

Exploring

The

# BUILDING BLOCKS

of

# SCIENCE

Book 2

TEACHER'S MANUAL



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# Materials at a Glance

Experiment 1	Experiment 3	Experiment 4	Experiment 5	Experiment 6
<p>magnifying glass butterfly or bug's wing (or substitute a leaf, flower, piece of wood, or rock) colored pencils microscope (or additional object to observe with a magnifying glass)</p>	<p>12 (or more) clear plastic cups measuring cup measuring spoons marking pen one head of red cabbage knife cooking pot, large food items:  <ul style="list-style-type: none"> <li>• distilled water, 1.25-1.75 liters (5-7 c.)</li> <li>• white grape juice, 60 ml (¼ cup)</li> <li>• milk, 60 ml (¼ cup)</li> <li>• lemon juice, 60 ml (¼ cup)</li> <li>• grapefruit juice, 60 ml (¼ cup)</li> <li>• mineral water, 60 ml (¼ cup)</li> </ul>                     antacid tablets—3 extra-strength unflavored white Tums baking soda, 5 ml (1 tsp.) other substances (see <i>Just For Fun</i> section) <b>Optional</b> small plastic bag wooden mallet or other hard object for crushing antacids</p>	<p>18 or more clear plastic cups measuring cup measuring spoons marking pen leftover red cabbage juice from Experiment 3 or one head of red cabbage food items, approx 300 ml (1¼ c) each:  <ul style="list-style-type: none"> <li>• vinegar</li> <li>• lemon juice</li> <li>• mineral water</li> <li>• distilled water (if you need to make red cabbage juice, you will need 1.5 liters more)</li> </ul>                     baking soda, 25 ml (5 tsp.) or more antacid tablets, 5 or more (try Tums plain, white, extra strength) substances of students' choice to mix together</p>	<p>the following food items:  <ul style="list-style-type: none"> <li>• marshmallows (2-3)</li> <li>• ripe banana</li> <li>• green banana</li> <li>• pretzels or salty crackers, several</li> <li>• raw potato</li> <li>• cooked potato</li> <li>• other food items</li> </ul>                     blindfold</p>	<p>magnifying glass colored pencils</p>
<p><b>Experiment 2</b></p>				
<p>salt, 15 ml (1 Tbsp.) water, 237 ml (1 cup) brick of modeling clay, 1 or 2 sugar</p>				

Experiment 7	Experiment 8	Experiment 9	Experiment 10	Experiment 11
<p>microscope with a 10x or 20x objective lens (look online for sources such as Carolina Biological Supply)<sup>1</sup> plastic microscope slides eye dropper pond water or protozoa kit<sup>1</sup> Protists (protozoa) can also be observed in hay water. To make hay water, cover a clump of dry hay with water and let it stand for several days at room temperature. Add water as needed.</p>	<p>(see Experiment 7) small piece of chocolate <b>Optional</b> baker's yeast Eosin Y stain<sup>2</sup> distilled water</p>	<p>6-8 sealable plastic bags waterproof disposable gloves piece of newspaper or plastic 2 pieces of fruit 2-3 pieces of bread (works best if bread does not have preservatives) marking pen water <b>Optional</b> colored pencils</p>	<p>clock or stopwatch</p>	<p>1 small glass marble 1 large glass marble</p>

<sup>1</sup> As of this writing, the following materials are available from Home Science Tools, [www.hometrainingtools.com](http://www.hometrainingtools.com): plastic microscope slides, MS-SLIDSPL or MS-SLPL144, Basic Protozoa Set, LD-PROBASC

<sup>2</sup> Eosin Y stain, CH-EOSIN

Experiment 12	Experiment 13	Experiment 14	Experiment 15	Experiment 16
stopwatch or clock an area to run in items for marking the beginning and ending of the running distance	4 plastic or Styrofoam cups with the mouth larger than the base 2 long poles (dowels work well or any two long sticks that are the same thickness from end to end) tape a cylinder, 10-13 cm long (4-5 inches) [such as a pencil, a dowel, a cylindrical block, or a cylindrical drinking glass that is not tapered; a paper towel tube may be used if it is filled with sand and the ends taped] chalk	plastic hammer regular metal hammer 3 pieces of banana 3 hardboiled eggs in the shell 3 raw potato halves 3 rocks of the same type and size (students can collect these) safety glasses <b>Optional</b> 8 pieces of paper marking pen	a toy, small music box, or toy car that can be taken apart a second similar item that can be taken apart screwdriver small hammer other tools as needed  <b>Note:</b> The objects used in this experiment may not work again.	2 clear, tall glasses (drinking or parfait glasses) spoon (1 or more) 3-6 student-chosen food items for building a parfait model of Earth's layers (such as: graham crackers, peanut brittle, cookies, hot fudge, Jell-O, pudding, ice cream, cream cheese, cherry, nut, jelly bean. etc.) student-chosen inedible items that can be used to build a parfait model of Earth's layers (such as: rocks, mud, dirt, clay, dog or cat food, Legos, etc.) colored pencils

Experiment 17	Experiment 18	Experiment 19	Experiment 21	Experiment 22
colored pencils outdoor thermometer helium-filled balloon string	colored pencils clear night sky basketball or other large object(s)  <b>Telescope materials*</b> empty cardboard paper towel tube 1-2 sheets of card stock or 1 manila file folder cut in half tape 2 lenses with different focal lengths from Home Science Tools: Item# OP-LEN4x15 and Item# OP-LEN4x50 <a href="http://www.hometrainingtools.com">http://www. hometrainingtools.com</a>  * Alternatively, you can look online for a telescope kit	colored pencils night sky daytime sky or textured surface  <b>Optional</b> book or online information about constellations globe or basketball  <b>Experiment 20</b> Styrofoam ball pick, awl, or other thin, sharp object to poke a hole through the center of the ball nylon string scissors 2 or more marbles of different sizes cups that are different sizes	flashlight with new batteries glow sticks in assorted colors may be found in places such as Walmart, toy stores, and online	10 small pieces of paper box for the paper pieces 2 beakers or jars: <ul style="list-style-type: none"> <li>• one with 118 ml (½ cup) of vinegar</li> <li>• one with 118 ml (½ cup) of baking soda and water (5 ml [1 tsp] baking soda in 118 ml (½ cup) water)</li> </ul> magnifying glass 2 balls of different weights (e.g., a glass marble and a metal marble, a plastic ball and a baseball) rock hammer or regular metal hammer safety glasses, 1 pair garden trowel or large metal spoon 10 pieces of paper 5 pens or pencils 4 friends or family members to help with the experiment scissors

# Materials

## Quantities Needed for All Experiments

Equipment	Foods	Foods (continued)
basketball or other large object(s) beakers or jars, 2 blindfold cooking pot, large eye dropper flashlight with new batteries glasses, safety, 1 pair hammer, plastic hammer, regular metal or rock hammer hammer, small knife magnifying glass, 1-2 measuring cup measuring spoons microscope with a 10x or 20x objective lens (look online for sources such as Carolina Biological Supply) microscope slides, plastic <sup>1</sup> pick, awl, or other thin, sharp object to poke a hole through the center of a Styrofoam ball scissors screwdriver spoon (1 or more) stopwatch or clock thermometer, outdoor tools, misc. as needed trowel, garden or large metal spoon  <b>Optional</b> mallet, wooden, or other hard object for crushing antacid tablets	antacid tablets—8 or more extra- strength unflavored white Tums baking soda, 35 ml (7 tsp.) or more banana, green, 1 banana, ripe, 2 bread, 2-3 pieces (bread without preservatives works best) cabbage, red, 1-2 heads cabbage juice, red, left over from Experiment 3 or one head of red cabbage to make new cabbage juice chocolate, small piece eggs, hardboiled in shell, 3 fruit, 2 pieces grape juice, white, 60 ml (¼ cup) grapefruit juice, 60 ml (¼ cup) lemon juice, 360 ml (1½ cup) marshmallows (2-3) milk, 60 ml (¼ cup) misc. food items misc. student-chosen food items for building a parfait model of Earth's layers (such as: graham crackers, peanut brittle, cookies, hot fudge, Jell-O, pudding, ice cream, cream cheese, cherry, nut, jelly bean. etc.) potato, cooked, 1 potato, raw, 3 pretzels or salty crackers, several salt, 15 ml (1 Tbsp.) sugar vinegar, 415 ml (1¾c) water, distilled, 1.5-3.5 liters (1.5-3.75 qt) or more water, mineral, 360 ml (1½ cup) water, tap	<b>Optional</b> baker's yeast

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# Materials

## Quantities Needed for All Experiments

Materials	Materials (continued)	Other
<p>ball, Styrofoam balls of different weights (2), e.g., a glass marble and a metal marble, a plastic ball and a baseball balloon, helium-filled book or online information about constellations card stock, 1-2 sheets, or 1 manila file folder cut in half chalk clay, modeling, 1-2 bricks colored pencils cups, clear plastic, 30 or more cups, 4 plastic or Styrofoam, with the mouth larger than the base cups, several of different sizes cylinder, 10-13 cm long (4-5 inches) [such as a pencil, a dowel, a cylindrical block, or a cylindrical drinking glass that is not tapered; a paper towel tube may be used if it is filled with sand and the ends taped] glasses, 2 clear, tall drinking or parfait glasses gloves, waterproof disposable gloves, 2 pairs glow sticks in assorted colors—may be found in places such as Walmart, toy stores, and online items for marking the beginning and ending of a running distance items, misc.: student-chosen inedible items to use to build a parfait model of Earth's layers (such as: rocks, mud, dirt, clay, dog or cat food, Legos, etc.)</p>	<p>lenses (2) with different focal lengths Home Science Tools: Item# OP-LEN4x15 and Item# OP-LEN4x50 <a href="http://www.hometrainingtools.com">http://www.hometrainingtools.com</a> (available as of this writing) * Alternatively, you can look online for a telescope kit marble, glass, 1 large marble, glass, 1 small marbles, 2 or more of different sizes newspaper or plastic, 2 pieces paper, 10 small pieces and box to put them in paper, 18 sheets or more paper towel tube, empty pen, marking pencils or pens, 5 pencils, colored plastic bags, sealable, 6-8 poles, 2 long (dowels work well or any two long sticks that are the same thickness from end to end) rocks, 3 of the same type and size (students can collect these) string, any string, nylon substances of students' choice to mix together tape toy, small music box, or toy car that can be taken apart and a second similar item that can be taken apart (they may not work again)</p> <p><b>Optional</b> Eosin Y stain<sup>2</sup> globe (world) or basketball object (additional object to observe with a magnifying glass) plastic bag, small</p>	<p>area to run in butterfly or bug's wing (or substitute a leaf, flower, piece of wood, or rock) friends or family members (4) to help with experiment sky, clear night sky, daytime, or textured surface substances, other (see <i>Just For Fun</i> section, Experiment 3) water, pond or hay, or protozoa kit<sup>1</sup> Protists (protozoa) can be observed in hay water. To make hay water, cover a clump of dry hay with water and let it stand for several days at room temperature. Add water as needed.</p>

<sup>2</sup> As of this writing, the following materials are available from Home Science Tools, [www.hometrainingtools.com](http://www.hometrainingtools.com):  
Eosin Y stain, CH-EOSIN