GREEN BY DESIGN

EDUCATOR RESOURCE PACKET

GRADES 4 — 9

NATIONAL BUILDING MUSEUM

The Green House:

New Directions in Sustainable Architecture & Design

National Building Museum

Created by an act of Congress in 1980, the National Building Museum explores, celebrates, and illuminates achievements in architecture, design, engineering, construction, and planning. Since opening its doors in 1985, the Museum has become a vital forum for exchanging ideas and information about such topical issues as managing suburban growth, designing and building sustainable communities, and revitalizing urban centers. A private, nonprofit institution, the Museum creates and presents engaging exhibitions and education programs, including innovative curricula for school children.

Over the past two decades, the Museum has created and refined an extensive array of youth programming. Each year, approximately 50,000 young people and their families participate in hands-on learning experiences at the Museum: several different, 2-hour-long school programs for grades K–9; major daylong festivals; drop-in family workshops; programs helping Cub and Girl Scouts earn activity badges; and three innovative outreach programs, lasting between 30 and 60 hours, for secondary school students. The Museum's youth programming has won the Washington, D.C., Mayor's Arts Award for Outstanding Contributions to Arts Education and garnered recognition from the National Endowment for the Arts.

The National Building Museum is located in a historic landmark structure at 401 F Street, NW, Washington, D.C. 20001. To learn more about the Museum, visit www.nbm.org.

Acknowledgements

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Table of Contents

To the Educator

The National Building Museum's Green by Design school program using The Green House: New Directions in Sustainable Architecture & Design exhibition, helps students in grades 4 through 9 understand the complexity of issues associated with making environmentally friendly living decisions and the effect different decisions have on their surroundings.

As an aid to teachers bringing students to the Museum for this program, the Museum has developed this Educator Resource Packet. It contains resources for use in the classroom before and after a school group visits the Museum and provides other information useful to teachers.

Why Green?

Every person, regardless of age, has a choice when making decisions that are considered environmentally friendly. The choices made may be based on a variety of reasons, including: scientific, philosophical, economic, religious, and cultural reasons. From the food people eat to leaving the bedroom lights on, the choices of being environmentally friendly, or being "green," can affect all aspects of life. Students visiting the National Building Museum will explore how design choices they make may have an effect on the natural and the built environments.

Why Use Design as an Education Model?

The *Green by Design* school program, and all other education programs at the National Building Museum, inspire students to examine the people, processes, and materials that create buildings, places, and structures. All of the Museum's education programs for youth use the design process as an educational model. It requires young people to identify problems or needs, imagine solutions, test them before building a suitable design, and evaluate the product.

Learning by doing is central to design education in general and to the Green by Design program in particular. After engaging in a variety of hands-on activities that stimulate exploration of materials and the built environment, students gain a fresh perspective on their surroundings and begin to understand how design decisions can have an impact on the environment.

What Are the Learning Benefits?

The *Green by Design* program and supplementary resources in this Educator Resource Packet meet national standards of learning in language arts, mathematics, science, social studies, technology, and visual arts. The specific standards are described on page 5.

The lessons in this curriculum encourage young people to explore and recognize how design decisions are made and how they impact the natural and built environment.

Through hands-on interdisciplinary activities that address multiple learning styles, the *Green by Design* program encourages and fosters life skills such as critical thinking, problem-solving, team building, and communication.

The Educator Resource Packet Includes

- list of national standards of learning addressed in the program;
- lessons for use before or after the Museum visit to help students prepare for or continue their exploration of environmentally friendly design; and
- architecture and green vocabulary and lists of supplementary resources.

NOTES:

Program Description

From the food people eat to leaving the bedroom lights on, the choices of being environmentally friendly, or being "green," can affect all aspects of life. Students visiting the National Building Museum will explore how their choices may have an impact on the natural and built environments. During this program students will collaborate to create a definition of environmentally responsible or "green" home construction. They will explore sustainable architecture from the past and present to gain insight into construction and design choices. Working in groups, students will construct green houses of the future for several different geographic regions. Similar to builders around the world, students must consider a variety of factors in planning and building their model houses, including the geography, climate, cost, materials, and uses. As both citizens and consumers, students come to understand the complexity of issues associated with making green living decisions and the effect different decisions have on their surroundings.

Goals, Objectives, and Skills Used in the Program

Goals

After completing the Green by Design program students will:

- understand and experience the numerous choices involved when designing and constructing a building;
- understand how citizens can negatively or positively impact their environment – natural and built – through the choices they make in location, materials, use of the building, etc.; and
- apply these lessons to their everyday lives.

Objectives

During and after completing the *Green by Design* program, students will be able to:

- identify 5 Big Ideas of Sustainable Design and define environmentally friendly building practices;
- recognize climate and geography as influencing factors of home and community design;
- recognize the changing needs in society and how those needs impact the natural and built environment;
- apply knowledge of early american architecture and modern building design and technology to design structures that reflect environmentally friendly or "green" principles; and
- work in a team, through the design process, to plan and construct future model homes with craft materials.

Skills

- Analysis
- Application of knowledge
- Cooperative Learning
- Experimentation
- Problem Solving

National Standards of Learning

Green by Design meets local and national standards of learning in several disciplines. The national standards are listed below by discipline.

Standards for the English Language Arts, National Council of Teachers of English & the International Reading Association

Students will	Standard
conduct research on issues and interests by generating ideas and questions, and by posing problems; they gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience; and	7
use a variety of technological and informational resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.	8

Principles and Standards for School Mathematics, National Council of Teachers of Mathematics

Students will	Standard
solve problems that arise in mathematics and in other contexts; and	Problem Solving
apply and adapt a variety of appropriate strategies to solve problems.	Problem Solving

National Science Education Standards, National Research Council

Students will develop an understanding of	Standard
structure of the earth system;	D
abilities of techonolgical design;	E
science and technology;	E
populations, resources and environments; and	F
science and technology in society.	F

Curriculum Standards for Social Studies, National Council for the Social Studies

Students will	Standard
analyze and explain the ways groups, societies, and cultures address human needs and concerns;	1
compare ways in which people from different cultures think about and deal with their physical environment and social conditions;	1
identify and use key concepts such as chronology, causality, change, conflict, and complexity to explain, analyze, and show connections among patterns of historical change and continuity;	2
describe how people create places that reflect cultural values and ideals as they build neighborhoods, parks, shopping centers, and the like;	3
create, interpret, use, and distinguish various representations of the earth such as maps, globes, and photographs;	3
propose, compare, and evaluate alternative policies for the use of land and other resources in communities, regions, nations, and the world;	3
work independently and cooperatively to accomplish goals;	4
explain and illustrate how values and beliefs influence different economic descisions;	7
show through specific examples how science and technology have changed people's perceptions of the social and naturlal world, such as in their relationship to the land, animal life, family life, and economic needs, wants, and security; and	8
recognize and interpret how the "common good" can be strengthened through various forms of citizen action.	10

Standards for Technological Literacy, International Technology Education Association

Students will	Standard
understand technology and society, including the effects of technology on the environment and its influence on history;	5, 7
understand design, including the attributes of design, engineering design, as well as the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving; and	8, 9, 10
understand the designed world, including transportation, manufacturing, and construction technologies.	18, 19, 20

National Standards for Arts Education, Visual Arts Category, Consortium of National Arts Education Association

Students will	Standard
understand and apply media, techniques, and processes;	1
use knowledge of structures and functions;	2
choose and evaluate a range of subject matter, symbols, and ideas; and	3
reflect upon and assess the characteristics and merits of their work and the work of others.	5

NOTES:

1. Museum Orientation

The information found in this section provides all of the logistical details for the field trip to the National Building Museum. Information in this section comprises the following:

Getting Ready

Before Visiting the Museum

Directions

Map

Nametag Template

"Don't Lose, Reuse" Supply Request Sheet

While You're Here

Upon Arrival

Touring the Building and Exhibitions

Lunches

Visiting the Museum Shop

The National Building Museum

Facts About the Historic Home of the National Building Museum

Getting Ready

Before Visiting the Museum

1. Share this Educator Resource Packet with each participating teacher.
2. Select a minimum of five chaperones. One adult will be assigned and must accompany each of the five student groups. Please instruct chaperones that they are expected to actively assist students. Provide each chaperone with a chaperone sticker (included in the confirmation package).
3. Arrange transportation and obtain permission slips.
4. Review the map and directions to the National Building Museum and bring a copy with you.
5. Contact the Museum's assistant youth groups coordinator at 202.272.2448, x3450, if the number of students changes by five or more.
6. If you would like to tour the building, or visit an exhibition, allow for extra time after your 2-hour program.

Prepare Your Students

1. Divide students into five even, compatible groups (see note 2 above).
2. Use the lessons in this packet to introduce green concepts to your students before attending the museum program.
3. Make nametags — use template on p.13 to make it a fun activity.

Directions to the National Building Museum

The Museum is located between 4th & 5th and F & G Streets, NW. It is accessible by Metro and located immediately adjacent to the Judiciary Square Metro station (Red Line). Two-hour metered parking is available on all sides of the building. Buses may park in the G Street driveway, but drivers must remain with them. Please distribute this sheet to the drivers and remind them that **the National Building Museum is NOT on the National Mall.**

From Northern Virginia on I-395

Follow I-395 north into the District.

Take either 14th Street or 12th Street exit northbound.

Follow either 14th or 12th Street north to Constitution Avenue.

Turn right on Constitution Avenue.

Follow Constitution Avenue east to 6th Street, NW.

Turn left on 6th Street, NW.

After several blocks, turn right on F Street, NW.

Follow F Street east to 5th Street, NW.

Turn left on 5th Street, NW.

Turn right on G Street, NW.

Pull into the G Street driveway.

From Northern Virginia on I-66

Follow I-66 east into the District, crossing the Roosevelt Bridge.

I-66 becomes Constitution Avenue.

Follow directions above from Constitution Avenue.

From Maryland southbound on I-95-/-Baltimore-Washington Parkway (I-295)

Follow I-95 to Baltimore-Washington Parkway
southbound.

Take Baltimore-Washington Parkway to Rt. 50 westbound into Washington, D.C.

Route 50 becomes New York Avenue.

Follow New York Avenue several miles, eventually passing the I-395 southbound exit to your left.

Shortly after the I-395 southbound exit, turn left on 5th Street, NW.

Take 5th Street to G Street and turn left.

From Maryland southbound on I-270

Take I-270 to I-495 (Beltway) eastbound.

Take exit Route 355, Wisconsin Avenue southbound.

Follow Wisconsin Avenue into the District.

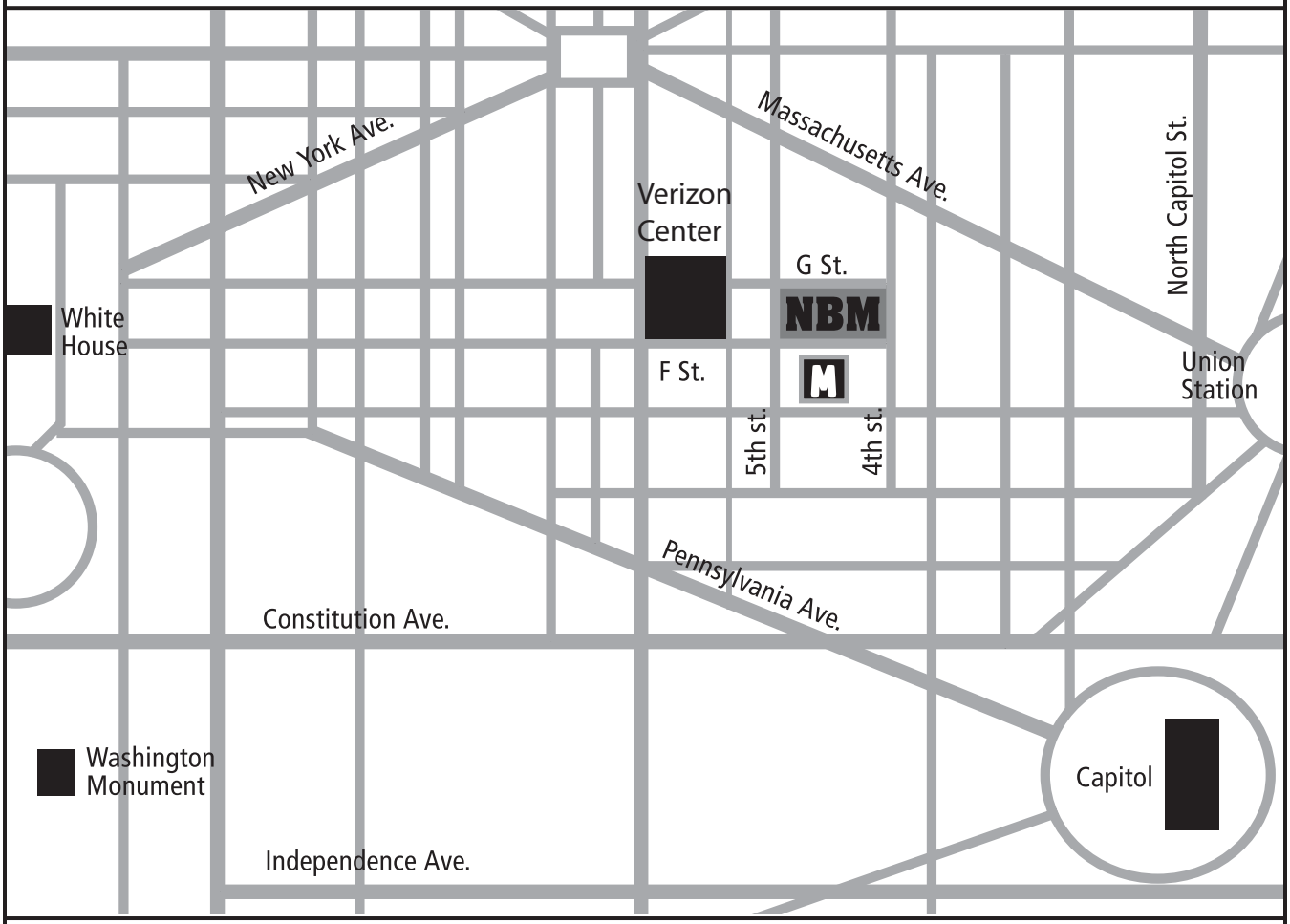
Turn left onto Massachusetts Avenue.

Take Massachusetts Avenue towards the Capitol, going through Dupont Circle.

Turn right onto 5th Street, NW.

Take 5th Street to G Street, and turn left.

Map to the National Building Museum



NBM

National Building Museum

401 F Street NW Washington, DC 20001

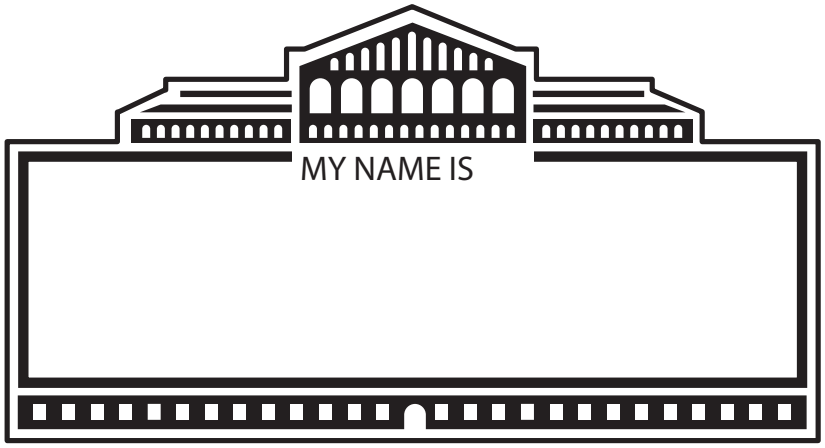
Between 4th and 5th and F and G Streets at the Red Line Metro; Judiciary Square.
Wheelchair access at 4th and G Street entrances.

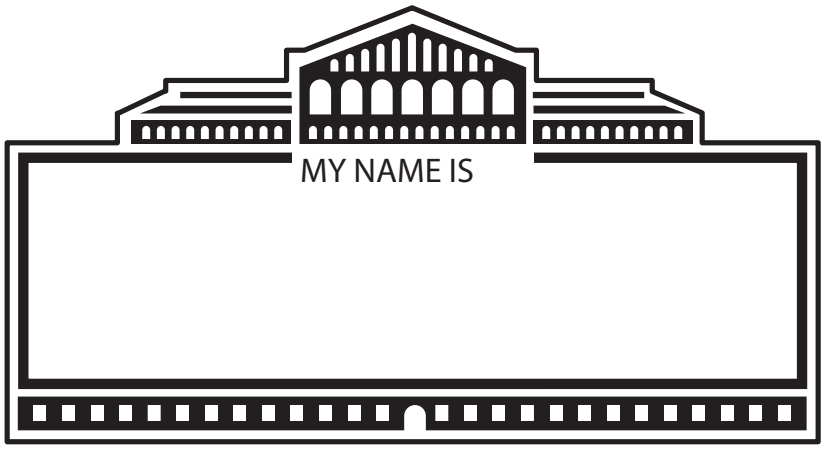
Telephone: 202.272.2448
Facsimile: 202.376.3564
Web site: www.NBM.org

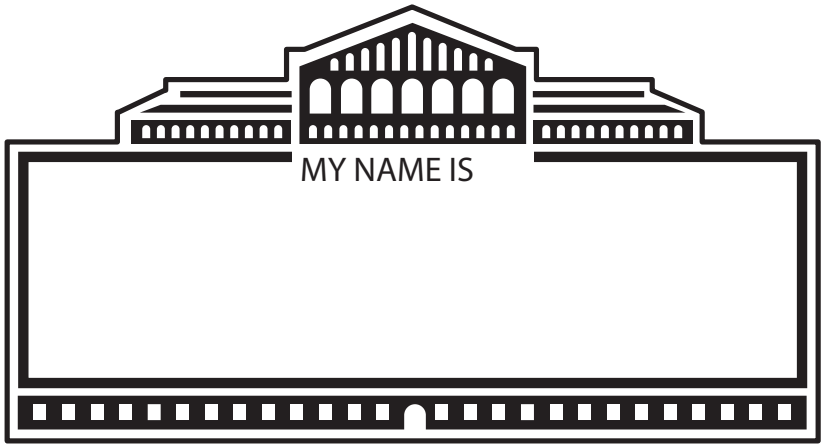
Nametag Template

Make a nametag before visiting the National Building Museum.

1. Write first name clearly.
2. Cut out nametag.
3. Color nametag.
4. Attach nametag to shirt with tape or a safety pin.







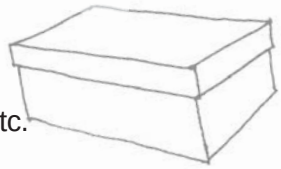
Don't Lose, Reuse
Supply Request Sheet

Student's Name: _____

STUDENTS:
During your upcoming trip to the National Building Museum for its *Green by Design* program, your class will build an environmentally friendly house of the future! There are many ways to be environmentally friendly, including reusing materials that normally would be thrown away. To supplement supplies provided by the Museum, please bring items from home to use as part of your house.

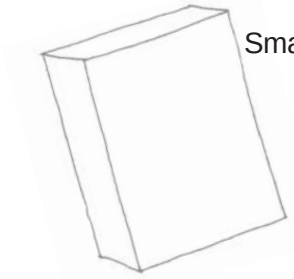
What can you reuse to:

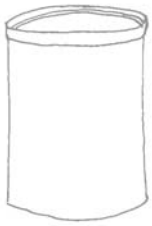
- make solar panels for your roof?
- create bamboo floors?
- design windows for your house?



The National Building Museum suggests:

Plastic containers (washed) from margarine, yogurt, film, etc.
Paper towel and toilet rolls
Small boxes from soap, rice, pasta, microwave dinners, etc.
Egg cartons
Wrapping paper





Can you think of anything else?

WARNING: Please avoid bringing milk cartons or containers that once held peanuts or peanut butter. Some people are highly allergic to these items.

Using recycled materials to create building models in the this program helps preserve the natural environment by promoting reuse of objects, rather than their disposal. Such activities prevent filling landfill sites and polluting our environment.

Please bring clean, recycled materials from home by: _____ date

While You're Here

Upon Arrival

- A Museum Teacher will greet you inside the entrance to the Museum.
- Please have a total count of students and adults ready for the guard at the entrance.
- Security measures require the checking of adults' bags.

Touring the Building and Exhibitions

Exhibition tours are self-guided. Please allow additional time for these activities, as the *Green by Design* program does not include building or exhibition tours. No food, drinks, or photography is allowed in the exhibitions.

Lunches at the National Building Museum

Please note that there are no formal lunch facilities at the National Building Museum. Students may picnic on the west lawn outside of the Museum, or eat in the Museum's Great Hall when space is available. However, please note that the Great Hall is frequently used for large events. When it is in use, students can eat outdoors or on their return trip to school. Please do not call to see if the Great Hall is available to eat lunch.

During the museum visit, and especially during lunch, please ask your students and chaperones to observe the following guidelines:

- Dispose of trash properly. Please bring a garbage bag with you for this purpose.
- Stay with the group at all times. Sitting beside one of the large columns encourages the group to stay together.
- Keep away from the fountain, café tables (reserved for café patrons), and the information desk.
- Walk. Although children are often tempted to run and jump in the Great Hall, these actions are unsafe and not recommended. Climbing on the columns is not permitted.
- Talk and laugh, but please be considerate of other museum visitors who may be enjoying a tour or exhibition.
- Restrooms are located at the southeast and southwest corners of the Great Hall.

Visiting the Museum Shop

The National Building Museum shop offers a variety of items for children that range in price from $1.00 up, including postcards, pencils, erasers, and puzzles. When visiting the Museum Shop, please keep these things in mind:

- Alert a shop staff member that a group of students will be visiting the shop.
- All students should be reminded to behave appropriately when visiting the shop.

- Students may visit the shop in groups of ten at a time. At least one adult must accompany and supervise each group of ten students.
- Arrangements can be made to purchase pre-packaged goody bags. Please call 202.272.7706 for more information.

NOTES:

Facts about the National Building Museum

Who designed the National Building Museum?

Montgomery C. Meigs (1816 —1892), Quartermaster General in charge of provisions during the Civil War. He was a West Point trained engineer. Meigs' design was inspired by Italian Renaissance architecture.

When was it built, and how much did it cost?

1882 —1887 and $886,614.04

What was the building used for before it was a museum?

Until 1926, it was occupied by the Pension Bureau, which provided pensions to veterans disabled during wartime. The building was later occupied by several other government agencies.

How big is it?

On the exterior, 400 feet by 200 feet,
75 feet to cornice level

What is it made out of?

15,500,000 bricks with brick and terra cotta ornaments

How long is the frieze on the building's exterior, and who designed it?

1,200 feet long, 3 feet high, made of terra cotta

Designed by Bohemian-born sculptor Caspar Buberl (1834 —1899)

Features a continuous parade of Union Civil War units

What are some interesting facts about the Great Hall inside the museum?

316 feet by 116 feet (a little larger than a football field)

159 feet — approximately 15 stories — at its highest point (The Statue of Liberty, without her base, could stand up straight if she were placed on top of the fountain.)

The Presidential seal has been in place since 1901, the only Presidential seal permanently affixed to a building other than the White House.

Presidential inaugural balls, from Grover Cleveland's in 1885 to the present, have been held in the Great Hall.

What are the Corinthian columns made from, and how tall are they?

Among the tallest interior columns in the world —75 feet high, 8 feet in diameter, 25 feet in circumference.

Each one is built out of 70,000 bricks and covered by plaster.

Originally painted in 1895 to resemble marble. The present faux marble pattern was applied in 2000.

How many columns are part of the arcade, and what are they made of?

On the first floor, there are 72 Doric-style columns (terra cotta covered with plaster); and on the second floor, 72 Ionic-style columns (cast iron).

NOTES:

2. Building a Foundation

Before visiting the Museum these lesson may be used to introduce students to the basic concepts of environmentally friendly building and sustainable architecture. These lessons are optional, but provide a deeper foundation to the ideas learned in the program.

Its Easy to be Green!

What a Piece of Junk!

- What a Piece of Junk! Student Worksheet

Thinking about Home

- Home Is Where the . . . Is Worksheet

What's In a Region?

- Mapping the US Student Worksheet
- Mapping the US: Map 1
- Investigating regions Student Worksheet
  - Northeast Region
- Mississippi Valley Region
- Southwest Region
- Midwest Region
- Pacific Northwest Region

It's Easy Being Green!

As environmental concerns continue to mount worldwide, thinking about how sustainable practices and products affect our lives becomes increasingly important. There is growing popular interest in green living, and the possibilities for achieving it in our personal lives are rapidly expanding.
This activity introduces students to the basic ideas behind being "green" or living in a sustainable way. Students discuss the concept, brainstorm ways to practice it in their own lives, and then market the idea to their peers.

OBJECTIVES

Students will:

- understand the basic concept of sustainability
- recognize and identify various ways they can practice being green
- become active citizens by encouraging other students to be green

MATERIALS

- paper
- pencils
- markers and/or colored pencils
- computers
- poster board

NATIONAL STANDARDS OF LEARNING

English 8
Social Studies 3, 4, 10
Visual Arts 1, 3, 5

DURATION

45 minutes-2 hours

TEACHER PREP

- Prepare various supplies for students to use to create posters, newsletters or flyers

LESSON PROCEDURE

1. What is green?
2. How can we be green?
3. Share the message

GREEN VOCABULARY

Green, Sustainable Design, Conserve

LESSON PLAN

1. What is green?
Ask the students to think about what it means to be green? What comes into their minds when they hear that word?

Ask the students to discuss why we need to protect the environment? (Lead the discussion to the idea that if we protect and take care of the environment then it will be there for future generations to enjoy and use).

2. How can we be green?
With the students brainstorm ways to "protect" or "conserve" the environment. What are things they can do at home? What are things they can do at school? Keep a running list on the blackboard or whiteboard. Challenge the students to think about how valuable it is for even one person to recycle their soda bottle. Is this worth it? Why? Some students may argue that they have little say in how environmentally friendly their home or school is. Encourage them to think of helpful things they can do without their parents or school administrations permission.

- Turn off the water when brushing youth teeth
- Turn off the lights/TV/stereo when leaving the room
- Recycle their bottles, paper, etc
- Reuse scrap paper for notes
- Put their lunch in a reusable bag and not a plastic bag
- Take shorter showers

Lead students toward the idea that one person can effect change and it could be them!

3. Share the message

Assign students to share their new knowledge by creating a poster, newsletter, comic strip, or flyer suggesting way other students in the school can go green at home or at school. Students may use computers to design these marketing pieces or construct them out of available craft materials. See suggestion page in resource section for other easy ways to go green.

NOTES:

What a Piece of Junk!*

Ever wonder if the parts of a cell phone are recyclable? Walked on a floor made of bamboo? Or wondered how to dispose of an aerosol can? If so, you are the happy or unhappy beneficiary of a choice made, in large part, by a designer. Choices that have the least negative impact on the health of people, the economy of an area, and the environment result in what is called "sustainable design." The goal of sustainable design is to meet the present generation's needs without compromising future generation's ability to meet their needs. But consumers can also affect sustainable design by the choices they make. If people don't buy a design, eventually it will no longer be made. In this lesson students will learn how choice plays an important role in sustainable design.

*This activity was adapted from *Why Design?* a publication by the National Building Museum.

OBJECTIVES

Students will:

- understand the roles of both designers and consumers in creating sustainable designs
- understand the effect of making choices and compromises as an important part of sustainable design

NATIONAL STANDARDS OF LEARNING

Science . . . . . F
Social Studies 1, 2, 4, 7, 10
Technological Literacy 18,19, 20
Visual Arts 3

DURATION

1 hour

MATERIALS

- *What a Piece of Junk!* worksheet
- pens or pencils
- poster board
- 2 objects (for each pair of students) that are designed to meet the same need (writing instruments, something that can scoop food, a container smaller than a shoe box that holds liquids). These objects can be brought from home.

TEACHER PREP

- Photocopy *What a Piece of Junk!* worksheets (one for each pair of students)
- As student homework, ask students to bring in one object that meets a specific need (a writing instrument, something that can scoop food, a container smaller than a shoe box that holds liquids). The class can be divided into 3 groups, each group bringing in objects from one of the three categories. The students will then be matched in pairs during the lesson; they will come back together in the conclusion to discuss all the objects.

LESSON PROCEDURE

1. Introduction to Sustainable (Green) Design
2. Sustainable Design as choices
3. Evaluate object pairs
4. Conclusion: Making the choice

GREEN VOCABULARY

Sustainable, design

LESSON PLAN

1. Introduction to Sustainable (Green) Design
Introduce students to the ideas of sustainable design. Explain that sustainable design means:

- Creating products/buildings that have the least negative impact on the health of people, the economy of an area, and the environment
- Meeting the needs of present generation's without depleting the ability of future generations to meet their own needs

2. Sustainable Design as choices
Tell students that designers concerned with sustainability consider things like: Will the paint give off a lot of fumes? Which material will create the least waste when it's processed and disposed of? Does this wood have to be trucked across the country, or will local wood be just as good (and help the local economy)? Consumers also need to ask themselves questions too.

Ask the students what questions they think should be asked before making a purchase? Designer and teacher Victor Papanek has suggested that before making a purchase we ask ourselves the following six questions:

- Do I really need it or am I being persuaded through advertising that I need or want it?
- Will something else serve the purpose?
- Are there substitutes I already own that will perform the same, or a similar, function?
- Can I share, rent, borrow, or lease it?
- Can I buy it used?
- Can I make from a plan or build it myself?

Our choices can affect sustainable design too. If we don't buy a design is will eventually no longer be made.

3. Evaluate object pairs

Pair the students up; making sure each pair has two objects to evaluate. Use the student worksheet to evaluate the object pairs. Students may add their own criteria to the list that already exists.

Ask students to decide which one of the pair they think is the most sustainable design (or least harmful to the environment and future generations)?

4. Conclusion: Making the choice

As a class, ask students to discuss the choices they made. Were the choices easy? Did they have to make a compromise (chose something more expensive because it had more efficient packaging)? Do they think any one of the criterion is more or less important in making the decision?

What conclusions can they make? Use student's answers to discuss the following ideas:

- questioning design is important to being sustainable; and
- each person's choices may be different but are equally valid.

What a Piece of Junk! Student Worksheet

NAME:

As you evaluate each product, put an X closest to the word or phrase that best describes it. Use the top half of the line for one product and the bottom for another.

Name of product on top half of line: ***Name of product on bottom half of line:***

parts are easy to get		**parts are hard to get**
safe		**unsafe**
accomplishes many tasks		**accomplishes one task**
requires little energy to operate		**requires a lot of energy to operate**
made from renewable/recycled materials		**made from nonrenewable materials**
recyclable or reusable		**must be disposed of after one use**
efficient packaging		**excessive packaging**
decomposes quickly		**takes years to decompose**
well made/durable		**poorly made/falls apart easily**
suited to a person of any physical ability		**suited to a very specific user**
manufactured close by		**manufactured far away**
easy to maintain/fix		**hard to maintain/fix**
works without additional purchases		**requires other purchases to work well**
materials required little processing		**material required a lot of processing**
easy to understand and use		**difficult to understand and use**
meets my physical needs		**doesn't meet my physical needs**
meets my emotional needs		**doesn't meet my emotional needs**
overall this design is worthwhile		**overall this design is a waste**

Thinking About Home

Often we do not think of the place we live as "shelter." To us, it is much more -- it is home. Though we often take it for granted, the most important function of a home is to provide shelter, but there are also many other functions for a home. Homes not only fulfill basic physical needs but also reflect our cultural values and ideals. During this activity students will work together to create a definition for the word home. Students then use this definition to analyze their own home and see how it fits their original definition.

OBJECTIVES

Students will:

- Define the word home
- Identify the various aspects of the word home
- Analyze and explain how their home functions to address these needs

MATERIALS

- *Home is Where the. . . Is worksheets* (1 for each student)
- Pencils

NATIONAL STANDARDS OF LEARNING

Social Studies 1, 3, 7
Technological Literacy 18,19, 20
Visual Arts 3

DURATION

45-60 minutes, plus homework

TEACHER PREP

- Copy *Home is Where the. . . Is* worksheets (1 for each student)

LESSON PROCEDURE

1. Define home
2. Analyze your home
3. Conclusion

GREEN VOCABULARY

Shelter, Home

LESSON PLAN

1. Define home
In small groups or as a class, ask students to brainstorm the function of a home. Why do we need homes? Have students write down their responses on the *Home is Where the . . . Is* worksheet in the blank spaces of the first column.

Use leading questions to guide students to the following answers: shelter to protect from the weather, animals, strangers; a center for family or social group; a place to store food, personal belongings; a place to sleep, relax, live; a place to feel safe; etc.

2. Analyze student homes
In class or as homework, have students use their *Home is Where the . . . Is* worksheet to analyze whether the building they live in functions well as a "home".

3. Conclusion
Ask students to discuss their findings. Would their homes still function well in another part of the world? In the desert? In the arctic? In a war zone? What would need to be changed? Do they need to change their definition of what a home is?

Home Is Where the. . . Is
Student Worksheet

NAME:

Often we do not think of the place we live as “shelter.” To us, it is much more -- it is home. Though we often take it for granted, the most important function of a home is to shelter us.

Using this sheet, investigate your home and discover how it functions.

Aspects of a Home	**Your Home (How does it meet these needs?)**
Shelter from the weather (rain, wind, snow, cold, heat)	
Shelter from animals	
Shelter from strangers	
Gathering space for family & friends	
Food Storage	
Personal Belongings Storage	
Space to sleep	
Space to relax	
Space to feel safe	
Other:	
Other:	
Other:	

What's In A Region?

While we often think about society's affect on the environment we do not typically consider the enourmous affect the environment has on society. To produce good design architects need to think about the climate and geography of their building site. In this lesson, students will be learn about how a region is defined and will then be introduced to 5 different regions in the United States. As they gather information about these regions they will discover the relationship between architectural design and the natural world. Students will work together to think about what challenges these climate and geographic features would cause when designing a home.

OBJECTIVES

Students will:

- map 5 regions of the United States
- compare and analyze the differences between regions
- identify the challenges for constructing homes in each region

NATIONAL STANDARDS OF LEARNING

English. 7, 8
Math . . . . . .Problem Solving
Science . . . . . F
Social Studies 1, 2, 3
Technological Lit. . 8, 9, 10,18,19, 20
Visual Arts 3

DURATION

2 hours

MATERIALS

- *Mapping the US* student worksheet
- *Mapping the US: Map 1* (p. 34) or *Mapping the US: Map 2* (p. 55)
- *Investigating Regions* student worksheet (p. 35)
- Regional Maps (p. 36 - 40)
- Computer access to online atlas
- Atlas
- Markers, colored pencils
- Blank paper
- Climate Normals data sheet (*optional* p. 54)
- Topographical map

TEACHER PREP

- Divide students into 5 groups (these will be the groups that they work in at the Museum) and assign geographic regions
- Photocopy US map (1 for each student)
- Photocopy regional maps (1 for each student group)
- Photocopy *Investigating Regions* student worksheet (1 for each student group)
- Have ready access to research sources

Note: This activity can be adjusted in difficulty depending on the level of your students. You may decide to provide the resource sheets in this packet or have them gather the information from the internet or a library.

LESSON PROCEDURE

1. Define regions
2. Investigate 5 different US regions
3. Compare regions and discuss
4. Conclusion

GREEN VOCABULARY

Region, physical features, natural resources, climate, boundary, border

LESSON PLAN

1. Define regions
Ask students if they can name some of the geographic regions of the US.

Ask students why they think the country is divided into different regions? Is it helpful to divide the country into regions? How do they think the boundaries for the different regions are decided? Explain that regions are places that share similar characteristics. Using regions as categories helps people more easily understand these places. For example in a grocery store we typically

know where to find food based on how its eaten or cooked-fresh apples with produce, apple sauce with processed fruit, etc.

2. Investigate 5 different US regions

Write the names of the 5 different regions on the blackboard/whiteboard. Have each student try to find these regions on the US map without giving them any resources. Depending on knowledge of students use *Mapping the US: Map 1* (states labeled, p. 34) or *Mapping the US: Map 2* (completely blank map, p. 55). Quickly discuss how students had various perceptions of the boundaries of each of these regions. Lead students to the idea that the boundaries of regions are fluid and can depend on the criteria being used to define the regions or who is defining the regions.

Divide students into 5 groups. Assign each group one of the following geographic regions:

a. Northeast
b. Mississippi Valley
c. Southwest
d. Midwest
e. Pacific Northwest

Hand out blank regional maps (p. 36 - 40) to students. Using online resources or atlases have students label the regions, including prominent physical geographic elements (mountain ranges, rivers, lakes, deserts, etc). Resources are provided in the appendix for answering the basic questions. On the student worksheets ask students to list additional characteristics of that region (climate, natural resources, etc) as well as what challenges might be faced in constructing a home for that region.

3. Compare regions

Ask a student from each group to be the presenter and share the information they discovered about their region. Be sure to have each group discuss why they think these states are grouped together and what the challenges are to constructing a building. As a class discuss the similarities and differences of these regions

Have students discuss which region they think would be easy/difficult to live in. If they had a choice which region would they live in? Why?

4. Conclusion

Each region has climatic or geographical similarities. The characteristics of the region will affect how a building is constructed. Buildings in the same region may have similar designs.

Mapping the US Student Worksheet

NAME:

Locate the following regions and states on the map. Then color them the appropriate color.

Northeast (blue)
Connecticut
Maine
Massachusetts
New Jersey
New Hampshire
New York
Pennsylvania
Rhode Island
Vermont

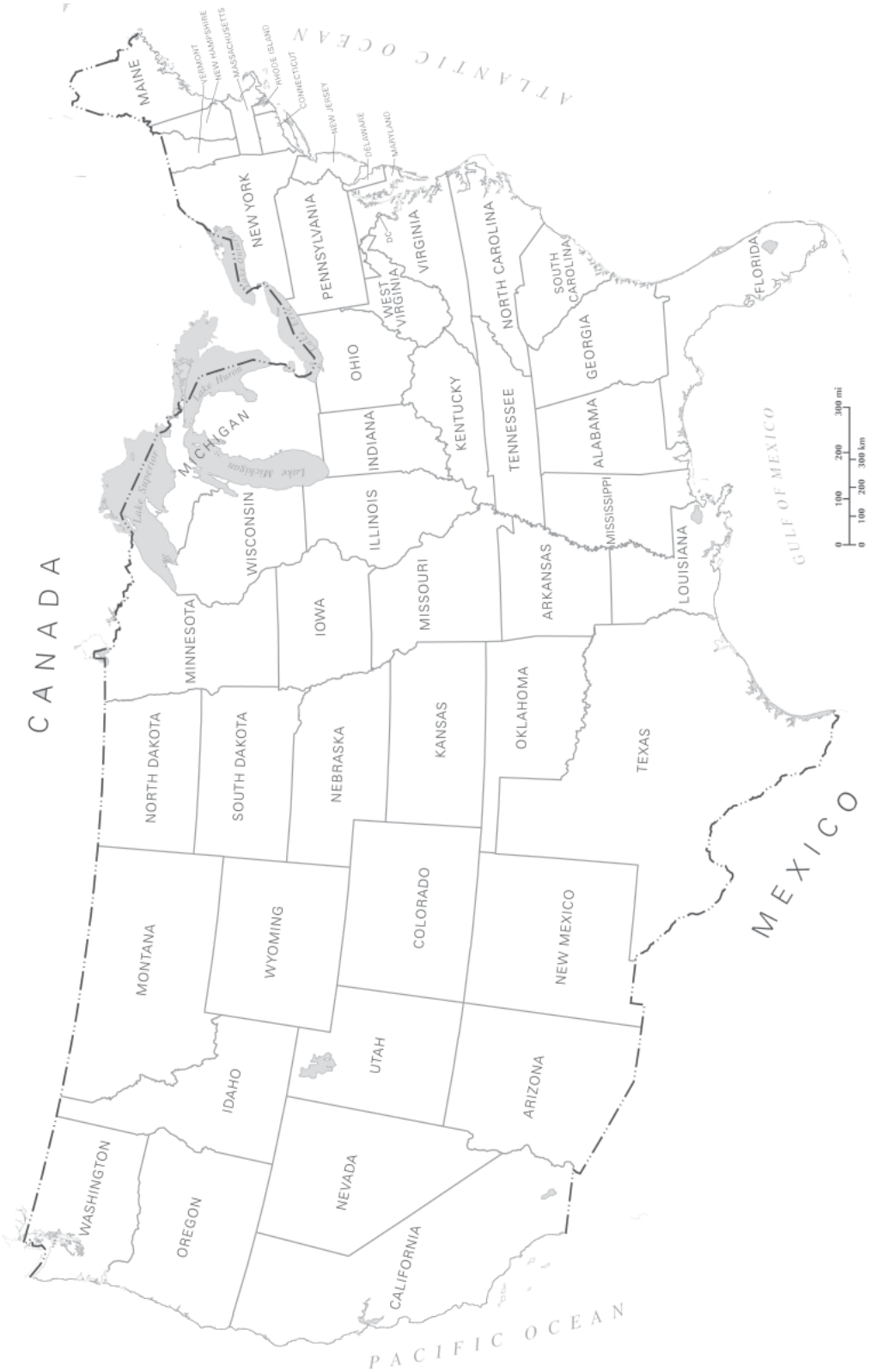
Mississippi Valley (purple)
Arkansas
Mississippi
Louisiana

Midwest (green)
Illinois
Indiana
Iowa
Michigan
Minnesota
Ohio
Wisconsin

Pacific Northwest (pink)
Washington
Oregon

Southwest (orange)
Arizona
New Mexico

Mapping the US: Map 1



Investigating Regions Student Worksheet

STUDENT NAMES: **REGION:**

Add the major rivers, lakes, mountain ranges, and other physical features to the map. Use the resources provided by your teacher to answer these questions about your region.

In your region:

What is the highest temperature? _____

What is the lowest temperature? _____

What is the total amount of precipitation for the year? _____

On a scale of 1(a little) to 4(a lot) how much wind does your region get? _____

Is your region at risk for natural disasters (earthquakes, tornadoes, hurricanes, floods)? _____

Why do you think these states are grouped together? _____

What are two challenges to constructing a building for this region? _____

_____

_____

Write one paragraph summarizing the information you discovered about your region.

_____

_____

_____

_____

_____

Now select a person from your team to present your research to the class.

Be sure to include symbols on your map for:

Mountains/Mountain Range

Rivers/Lakes

Forest/Thick vegetation

Deserts

Northeast Region

Mississippi Valley Region

Southwest Region

Midwest Region

Pacific Northwest Region

3. Reinforcement Lessons

After visiting the National Building Museum, use thse optional lessons to strengthen the students understanding of sustainable architecture and design.

Apple Diaries

Apple Diaries Student Worksheet

Milli's Insulation Investigation

What Did You Observe? Student Worksheet

Green by Design: Take a Closer Look

Fun Field Trips

Apple Diaries*

The things we buy and eat are often from faraway lands. People can get fruit and vegetables that aren't native to the farms in their surrounding area. They can also get fruit and vegetables year round when they aren't in growing season in their region. The environmental impact of shipping food long distances is hard to recognize when shopping in a supermarket with little information about where the food was grown and how it traveled to the store. The exact impact to the environment is also very difficult to measure. This lesson helps students begin to think about these topics in a new way. The concepts of supply and demand, transportation, local vs. global, and environmental impact are all introduced in this lesson. The topic is a large one and can be approached with varying levels of detail and layers based on the students' age.

*This lesson plan was developed by teachers and educators participating in the National Building Museum's workshop on Environmental Educaiton entitled "Teaching your students to go green at home and at school!" which took place in December 2006.

OBJECTIVES

Students will be able to:

- investigate how the demand for apples year round affects the global supply of apples;
- become familiar with the types and amount of energy used to transport produce locally and globally;
- consider the environmental cost and discuss pros and cons of "buying local" and globally; and
- propose ways to make purchasing decisions.

NATIONAL STANDARDS OF LEARNING

Math . . . . . Problem Solving
Social Studies 1, 2, 3
Technological Literacy 18,19, 20
Visual Arts 3

DURATION

2 class periods,
45–60 minutes each
depending on research time, may assign research as homework

MATERIALS

- Apples
- *Apple Diaries* worksheets (1 for each student)
- World map
- String and push pins (or another way to demonstrate original location and distance on map)
- Access to library or Internet for research

TEACHER PREP

- Photocopy *Apple Diaries* worksheets (1 for each student)
- Purchase apples or have students purchase apples

LESSON PROCEDURE

1. Discuss Where Apples Come From

2. Research How Apples Travel

3. Discuss Students' Findings and Compare Choices.

VOCABULARY

"Buying local," conserve resources, economics, embodied energy, energy, energy cost vs monetary cost, energy efficient, environmental cost, environmental impact, fuel, geography, locally grown, personal footprint, produce, supply and demand, transportation

LESSON PLAN

1. Discuss Where Apples Come From
Ask the students where they buy their apples and do they know where those apples come from?

Introduce the Apple Diaries. Tell students that they will spend some time discovering where apples come from.

Homework Assignment: Have students buy an apple, being sure they know where the apple was picked (ie label on the apple). Have students fill out the *Apple Diaries* worksheet.

Using a map of the world, ask students to mark where their apple comes from. Discuss the findings. Are the students surprised by the global locations? Why do they think apples come from far away places such as Israel, South Africa, etc.? What do they think the environmental cost is to ship apples from far away places instead of buying apples grown locally? Can you grow apples locally?

2. Research How Apples Travel
Discuss supply and demand, environmental cost, energy, etc. Have students research the environmental cost of transporting their apple to their community. Research can be done individually, in groups, or as a class. Be sure to have at least one locally grown apple for comparison. Suggested research:

- find the general distance between the school and where their apple came from (the last line of the Apple Diaries),
- the types of transportation that could be used when transporting their apples,
- the types of fuel needed for the transportation,
- write letters to an apple distributor asking how apples are shipped,
- create a transportation timeline for (all or a selected number of) apples.

3. Discuss Students' Findings and Compare Choices.
Suggested questions: Why do they think apples come from far away places? Why do they come from so far away? (Seasons, taste)What influences the shippers', grocery stores', and individuals' decisions when selling and buying apples?

Compare and contrast local and global choices. What is the environmental cost of both choices? What is the more energy efficient/environmentally friendly option?

Optional for older students:

- research additional pros and cons of buying local vs. globally (ie nutrition, jobs, etc.),
- create a comparison chart of all apple locations (where do most apples come from?)

TAKING IT FURTHER

1. **Create a class play: Two apples from different geographic locations meet and share their stories**
2. **Apple travel journal: What is the apple's experience while traveling?**
3. **Draw/paint/sculpt the life cycle of each apple (from seed to composting).**
4. **Poem/short story from the local and global perspectives.**
5. **Visit from local farmer.**
6. **Letter to the editor or grocery store asking for more locally grown produce.**
7. **Create advertisement sharing the benefits of locally grown produce for the school lunch room.**
8. **Calculate the cost of transporting 1000 apples from grower to your local store via truck, ship, airplane, etc using gas mileage and gas prices.**

Apple Diaries
Student Worksheet

NAME:

Type of apple _____

Grocery store/place where apple was bought _____

Cost of one apple _____

Where apple was grown (read label) _____

Number of miles between where apple originally came from and school _____

Milli's Insulation Investigation*

When it is cold, we have to heat our homes to keep them warm. When summer comes, we turn on fans or air conditioning to keep our houses cool. Adding insulation to the walls helps decrease the amount of energy used to heat or cool our homes. Insulation is one of the materials that impacts the environmental friendliness of our homes. This experiment allows students to see how insulation works, by having them compare different types of materials used as insulation.

*This activity was developed by the American Chemical Society (ACS) as part of their National Chemistry Week (NCW) publication, Celebrating Chemistry. It is reprinted with their permission. For more information about NCW and other ACS educational resources, visit www.acs.org.

OBJECTIVES

Students will:

- identify how citizens impact their environment – natural and built – through the choices they make in use of construction materials;
- evaluate different insulating materials; and
- recognize the role of insulation in a house being environmentally friendly.

NATIONAL STANDARDS OF LEARNING

Science . . . . . E
Math . . . . . Problem Solving
Technological Literacy 8, 9, 10
Visual Arts 3

DURATION

1- 2 class periods, or 1- 2 hours

MATERIALS

- Blunt-ended scissors
- Ruler
- Pencil or pen
- Aluminum foil
- Newspaper
- Plastic wrap
- Wax paper
- 5 identical ice cubes
- Rubber bands
- Paper towels
- Baking tray
- Watch or timer
- Wire rack (optional)

GREEN VOCABULARY

insulation, chemistry, energy-efficient,

TEACHER PREP

- Photocopy *What Did You Observe*? worksheets, p. 50 (1 for each group)
- Ask students to review safety guidelines for conducting experiments, p. 57
- Gather supplies

LESSON PLAN

1. Discuss what insulation is

Explain to the students what insulation is. It is important to keep the temperature at home comfortable for living, no matter what the weather is like outside. When it is cold, we have to heat our homes to keep them warm. When summer comes, we turn on fans or air conditioning to keep our houses cool. Heat moves from a place where it is warmer to one where it is colder. To help keep your home comfortable inside, insulation is placed in the walls, where it works like a jacket around your house. The most common types of insulation used in homes are made from fiberglass and cellulose. Fiberglass is extremely fine strands of glass. Cellulose insulation looks like a pulpy, puffy form of just what it is: recycled newspapers, boxes and waste paper. Adding insulation to homes is a good way to save energy. In this activity you will test several different materials to find out which one is the best insulator.

2. Test the insulators
Divide the students into smaller working groups. Work with the students to complete the following experiment:

1. Cut the aluminum foil, newspaper, plastic wrap, and wax paper to the same size for wrapping each ice cube.

2. Wrap one ice cube in each type of wrapper, being careful to wrap the cubes the same way each time.

3. Use a rubber band to hold each wrapper in place.

4. Cover the baking tray with a paper towel. Place the cubes on the baking tray. A wire rack may be placed on the tray to observe the cubes more easily.

5. Check the cubes every fifteen minutes and record your observations in the “What Did You Observe?” section.

6. After the unwrapped cube has completely melted, or one and a half hours have passed, unwrap the cubes and observe how much ice is left inside each wrapper. Record your results in the “What Did You Observe?” section.

7. Throw away the wet wrappers and paper towels. Thoroughly clean the work area and wash your hands.

3. Discuss findings
Discuss with students the results of their experiment. Which material was the best insulator? Why? Think about heating and cooling your home if you didn't have insulation in your walls; what would happen? Why is insulation energy efficient? How does it save energy?

Explain to the students that the wrapper that allowed more heat through to warm up the ice and melt it fastest is the worst insulator. The insulator that kept the heat away from the ice and melted the ice the slowest is the best insulator. Metal tends not to be a good insulator because it transfers, or conducts, heat instead—in this case, the heat from the warmer air in the room to the cold ice. Materials like wood, cork, and some plastics and fabrics, on the other hand, are good insulators because they are poor conductors. Whether a material conducts heat, and how quickly or slowly it does, is determined by its chemical make-up and arrangement. Chemists can study and tweak those designs to make new, high-tech materials that make everything from our houses more weather-resistant and energy-efficient to our parkas warmer and computers smaller!

What Did You Observe? Student Worksheet

NAME:

Describe how the cube looks (if you can see it), or measure how big the damp circle on the paper towel has become.

Time in Minutes	Unwrapped Cube	Aluminum Foil	Newspaper	Plastic Wrap	Wax Paper
15					
30					
45					
60					
75					
90					

Which cube melted the fastest? _____

Which cube took the longest time to melt? _____

List the wrappers in order from worst to best insulator: _____

_____

Why do you think this is so? _____

Try this…
Try using other "wrappers" like heavy-duty foil, pieces of fabric, or bubble wrap. Try putting a set of cubes in the shade and a set in the sun. Put a set of wrapped cubes in the refrigerator and observe how the melting times differ when the surrounding temperature is lower.

Green By Design: Take a Closer Look

Treasuring Trees

Trees provide benefits that many communities value such as clean air, shade, and beauty. Walk around your community and conduct an inventory of the trees by recording the number and type of trees (use a botany/tree book from your local library). Based on the number of tree stumps you see, how many trees are missing? Contact your local government to find out where trees are needed in your community. Then ask a local nursery if it will donate trees to plant in the neighborhood, or do a fund-raiser in your school to collect money for them. As a class, plant them. Consider other places that need trees or plants. Start a garden at your school or bring plants into your home.

Resource: Casey Tree Endowment,www.casey-trees.org; Arbor Day Foundation, www.arborday.org; Edible School Yard, www.edibleschoolyard.org; neighborhood associations, and local departments of public works.

Locating Power, Water, and Waste

How is it possible that when we turn on the faucet, clean water comes out; that the lights turn on with a flip of a switch; and that streets are not full of trash? Local taxes help pay for a community's infrastructure—the services that help our cities work such as trash pick-up, power, recycling, and water. Try to imagine what happens beneath the streets to help your community operate. Walk around the block and locate manhole covers and meter boxes. How are they labeled? (i.e. water, sewer, telephone, other) Record how many you find in a given block. What happens with poor sewage? Locate storm drains. Are any labeled? Participate in labeling storm drains with "Don't Dump" to encourage people to think about where the storm drains lead. Are paper, plastic, and glass recycled at your home? Where do these things go? Visit a recycling plant and/or landfill to better understand how trash is discarded and recycled material is reused. What choices can be made at a landfill?

Resource: Local departments of public works, Chesapeake Bay Foundation, www.cbf.org, DC Storm Drian Marker Program, www.dcschoolyard-greening.org/stormdrain—about.htm.

Rebuild or Preserve?

What should be done with an old house? This is an issue faced daily by city planners, developers, and architects, as well as people interested in preservation. Students can identify a deteriorated old building in their community and find about the plans for its future. Ask your class about the advantages and disadvantages of tearing down the building and replacing the building versus renovating the existing building for another purpose. What factors will influence the decision such as budget, the citizen's voice, environmental impact, taxes, safety, etc.? Who should make the decision? What actions could the students take to influence the decision?

Resources: National Trust for Historic Preservation, www.nthp.org, and state and local preservation offices and organizations.

Fun Field Trips: Exploring Your Community

Families:

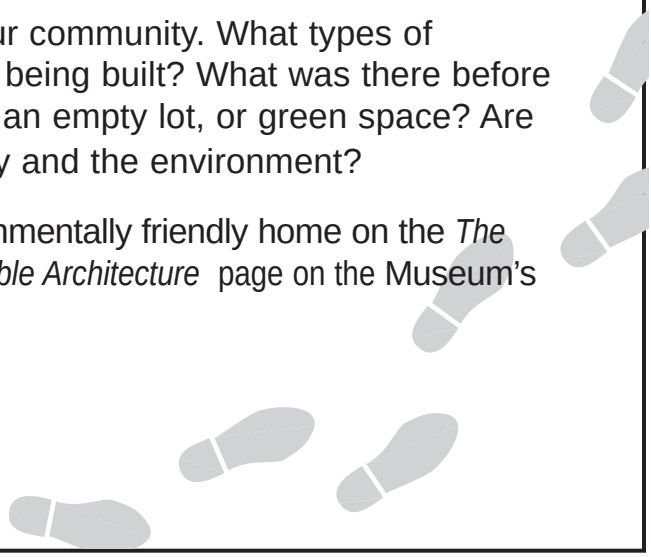
Your children are learning about constructing environmentally friendly buildings and communities in school and at the National Building Museum. Encourage them to explore these ideas in their community and have them teach *you* about being green.

1 Ask your child about the building s/he built at the National Building Museum. Have her/him explain what happens in the building, why it looks the way it does, and why it is envirnonmentally friendly.

2 Go on a green tour! Some places to visit include the EcoVillage in Loudoun County, VA (www.ecovillages.com) and Casey Trees' green roof (www.caseytrees.org/programs/greeninitiatives.html).

3 Take a construction inventory of your community. What types of buildings, bridges, and/or parks are being built? What was there before the construction began: other buildings, an empty lot, or green space? Are the new places good for your community and the environment?

4 Learn more about creating an environmentally friendly home on the *The Green House: New Directions in Sustainable Architecture* page on the Museum's Web site (www.nbm.org).



Visit the National Building Museum, where families can discover the world we build for ourselves!

NATIONAL BUILDING MUSEUM 401 F Street NW Washington, DC 20001
202.272.2448 | www.NBM.org | Red Line Metro, Judiciary Square

Programs for Schools, Families, Community Groups and Scouts, Outreach Programs, Discovery Carts, Exhibitions, Birthday Parties, Festivals, Summer Camp, and Interactive Web site

4. Resources

Information in this section comprises the following:

Climate Nornals

Mapping the US: Map 2

Ways to Go Green

Milli's Safety Tips

Architecture and Green Vocabulary

Books

Web sites

Climate Normals

Climate normals are a useful way to describe the average weather of a location. Though there are complicated equations used to determine these numbers, simply said, the climate normal is the mean or average of the temperatures and precipitation values over a 30-year period.

Key: Temperatures are measured in Fahrenheit, Precipitation in inches

DES MOINES, IA

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Minimum	11.7	17.8	28.7	39.9	51.4	61.0	66.1	63.9	54.3	42.2	29.0	16.7	40.2
Maximum	29.1	35.4	48.2	61.3	72.3	81.8	86.0	83.9	75.9	63.5	46.7	33.1	59.8
Precip.	1.03	1.19	2.21	3.58	4.25	4.57	4.18	4.51	3.15	2.62	2.10	1.33	34.72

SEATTLE URBAN SITE, WA

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Minimum	36.0	37.1	39.2	42.5	48.2	52.7	56.4	57.1	52.6	46.4	40.4	36.1	45.4
Maximum	46.9	50.5	54.5	59.3	64.9	69.5	74.5	74.9	69.9	60.3	51.5	46.5	60.3
Precip.	5.24	4.09	3.92	2.75	2.03	1.55	0.93	1.16	1.61	3.24	5.67	6.06	38.25

DEER VALLEY, AZ

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Minimum	39.2	42.7	45.6	50.5	59.4	68.3	76.9	75.8	69.5	57.1	44.6	39.1	55.7
Maximum	65.8	70.6	74.4	82.9	91.8	102.1	104.2	102.2	97.7	86.5	73.9	65.8	84.8
Precip.	0.75	0.99	1.18	0.24	0.18	0.04	0.63	0.99	0.65	0.57	0.77	0.79	7.78

NEW ORLEANS, LA

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Minimum	45.3	48.3	54.5	59.9	67.7	73.1	75.0	74.9	71.7	62.1	53.6	47.6	61.1
Maximum	62.7	66.2	72.8	78.6	85.4	90.1	91.6	91.7	87.9	80.5	71.7	65.3	78.7
Precip.	5.52	4.66	5.28	4.99	5.07	6.29	6.97	6.34	6.04	2.90	5.02	4.65	63.73

BEDFORD, MA

Normal	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Minimum	15.7	18.2	26.6	35.8	45.8	54.7	60.3	58.9	50.2	39.0	31.2	21.5	38.2
Maximum	35.0	38.0	46.8	58.0	69.4	77.5	82.7	80.7	72.4	61.7	50.7	39.6	59.4
Precip.	4.24	3.33	4.21	3.99	3.76	3.61	3.83	3.54	3.84	4.14	4.39	4.07	46.95

http://ggweather.com/normals/
Climate Normals*(1971-2000)* Data extracted from NCDC CLIM81 1971-2000 Normals (issued November 30, 2001)

Mapping the US: Map 2

What Can You Do To Go Green?

Here are some more ideas for things you can do to go green at home, or at school.

1 Open window to allow fresh air into your home (after the air conditioner or heater is turned off).

2 Put plants inside your home to clean the indoor air.

3 Use the exhaust fan over your stove to remove gases like carbon dioxide from your kitchen.

4 Use the fan in bathrooms to remove water from the air and prevent mold from growing.

5 Use cleaning products that are made of natural ingredients and are not harmful to people or animals.

6 Plant trees around your home to provide shade and keep your house cool.

7 Dry your clothes on a line instead of in the dryer to save energy.

8 Stop vampire electronics from sucking energy (Vampire electronics are cell phone chargers, stereos, DVD players that use electricity even when turned off).

9 Use ceiling fans in the summer AND winter. By reversing the direction of the blades in the winter, warm air is pushed down, and heat is distributed more efficiently throughout the home.

10 Install compact fluorescent light bulbs, which last 6 to 10 times longer than incandescent bulbs.

11 Run the dishwasher only when full to save water and energy.

12 Wash your face and brush your teeth without letting the water run constantly.

13 Decide what you need from the refridgerator or freezer before you open the door.

14 Sell or donate items that are in good shape to keep them out of the landfill.

15 Bike, walk, or use public transportation instead of driving to save energy.

What else can you do?

Milli's Safety Tips

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to chemistry.org/ncw and click on “Safety Guidelines”.

Architecture and Green Vocabulary

Built Environment
Human-made surrounding, such as buildings, structures, parks, streets, bridges, etc

Conserve (earth's resources)
To preserve and/or to use in such a way as to avoid waste

Durable
Products that are long lasting and require little maintenance

Energy smart
Meeting your energy needs cost effectively and with the least impact on the environment

Envelope
The skin of a building—including the windows, doors, walls, foundation, basement slab, ceilings, roof, and insulation—that separates the interior of a building from the outdoor environment

Environmental impact
The effect of materials on the environmental quality inside your home and to the outdoor environment and atmosphere

Footprint
Land area taken up by a building

Fossil Fuels
Carbon-rich deposits in the earth, such as petroleum (oil), coal, or natural gas, derived from the remains of ancient plans and animals and used for fuel; non-renewable energy

"Green"
Making environmentally friendly choices that use our natural resources for present needs without depleting those resources for future generations

Local (materials)
Materials extracted/manufactured/produced within 500 miles of building site

Natural Resource
A material or supply such as timber, fresh water, or a mineral deposit, occurring in nature and with the potential for human use.

Prefabricated
Standardized building sections that are created in a factory to be shipped and assembled in another location

Recycle
To use again, especially to reprocess

Region
An area with similar characteristics that separates it from other areas. Regions might be defined by criteria like common culture or language; climate; economic activity; or political connections. Regions have extremely fluid definitions that might be as small as a neighborhood or as large as a continent.

Renewable
Natural materials that can be rapidly replaced in the environment, such as fast-growing trees and agricultural products

Renewable energy
Energy derived from sources that do not deplete natural resources; examples include solar, wind, and geothermal energy from the Earth's core

Reusable
Products that can be used again or recycled once they are no longer needed or operable for their original purpose

Rural Area
An area of very little development, often characterized by agricultural uses or undeveloped land

Suburban Area
A developed area outside the denser urban center characterized by a separation of uses and a dependence on highways and cars for transportation

Sustainability
Meeting the needs of the present without depleting resources or harming natural cycles for future generations; another way to say "green"

Urban Area
An area of dense or closely placed development, often associated with a street plan made up of blocks, and mixed uses; a city

Books

Sustainable Architecture Books

Dean, Angela M. *Green by Design: Creating a Home for Sustainable Living.* Glybbs Smith: Layton, Utah, 2003.
Includes information about the process of designing and building your own sustainable home.

Roberts, Jennifer. *Good Green Homes.* Gibbs Smith: Salt Lake City, Utah, 2003.
Ideas to consider when constructing or designing a sustainable home.

Stang, Alanna and Christopher Hawthorne. *The Green House: New Directions in Sustainable Architecture.* Princeton Press: New York, New York, 2005.
A survey of contemporary house designs that were designed to be sustainable and have a low impact on the environment. Includes numerous photographs and building plans.

Trask, Crissy. *Its Easy Being Green: A Handbook for Earth-Friendly Living.* Gibbs Smith: Salt Lake City, Utah, 2007.
Easy and practical tips for going green at home.

Wiland, Harry and Dale Bell. *Edens Lost and Found: How Ordinary Citizens are Restoring Our Great American Cities.* Chelsea Green Publishing: White River Junction, Vermont, 2007.
Part of a PBS series that suggests practical solutions to improve the environment and quality of life in cities.

Winters, Nathan B. *Architecture is Elementary.* Gibbs M. Smith, Inc.: Salt Lake City, Utah, 1986.
A guide to visual thinking through the examination of architecture.

Web sites

At the publication of this resource packet, the following Web sites were all active.

Lesson Plans/Classroom Activities

Curriculum Guides and Activities
The National Energy Education and Development Project (NEED)
http://www.need.org/curriculum.php
Information and lesson plans about understanding the scientific, economic, and environmental impacts of energy so that wise choices can be made.

Earthday Network Educator's Network
http://www.earthday.net/involved/teachers/join-Network.aspx
The Educator Network provides lessons and tools for integrating environmental issues into core curriculum.

Eden's Lost and Found
Teacher's Guide
http://www.edenslostandfound.org/home/EdensTeachersGuideFinal.pdf
A PBS series that suggests practical solutions to improve the environment and quality of life in cities. Web site has a teacher's guide with classroom activities.

Energy Star, Change a Light, Change the World, Classroom Activities for K-12
http://www.energystar.gov/index.cfm?c=change_light.changealight_educateResources
These three lesson plans guide students through an investigation of "energy efficiency."

Rustle the Leaf
www.rustletheleaf.com
Environmental comics for students and teacher lesson plans encouraging enivronmental awareness.

Online Student Activities

Bobbie Bigfoot
http://www.kidsfootprint.org/
Online student activity to measure ecological footprint, as well as classroom lesson plans about environmental responsibility.

Energy Hog
http://www.energyhog.org/
Online activity that teaches students about energy efficiency and how to save energy. teacher and student guide for 3rd through 6th grade available to print out.

The Green Squad
http://www.nrdc.org/greensquad/intro/intro_1.asp
The Green Squad is an interactive web site that teaches students about the relationship between their schools and environment. The site is primarily for students in 5th through 8th grade, but also has information for teachers.

General Resources

American Society of Landscape Architects
www.asla.org
General resources about landscape architecture.

D.C. Schoolyard Greening Consortium
www.dcschoolyardgreening.org
The D.C. Environmental Education Consortium provides teachers and administrators with resources for beginning their own schoolyard greening project.

design:e2
http://www.pbs.org/designe2/
A PBS series that explores the built environment and environmentally friendly architecture.

The EnviroLink Network
http://www.envirolink.org/categories.html?catid=1
An online community listing environmental resources.

Green Roofs for Healthy Cities
www.greenroofs.org
Explanation of how green roofs work, as well as the benefits and components of green roofs.

Green Schools
www.mcps.k12.md.us/departments/facilities/greenschoolsfocus
Learn more about the Green Building Program of Montgomery County Public Schools and other green programs in Maryland.

Healthy Schools Network
http://www.healthyschools.org/index.html
Information and actions to create a healthy school environment for students and teachers.

National Wildlife Federation
Backyard Wildlife Habitat
www.nwf.org/backyard
Tips for creating a backyard that attracts and supports local wildlife.

Other School Programs at the National Building Museum

Be a Green Builder

Bridge Basics

City by Design

Fuller's Fantastic Geodesic Dome

Learning to Look: Looking to Learn

Lifecycles of a Building, a Street, and a City

Patterns: Here, There, and Everywhere

Washington: Symbol and City

For more information, or to obtain a school programs brochure, contact youth groups programs at **youthgroups@nbm.org**.

Other Youth Programs at the National Building Museum

After-School and Community Groups

Birthday Parties

Family Programs

Festivals

Outreach

Scout Programs

Summer Camp

For more information, contact youth education at youthgroups@nbm.org, outreach@nbm.org, or family@nbm.org.

NATIONAL BUILDING MUSEUM

401 F Street, NW
Washington, DC 20001
Telephone: 202.272.2448
Facsimile: 202.376.3564
Web site: www.NBM.org

The National Building Museum, a nonprofit educational institution, was created by Congress in 1980 to celebrate achievements in architecture, urban planning, construction, engineering, and design. It presents exhibitions and public programs, collects artifacts of the building process, and publishes books and a quarterly journal.

MUSEUM HOURS
Monday to Saturday, 10:00am – 5:00pm
Sunday, 11:00am – 5:00pm

ADMISSION
Admission is free.

LOCATION
401 F Street NW, between 4th and 5th
Streets at the Judiciary Square Metro Station (Red Line).
Wheelchair access at 4th and G Street entrances.

MUSEUM SHOP
The Museum Shop, located on the ground floor, is Washington's finest source of design and building-related books and gifts, including jewelry, home furnishings, toys, and games. Museum members and teachers receive a discount on all purchases.

MEMBERSHIP
Museum membership offers such privileges as invitations to exhibition openings and special events; discounts on Museum Shop purchases, programs, workshops, and tours; and subscriptions to *Blueprints* and the Museum Calendar of Events.