

ADVENTURES IN DESIGNING A

Tiny Town



Humboldt Interdisciplinary STEM Initiative

Tiny Town



FORWARD

Purpose

This is an integrated project based 8 unit lesson plan where students create art-inspired, energy efficient miniature homes and neighborhoods for the future, designing into the infrastructure good environmental design and consideration, as well as efficient human life styles, utilizing landforms, while honoring the Mother Earth

Objective

The objective is to utilize STEM and STEAM missions of bring together math, technology, engineering, art, and the sciences into the creative thought processes of our students. Students use these disciplines as the tools in their creation, planning, testing, and revising of practical everyday problems in today's busy world. This particular problem involves creating a futuristic community where energy efficiency, environmental protection, and human harmony in spirit with each other and all of life around us is honored. This project asks students to dream, create, invent, theorize, produce, reflect, and then re-invent, reproduce ideas they have created themselves. Students are encouraged to create with their culture in mind. To do this students will utilize the processes of mathematics, technology, engineering, art, and all of the sciences to make informed choices, and to plan, produce, and revise their STEAM Tiny Town.

CHAPTER 1

Tiny Town: Introduction



It takes a lot to design a town. What type of buildings do you see in the picture above. Is there anything that you think your town should have? As you go through the design process remember nobody usually gets it right the first time. You have to design and redesign to make it just right.

What is a Sustainable Community

Vocabulary

1. Sustainable
2. Environment
3. Resources
4. Emissions
5. Green House Gasses

Figure 1.1



In this book you will learn how to make a model Tiny Town. A place where everyone works together to make the best town it can be. Now this isn't just any town, this town is special. This town is a **sustainable** living commu-

nity. A place where the people work hard to protect the **environment** and the **natural resources**, like water, energy and clean air that are available to them. So read on and let's start our adventure as we design our Tiny Town.

What is a sustainable town. There are a lot of ways to define a sustainable community. one way to describe it is as a place where the use of resources and **emissions** of **greenhouse gases** and pollution is going down, not up. It is a place where the air and water is clean and the land is used in a way that is respectful to nature and the environment. A place where there are plenty of parks and public spaces accessible to all of the people for them to enjoy. As we design our Tiny Town think about how many of your daily needs can be met there.

Interactive 1.1 Guess the word from the clue



use this interactive game to better learn the vocabulary

CHAPTER 2

Architectue



The Rheinhafen centre of arts by Frank O. Gehry (USA) consists of three contrasting building complexes and appears like a gigantic sculpture. The different materials chosen give each complex its own identity. The outer material of the central building reflects the buildings on its northern and southern side, thus creating a link between the three.

Frank Gehry

Figure 2.1 Walt Disney Concert Hall



The Walt Disney Concert Hall at 111 South Grand Avenue in Downtown of Los Angeles, California, is the fourth hall of the Los Angeles Music Center and was designed by Frank Gehry. It opened on October 24, 2003.

After watching the following videos you will research other architectural designs, concerns, problems, ideas, in books and on the Internet and draw some designs for what a futuristic neighborhood might look like. What do you think of when you picture a futuristic building in your head. What does it

look like? What kind of design features does it have. What is it used for? these are all questions to consider as you draw your design of a futuristic neighborhood. Watch these videos to get a little more information on the architecture design proc-

ess and one of the pioneers of modern architecture,
Frank Gehry

Interactive 2.1 Frank Gehry teaches design and architecture



This is a short introduction video to Frank Gehry new master class course.

Interactive 2.2 So you want to be an architect



This is a short video on architecture and the design process

Interactive 2.3 So you want to be an architect part 2



This is part 2 of a video on architecture. it explorers the process of building.

Interactive 2.4 My futuristic neighborhood sketch



Use this sketchpad to draw a design of your futuristic neighborhood

CHAPTER 3

Designing your house



Getting Started

What you will need

1. large six foot by three foot ply board or shallow boxe(s) (two large panel TV boxes)
2. 11x18 construction paper. Label with title and name, and date.
3. materials to build your house (cardboard, paper etc)

Figure 3.1 Student drawing of tiny town



Now we will begin planning our tiny town. It will consist of 5-6 neighborhoods of four to six houses each, side by side on a large six foot by three foot ply board or shallow boxe(s) com-

prising STEAM Tiny Town. (I used two large panel TV boxes.)

Step 1

- Create a STEAM Tiny Town folder out of 11x18 construction paper. Label with title and name, and date.

Step 2

- brainstorm and generate some questions about planning and building a neighborhood. Record these ideas on the notepad below. You will share your ideas with the whole class. and put these in your tiny town folder. on front classroom board. Let these ideas be student derived only.

Interactive 3.1 Interactive notepad



brainstorm and generate some questions about planning and building a neighborhood.

Step 3

- your teacher will put you in a group of 4-5 students "neighborhoods" where each one of you will design and make a house for your neighborhood.
- on the notepad below generate a list of ideas for the building needs, and another list of questions that you and your group have. here are some of the things you should answer in your notes.
 - power and heating; from where, how
 - water; from where, how, goes where
 - sewer; to where, how
 - garbage; to where, how
 - transportation; roads, pavement, sidewalks,
 - community lighting, where, how
 - stores, schools,, community center, etc.
 - aesthetics

Interactive 3.2 Interactive notepad 2 (building needs)



generate a list of ideas for the building needs. make sure to answer the questions on the previous page.

Step 4

•share your ideas from your notepad with the whole class. The teacher will put your ideas under one of each category bellow.

Record on board: 1) power sources, 2) power ideas, 3) environmental concerns, 4) inventions, 5) problems, and 6) solutions.

Once all of the ideas from all of the groups are on the board use your i-pad to take a picture of what

your class came up with. You will put your picture in the book photo bellow.

Interactive 3.3 In book photo



take a picture of your class ideas that everyone came up with on the board to put in your book.

Step 5

•Now start thinking bout what building Materials you will need to build your house. Make a List of what you will need to collect and bring to school. Some ideas include , construction paper, glue, cardboard, plastic wrap, popsicle sticks etc. Also make a list of what school supplies available (you may have to ask the teacher) .

Interactive 3.4 Building materials notes



Make a list of building materials you will need to build your house.

Step 6

- Use the sketchpad below to make a sketch of what your house will look like

Interactive 3.5 Make a sketch of your house design



What will your house look like using the materials that you will pick?

Building Your First Model

Figure 3.2 Student watercolor painting of house

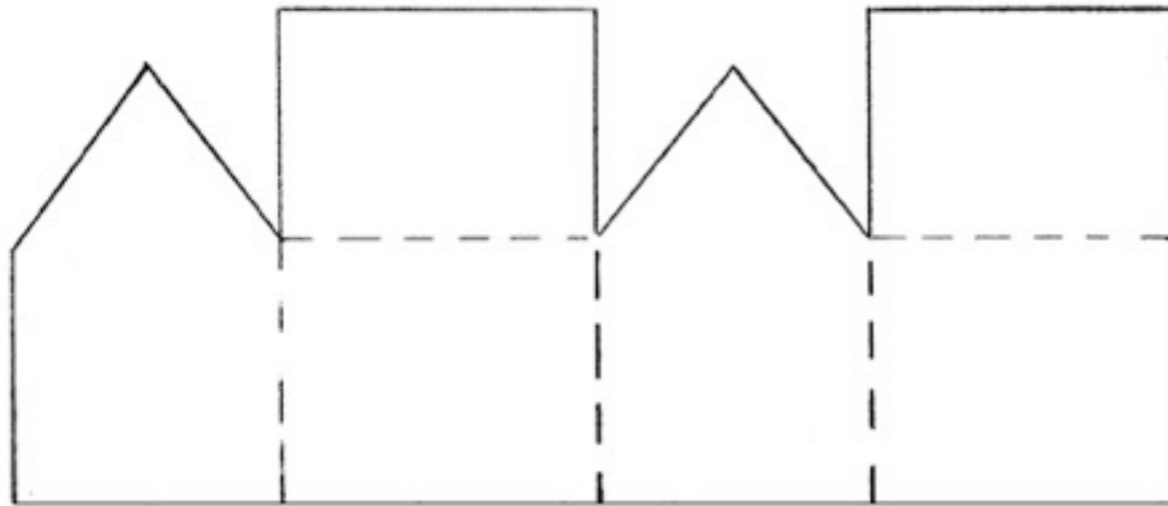


Challenge #1: Make a paper house that stands. First you will make a template for your paper model homes. You will then use the template to make a model that stands up.

Center 1; Drawing Center: graph paper, pencils, rulers

- Using one inch graph paper, center a group of four squares for the floor and create a net pattern with the four square walls coming out from the

floor, and triangular roof pieces coming out of the top of each wall, all attached to each other. Use the template bellow as an example.



Now add windows, skylights, and doors on pattern.

Center 2; Cutting Center; templates, scissors

- Carefully cut out template.

Center 3; Taping Center; tape, scissors

- Now that your house is cut out tape it all together. It may take some practice and if you mess

up thats ok, you can go back to center 1 if you need to.

Center 4; Final testing; can it stand?

- Choose a safe spot in the classroom, and set them up like a neighborhood.

Interactive 3.6 Paper Model House Picture



Use this interactive to take a picture of the house that you designed

Reflection; Think about the design process you just went through. How did it go. Were there any problems or obstacles, what worked and what did not. What might you do differently next time. take a piece of paper and write a reflection on this and put it in your Tiny Town folder.

Revise Your Design

Figure 3.3 Computer generated 3-D house



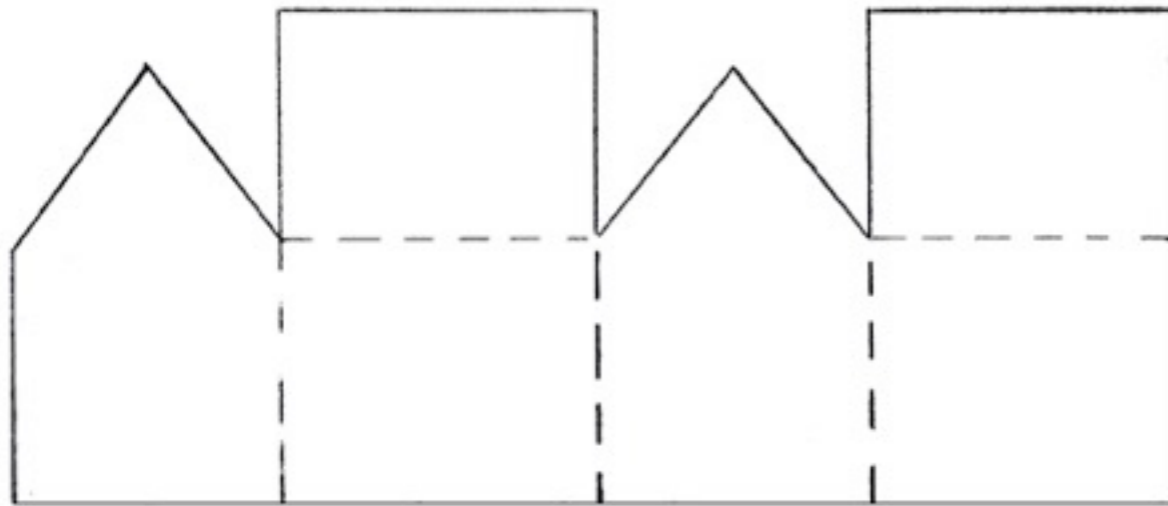
Challenge #2 : Now that you have designed and built your first house model we will make improvements. Your first improvement will be on the material you used. In your first design you used paper to build your house. You may have noticed some challenges and difficulties getting your house to stand.

What is another material we could use that is a little stronger than paper? Lets try building this house using cardboard. It is more ridged and a little stronger. This should help our houses stand up a little better. Just like before you will use a template for your cardboard model homes. You will

then cut it out and put together to make a model that stands up.

Center 1; Drawing Center: cardboard, pencils, rulers

- Use the template bellow as an example to sketch your new design on a piece of cardboard.



- Draw windows, skylights, and doors on pattern.
- Label and date center of template. Label all walls with a "w", floor with an "f", and roof pieces with a "r."

- Get teacher approval of plans before moving to center 2

Center 2; Cutting Center; templates, scissors

- Carefully cut out template.
- Fold inwards on ALL of the lines and check for fit.
-

Center 3; Taping Center; tape, scissors

- Now that your house is cut out tape it all together. It may take some practice and if you mess up thats ok, you can go back to center 1 if you need to.

Center 4; Final testing; can it stand?

- Choose a safe spot in the classroom, and set them up like a neighborhood.

Interactive 3.7 Cardboard model house picture

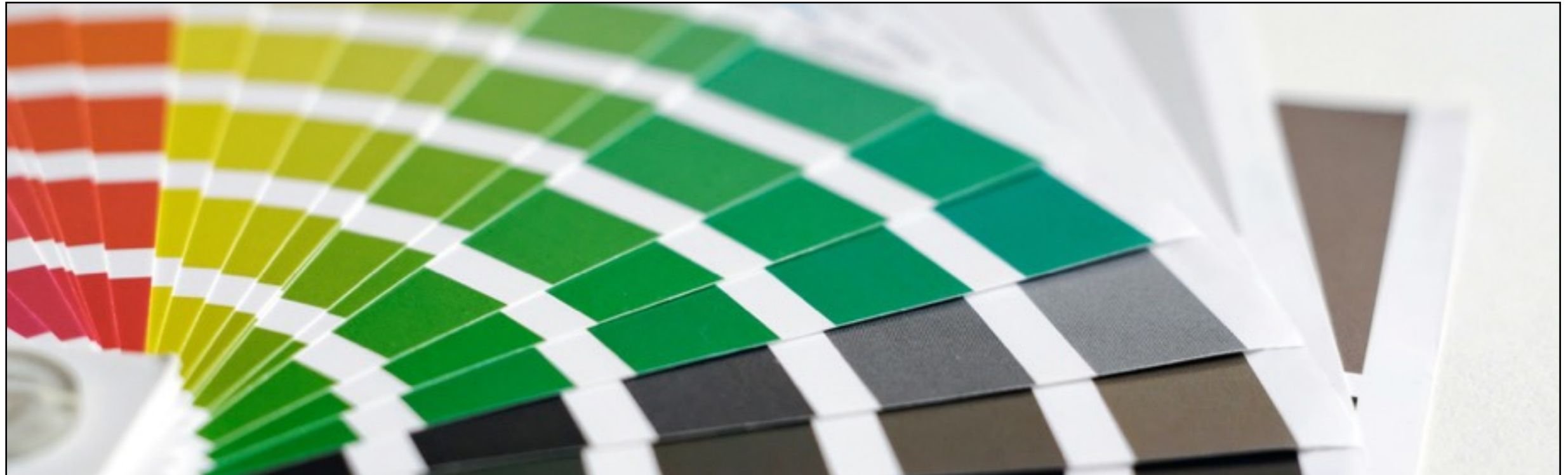


use this interactive to take a picture of your house and revisions

Reflection; Think about the redesign process you just went through. How did it go. Were there any problems or obstacles, what worked and what did not. What might you do differently next time. take a piece of paper and write a reflection on this and put it in your Tiny Town folder.

Decorate Your House

Figure 3.4 Color Wheel



Now you will make some more changes (revise design) to your house . You will add plastic windows and doors, and paint your home. Every home needs a good coat of paint. What color will your house be? How many windows will it have? How many doors.

these are just a few of the questions we will answer as you continue to improve on your house design.

Center 1; Drawing Center: transparency paper, pencils, rulers

- Using a ruler carefully measure the windows on your house.

- Use these measurements to trace your windows on the transparency paper.

Center 2; Cutting & Gluing Center; cut out windows, scissors,

- Carefully cut the door form your cardboard house

- Carefully cut out windows form your cardboard house

- Carefully cut out windows form transparency paper

- Glue the plastic windows on your house.

Center 3; Painting center; ruler, tape, scissors colored construction paper

- Use the colored construction paper to "paint your house.

- Use a ruler to measure all of the sides of your house.

- trace your measurements on a piece of colored construction paper

- Glue the construction paper to all of the sides of our house . tape house together

Center 4; Final testing; can it stand?

- Choose a safe spot in the classroom, and have all agree not to touch others homes, and set them up like a neighborhood.

- reflect on paper; what might your neighborhood also need to build?

- Draw and color what your land surrounding your community might look like. Add these drawings and reflections to your folder.

Making Your Tiny Town

Figure 3.5 Tiny Town



Now that your house is ready you will add it to the neighborhood. Look at all of the houses you and your classmates have made! Each one is a little bit different and unique. How will you set up your neighborhood. How will your houses get water and elec-

tricity? Where will the roads and sewer lines go? Think about these things as you plan your design.

Step 1; Create lots on the "land" boxes, and grid out a neighborhood big enough for all of the homes,

and other buildings. Place tubing for sewer/water, and electricity sources.

Step 2 ; Place homes onto lots; land development; plan for solar and water wheel power generation.

Step 3; Solar Panel and Pelton Wheel set-up; run, troubleshoot, resolve

Emissions

something sent forth by emitting such as substances discharged into the air (as by a smoke-stack or an automobile engine)

Related Glossary Terms

Drag related terms here

Index

Find Term

Environment

All the physical surroundings on Earth are called the environment. The environment includes everything living and everything nonliving.

Related Glossary Terms

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Greenhouse Gas

any of the gases whose absorption of solar radiation is responsible for the greenhouse effect, including carbon dioxide, methane, ozone, and the fluorocarbons.

Related Glossary Terms

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Find Term

Natural Resources

A natural resource is something that is found in nature and can be used by people. Earth's natural resources include light, air, water, plants, animals, soil, stone, minerals, and fossil fuels.

Related Glossary Terms

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Sustainable

method of harvesting or using a resource so that the resource is not depleted or permanently damaged

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