

Below Level Differentiation

■ Reading and Discussion Tips:

- To begin the discussion on green building, ask students to write down what they already know about the topic. Have them use a concept web or other graphic organizer to record any connections they can make to the terms “green,” “environmentally friendly,” or “sustainable,” and discuss how these terms relate to home construction.
- Students may benefit from touring the Interactive Green Build home on Habitat for Humanity’s web site while learning about the various green building practices. You can project the web site in the classroom and tour the home together by visiting <http://www.habitat.org/youthprograms/greenbuild/> and clicking on “Interactive Green Home.”

■ Activity Tips:

- You may wish to assign to students sustainable practices that are straightforward and require only a basic understanding of scientific or technological processes.
- Students may benefit from working with a partner to create their diagrams or from seeing more diagram samples that you have located on the Internet. You may also wish to provide students with a basic diagram template or tip sheet that clarifies the elements of a diagram.
- Students may need more class time to complete the diagram assignment. Allow students another class period or a portion of the period to conduct research and create the diagram. Check in with students during this time to make sure they are making satisfactory progress.
- Place students in mixed-ability groups to create the assigned portion of the green initiative proposal. Within these groups, help students break down the assignment into smaller tasks or guiding questions that will help them complete the proposal.

■ Assessment Tips:

- When assessing the diagrams, you may wish to award points for effort and work habits during classroom time.

Above Level Differentiation

■ Reading and Discussion Tips:

- Ask students to read and report to the class about how Habitat for Humanity makes use of sustainable practices in their Habitat ReStores and Neighborhood Revitalization program. Direct students to the following web sites to gather information: http://www.habitat.org/env/NRI_default.aspx and <http://www.habitat.org/restores/default.aspx>.
- Have students investigate how green building can contribute to the health and wellness of a home’s inhabitants. Ask students to write a short summary of their findings.

■ Activity Tips:

- Allow students to investigate a sustainable practice that they are interested in, but that does not appear on the list. You may also challenge students to choose two related practices and to show in their diagram how the practices work together to lessen environmental impact and/or create cost-savings for families.
- Challenge students to create an interactive or three-dimensional diagram to illustrate the sustainable building concept. You may also encourage them to use recyclable objects in order to create an eco-friendly project.
- Allow students to work independently to write a green initiative proposal other than the one decided upon in class. After reviewing the proposals, submit them to their intended recipients along with the classroom proposal.

■ Optional Extension Tips:

- Encourage students to take a leading role in the organization and design of the virtual manual. Have students create a cover design and title for the manual as well as introductory pages that point out the purpose of the manual and explain how to use the information the manual provides.

Grades 9–12

Objectives

Students will:

- read about green building practices Habitat for Humanity considers when planning and constructing homes.
- create a diagram to explain one sustainable practice.
- work together to draft a proposal for a green initiative.

Educational Standards

Common Core State Standards

Literacy in Science and Technical Subjects

- Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

National Science Standards

- Students should develop understandings about science and technology.
- Students should develop understanding of natural resources.
- Students should develop understanding of environmental quality.
- Students should develop understanding of science and technology in local, national, and global challenges.

Scope

- 3 class periods (45 minutes each)

Materials

- markers
- 11 x 17 sheets of paper
- access to the Internet and computer lab for research
- classroom computer with Internet access and projector
- **Information sheet:** Sustainable Practices
- **Worksheet:** Green Initiative
- **Teacher Resource:** Diagram Rubric

Lesson Plan

In this lesson, students will learn about sustainable building practices Habitat for Humanity supports. Students will generate a diagram to explain an aspect of green building and then create a proposal for a green initiative.

■ Preparation:

Before beginning the lesson:

- Make copies of the information sheet and worksheet for students.
- Arrange for students to use the computer lab for a class period.

■ Procedure:

Day 1 Discuss the topic of sustainable building practices. Introduce the diagram assignment.

1. Read the information sheet “Sustainable Practices” together.

Explain that these practices are encouraged by Habitat for Humanity because they support the organization’s goal of building safe, affordable, and durable housing with partner families in need. Talk about how building sustainably not only saves resources and energy but also saves the homeowners money on utility bills and creates healthy homes.

2. Introduce diagram assignment.

- Explain to students that they will be creating a diagram that focuses on one of the bulleted items listed on the information sheet. The diagram will define the practice in further detail and/or show how it works. Share the “Diagram Rubric” with students so they are aware of the assignment’s expectations.

- Assign each student one of the green practices. (You may assign more than one student to the same practice.) Then direct students to the following links to help them begin their research for their diagram:
http://www.habitat.org/env/energy_bulletins.aspx
http://www.habitat.org/env/materials_conservation.aspx
<http://www.habitat.org/youthprograms/greenbuild/projects.aspx>
- Hand out the large sheets of paper and markers to students to create their diagrams. You may also have students use computer design and drawing tools to generate their diagrams. Students should complete their diagrams for homework.

Day 2 Students present their diagrams.

- Have students present their diagrams to the class. Encourage students to ask questions about the information presented on the diagrams.
- Afterward, ask students to discuss which sustainable practices would
 - have the least impact on the environment.
 - create the longest-lasting benefits.
 - save the most energy.
 - save the homeowner the most money.
 - require the least planning and implementation.
 - require the most planning and implementation.

Day 3 Students draft a green initiative proposal.

- At the start of class, direct students' attention to the following site:
http://www.habitat.org/env/project_examples.aspx.
 Choose a few of the links to read about some of Habitat for Humanity's current green initiatives. Discuss how each initiative uses concepts from the sustainable practices you learned about on Days 1 and 2 of the lesson.
- Explain to students that as a class, you will be coming up with an idea for your own green initiative. The initiative may benefit your local Habitat for Humanity affiliate, your school, or a community building or center. (You can locate Habitat for Humanity affiliates at <http://www.habitat.org/cd/local/>. Before

contacting an affiliate, remind students that not all affiliates have incorporated Habitat for Humanity's sustainable building initiative into their program yet. This fact should be taken into consideration as they plan to propose their green initiative to the affiliate. The initiative should be a low-cost way to support green practices. For instance, students could run a program in association with their local affiliate to collect worn jeans to be recycled and processed into an inexpensive and nonhazardous form of insulation. Or, students might propose that a section of the school roof or surrounding fields be used for a garden. Have students answer the questions on the "Green Initiative" worksheet to help them formulate ideas.

- Once students have completed the worksheet, ask volunteers to share their ideas. Record them on the board. Take a vote to narrow down the list. Once you've considered the feasibility of the remaining options, choose one to pursue.
- Assign groups of students to begin drafting sections of the proposal. Sections might include the following:
 - Background (why the initiative is necessary and how it supports green living)
 - Description (specific details defining the initiative)
 - Budget and time line (the cost of the initiative and how and when it will be achieved)
- Reconvene as a class to review the sections of the proposal. Make necessary additions and revisions. Ask a volunteer to type the proposal. Email the proposal to its intended recipient.
- Once you've received approval for your proposal, have your class follow the necessary steps to put it into action.

■ Assessment:

Evaluate students' diagrams according to the diagram rubric on page 5.

■ Optional Extension:

Have all students create computerized versions of their diagrams. Have them type a short explanation to accompany them. Then, organize the files and save them as a "visual" manual of green building practices. Save the manual as a pdf and send it to your local Habitat for Humanity affiliate to share with partnering families.

Sustainable Practices

Below are some of the sustainable construction and maintenance standards Habitat for Humanity supports.

Building Orientation and Landscaping

- Orient the home on the site to capture the benefits of passive solar heating and cooling.
- Make an intentional effort to save green space, topsoil, and trees on the building site. Practice proper fencing of tree root zones to lessen construction damage.
- Plant vegetation that is native and drought-tolerant, called *xeriscaping*. Develop landscapes that require less maintenance, minimizing turf.
- Plant shade trees to help cool the home during summer months and allow for natural heat gain in the winter, thereby lowering costs and improving comfort.

Energy-efficient Features, Air Quality, and Water Conservation

- In the laundry room, vent the clothes dryer directly outside.
- Install a washer and dryer that are Energy Star-approved.
- Install a programmable thermostat. Set the thermostat 2 degrees cooler in the winter and 2 degrees hotter in the summer.
- Set water heater at 120 degrees or lower.
- Make sure water heater is tankless or solar.
- Install low-flow flapperless toilets and low-flow faucets and showerheads.
- Install Energy Star-approved stove, refrigerator, microwave, and dishwasher.
- Install Energy Star-approved light fixtures with compact fluorescent light bulbs.
- Proper window insulation provides energy efficiency, comfort, and durability. More efficient windows provide a greater barrier against cold and hot temperatures outdoors, thereby reducing energy bills. Better windows also decrease condensation indoors,

reducing moisture and mold problems.

- Build a tight house. Seal up holes—small and big—within the building envelope. Even little holes add up in a house, resulting in one big hole of total air leakage.
- Placing heating and cooling units within the attic is not advisable, as extreme hot or cold temperatures reduce the efficiency of the unit and any leaks leading to and from the unit invite undesirable air into the living space. The shorter the length of a duct, the more effective the heating and cooling system will be in removing moisture and providing proper ventilation.
- Efficient plumbing design and efficient hot water systems reduce heat loss and reduce water wasted waiting for hot water by locating the heater near fixtures.

Materials and Resources

- Choose building materials that are local to save in transportation costs and support the local community.
- Utilize a construction waste management plan to reduce the amount of waste sent to the landfill.
- Use materials with recycled content and reclaimed materials that may otherwise be deposited in landfills.
- Apply advanced framing methods to reduce the amount of lumber needed in each home while maintaining structural integrity and meeting the building code. Advanced framing saves wood and costs while allowing for more space in the wall to install insulation and improve the building shell.
- Select certified wood that ensures wood is harvested in an environmentally, economically, and socially responsible manner that protects the health of the forest ecosystem and local economies.
- Use low or zero VOC (volatile organic compounds) when selecting paint, finishes, caulk, and construction adhesives, thus reducing toxic gasses.

Sources: Habitat for Humanity's U.S. Sustainable Construction Standards manual and Habitat for Humanity Green Build checklist

Green Initiative

Directions: Answer the following questions to help you propose a green initiative.

1. What green practice from the “Sustainable Practices” information sheet interested you the most? Why?

2. What current Habitat for Humanity green initiative interested you the most? Why?

3. Is there a practical way you could apply your answers from questions 1 and 2 to a classroom green initiative? If so, how?

4. What would you need to accomplish this initiative? (Think about costs, labor, approval or permission from authorities, etc.)

5. If your initiative is too costly or labor-intensive, how might you revise it to make it more feasible?

Diagram Rubric

	Exceeds Expectation (4)	Meets Expectation (3)	Partly Meets Expectation (2)	Fails to Meet Expectation (1)
Accuracy of Information	All information is well-researched and accurate.	Most of the information is well-researched and accurate.	Some of the information is accurate.	Little to none of the information is accurate.
Organization and Coherence	Content is arranged in a highly logical order with a strong connection between ideas.	Content is arranged in a logical order with a good connection between ideas.	Content is arranged in an order that is, at points, illogical. The connection between ideas is weak at times.	Content is not arranged in a logical order. There is no connection between ideas.
Application of Knowledge	Student shows a strong understanding of green practice.	Student shows a good understanding of green practice.	Student shows a limited understanding of green practice.	Student shows no understanding of green practice.
Visual Appeal	Diagram is clear, thorough, and visually appealing.	Diagram is somewhat clear, thorough, and visually appealing.	Diagram is difficult to interpret and understand.	Student does not create and present a diagram.