You can use them to complete requirement # 4, #8, and #9. It also gives the participants a chance to touch and examine an assortment of stones.

The items that are located in this kit can be copied for the participants and stapled together in a book format. There are also information sheets and descriptions of additional crafts. Choose items to complete according to age level. Older participants can assist younger participants.

*Page 11- Front cover of Geology Journal

*Page 12- Use this "Identify" sheet to classify the stones purchased through Patchwork Designs, Inc. or other local vendors. By using this identification sheet you can log the color, appearance, and any special features or stones. There is also a space available to draw the stone. (Meets Requirement #4)

*Page 13-Common Stone Identification tags to assist you in identifying your stones or assorted stones that you purchased from Patchwork Designs, Inc. (Meets Requirement #4)

*Page 14 - Review the traditional birthstone chart on this page and circle the month and gemstone according to your birth month. It also includes the color of the gem for your reference. There is a space to draw a piece of jewelry with your birthstone. (Meets Requirement #6)

*Page 15 - Label the four layers of the earth. Definitions of the layers are located on this page for easy identification. (Meets Requirement #1)

*Page 16 - Have the participants gather 5-6 small rocks in the front yard or play area and categorize them by color and shape. It may be easier to gather them according to the chart by the adult or participants so they fit more closely in the categories. (Meets Requirement #2)

*Page 17 - Circle the things that are made from rocks on this activity sheet. (Meets Requirement #5)

*Page 18- Create a drawing of rock formations called stalactites and stalagmites. This page also offers a definition of these formations. (Meets Requirement #10)

*Page 19- Choose a career in Geosciences that sounds interesting. Ten jobs are listed and defined for easy reference. (Meets Requirement #11)

*Page 20 - Complete a word search for the different equipment you would need to become a geologist in your backyard or as a career. (Meets Requirement #13) Solution is on page 27.

*Page 21-26 Geology Game. This board game covers several requirements if played.

Included in the kit are items to complete the following requirements #1, #2, #4, #5, #6, #10, #11, #13. Choose items for the participants to complete according to their age level or interests. If you wish to complete the remainder of the requirements, they can be completed outdoors, by internet, books, or visiting local museums.

Name_____

My

Geology

Journal

Identify Polished Stones

Polished Stones are commonly sold in local shops, caverns, and local shows. They are smooth, beautiful, and have patterns and vibrant colors. Use this identify sheet to classify the stones purchased through Patchwork Designs, Inc or other local vendors.

Identifying the appearance: **Transparent** means that you can see though it. like glass. **Translucent** means you can see light through it, not quite clear; cloudy. **Opaque** is when light can not shine through it.

Place each stone in the oval while you identify the features. ***Circle*** the features that apply. After you complete the identification then you can draw and color the image in the oval. **Requirement #6**

Name_____
Color:_____
Appearance: (circle one) transparent opaque translucent
Features: marbled speckled Striped other:_____

Name_____
Color:_____
Appearance: (circle one) transparent opaque translucent
Features: marbled speckled Striped other:_____

Name_____
Color:_____
Appearance: (circle one) transparent opaque translucent
Features: marbled speckled Striped other:_____
.

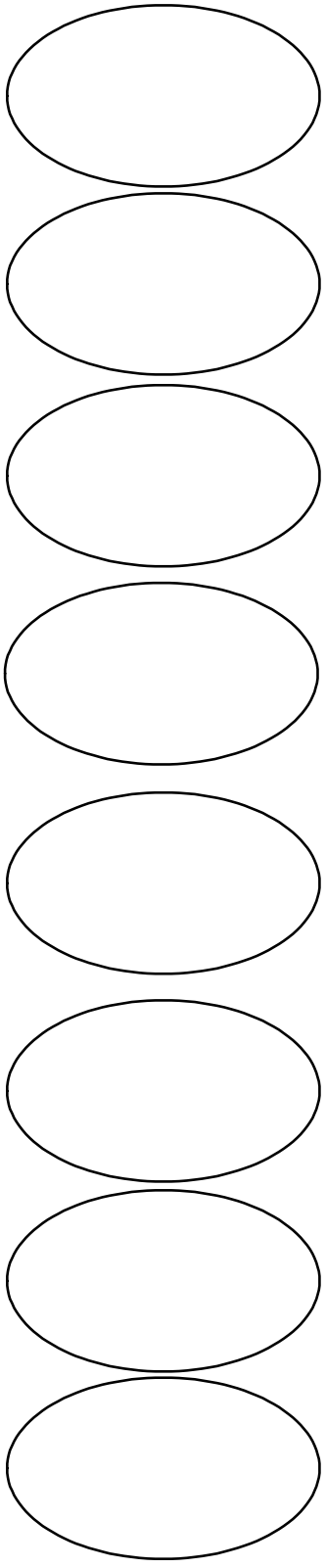
Name_____
Color:_____
Appearance: (circle one) transparent opaque translucent
Features: marbled speckled Striped other:_____

Name_____
Color:_____
Appearance: (circle one) transparent opaque translucent
Features: marbled speckled Striped other:_____

Name_____
Color:_____
Appearance: (circle one) transparent opaque translucent
Features: marbled speckled Striped other:_____

Name_____
Color:_____
Appearance: (circle one) transparent opaque translucent
Features: marbled speckled Striped other:_____

Name_____
Color:_____
Appearance: (circle one) transparent opaque translucent
Features: marbled speckled Striped other:_____



Hematite
Opaque, Steel or silver gray
It is a metal-bearing mineral valuable enough to be mined for iron.

Tigers Eye
Opaque, striped Brown, tan, yellow
Used for jewelry, eggs, spheres and ornamental designs.

Amethyst
Transparent, purple and white
Used for jewelry. Member of the Quartz family.

Jasper
Opaque, various colors and designs
Jasper occurs in shades of red, yellow, green, greyish blue, brown and various combinations. Commonly covered with spots, stripes or marbled effects.

Clear Quartz
Transparent or Translucent, clear
Most common mineral found on earth. Commonly used for optical lenses and building stones.

Black Onyx
Opaque, black
Commonly used in jewelry.

Sodalite
Opaque, blue with white or gray marble.
Sodalite is named in reference to its sodium content

Blue Quartz
Opaque, blue
Used for beads or jewelry making.

Yellow Jasper
Opaque, yellow
Used for jewelry and beading.

Green Adventurine
Opaque, green
Used for beads, pendants, and ornamental designs.

Red Jasper
Opaque, red
Used for beads, eggs, spheres and ornamental designs.

Moonstone
Translucent, white or creamy color
Named from the moon because of its glow and color.

Red Tigers Eye
Opaque, striped, Red and brown
Used for jewelry, eggs, spheres and ornamental designs.

Blue Tigers Eye
Opaque, striped, deep blue and brown
Used for jewelry, eggs, spheres and ornamental designs.

Traditional Birthstones

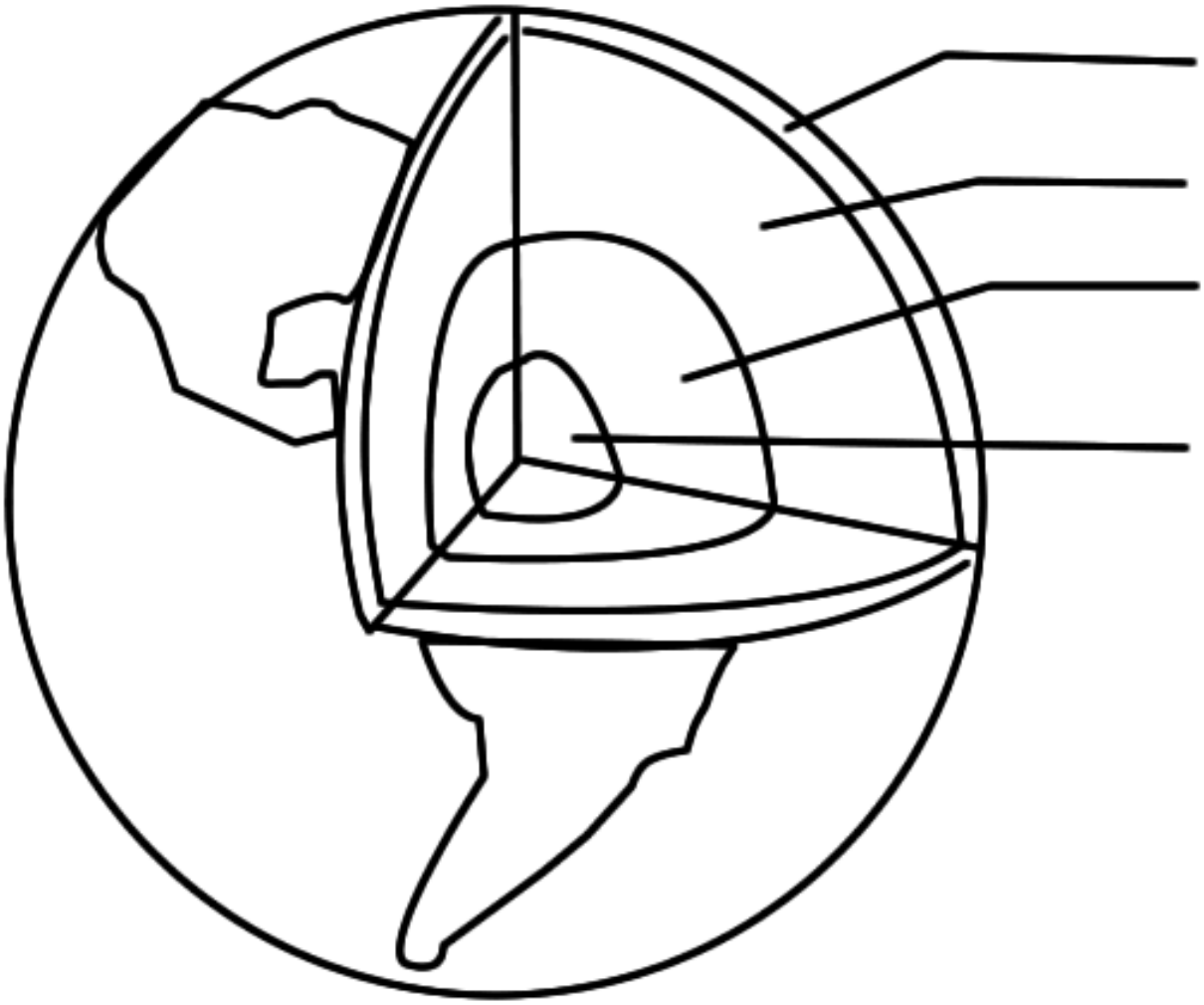
Do you know your birthstone? Review the chart below and circle the month and gemstone according to your birth month. It also includes the color of the gem for your reference. For extra, draw a piece of jewelry with your birthstone encased in it.

January **Garnet** available in all colors except blue	**February** **Amethyst** purple	**March** **Aquamarine** aqua	**April** **Diamond** clear
May **Emerald** green	**June** **Pearl** white	**July** **Ruby** red	**August** **Peridot** light green
September **Sapphire** blue	**October** **Opal** white	**November** **Citrine** yellow	**December** **Blue Topaz** blue

Draw a piece of jewelry with your birthstone encased in it.

Geology is the study of the earth and its life through rocks and minerals. The entire earth is made of rocks and minerals. You need minerals to make rocks, but you don't need rocks to make minerals.

Locate the four layers of the earth.



crust - the outer surface of the Earth.

inner core - very hot inner part of the earth.

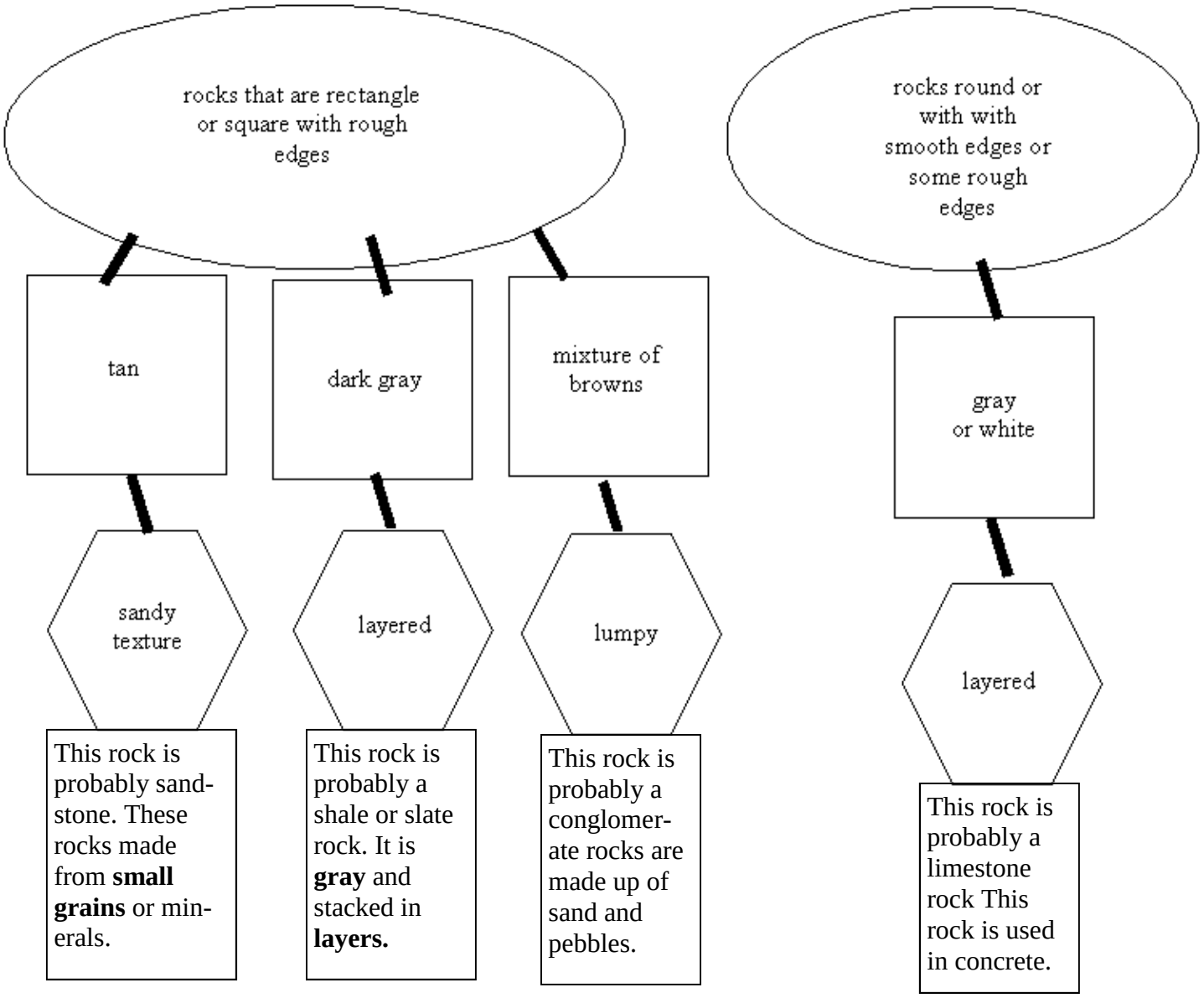
mantle - a rocky layer located under the crust

outer core - surrounds the inner core

Categorize Rocks

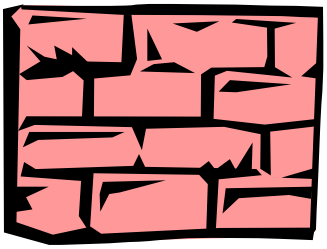
All rocks contain minerals. There are three basic type of rocks, **Igneous Rocks**, formed from hot magma liquid from a volcano; **Sedimentary Rocks**, made from fragments of rocks from mountains erosion (over 75% of the earth are covered with these); **Metamorphic Rocks**, least common rock, created when igneous or sedimentary rocks that have been transformed by great heat or pressure.

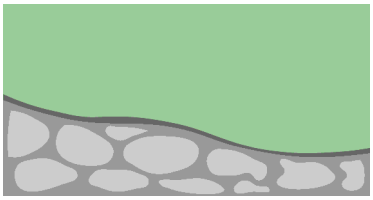
Gather 5-6 small rocks in the front yard or play area and categorize them by color and shape. **Divide them between the two ovals and move them down the chain to determine how many you have in each category.**



These are just some of the common categories for rocks. Some of your rocks may not fit in these categories. It may be easier to go on a rock hunt and look for rocks in the specific categories.

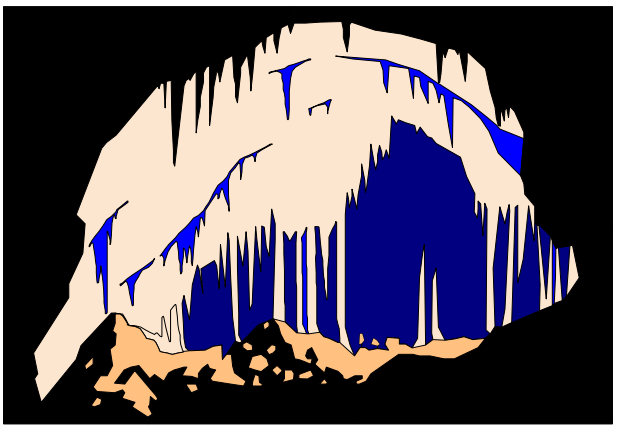
Rocks are used to make many things that we use and live in today. Circle the things that are made from rocks. For extra, you may wish to label the items.





Formations of rocks called stalactites and stalagmites are formed in caves or caverns. What is a stalactite and stalagmite? Formations in caves or caverns are produced by continuous water droppings containing minerals. Draw long tapering formations from the ceiling are called stalactites. The formations seen tapered from the bottom of the floor are called stalagmites. The two sometimes meet together to form a column.

Draw long tapering formations. Use shades of browns or beige to decorate these drawings.



Requirement #10

Geologists study rocks and minerals. Which career in Geosciences would you like to explore? Shade or color in the shape that pertains to that job.

Lapidarist
An expert on precious stones. They also have an art of cutting and engraving them.

Mineralogist
A person that studies minerals properties, structure, and design.

Stratigrapher
An person that investigates the geologic timeline through rocks, especially ones with fossils on them.

Jeweler
Someone who makes or sells jewelry

Soil Scientists
A person that maintains the farming output by studying the soil for contamination and restore it if needed.

Petrologists
A person that determines the age, history, and where it came from by observing what the rock is made of.

Geochemists
A person that studies the elements of the earth, how rocks and minerals absorb and release harmful compounds.

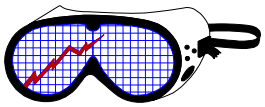
Geologist
A person that studies rocks and minerals.

Geochronologist
A person that studies the radioactive elements in rocks to determine the events in the history of the earth.

Mining Geologist
A person that gathers and studies geologic data by mapping and drilling mining areas. They also create models of the mining areas, research mines, go on mining projects and provide assistance on environment issues involving mines.

Would you like to be a Geologists in your own home or backyard? There are several items that can assist you in getting familiar with rocks and minerals. Be careful not to take risks and climb too high, wear protective gear durable for being in a rocky area, take a backpack with your supplies, food and drink, and always let someone know where you are going.

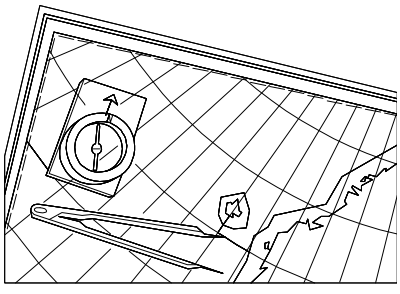
See how many words you can find in the below word search.



Geology Equipment

G F E M Z W D K N Y N Y D B R
O T R A H C L A R E N I M E F
G S R G P T D V P L Q G M E K
G P S N S E W Q I T X M I C X
L A E I C E N E D C A T A G X
E M G F E D D Z E H D P N K D
S W H Y P C B I T Z K O P P N
F I E I O A K S U C E B O K L
D C Y N C C I R A G J R O F B
R U E G S G U B Z Q D C S M O
S K N G O R E T A W A L O O V
T T K L R B D Q B M I Q E N O
P X O A C N O T E B O O K I R
F E O S I K I R K A G C G I F
G B R S M U A E K P I M U Q Y

BACKPACK
CAMERA
FIELD GUIDES
FOOD
GEOLOGIST HAMMER
GOGGLES
MAGNIFYING GLASS
MAPS
MICROSCOPE
MINERAL
CHART
NOTEBOOK
PEN
TWEEZERS
WATER



Digging Up Geology Game

You will need a **dice** and **game markers** to move around the board. Markers can be coins, polished stones, or pieces from other games.
3-4 players needed

1. Connect the two board pieces together with tape. If you would like to color the board you may.

2. Cut out the gold cards and place them on the board where it states “Gem Cards.”

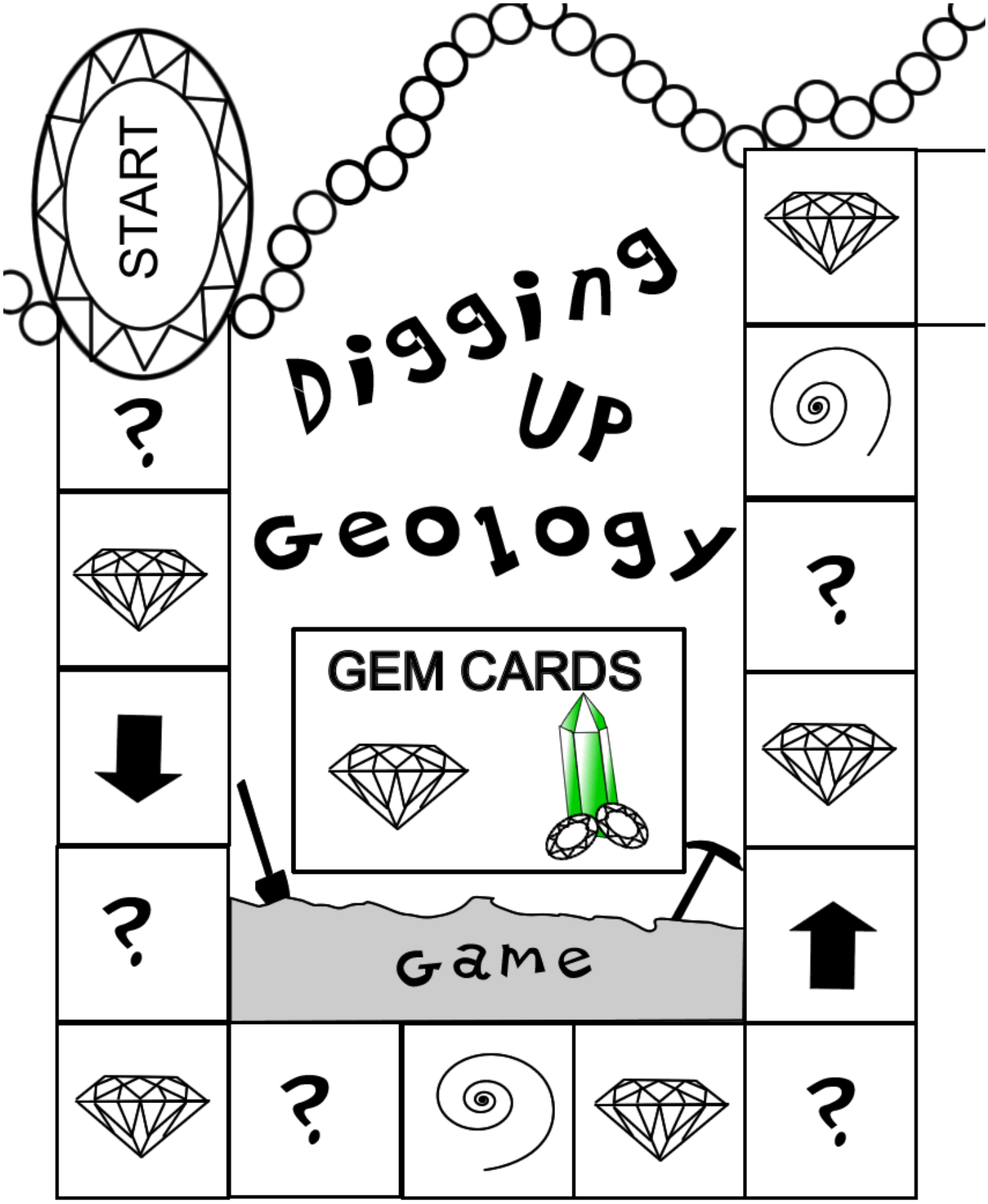
3. Cut out the Geology ? cards and place them on the board where it states “Geology ? cards.”

4. Have each participant roll the dice. Whoever rolls the highest number goes first. Turn order continues in a clockwise motion.

5. If a participant lands on a ***diamond,*** then they draw a gem card. If they land on an ***arrow*** then they go forward one space. If they land on a ***swirl*** then they move backward one space.

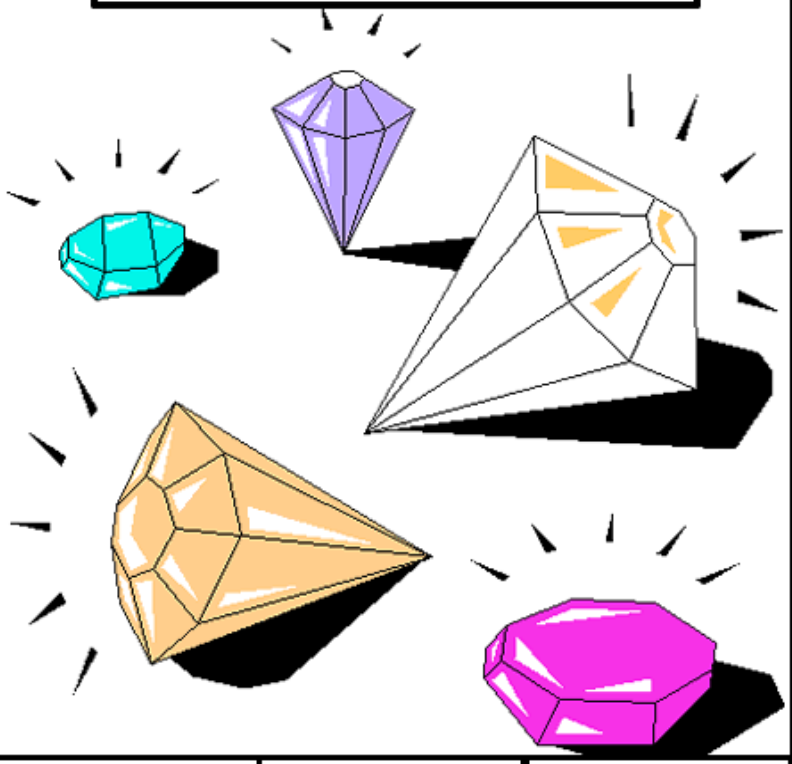
6. If the participant lands on a ? then they will have to answer a question about Geology from the “Geology ? cards.” The player to the right of the participant must ask the question. If they answer the question correctly then they receive a gold card. If they do not answer the question correctly then they need to give up one of their gem cards and place it back in the gem card stack. If they don’t have any gem cards, then they move back one space. They **do not** do what the space indicates when they move backward. Once the ? card has been read, place it on the bottom of the stack face down.

7. The object of the game is to make it to the end with the most gem points. Once the first person makes it to the end, everyone counts their gem points and the winner is determined.

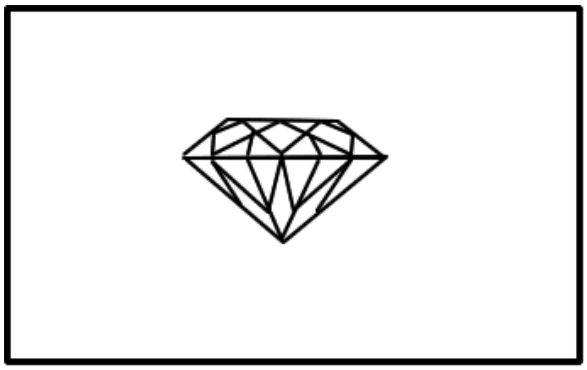
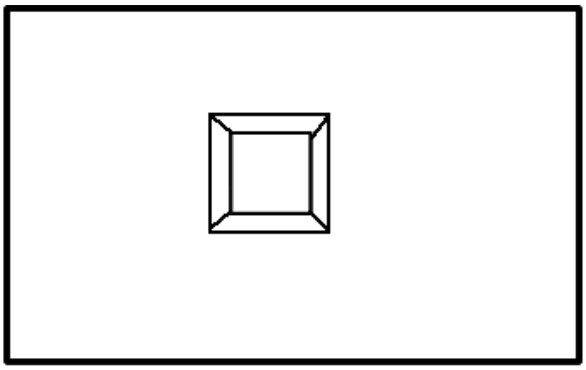
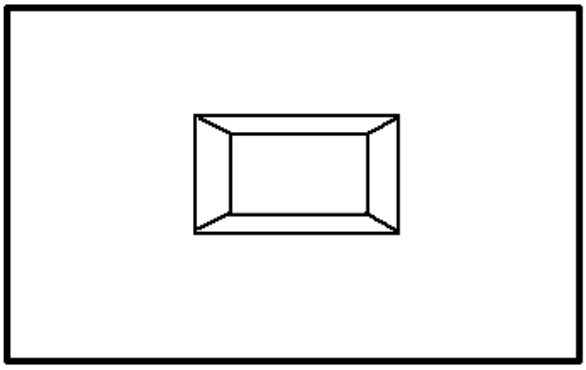
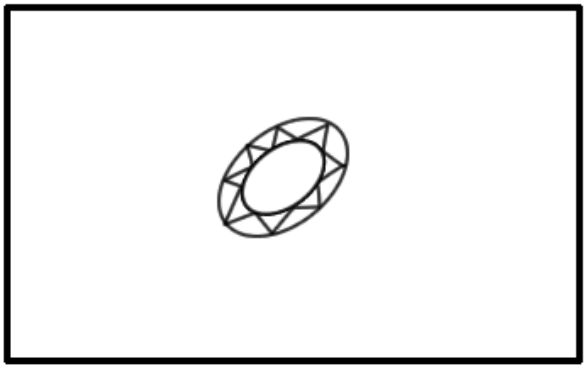
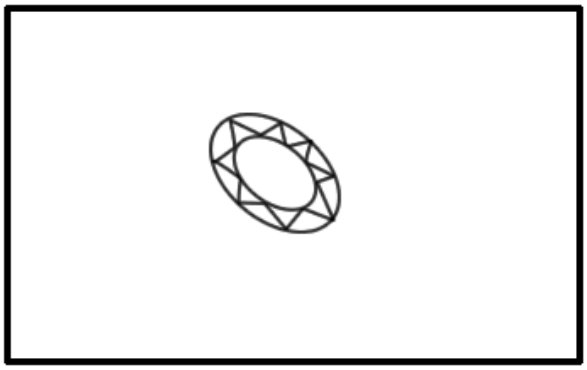
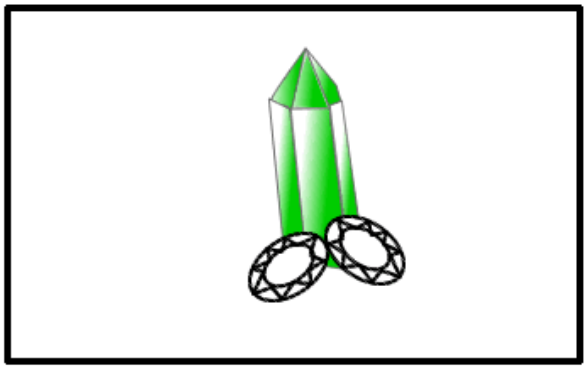
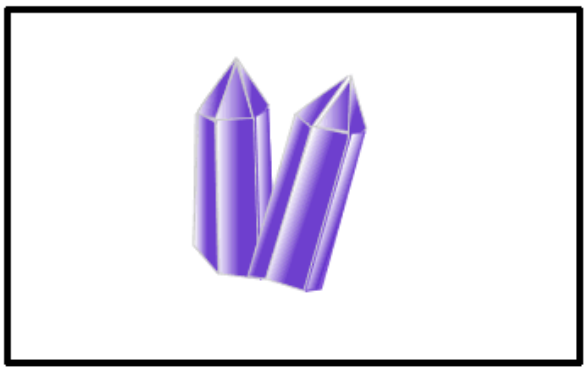
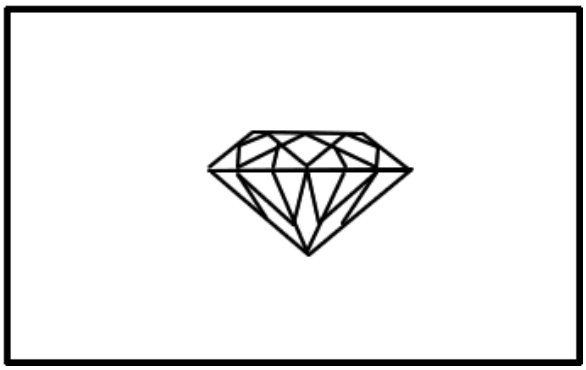

START
Digging UP Geology
GEM CARDS
Game

END

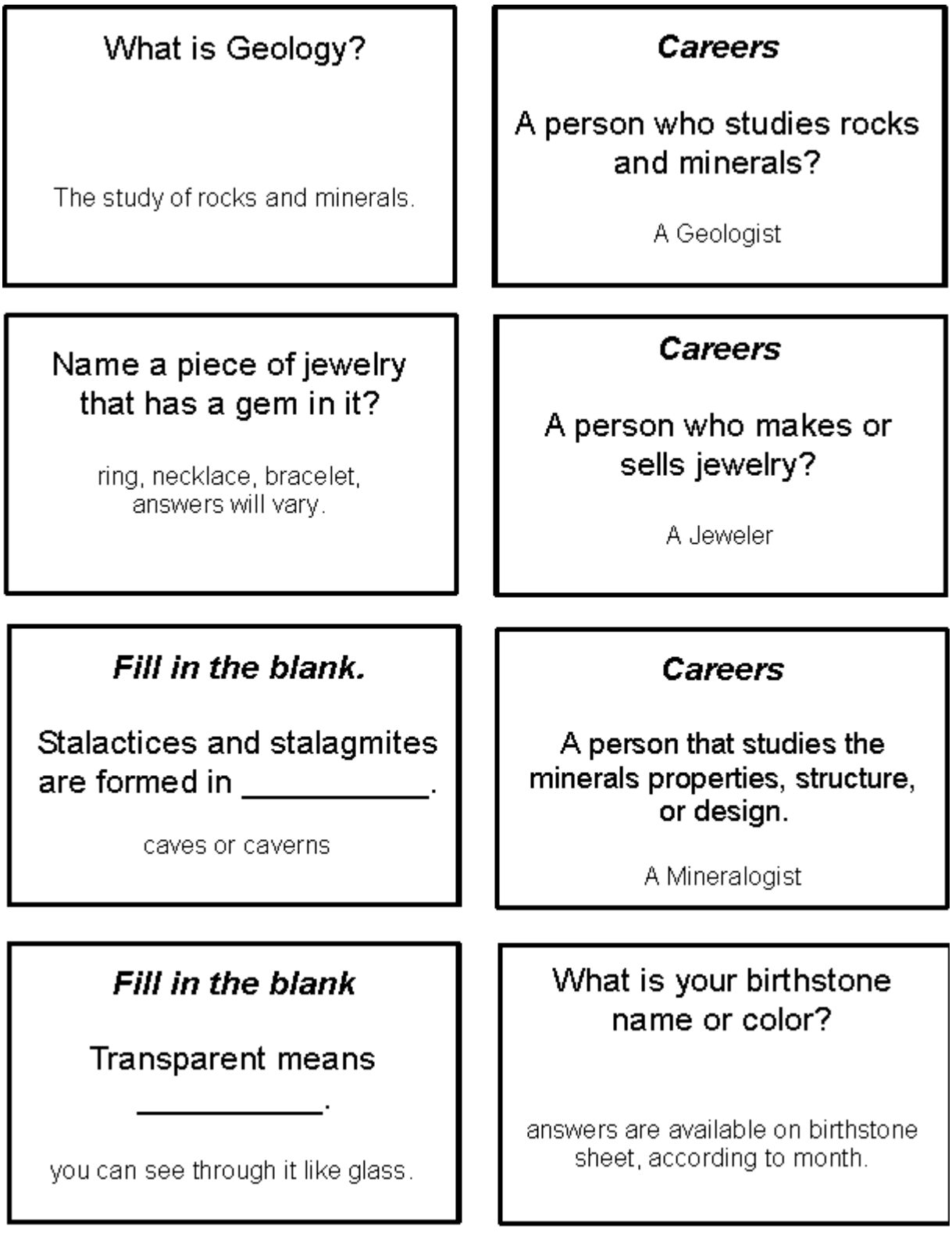
GEOLOGY ? CARDS



You will need to make at least three copies of this page for the game board. Cut each card out and place it on the game board on the spot marked “gem cards”.

Cut each card out and place it on the game board on the spot marked “Geology ? Cards”.



Cut each card out and place it on the game board on the spot marked “Geology ? Cards”.

Name a part of the earth. crust, inner core, mantle and outer core.	What type of rock is formed from a volcano. Igneous rock
Over 75% of the rocks on earth are _____. Sedimentary rocks	Rocks that are created when igneous or sedimentary rocks have been transformed by heat or pressure. Metamorphic rocks
Name a piece of equipment needed for exploring rocks. answers will vary items listed in word search.	Name a piece of equipment needed for exploring gems. answers will vary items listed in word search.
Name a shape that gems are cut into for jewelry. square, round, oval, or rectangle.	Name a piece of jewelry that has a gem in it? ring, necklace, bracelet, tiara. answers will vary.

Geology Equipment Solution

G + + M + + + + + + N + + + R
O T R A H C L A R E N I M E +
G S + G + T + + P + + + M + K
G P + N S + W + + + + M + C +
L A + I + E + E + + A + A + +
E M + F E + D + E H D P + + +
S + + Y P + + I T Z K O + + +
+ + + I O + + S U C E + O + +
+ + + N C + I + A G + R + F +
+ + + G S G + B + + D C S + +
+ + + G O R E T A W A L + + +
+ + + L R + + + + M + + E + +
+ + O A C N O T E B O O K I +
+ E + S I + + R + + + + + + F
G + + S M + A + + + + + + + +

(Over,Down,Direction)
BACKPACK(8,10,NE)
CAMERA(12,10,SW)
FIELDGUIDES(15,14,NW)
FOOD(14,9,NW)
GEOLOGISTHAMMER(1,15,NE)
GOGGLES(1,1,S)
MAGNIFYINGGLASS(4,1,S)
MAPS(2,6,N)
MICROSCOPE(5,15,N)
MINERALCHART(13,2,W)
NOTEBOOK(6,13,E)
PEN(9,3,NE)
TWEEZERS(6,3,SE)
WATER(10,11,W)

Bibliography

Websites:

Careers: http://www.agiweb.org/career/brochure/career97.html
How Rocks and Minerals are Formed: http://www.rocksforkids.com/RFK/howrocks.html
Minerals By Name: http://www.galleries.com/minerals/by-name.htm
How Rocks are Formed: http://www.rocksforkids.com/RFK/howrocks.html
How Rocks are Formed: http://www.fi.edu/fellows/fellow1/oct98/expert/pumice.htm
Craft: http://www.thecraftyclassroom.com/CraftGeologyEarthLayers.html
Craft: http://www.thecraftyclassroom.com/CraftGeologyFossil.html
Craft: http://www.sciencekids.co.nz/experiments/quicksand.html
Craft: http://www.activityvillage.co.uk/sparkly_gem_bangle.htm
Craft: http://www.storknet.com/cubbies/kidscrafts/bubbleframe.htm
Craft: http://library.thinkquest.org/J002289/crystals.html
Recipe: http://www.sciencebob.com/experiments/rockcandy.php
Recipe: http://library.thinkquest.org/J002289/snacks.html

Books:

Bramwell, Martyn. Rocks and Fossils. England. Usborne House Ltd, 1983.

Parker, Steve. Rocks and Minerals. New York: Dorling Kindersley, Inc, 1993.

Woolley, Alan. Rocks and Minerals. England: Usborne House Ltd, 2000.

Other websites that may be useful:

http://www.museum.mtu.edu/
A.E. Seaman Mineral Museum in Houghton, Michigan

http://www.parks.ca.gov/?page_id=588
California State Mining and Mineral Museum in Mariposa, California.

http://www.mnh.si.edu/
National Museum of Natural History in Washington DC

http://www.minerals.si.edu/images/gallery/gem.htm
(view the Hope Diamond and other magnificent gems)

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Cheryle Oandasan

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Gainesville, VA 20155
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Phone ( )_____ Referred By:_____
Email Address: _____
Discover/Mastercard/Visa# _____-_____-_____- _____ or Check #_____
Expiration Date:_____ Have you ordered before?_____

Item #	Description	Quantity	Unit Price	Total Price
DISC-GEOLOGY	Discovering Geology		$1.75	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			$	$
			SUBTOTAL	$
			Regular Shipping & Handling (view chart on the next page)	$
			Special Shipping (next day, priority mail etc)	$
			TOTAL ENCLOSED	$

Shipping Chart

If you would prefer Priority Mail, please add $2.00 to the $4.99 or above shipping category.

Next day service is an average cost of $28.00 (USPS determines the pricing according to the zone and weight.)

Patches	
1-5	$3.55
6-20	$4.99
21-30	$5.99
31-50	$6.50
51-70	$6.99
71-100	$9.55
101-150	$10.55
151-200	$13.00
201-400	$15.99
401-500	$17.50
Over 500	Contact us for pricing

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2	$9.25
3-5	$10.75
6-8	$12.75
10-12	$15.75
13-20	$22.25
21-23	$24.00
Over 24	Contact us for pricing

Kits and manuals range from 30 to 62 pages in length (except the Patch Program Book, that is over 100). Therefore if you are ordering more than 2 kits or manuals, please use the above shipping chart. Patches, bracelet kits, and stamps can be added to any order falling within that price range. Otherwise, use the highest shipping amount on the chart according to the items ordered.