

Building a Model House STEAM Lesson

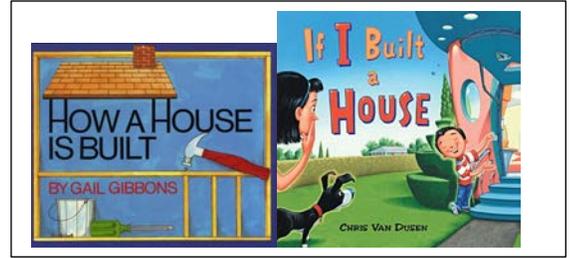
Suggested titles:

If I Built a House by Chris Van Dusen

How to Build a House. Technical Tales by Saskia Lacey

Building Houses 3D Shapes by Moira Anderson

How a House is Built by Gail Gibbons



Lesson duration: 90 minutes with Read Aloud

Suggested Age Range: 6-16

STEM Activity: Choose one

- Build a model home, from given recyclable materials, that protects people (or your UV sensitive critter keychain) from sun radiation
- Build a model house, from given recyclable materials, that withstands a storm (fan on medium or high speed)
- Build a model home that is energy efficient (retains heat)

Objective: Children will design and build a model house that meets the engineering design challenge (UV protected, withstands a storm {hurricane} or retains heat {requires a thermometer, incandescent light bulb and socket on a cord (around \$6)} – see suggested resources below} and share decisions, what went well, what was challenging and how they collaborated.

Supplies/Resources/Tech:

Cardboard pieces, cardboard tubes, paper plates, construction paper & scraps, wooden craft sticks, rulers, masking tape, clear tape, scissors, plastic wrap, wax paper, simple blueprint paper – *optional*, plastic tubs to organize supplies, images of simple cardboard houses for kids (use Google images)

Special supplies needed for each:

UV Protection Challenge: UV beads keychain from previous lessons or create a small one, small UV light or lamp (\$8-\$10) in case of cloudy or rainy weather, foil, fabric scraps (*optional*-for model roof tiles or asphalt) ****See suggested purchase options below***

Withstand a Storm Challenge: box or table top fan with multiple speeds

Energy Efficiency Challenge: incandescent light bulbs, sockets on cords, inexpensive digital thermometers (less than \$10 each – food thermometer not oral thermometer) or heat measuring app if cell phone, or other device, has a built in thermometer. ****See resources below for app and thermometer suggestions.***

Read Aloud: stop to discuss talking points about realistic or innovative home construction and interior design ideas; encourage children to share personal connections (text-to-self) with building or remodeling homes

Introduction: “Architects, engineers and construction workers all work to build houses and other buildings. Sometimes they are built to look great for people to live or work in them. Homeowners and businesses do worry about making sure that their buildings keep cool air in during summer and hot air in during winter. Sometimes homes, stores, offices and other buildings are built for special places to stand up to extreme weather or temperatures. There are many ideas that are thought about and planned for creating any kind of structure. Once the safety and working parts of a building are designed, then the architects focus on making a home or building functional, interesting, exciting, innovative and decorative.”

Children Ask Questions: Encourage children to ask questions about constructing different kinds of buildings. Answer procedure questions directly but not creating questions. Record these, if able, to revisit later. (Some questions may be answered today and others another

visit. You might have to read to find out an answer to your questions. You might look on the Internet or find a YouTube video answer. Some questions just can't be answered and that's okay.)

Engineering Challenge: Choose one. "Today, you will be an architectural engineer or mechanical engineer while you design a house..."

- that protects people (and animals) from dangerous UV radiation from the sun, showing the UV light and sample bead critter then discussing how houses, cars and windows keep dangerous burning radiation from the sun away from our bodies eyes **OR**
- that protects people and their homes or businesses from strong winds during a hurricane or very strong thunderstorm, showing the fan and all its settings then telling children that their structure needs to stay standing at the highest speed as those are model hurricane force winds **OR**
- that helps people save money by keeping cool or warm air inside the building making it "energy efficient" (efficient here means works very well and doesn't waste anything) then showing the light bulb in the socket at the end of an extension cord

Guided Practice:

1. Have children walk along the makers table with all the supplies to choose from. Ask them to start thinking about how they might design a model house with what they see.
2. Show children the paper plates explaining that this is a base they should use to tape their house or building onto to help make it strong and to carry it the hurricane testing area.
3. Google "cardboard model house for kids" for a few plain and simple designs to show children.
4. Remind children that they will need to measure their walls and roof so the sizes match. Show the rulers again at the makers supply table.
5. Have children brainstorm how they might create the walls and roof of their model house by telling someone sitting near them and then others in their group.
6. Remind the group again about how their building needs to meet the challenge.
7. Have 4-6 children share their ideas with the whole group.
8. Optional: have children draft any ideas on simple blueprint paper. Be sure they estimate the measurements of the walls and roof.
9. Call groups of children over to the makers table to collect supplies they want to start with.
10. Circulate helping children with procedural needs but encourage design and building help to come from other children or ask a child, "What do you think? How could you show that?" "How could someone help you do that?" or other prompts or questions to lead children to decide and plan their design.

Independent Practice:

1. Have children continue to share ideas with each other about how to build the challenge structure.
2. Children should be creating their own ideas or using ideas from other children, adults should not be telling them how to build except for perhaps how to connect pieces and help with getting walls to stand up and connected.
3. As children get close to finishing their design, they can begin testing their structure and make changes as desired. Be sure each child has tested at least once so she/he can make changes.

4. If time, children can add creative decorations to their structure to make it look like a house or other building.
5. Give children a time limit of ten minutes to finish what they are working on, even if their building is not completely finished.
6. Have children do a “mini clean-up,” returning supplies and throwing trash away.
7. Bring all children together to “officially” test their structure.
8. Each child brings their structure, taped to a paper plate, to a table set up as the official “Sun Harmful UV/UVA Radiation Testing Area,” “Hurricane Winds Testing Area,” or “Money Saving Energy Efficient Testing Center.”
9. Children test their structure’s efficiency by:

UV Protection Challenge: shine sunlight or a UV light over the structure and count how many beads change color and stay the unchanged; the least changes is the most efficient

Withstand a Storm Challenge: blow the fan at low, medium then high speeds; the structure(s) that stays intact have the strongest design features

Energy Efficiency Challenge: turn on an incandescent light bulb inside the structure and measure how much energy (higher temperatures) are escaping the building. The structure with the least amount of heat “leakage” has very efficient designs to keep both heating and cool air conditioning inside.

Children answer questions posed as able or researched: Have children answer questions posed by kids, if appropriate and able.

Children Share/Present: Each child talks about what choices they made in creating their structure any why they thought that met the challenge. What changes were made and why? What was difficult, what was easy and how did others help?

- Have everyone applaud for each prototype.

Resources:

Android Apps - may need an additional temperature sensor device added to cell phone or tablet

<https://play.google.com/store/apps/details?id=io.senseai.kelvin>

https://play.google.com/store/apps/details?id=com.playsimple.roomtemperature&hl=en_US

<https://thermometer.en.softonic.com/android>

http://download.cnet.com/Digital-thermometer/3000-20432_4-75998825.html

https://play.google.com/store/apps/details?id=com.colortiger.thermo&hl=en_US

Cords, sockets for lightbulbs suggested ordering or purchasing:

<https://www.sciplus.com/Lamps-Sockets-Wiring-c>

<https://www.homedepot.com/p/Newhouse-Lighting-18-2-12-ft-Black-Hanging-Lamp-Light-Cord-with-E26-Socket-CCORD-BLK/206973568>

https://www.amazon.com/Simple-Deluxe-Extension-Hanging-Included/dp/B01LFYVW7O/ref=pd_lpo_vtph_60_bs_t_1/144-5048499-6564364?_encoding=UTF8&psc=1&refRID=78A4JYKNRQWD9DFA910K

<https://www.amazon.com/WALLNITURE-Pendant-Lamp-Switch-White/dp/B00OZRF798>

<https://www.walmart.com/ip/Brown-Cord-with-Light-6/43525794?wmlspartner=wlp&selectedSellerId=0>

<https://www.amazon.com/WALLNITURE-Pendant-Lamp-Switch-White/dp/B00OZRF798>

UV Protection Challenge Developed by: Laura Kitagawa. (January 2016). Made for the Shade. *Science & Children*. NSTA: Arlington, VA.

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