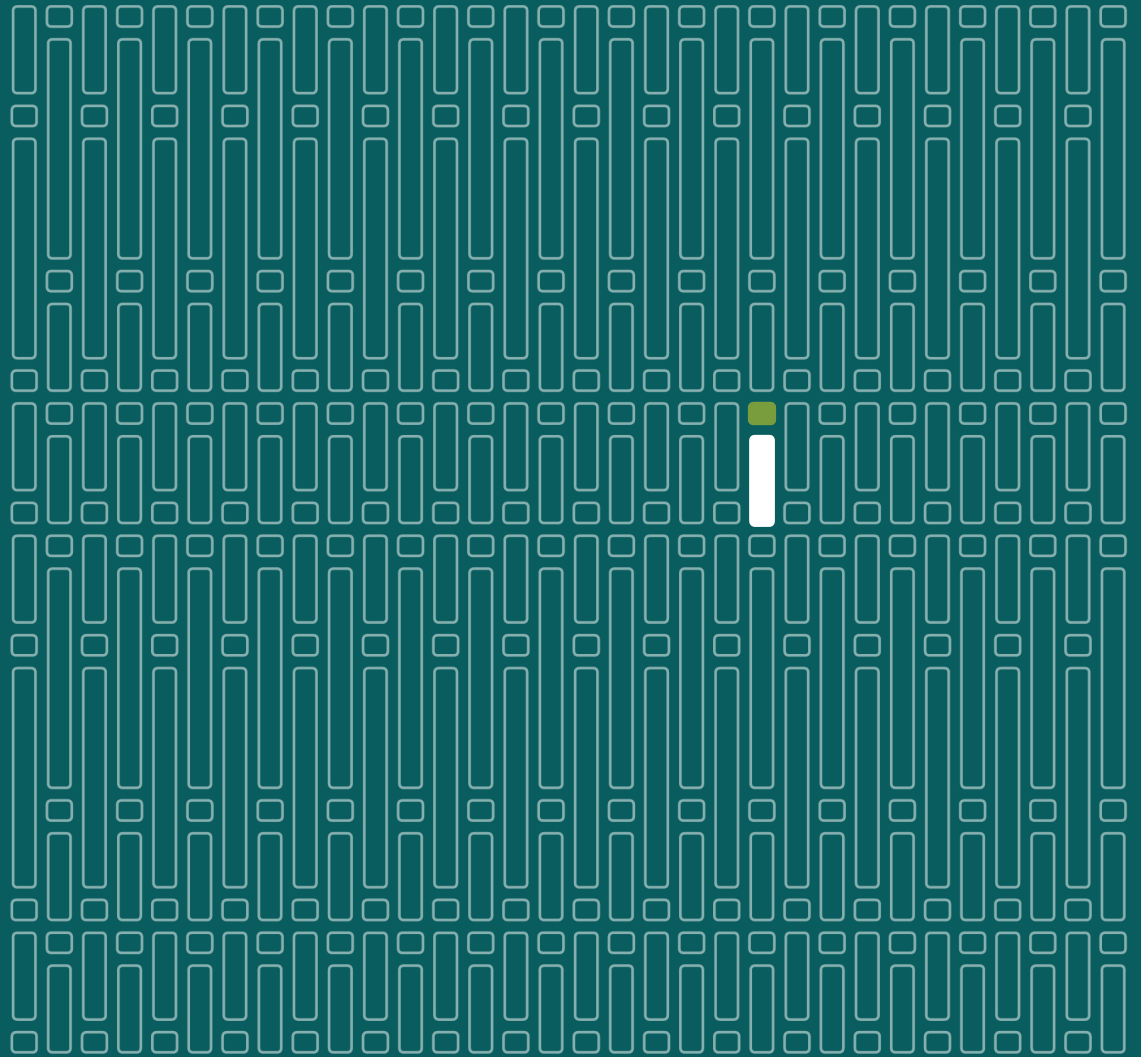


DESIGN LAB

LEARN + BUILD

2023 EDUCATOR and VOLUNTEER RESOURCE GUIDE | GRADES 3-8



gathering spaces:

connection ■ community ■ togetherness

DESIGN LAB: LEARN AND BUILD MISSION

Our mission is to create awareness, appreciation, and understanding of the built environment through education.

We do this by:

- Offering our distinctive K-8 education program to area classrooms
- Creating thematic annual educational programs aligned with state learning standards, implemented through an active partnership between educators and professionals in the built environment.
- Offering appropriate grade level content, lesson plans and learning goals.
- Providing educators with a useful and imaginative tool to help meet educational goals in a variety of academic and enrichment subject areas.

DEAR EDUCATORS & VOLUNTEERS,

Welcome to **Design LAB: Learn And Build 's K-8 education program.** This is a design education program as much as it is a wonderful community of people who are passionate about the built environment and the next generation. As the Executive Director, it is truly this program that makes my job so meaningful and a big part of why a lot of our board members are passionate in their roles. While we find meaning in managing the program, it is you who brings it to life and makes it possible for the enormous amount of students who participate each year. It is my hope that you, too, will benefit from being a part of the program, as I know each year the students, educators, and volunteers who participate bring a little bit more into my life than was there before.

For over 20 years, this program has aimed to assist students in learning about how they can plan, communicate, and thoughtfully build their environments. As students design and model their projects, they also build awareness, knowledge, and confidence. They start to understand how to engage with their world as curious and thoughtful citizens.

Throughout this program, students will gain an appreciation of the built environment and the role they can and will have in shaping it. Please feel free to reach out with any questions, concerns, or input into how to improve the program.

Thank you for your participation!



Christen Lubbers, Executive Director
Design LAB: Learn and Build
CLubbers@architecturecincy.org
(513) 421-4469

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important information for educators

THANK YOU FOR PARTICIPATING IN DESIGN LAB! We hope that this experience will be a great one for you and your classroom. This page contains some tips and information to make sure that it is the awesome experience that it should be.

TAKE FULL ADVANTAGE OF THE TIME YOU HAVE WITH YOUR VOLUNTEER IN THE CLASSROOM. They have a depth of knowledge and exposure to the built environment that can bring this program to life in the classroom. However, these volunteers do have a career and likely cannot be in your classroom each time you work on Design LAB. They are also not educators and for some, this may be their first foray into a classroom environment.

MAKE YOUR GOALS AND EXPECTATIONS FOR YOUR CLASSROOM'S PARTICIPATION IN DESIGN LAB CLEAR, TO BOTH THE STUDENTS AND VOLUNTEERS. This project is yours to direct and your volunteer is an assistant and a knowledge resource. They also give students a look into a potential career path, one of the many perks of this program. Be sure to ask them about their profession (or program in school, for our wonderful student volunteers) and allow them to talk to the students about what their days look like and about real-world challenges/solutions.

MAINTAIN GREAT COMMUNICATION WITH YOUR VOLUNTEER. Collaborate on a plan for the program and remain flexible. You will likely need to make adjustments, but going in with a plan is a pro move. Support your volunteer with any unfamiliar classroom circumstances and lead the process to implement the best ways of reaching achievement goals for your students.



LESSON PLANS AND ACTIVITIES This guide contains foundational education about the built environment, instructions on how to implement a constructive and fun critique/presentation, as well as suggested activities pertaining to the annual challenge. The initial presentations and activities are necessary for a successful program and we do highly encourage the critiques/presentations as part of the learning process. However, **the entirety of this guide is yours to use as a resource**, do not feel like you have to use every page. **Pick what works best for your class and your students** and feel free to add your own activities or lessons as you see fit.

LEARNING OUTCOMES We ask educators to conduct a pre and post assessment with their students and return them to our office (electronically or by mail). The data we collect from these helps us improve the program and support fundraising efforts. While our program is extremely versatile, there are key learning components that will be covered in the initial presentations and these cover a foundational understanding of the built environment.

The learning that occurs during this program that we can test for is limited. The growth that occurs is usually based around teamwork, creativity, confidence, and an array of other great outcomes that cannot be tested, but are applicable in the real world. What we are testing for are foundational aspects that are very important to modeling and building. Do let your students discover through tinkering and fumbling through their model builds. **This program is truly about the process, try not to focus on the end result.**

ABOVE ALL, HAVE FUN! This can become frustrating for students as they build their models. Laugh at and learn from failures and highlight the growth that occurs from rebuilding. That is what the built environment is all about!

If you have any questions or need assistance during the program for any reason, please contact us at CLubbers@architectureincy.org or 513.421.4469. We want to know how the program is going in your classroom and if there is anything we can do to help.

important information for volunteers

THANK YOU FOR PARTICIPATING IN DESIGN LAB! We want to make sure that you go into this program prepared so that it is a great experience for you, your educator, and your students. Please read this page carefully, as it will provide information and advice that will help you make the most of your time with Design LAB.

THE CULTURE OF CLASSROOMS WILL VARY BASED ON THE SCHOOL TYPES AND LOCATIONS.

Talk your teacher to understand the classroom dynamics and to understand the best way to communicate with the students. Keep in mind that the more challenging the classroom, the more you and the students will gain from the experience. Remember to be patient with your students. The model build can be frustrating for some and with students having different levels of exposure to the information that is presented to them, some of them may find it difficult. Each student will benefit from your willingness to share your passion and creativity, even if it does not always seem that way. It is not essential for a third grader to completely understand scale, it is essential that they use their creativity and have fun while taking a closer look at the built environment.

TIMING

You are an extremely valuable resource for the classroom, but your time there is limited. Your creativity, expertise, and passion is all of great use to your classroom; so be mindful of effective ways to leverage the time you have available to your students.



STAY FLEXIBLE WHEN PLANS CHANGE.

Things don't always go per the plan, especially when it comes to building models. If there are any differences in visions or goals for the classroom, this is something you should speak to your educator about.

LEARN FROM YOUR STUDENTS.

Don't look at this as a one-sided relationship. You can gain just as much from this experience as the students can, be open to it. Acknowledge their innovative thinking and lack of inhibition, realize how keyed in they are to the problems facing their communities and the creative responses they have for solutions. Understand how much they have to offer the world and treat them accordingly.

ABOVE ALL, HAVE FUN!

Don't get caught up if students are having a hard time grasping certain aspects of this project. If you are having fun, they will likely be having fun as well and the learning will occur naturally throughout the course of the program. Laugh through the "trying" phase with them.

Encourage them to keep going. Sharing your enthusiasm is contagious and will inspire students to express theirs as well.

Design LAB is possibly their first in-depth exposure to built environment concepts, and it has proven potential to elevate career aspirations.

If you have any questions or need assistance during the program for any reason, please contact us at CLubbers@architecturecincy.org or 513.421.4469. We want to know how the program is going in your classroom and if there is anything we can do to help.

acknowledgements

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Design LAB is only possible thanks to the generous, energetic and thoughtful work of **all participating educators and classroom volunteers.** Your work in the classroom with students broadens their horizons and hones their skills in important ways no textbook ever could.

We also thank our sponsors and program volunteers, who contribute the treasure and time needed to implement Design LAB.

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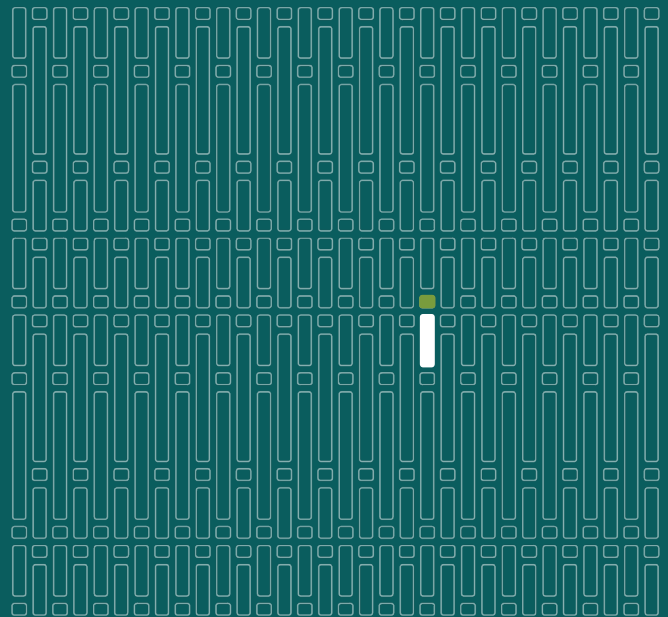
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WE WOULD LIKE TO THANK ALL OF OUR SPONSORS AND SUPPORTERS FOR MAKING THIS PROGRAM POSSIBLE. Without your generosity, this program and the impact it has on the students who participate, would not be possible.



program overview



build awareness ■ build knowledge ■ build community

design thinking and the design process

WHAT IS DESIGN THINKING?

Design Thinking is a mindset. It's the confidence that everyone can be part of creating a more desirable future, and a process to take action when faced with a difficult challenge. That way of thinking, acting, and innovating is well needed in education.

THE DESIGN PROCESS

The design process is what puts Design Thinking into action. It's a structured approach to generating and developing ideas.

THE 5 PHASES OF THE DESIGN PROCESS



1. DISCOVERY

Discovery means opening up to new opportunities, and getting inspired to create new ideas. Discovery builds a solid foundation for your ideas. Creating meaningful solution for students, parents, teachers, colleagues and administrators begins with a deep understanding for their needs. With good preparation, this can be eye-opening and will give you a better understanding of your design challenge.

- **Understand the Challenge** – Uncover your challenge to understand how it impacts the community you chose as your client or even a more global community.
- **Prepare Research** – Look into the challenge and research the community you are focusing on improving, how will this challenge address their needs?
- **Gather Inspiration** – How have others used similar challenges to improve communities? Collect images and stories, anything that can inspire your project.

2. INTERPRETATION

Interpretation transforms your stories into meaningful insights.

Observations, field visits, or just a simple conversation can be great inspiration—finding meaning and turning these into actionable opportunities for design can be a challenge. It involves storytelling, as well as sorting and condensing thoughts until you've found a compelling point of view and clear direction for ideation.

- **Tell Stories** – Synthesize your discovery by creating inspirational stories that captures your learnings.
- **Search for Meaning** – Look for themes that appear, explore the meaning of your findings, and define insights.
- **Frame Opportunities** – Experiment with various visualization methods such as charts and diagrams to present your learnings. Turn your ideas into brainstorming “how might we” questions that will be used in the next phase, Ideation.

design thinking and the design process

THE 5 PHASES OF THE DESIGN PROCESS (CONTINUED)

3. IDEATION

Ideation means generating lots of ideas. Brainstorming encourages you to think expansively and without constraints. It's often the wild ideas that spark visionary thoughts. With preparation and a clear set of rules, a brainstorm session can yield a multitude of fresh ideas.

- **Generate Ideas** - Establish and follow rules for brainstorming in your group, engage in brainstorming sessions, and then select ideas that have the greatest potential. Be sure to keep your notes and even take pictures of the process as they will be valuable later on for your presentation. Freely conceptualize with words, diagrams, sketches, drawings...choose methods that best help you describe your ideas.
- **Refine Details** - Start with a reality check to determine which ideas support your goals for the challenge, which ideas have potential barriers, and which ideas can be evolved. As you narrow your ideas, capture them in a more structured format such as a mini-poster that would include the following:
 - Title of your idea
 - Summary of your idea in a single sentence
 - Description of how your idea would work
 - Explain the features and benefits
 - List challenges and questions

4. EXPERIMENTATION

Experimentation brings your ideas to life. Drawing and building prototypes means making ideas tangible. Spontaneous learning occurs while drawing and building, and sharing ideas with other people. Even with early and rough prototypes, you can receive a direct response from an idea.

- **Make Prototypes** - Prototypes enable you to share your ideas with other people and discuss how to further define it. You can prototype just about anything through drawing, modeling, role-playing, storyboards, diagrams, advertisements, etc.
- **Get Feedback** - Present your prototype to an audience to get valuable feedback which you can use to modify and improve your idea.

5. EVOLUTION

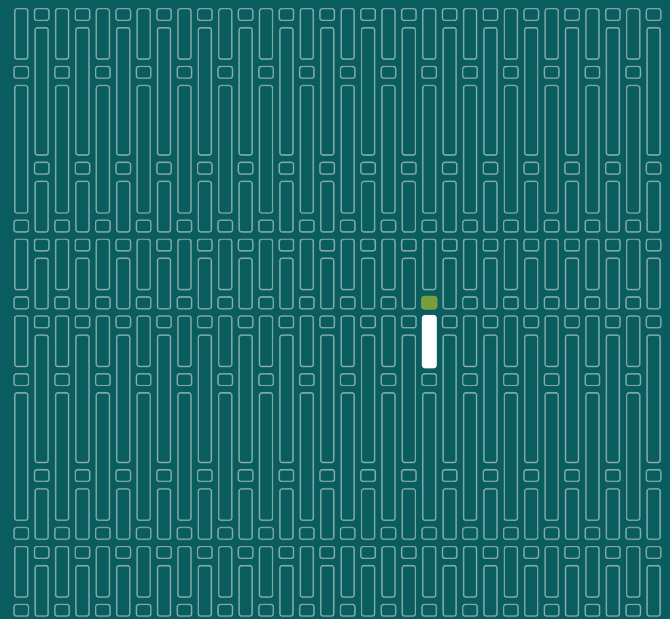
Evolution is the development of your concept over time. It involves planning next steps, communicating the idea to people who can help you realize it, and documenting the process. Change often happens over time, and reminders of even subtle signs of progress are important.

- **Track Learnings** - As your concept evolves, you can begin to measure its impact. Define a set of criteria for success to help guide and evaluate the development and progress of your idea. Be sure to document your progress, discuss the impact of your ideas and celebrate the progress you have made.
- **Move Forward** - When your idea has evolved into a solid concept, it's time to plan for the next steps. Create an overview of the project and determine a final timeline. Identify the tasks that need to be completed and decide who will be responsible for completing them. Invite input from people outside of your design team to help, and build collaborative working relationships with each other and other teams.

Adapted from 'Design Thinking for Educators', www.designthinkingforeducators.com, IDEO

THE DESIGN CHALLENGE:

gathering spaces



connection ■ community ■ togetherness

book list to support learning

The books listed are completely optional, but offer insight that furthers learning of the topics presented in Design LAB. Since the program is only able to give a broad overview, this list is meant to support students who want to take their learning further and/or for classrooms who have more time to dedicate.

KINDERGARTEN – SECOND GRADE

- *Iggy Peck, Architect*
by Andrea Beaty
- *Look at That Building!: A First Book of Structures*
by Scot Ritchie
- *Brick: Who Found Herself in Architecture*
by Joshua David Stein

THIRD – FIFTH GRADE

- *The Future Architect's Handbook*
by Barbara Beck
- *The World Is Not a Rectangle: A Portrait of Architect Zaha Hadid*
by Jeanette Winter
- *What Do You Do With An Idea?*
by Kobi Yamada

SIXTH – EIGHTH GRADE

- *Architecture 101: From Frank Gehry to Ziggurats, an Essential Guide to Building Styles and Materials*
by Nicole Bridge
- *Welcome to Your World: How the Built Environment Shapes Our Lives*
by Sarah Williams Goldhagen
- *Archidoodle: The Architect's Activity Book*
by Steve Bowkett

field trips for extended learning

RUMPKE LANDFILL OR RECYCLING CENTER

<https://www.hcdoes.org/332/field-trips>



- The District offers free field trips, including **transportation**. To qualify for these, schools must be registered with the District's **Recycling Assistance Program** and be willing to submit **student reflections** after the trip.
- Whether you teach Environmental Science, Engineering, Physics, Economics, or Civics, this field trip is a real eye-opening experience for both students and faculty. Groups are welcome to pack a waste free lunch and eat indoors at the MRF before heading to the landfill. The trip requires a minimum of 10 students and is limited to a maximum of 40 students.
- Want to make it a full day? You may also visit Fernald Preserve and tour an exhibit including environmental cleanup, ecological restoration and legacy management. *Times will be adjusted accordingly.*

CIVIC GARDEN CENTER

<https://www.civicgardencenter.org/learn>



- The Civic Garden Center (CGC) is a non-profit horticultural resource whose mission is building community through gardening, education and environmental stewardship.
- The Green Learning Station at the Civic Garden Center is home to a hands-on field trip for students to learn about green solutions to common urban environmental issues. Trained guides lead small groups of students through the site, facilitating discussion and engaging students in group-problem solving and scientific inquiry.

MUSIC HALL TOURS & EDUCATIONAL PROGRAMS

<https://friendsofmusichall.org/music-hall-tours/#school>



Friends of Music Hall offers a variety of Music Hall tours, speakers, and classroom presentations of this world-class historical landmark.

Visit the Friends of Music Hall website for information and details.

IN-CLASS WORKTIME

■ ■ ■ DECEMBER 2022 | FIRST CLASSROOM VISITS

Volunteers and educators will coordinate their first classroom visits after receiving the volunteer/educator assignment information. This class visit will have an ice-breaker activity to go along with it, but it is a great way for the volunteer to get to know the teacher and students before the program officially kicks off in January.

■ ■ ■ JANUARY 9, 2023 | PROGRAM KICK-OFF

The classroom PowerPoint and all Program Materials will be posted on Dropbox and on the AFC website. All participating educators and classroom volunteers will receive an electronic invitation to access program materials. If you do not receive an invitation, email CLubbers@architectureincy.com.

■ ■ ■ JANUARY 9 - MAY, 2023 | RESEARCH, DESIGN, AND CREATION PERIOD

See the Design Challenge and **week-by-week** timeline for a breakdown of suggested benchmarks and order of activities for the completion of projects.

**PRESENTATION SCHEDULE

■ ■ ■ MAY 6, 2023 | PROJECT DROP-OFF

■ ■ ■ MAY 6 - MAY 13, 2023 | DESIGN LAB EXHIBIT WEEK

■ ■ ■ MAY 9, 2023 | DESIGN LAB EXHIBIT JURY REVIEW

See the **DESIGN LAB EXHIBIT & COMPETITION REQUIREMENTS** for jury award categories.

■ ■ ■ MAY 13, 2023 | DESIGN LAB EXHIBIT RECEPTION & AWARDS CEREMONY

***Based on availability, the dates of the exhibit may change, but it will not be earlier than the predicted dates. We will have an in-person exhibit again. We greatly appreciate your flexibility & understanding!*

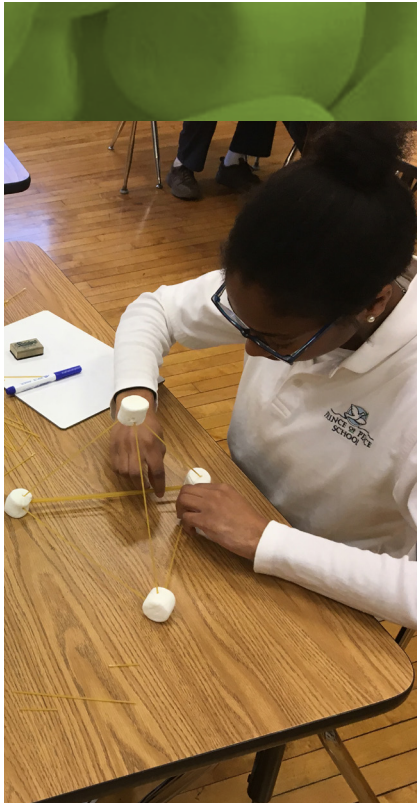
project timeline

SUGGESTED WEEK-BY-WEEK TIMELINE

The following schedule is based on a classroom working on the project for one 45-60 minute class period per week. You may choose for students to participate more frequently and distribute information, activities and worksheets for review/completion outside of class. Other than assessments, this outline schedule is not mandatory, and is intended to help guide your class through the design process. Adjust at your discretion and include holidays, Spring Break and possible snow days in your overall Work Plan. Remind students to keep a folder with information and images to prepare their tri-fold project display.

	MONTH/WEEK	PROJECT PHASE	SUGGESTED ACTIVITIES	
	DECEMBER	INTRO	1st Visit/Getting Acquainted	Activity, Materials Reminder, Pre-Assessments
CONCEPTS	JANUARY			
	Week 1	DISCOVER	Project Introduction	Intro Presentation, Q&A, Ice Breaker
	Week 2	DISCOVER	Design Planning	Build Your Dream Home; Plan, Section, & Elevation
	Week 3	INTERPRET	Understanding Sustainability	Structures & Spatial Awareness
	Week 4	INTERPRET	Understanding Sustainability	Sustainable Building Design
DRAWINGS	FEBRUARY			
	Week 5	IDEATE	Design Planning	Drawing to Scale
	Week 6	IDEATE	Client & Site Phase	Client & Site Selection
	Week 7	EXPERIMENT	Design Planning	Design Ideas
	Week 8	EVALUATE	Presentations	Student Presentations & Critiques
MODELS & TRI-FOLDS	MARCH			
	Week 9	EVOLVE	Work Week	Modeling Exercise, Model Bases/Layout
	Week 10	EVOLVE	Work Week	Build Models & Tri-Folds
	Week 11	EVOLVE	Work Week	Build Models & Tri-Folds
	Week 12	EVOLVE	Work Week	Build Models & Tri-Folds
	APRIL			
	Week 13	EVOLVE	Work Week	Mid-Project Presentation: Models & Tri-Folds
	Week 14	EVOLVE	Work Week	Refine Models & Tri-Folds
Week 15	EVOLVE	Work Week	Finalize Models & Tri-Folds	
Week 16	EVOLVE	Presentation	Final Class Presentation, Post Assessments	

marshmallow challenge



MATERIALS NEEDED:

- Sticks of Spaghetti
- Large Marshmallows
- Yard Stick (to measure)

Prior to the first visit with the class, we strongly recommend that educators and volunteers schedule a meeting without the students. We recommend having this in the classroom, outside of classroom hours, so the volunteer knows where to go and has seen the classroom before the program begins. We recommend doing this some time in December, before the first official classroom visit.

This challenge is intended to give volunteers a chance to get to know the students they will be working with for the next semester while having some fun. It is nice to talk to them about benefits of building up, rather than out, which they are being challenged to do. Decreasing habitat loss and increasing the amount of space in a city center are good starting points for that conversation, but see what benefits the students can think of before prompting them.

If the activity is done and there is time left, talk to the students about these ideas:

- What makes a good building/structure?
- What buildings or spaces have they enjoyed being in? What buildings or spaces do they not enjoy being in?
- Talk to them about what you do and what you liked to do when you were their age. How did that lead you to your career?

MARSHMALLOW CHALLENGE

RULES:

Your challenge is to build the tallest freestanding structure using ONLY spaghetti and marshmallows.

The winning team is the one that builds the tallest freestanding structure measured from the table top surface to the top of the structure.

The team's structure must stand on its own for measuring. Teams touching or supporting their structure will be disqualified.

Teams can use as much or as little of the spaghetti and marshmallows provided. Extra materials CANNOT be provided.

The entire marshmallow must be on the top of your structure. Cutting or eating part of the marshmallow will disqualify your team.

***NOTE: the students will probably have no idea what they are doing and that is kind of the point. They will be learning this stuff during the program! So allow them to fumble around, it is just to get them thinking about how structures are built and get them excited to build after they have some foundational knowledge of how to do so (and maybe even encourage them to pay attention during those classes).**

OPTIONAL ADDITIONS: Have one wall of the room assigned "triangles" and the other side assigned "squares". Ask students which they think is more stable, triangles or squares, and have them go to the wall they believe is correct. They can only use these shapes to create their structure.

the challenge

OVERVIEW & PROJECT REQUIREMENTS

- Over the next 4 months, you are going to be learning about aspects of the built environment and given the opportunity to show off what you have learned by creating a model that aligns with the theme of the program.

This year's theme is GATHERING SPACES and it will challenge students to expand their understanding of what these spaces are, how they are built, and who they are built for. What elements are necessary to create a space that fosters connection, community, and togetherness? Check out the rest of the page to get a sense of how this process will work and some of the rules of the road as you continue. Happy building!

THE CHALLENGE IS TO UNDERSTAND THE CLIENT'S NEEDS AND DESIGN ACCORDINGLY.

This means understanding WHO you are building this space for and WHY it needs to be built. HOW will your space improve upon the landscape or community in which it exists?

RULES OF THE ROAD

Projects may be developed in teams or individually. We recommend teams of four students. This limit ensures that each student will have ample opportunity to contribute to the design process, drawing, and model-building.

- HAVE EACH TEAM KEEP A FOLDER** containing the Design Ideas Form(s) and all additional research, sketches, concept images, photographs, etc. for the project, and use to prepare the tri-fold panel. Also consider having students create a Powerpoint and saving all of their research digitally.

1. Models should offer real-world solutions to the design challenge. Embrace innovation and build a space that could actually be built to address a real-world problem we are facing today.

2. Make sure you are thinking about the natural environment both in your design and in how you build your model. See if you can reimagine old/used/thrown-away items and only use these to build your model.

3. To enter your project into the Design Exhibit, you must have a completed tri-fold board unique to your project as well as a 3D model spanning no more than 2'x2'. Adults may assist, but the work must be designed and completed by students. There will be ONE project submitted from each class. Refer to the model rubric for details on judging.

CONCEPTS: DISCOVERY & INTERPRETATION

Throughout the first 4 weeks of the program, use the Powerpoints to guide you through the groundwork. This will involve a lot of basic principles to provide a base understanding of the concepts before the students begin their models. Identify your client(s) as soon as possible to facilitate development. See the 'Client Phase', 'Site Phase', and 'Design Inspiration Phase' to start your planning. Refer to supplemental activities and handouts to build on to the program if preferred.

DRAWINGS: IDEATION & EXPERIMENTATION

Use these three weeks to develop ideas into drawings, plans, and elevations. If your students are ready for it, this is a great time to introduce them to scale.

Have students define desired qualities/uses of their gathering space: type, size, height, length, shape, color, material, etc.

STUDENT CRITIQUE

On week 8, or before students move on to building their models, have each team present their ideas to their classmates. This should include their client, site, specifics of their design (materials, size, color, etc.), and any photos or sketches they have. Have their peers give them feedback, ideas, and constructive criticism.

MODELS & TRI-FOLDS

Time to BUILD! On average, classrooms spend about 50% of the project time for building. Students seem to look forward to this the most, but the foundational work that occurs before it is so important. Teachers who have tried to skip past that step in the past have learned how regrettable it can be.

For scale, create a few pipe cleaners (or a similar, cheap material) models to help figure out sizing for your model. Refer to the modeling section of this guide for more tips, tricks, and ideas for building the model.

TAKE PHOTOS!

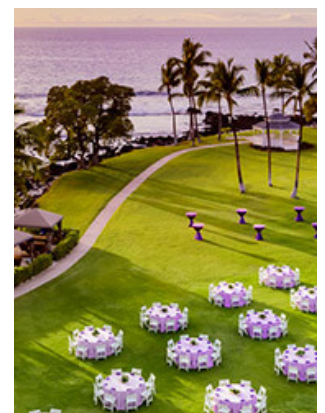
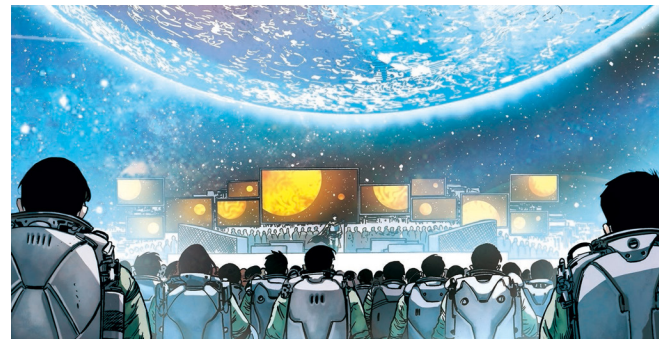
Please take photos and send them to us.

We love to see what the students are up to and use photos to show off the students' work. If there are students whose photos we cannot show publicly, just let us know and we will ensure they are not made public. We love to post photos on social media and use them for marketing as well as fundraising for the program.



gathering spaces

What kind of spaces foster gathering? What types of activities need to happen within that space for it to be a gathering space? Can we gather anywhere? During Covid restrictions, many people had to spend a lot of time alone - did that time change your perspective on the importance of people being together? Why or why not? Are there places that bring people together or pull people apart? Think about how the spaces we use can bring us, or others, together. You don't have to focus on people either, is it important for animals to come together for any reason? Are there spaces that we have destroyed, but could rebuild to help them gather? You can also think about fictional characters like aliens, unicorns, superheroes, or cartoons. This list is only limited by your imagination!

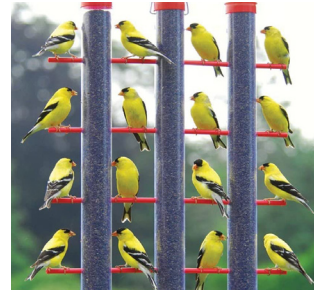


design concepts

SIZE

Buildings and spaces come in all sizes, varying from small structures meant for one person to large buildings made for hundreds of people.

Structures can vary immensely based on many factors, including who they are made for, what space they have to occupy, and what their function is.



SHAPE

Some buildings/spaces are square, some are rectangular, others may be L-shaped or H-shaped and some are even round.

Some spaces are a specific shape because that shape is symbolic to the people using the space. For some cultures, circles represent unity and eternity, so their buildings may be built in circular forms. Other buildings are shaped a certain way to gain attention or to be unique.

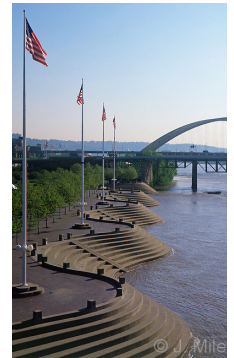
Choose a shape for your design that you think best suits your client(s) needs.



LOCATION

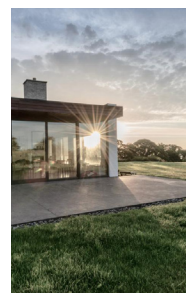
Buildings and spaces are to be built on a specific site. A "site" is simply a piece of land on which a building can be built. The location of the building or space is very important when it comes to designing an appropriate building for a specific site. For example, would you build an igloo in the desert?

The precise positioning of the building on a site is also important. Let's say you are building a structure on a piece of land with a pond on it. How close do you want the structure to be to the pond? If you put it too close to the pond what will happen if it rains a lot and the pond gets bigger? Will it flood your space?



ORIENTATION / DIRECTION

Orientation is a concept that is closely related to location. When a built environment professional is looking at a site, it is very important that she/he knows which direction is North. When you look at drawing or construction plans, you should always see an arrow that shows which way North is. The way a building sits on a site in relationship to which direction North is called the building's orientation.

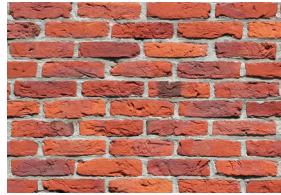


design concepts

TREATMENT (MATERIALS)

Buildings and spaces are made out of a collection of many different building materials. Some of the materials are easy to see when you look at a building, such as brick or glass on the outside of the building. Other materials are hidden on the inside of the building, like the wood, steel, or concrete used to hold the building up. The color, size, and texture of the materials that you can see when you look at a building or occupy a space play a very important role in the overall look or character of that space or structure. Color, size, and texture are the basic elements of the concept of "treatment."

What "treatments" are being used for the buildings in your neighborhood? You might see buildings with bricks, or wood siding, or maybe even stucco. Are all the brick houses the same color? Brick and other building materials often come in many different colors to help personalize and customize a building. Often various treatments have certain adjectives associated with them as well. Brick is often thought to be "heavy" and "solid" (opaque) whereas glass is seen to be "light" and "airy" (transparent or translucent). All exterior building surfaces can be said to have a "treatment."



BRICK



CONCRETE



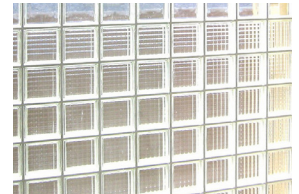
SIDING: ALUMINIUM, VINYL, OTHER



WOOD



STUCCO



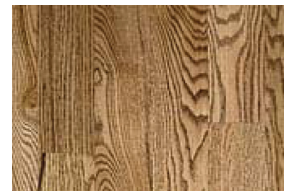
GLASS

EXTERIOR TREATMENTS: WALLS, ROOFS, PATHS

Question: What other exterior building treatments can you think of? What treatments are used for your house? How about your school? Don't forget that roofs have treatments too.



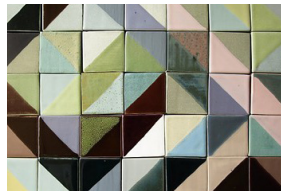
CARPET



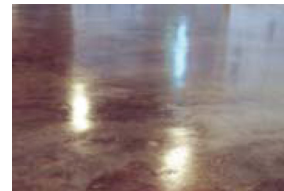
HARDWOOD



BAMBOO



TILE



CONCRETE



WALL COVERING

INTERIOR TREATMENTS: FLOORS, WALLS & CEILINGS

The concept of "treatment" does not just apply to the exterior of the building. Interior surfaces have treatments as well. Floors have a variety of treatments such as wood, tile, carpet, bamboo or cork. Wall treatment can also vary using materials such as paint, wallcovering or wood paneling. The possibilities are endless!

Look at the interior treatments above. What adjectives can you use to describe each one. For example, some people might say that carpet is warm, soft, and fuzzy.

introduction to Design LAB: gathering spaces

LEARNING OUTCOMES

Students will more fully understand what Design LAB is and what they will be doing during the course of the program. They will be given a chance to ask questions if they are unsure of anything.

MATERIALS NEEDED

- Digital Presentation 1
- Notebooks
- Pencils

This lesson is meant to give students a cohesive understanding of what they will be doing throughout the program. If they haven't completed their pre-test yet, they must do that before going any further with this lesson.

Present the introductory information found in the Powerpoint which is located at www.architectureincy.org/programs/design-lab/edu-res/

If time allows at the end of the lesson, students will be instructed at the end of the Powerpoint to journal how they are feeling about the project ahead and any initial ideas they have for it. Feel free to have this as an open class discussion or a personal reflection time.

Consider questions, discussions, and activities to get students thinking critically about the built environment. Some students have never really stopped to consider what goes into creating the environments and spaces that they occupy every day. Spend a few minutes helping them to think critically about ideas such as:

- The factors that are important in the design of a new structure or space.
- Which systems make up a building and what they are designed to do (this is a great place to make a comparison to the body – the building envelope is the shell, the structure is the skeleton, HVAC is the respiratory system, etc.)
- Spaces they like or don't like in buildings (e.g. their school), and why.

Check out the marshmallow and spaghetti activity for a suggested, fun warm-up to get students thinking about the built environment and the project ahead.

VOCABULARY

BUILT ENVIRONMENT - the man-made surroundings that provide the setting for human activity, ranging in scale from buildings and parks or green space to neighborhoods and cities that can often include their supporting infrastructure, such as water supply or energy networks

DESIGN PROCESS - an approach for breaking down a large project into manageable chunks. Architects, engineers, scientists, and other thinkers use the design process to solve a variety of problems.

build your dream home

NOTE: This activity can easily be graded.

LEARNING OUTCOMES

- Students will understand the general financial processes of building, from getting an estimate, to getting a loan approved.
- Students will understand the financial process of building and understand that money is a limited resource that needs to be allocated carefully in the building process.

MATERIALS NEEDED

- Video presentation for Building Your Dream Home
- Student Worksheets

Today, your students are going to build their dream home! They can do this as individuals or as a group. Use the following worksheet to complete the activity.

1. They will start by deciding if they want a small, medium, or large house and what "extras" they want for their house.
2. You will have them cut out each of what they want from the worksheet to build their home.
3. They will bring those pieces to a builder to get a cost estimate. To find their estimate, they can add up the numbers on the pieces to come up with a final price for their houses.

HERE'S THE TWIST:

After getting their estimate, they still need to go to the bank to appraise the value of the plan and ask for a loan. Based on an average American's salary and savings, the bank will approve them for a \$250,000 house - they will need a \$40,000 down payment and they will get a loan to cover the other \$160,000 (remind them that saving for the future is important!).

4. Students will have to re-examine their housing choices. Since they can't afford everything anymore, they will need to figure out what is important to them and prioritize what to build.
5. Students will turn in their final choices to teacher.

VOCABULARY

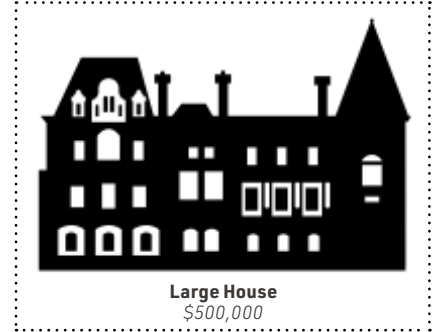
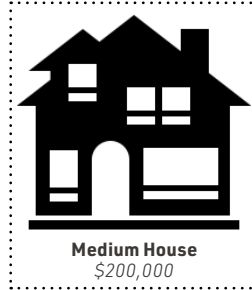
ESTIMATE - a written statement indicating the likely price that will be charged for specified work or repairs

APPRAISAL - an expert estimate of the value of something

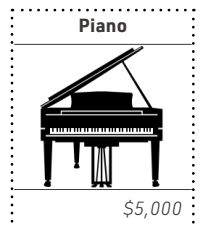
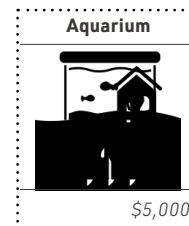
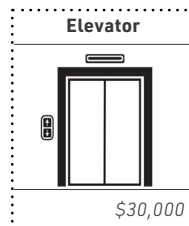
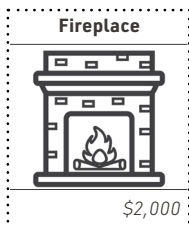
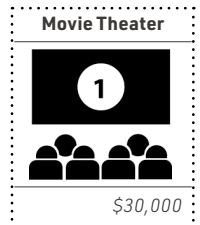
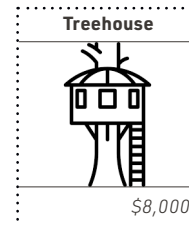
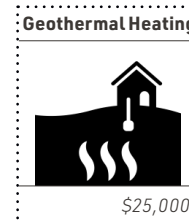
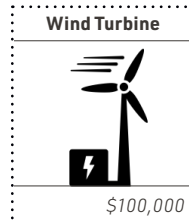
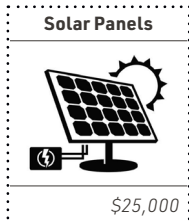
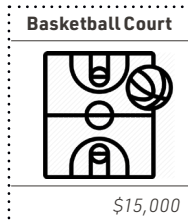
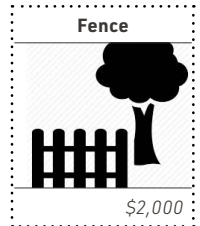
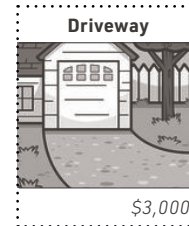
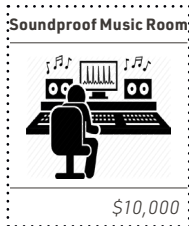
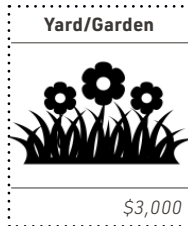
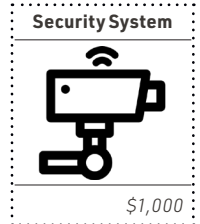
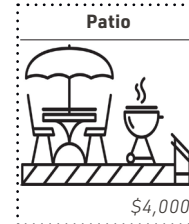
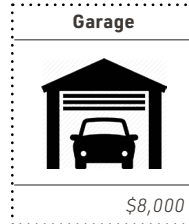
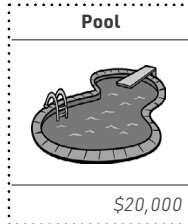
build your dream home activity



Choose which size of house you want:



Now, choose which extras you want to help turn your house into your dream home:



build your dream home activity

Name(s): _____ Grade: _____
_____ Teacher _____

DO NOT PASTE OR TAPE ANY OF YOUR ANSWERS ON HERE UNTIL YOU HAVE YOUR LOAN TO PAY FOR THEM.

YOUR CHOSEN HOUSE SIZE:

YOUR CHOSEN EXTRAS:

1. Go to a builder to get an estimate - calculate the total of the above: \$_____
2. Go to the bank and get a loan! They appraised your house at the total you came up with, but you still need to get approved for a loan. Ask your teacher how much you got approved for with your loan and write it here: \$_____
3. Prioritize what you want with the money that you have. Rework what size house you want and what you would like to have in or around your house. Now, you can tape or paste your decisions onto the paper, just make sure you can afford them.

plan, section, and elevation

LEARNING OUTCOMES

- Students will draw a plan, a section, and an elevation to understand how this applies to the built environment.

MATERIALS NEEDED

- Green peppers for each group of students
- Knife and cutting board for volunteer or teacher
- Student worksheets
- Powerpoint and/or video presentation

Architects, Contractors and Designers use three main kinds of drawings to show what designs look like and how they are built. These are the PLAN, the ELEVATION, and the SECTION.

Introduce this to students and write the words, "plan" "section" and "elevation" across the board, leaving room for you to sketch the pepper beneath each word along with them.

DRAWING ACTIVITY

INSTRUCTIONS:



ELEVATION



PLAN



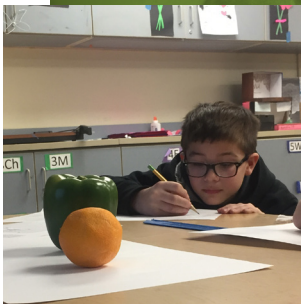
SECTION

1. Set the first **uncut** pepper on the desk or table in front of you. Crouch down and look at it with your eyes level with the **side** of it. What you see is the ELEVATION of the pepper. Draw what you see in the **first** section of the paper. An **elevation** is a drawing of the **side** of a building, and is a direct, **perpendicular** view to what you are seeing and drawing.

2. Slice the second green pepper in half **horizontally**. What you see when you look **down** into the bottom is the PLAN of the pepper. Draw what you see in the **top half of the middle section** of the paper. When you draw the plan of a building, you are showing a horizontal "slice" at approximately four feet above the floor. When you look directly **down** at the top of the **un-cut** pepper, what you see is the "ROOF PLAN." Draw the roof plan of the pepper **below the floor plan**.

Try to orient the shape of the pepper the same way for both drawings. On the **Floor Plan**, shade in the thickness of the "walls". This shading is called "poche."

3. Slice the third green pepper in half **vertically**. When you look at the cut side of either half, you see a SECTION view of the pepper. Sections show **vertical** relationships between spaces in a building, and the walls beyond the "cut line" can be drawn in elevation within the section. Just like the plan, it's a "slice" through the object— shade in the thickness of the walls, roof and floor like you did for the walls on the plan.



- ■ ■ *NOTE: Students can use whatever paper they wish to sketch the peppers. When they draw their own spaces, they can use the pages we have provided or they can use grid paper if it is available to them.*

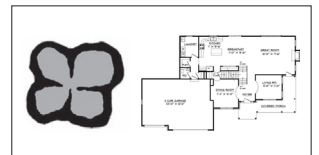
your plan, section and elevation sketches

Sketch the plan you have for YOUR SPACE now, as an elevation, a plan, and a section. The sketches don't have to be professional quality – and they likely won't be! It is good to plan your space out before you begin to build.

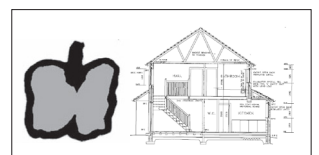
ELEVATION



PLAN



SECTION



structures & spatial awareness

This will be a lesson full of exploration. It's important to get the students out of their seat and actually FEELING how structures work with the different loads they are dealt. Feeling how compression and tension work will be important to help them understand how their structure should be built.

LEARNING OUTCOMES

- Students will know different types of structures and understand the forces that they are built to withstand.
- Students will understand how they relate to the space they occupy and how different structures and natural elements exist in a space.

MATERIALS NEEDED

- Digital Presentation and Video Presentation
- Notebooks
- Pencils
- Open Space

VOCABULARY

STRUCTURE - parts or elements of a built object and how they are combined and organized to hold the object together and keep its shape

LOADS - natural forces that work against structures (gravity, weight, movement, vibrations, weather events, movement of the earth)

SPATIAL - how objects fit together in a space

COMPRESSION - Objects get pressed/crushed

TENSION - Objects get pulled



SPACEFRAME



COMPRESSION



CANTILEVER



TENSION/TRUSS



COLUMN

structures

Basic structural elements are used in various combinations to make up the built environment. Look around your school, community or neighborhood and see which elements you can find and identify how the loads placed upon them are transferred to the **ground**.

The structural elements to the right visually describe each element and how it reacts to **gravity** loads placed upon it. Looking at these diagrams, try to act out the structural elements with your classmates and see what it feels like when different loads are placed upon you.

TENSION:



A pulling, stretching, and expanding action

COMPRESSION:



A pressing, pushing, squeezing, and compacting action

STRUCTURE	DEFINITION	EXAMPLE	LOAD	ACT IT OUT
COLUMN	A vertical linear element used to support a beam, floor, or roof			
BEAM	A horizontal linear element spanning across an opening, supported at both ends			
WALL	A vertical planar element that separates two spaces			
SLAB	A horizontal planar element that separates two spaces			
CANTILEVER	A horizontal structural element supported only at one end			
FRAME	A rectangular arrangement of linear structural elements			
TRUSS	A 2-dimensional triangular arrangement of linear structural elements			
SPACEFRAME	A 3-dimensional triangular arrangement of linear structural elements			
ARCH	A curving or pointed element that spans across an opening			
VAULT	A series of parallel curved or pointed arches			
DOME	A series of curved or pointed arches on a round or many-sides base			
FOUNDATION	Anchors a building by transferring the loads acting upon the building into the ground			

Source Credit: *Architecture In Education, The Foundation for Architecture, Philadelphia.*

spatial awareness

NOTE: This is a good activity to lead with volunteer(s).

The intent of this activity is to help students begin to understand how their bodies relate to spaces of different sizes and types, and the functionality and feelings associated with each different spatial experience. This exploration will assist students in understanding how the specificity of space relates to the functions and activities associated with gathering.

MATERIALS NEEDED:

- Ability to explore the school grounds – inside and possibly outside. Access to various spaces around the school.
- (Optional) 100 foot measuring tape or 25 foot measuring tape, grid paper, and clipboard. For this optional portion of the activity, students will measure the spaces and record responses to the questions below.

DURATION: 30-45 minutes

OBJECTIVES– Students will:

- Relate purpose and activity to space size and type – recognizing which spaces are more appropriate for specific purposes and how rooms and spaces are designed with specific intent.
- Understand their own bodies as they relate to the size and nature of different spaces.

ACTIVITY:

Select two to three of the spaces listed below (or others appropriate to your school) to visit with your students. Try to provide a range of spaces from small to large, and a variety of uses.

- Classroom
- Closet or small office (less than 8' x 8' in size)
- Gymnasium or cafeteria
- School office
- Athletic field
- Under a tree – or at the edge of a wooded area
- Outside, against a tall, blank wall (preferably no windows)
- Corridor or hallway
- Playground

(Optional) Measure the first space – students should draw and record the space size on their grid paper. Calculate the area in square feet.

Begin in the first space by having the students stand shoulder-to-shoulder in one corner of the room.

(Optional) Measure the space that this tight cluster of students occupies and record the square footage as the minimum required to pack everyone in.

- While in this configuration, ask the students what they see, what they hear, and how they feel.
- Ask the students to carry on conversations with their neighbor – and also with the teacher and volunteer from this tight configuration. What do they notice about the ease / difficulty of communicating this way?

Ask the students to spread out – at arm's length apart so that they can just turn in circles without touching. Repeat the exploration questions above.

In the larger spaces, work through one or two more cycles of spreading farther apart, and then checking how the students perceive the space they are in. Pay particular attention to how easy or difficult it may be to learn and communicate in this space. What is the appropriate people-density for the space that you are exploring? Would this type of space be appropriate as a gathering environment?

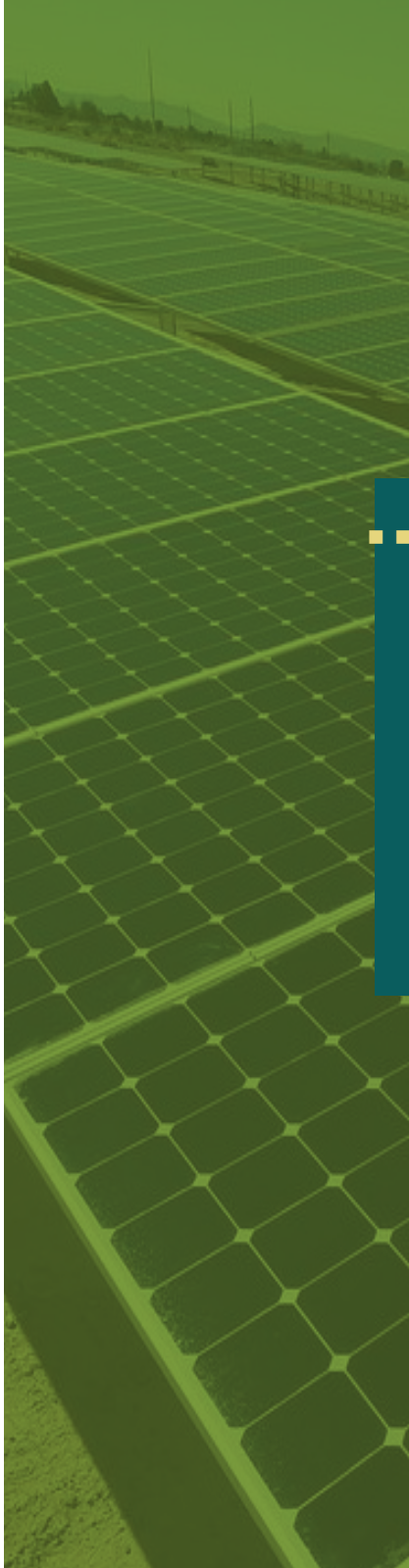
For what types of gathering? (Be creative here – push students to think beyond the traditional uses of each of these spaces.)

Try to repeat these steps in each room or space you've selected. Help the students note the similarities and differences in their responses to each space.

DISCUSSION: We use different spaces in different ways. Typically, the places you'll visit during this activity have been designed with a very specific use in mind. Consider additional questions such as:

- How many people usually use a space this size? Would you call this a public or private space?
- What is this space used for? Is the space too big, too small, or just right for its use? Could it be used for more than one purpose?
- How many people could be in this space before it no longer works for the users? (Test this, if you can.)
- What is the light like in this space? Do the activities here need lots of light or just a little? Is there daylight? What would the room be like with / without sunshine or views to the outside?
- Can people outside the building see into this space? What do you see during the daytime? During the nighttime? What does this transparency (or lack of transparency) do to the privacy of the space?
- How easy or difficult would it be to learn in this space? What types of gathering might be most appropriate to be carried out here?

sustainable building design



Use the information on the next page to decide on what sustainable building aspect(s) you want to incorporate in your model. Once you have decided on one, create a flyer/poster that explains that idea for your tri-fold board that will accompany your model. It can be any size, but it should tell your viewers what you used and teach them what it does. Examples of this are solar power, rain barrels, landscaping, passive heating or lighting strategies, and more.

NOTE: If students change the sustainability aspect on their final model, that is ok. We want them to really understand at least one of these concepts, but they won't be forced to use it in their model if it no longer fits the needs of their client. Use the video presentation to give your students a deeper understanding of these principles

■ ■ ■ VOCABULARY

SUSTAINABILITY - ability to continue a defined behavior indefinitely

RENEWABLE - relating to a natural resource, such as solar energy, water, or wood, that is never used up or that can be replaced by new growth indefinitely

ORGANIC - of, relating to, or derived from living matter

PERVIOUS - allowing water to pass through; permeable

SOLAR POWER - power obtained by harnessing the energy of the sun's rays



sustainability in the built environment

INTRODUCTION TO SUSTAINABLE BUILDING

A “Green Structure” does not mean the structure is colored green. A “green” way of creating structures means that you respect and try to understand nature in every way that you can. It means that you work with nature and not against it. Nature is older, wiser and stronger than any person or structure. To keep nature happy, healthy and friendly, choose to be considerate in the following ways:

1. RESPECT THE EARTH. Place structures onto the land and among the plants, trees, and streams so that natural beauty stays in place. Protect parks, farms, fields and natural landscapes whenever you can. Don't put things into the ground that could be destructive, such as chemicals and other man-made objects that will harm the soil, plants and animals.

2. RESPECT THE WATER. Save as much clean water as you can for important things like drinking, washing and irrigating. Collect rainwater from the roofs of structures so it can be used for other needs in the structure or garden instead of letting it wash away the topsoil or be put into underground pipes that take it far away. Where needed for pathways or parking areas, cover the ground with materials that still let the rainwater soak in and feed the plants and trees.

3. RESPECT THE AIR. Create structures that don't need a lot of energy to make them comfortable and warm. Most of the electricity that comes from power plants is made from burning coal which pollutes the air. Structures that are better insulated against the cold in winter and better ventilated with natural breezes in the summer will need less energy for heating and air conditioning. This helps the air inside and outside of the structure.

4. RESPECT THE SUN. Let the sun help light the inside of your structures instead of using lots of electric lights. To collect heat and light for winter face the structure to the south. You can use this side to have the most windows. For summer, you can use an overhang to block the sun when you don't want additional heat. If the summer sun heats up the side of the structure too much, plant big leafy shade trees to block the sun's rays. The sun and trees work well together. In the fall, these trees will drop their leaves to let the sun warm up the structure in the winter time. Make roofs, sidewalks and driveways with light colors so the summer sun will not make them too hot.

5. RESPECT THE WIND. Put structures on the land in places that protect them from cold wind in the winter. Plant evergreen trees on the side of the structure where they can block the winter winds. Try to let the breezes get into or around the structure in the warmer months of the year to help cool things off. **TIP:** Do an online search for prevailing winds in the Cincinnati area.

6. RESPECT MATERIALS & RESOURCES. When we buy materials that are made or sourced close to a project, we invest in our local economy and reduce transportation costs and expended energy. Less miles to travel also reduces the amount of carbon emissions from trucks and semis. Whenever possible, reduce, reuse and recycle materials and resources.

7. RESPECT TREES & OTHER LIVING THINGS. Try to make structures fit into the landscape without removing many trees, plants and other living things. All of nature's creatures need to have places to live and people can't live well without them. Trees help create the air that people and animals need to breathe.

8. AND OF COURSE, RESPECT PEOPLE. Structures are made for people to use and live in. Make buildings bright, comfortable and safe. Make them out of things that help people stay healthy. Make them strong and long lasting because people spend lots of money and use lots of resources to build them. And, probably one of the most important things is to make them beautiful for people and for Mother Nature.

— Joel Elliott Stout, AIA, Committee On The Environment,
11/17/2000 (adapted)

drawing to scale

LEARNING OUTCOMES

- Students will understand scale as it is used in the industry and how they can utilize it in building their model.

MATERIALS NEEDED

- Notebooks
- Pencils
- Drafting Paper, if available
(they can also create their own)
- Masking Tape
- Flat Ruler
- Pipe Cleaners

This is another section that can seem ambitious for some teachers. This is a good one to do with the volunteer. Start with the scale figure activity. Take it step by step with your students and understand that they may have a difficult time with it. Understanding this section will make a huge difference when they go to build their models, but it is not the end all - be all of the program.

Again, if you can't cover it all, try to pick out the activities that you feel are most useful for your students. You know them the best, you know what they are capable of and what is too advanced. Let them leave their comfort zone, but this section should not be creating unnecessary stress for any student.

VOCABULARY

SCALE - The ratio of a distance on a map to the corresponding actual distance; the ratio of a linear dimension of a model to the same dimension of a full-scale original

WHAT SCALE SHALL WE USE FOR THE MODEL?

- How big is the structure?
Determine the area required for the gathering space.
- How much space do we need AROUND the gathering space?
- Calculate the scale of the site for the model.
- The maximum model display space is 24" x 24".
Listed below are the sizes of site that will fit in that space based on which drawing scale the team uses:
 - Drawing scale is 1/4"=1'-0". Largest site is 96' x 96'.
 - Drawing scale is 1/8"=1'-0". Largest site is 192' x 192'.
 - Drawing scale is 1/16"=1'-0". Largest site is 384' x 384'.
 - Drawing scale is 1/32"=1'-0". Largest site is 768' x 768'.

NOTE: Scale is not required, but is highly recommended as part of the learning and design process, especially for grades 6 - 8.

drawing to scale

An architect's or engineer's scale is a specialized ruler designed to facilitate the drafting and measuring of drawings such as floor plans and orthographic projections (three-dimensional objects represented in two dimensions). Because the scale of such drawings are smaller than life-size, an architect's or engineer's scale features multiple units of length and proportional length increments. Scales may be flat, with 4 scales, or have a symmetric 3-lobed cross-section, with 6 scales.

In the United States, architectural scales are marked as a ratio of 'x' inches per foot, typically written as $x'' = 1'-0''$. For example, one-quarter inch measured from a drawing with a scale of "one-quarter inch per foot" or $1/4'' = 1'-0''$ is equivalent to one foot in the real world (a scale of 1:48). Another example, one inch measured from a drawing with a scale of "one inch per foot" is equivalent to one foot in the real world or $1'' = 1'-0''$ (a scale of 1:12).

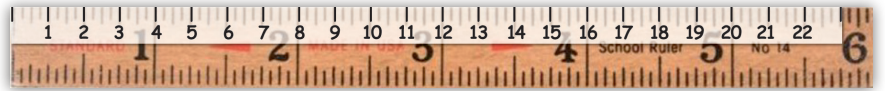
USING ARCHITECTURAL & ENGINEERING SCALES

If you do not have architectural scales, the students can create their own by placing masking tape over a flat ruler, and marking off the increments to create a scale to use for measuring. Following are instructions on how to make a $1/4'' = 1'-0''$ architectural scale (*you can adjust for other scales, $1/8'' = 1'-0''$, etc.*):

MATERIALS NEEDED:

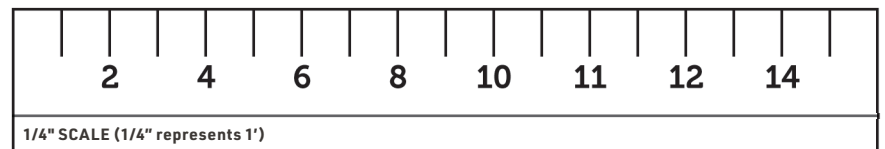
- Flat ruler (plastic, metal, etc.)
- Masking tape
- Sharp pencil or fine-point pen for marking

1. Place masking tape over the length of a flat ruler that has 16 markings per inch.
2. Starting at zero "0", for every 4 markings (or $1/4''$), create a new mark that will represent 1'-0".
3. Going back to zero "0" and from left to right, number each new mark that you made sequentially so that each one represents one foot. You should have 4 'feet' per inch. If you mark all the way to 12", you will have 48 'feet'.
4. It should look something like this (not shown to scale):



5. Now you're ready to use the architectural scale you just created for your project!

You can also create a paper scale and photocopy for student use:



In SCALE, this straight edge is 16 feet long. Each mark represents 1 foot.

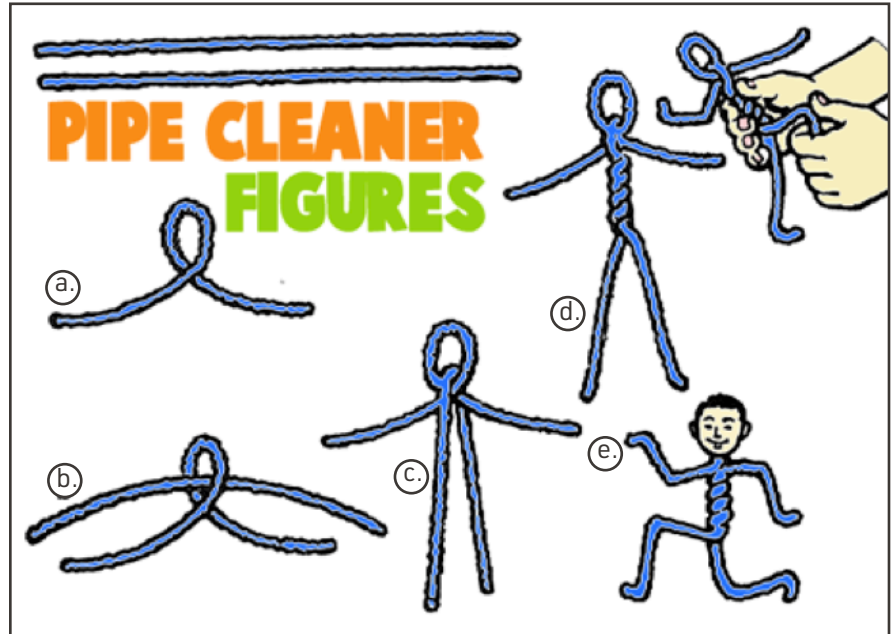
For more printable scales, go to www.printablerulers.net

- Select 'Architect Scale 12-inch Ruler'.
- Requires legal-sized, 8.5" x 14", paper.

scale figure activity

In this activity, students create a figure that can be kept and used as a scaled object for drawings and models. If you do not have pipe cleaners, you can also create a "flat" scale figure from paper, cardstock or other material.

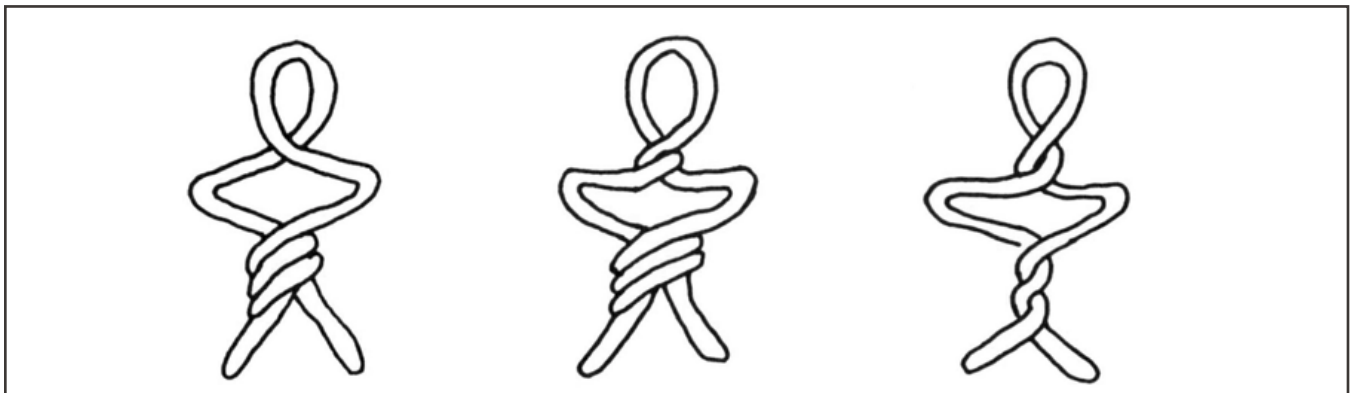
OPTION 1: To make these figures, you will need 2 pipe cleaners, face cut-outs (optional), and glue (optional). Carefully follow the illustrations shown at the right to make the pipe-cleaner figures. Go from illustration a. to e. Glue faces to heads of figures (optional). Have each student twist two pipe cleaners as shown above to resemble a human figure. Students should measure and cut their figures, estimating how tall a house would need to be to fit the figure's scale. When making a drawing or model, use the figure to make adjustments as necessary to be sure that the figure fits.



OPTION 2: Give each student one pipe cleaner to be cut and twisted to resemble a human figure. Students should measure their figures and estimate how tall a space would be to fit the figure's scale; they can make a drawing of their gathering space, adjusting it as necessary to be sure that the figure "fits" (doorway, steps, windows, ceilings, walls, etc.) This figure can be kept and used as a scale determinant for further drawings and constructions.

NOTE: A 6'-0" tall person at 1/4"=1'-0" scale would be 1 1/2" tall. A 4'-0" tall person at 1/4"=1'-0" scale would be 1" tall.

From 'Architecture in Education: A Resource of Imaginative Ideas and Tested Activities' by the Center for Architecture, Philadelphia, PA



drawing to scale

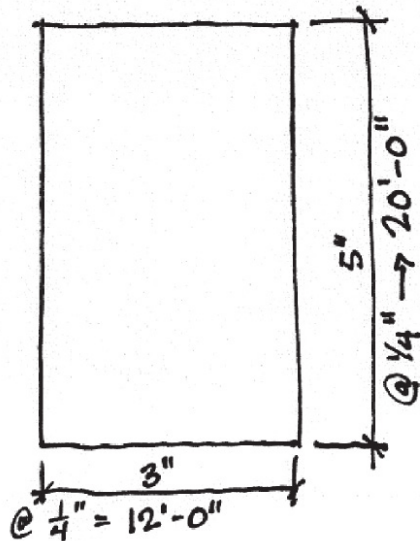
DRAWING ACTIVITY

Scale can be a tricky concept to get across, but this multi-part activity will help you and your students to understand and be able to create scaled drawings & models.

MATERIALS

- Architectural Scales / Rulers
- Each Student: standard 12" ruler, blank piece of paper - Lined or Graph paper work well too.

Copy the sketch below onto the board, large enough for students to read:



PART 1: INTRODUCING DIMENSIONS

Verbal Introduction: Architectural and engineering drawings show how big things need to be, so they're labeled with the dimensions of all the parts so the builder can build it. (an example from your volunteer would be helpful to have on hand) This is how dimensions are written on a drawing.

Walk through the parts of the dimension notation in the drawing you copied onto the board.

PART 2: INTRODUCING THE CONCEPT OF SCALE

Verbal Introduction: What does it mean when we say that drawing is "to scale"? Since we can't draw a building as big as it really is (your school building won't fit on even a large piece of paper!), we 'shrink' it down so it fits into a manageable picture, but we still need to be able to measure it as we work on the design. So, we shrink it down by using a ruler in a new way: an inch or a fraction of an inch represents one foot of length.

This can be done with a regular ruler (with a bit of mental math); architects usually use something called an ARCHITECTURAL SCALE. == *pass around your scales* == It's a special kind of ruler that is marked so that when you read 1, 2, 3, etc., instead of inches, they are actually 'feet', just shrunken down like a dollhouse or matchbox car. The smaller the fraction of an inch that is used to equal a foot, the smaller the "scale" of the drawing.

Another example of something 'scaled down' are model train sets. They're labeled differently, (O, H, HO, G, N, etc.), but each of those 'scale' designations represents a fractional scale, so that if you get parts from different places, getting the same scale makes sure they will all fit together.

1. Ask students to use the ruler to draw a rectangle in the middle of the page that is 3 inches wide and 5 inches tall.
2. Have students measure the box they drew using the 1/4" edge of the Architectural Scale, and have them write down the dimensions in feet and inches. (for younger students, do this larger on the board with them, so they can see and copy).

The box will measure 12'-0" wide, and 20'-0" tall at 1/4"=1'-0" scale.
3. Ask students to check out how big the box is at other scales. How big is it at 1/8"=1'-0" or 3"=1'-0"?

drawing to scale

DRAWING ACTIVITY

MATERIALS

- K-6**
 - Roll-paper (or large sheets) for making full-size outline tracings of kids
- K-8**
 - Architectural Scales
 - Standard 12" Ruler
 - Tape Measure
 - Each Student: DRAWING TO SCALE STUDENT HANDOUT (next page), and Pencil

PART 3: DRAW YOURSELF TO SCALE

K-6

1. Create full-size outlines of each student on roll paper. Arms should be down to the sides. Feet should be flexed, with the soles of the shoes at the bottom edge. Before they get up, draw horizontal lines at the ankle, knee, wrist, elbow, shoulder, chin, eyes, and top of head, similar to the Student Handout. Have them write their names on their outline's 'shirt'.
2. Hang the tracings on the wall with the "feet" on the floor. (point out now they now have "elevations" of themselves at "full-scale" meaning the drawing is the same size they are. It's a really BIG drawing! Ask, "Can you draw the school building or your house at "full scale"?)

K-8 (6th grade and up could start here)

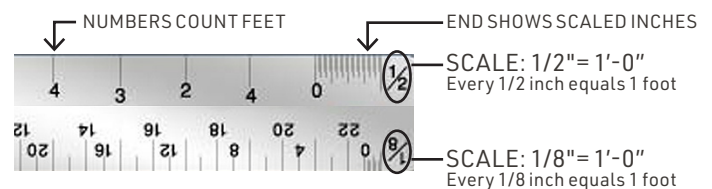
3. Have students pair off and measure themselves (or their full-size elevations) to fill out the DRAWING TO SCALE STUDENT HANDOUT. As they work, check to see that they are writing the dimensions with proper notation (from "Part 1: Introducing Dimensions" activity).
4. Once the dimensions are filled out, have them draw themselves in the graph paper section of the handout, using the 1/4" side of the architectural scale. You may need to walk through the scale translation of a few dimensions of yourself or students on the board to show the process.

DRAW YOUR CLIENT TO SCALE

When students research their client, have them find or estimate their client's height(s) and draw their client to scale next to them on the DRAWING TO SCALE STUDENT HANDOUT. A scaled, cutout figure of their client will be helpful when they start building their models. You can also have them create a Pipe Cleaner Scale Figure (see 'Scale Figure Activity').

PART 4: HOW BIG IS BIG ENOUGH?

Have students measure and evaluate a few spaces that they use for studying different subjects. How much space do you really need for these activities? Green design utilizes the concept of efficiency, not just in regards to energy, but also in materials. Smaller structures use less material. How small of a space could someone learn in? Can some rooms be used for more than one purpose? Why or why not? TIP: Send students on a web quest for examples of small, efficient gathering spaces.

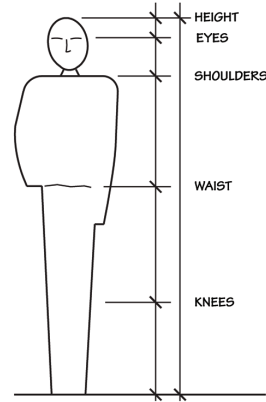


drawing to scale

STUDENT HANDOUT

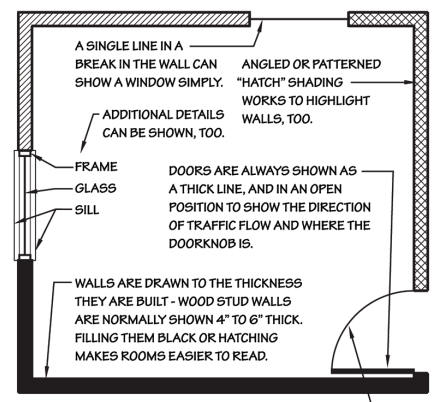
1. Have students measure their classroom, or bedroom at home, and draw a floor plan and the elevation of a wall with a window in it.
2. Evaluation – Have students write about their space. Is your room comfortable for the activities you do in it? Would it be too big or too small for other activities? Why?

YOUR MEASUREMENTS



MEASURE YOURSELF WITH A TAPE MEASURE, AND FILL IN YOUR DIMENSIONS.

DRAWING A FLOOR PLAN



A 1/4- CIRCLE ARC IS DRAWN TO SHOW HOW MUCH FLOOR AREA THE DOOR SWING TAKES UP.

YOU	SCALE: 1/4"=1'-0"	YOUR CLIENT
<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); margin-right: 5px;">YOUR ROOM</div> <div style="border: 1px solid black; width: 100%; height: 100%; grid-template-columns: repeat(12, 1fr); grid-template-rows: repeat(12, 1fr);"></div> </div>	<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); margin-right: 5px;">YOUR ROOM</div> <div style="border: 1px solid black; width: 100%; height: 100%; grid-template-columns: repeat(12, 1fr); grid-template-rows: repeat(12, 1fr);"></div> </div>	<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; margin-right: 5px;">YOUR ROOM</div> <div style="border: 1px solid black; width: 100%; height: 100%; grid-template-columns: repeat(12, 1fr); grid-template-rows: repeat(12, 1fr);"></div> </div>
<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); margin-right: 5px;">YOUR ROOM</div> <div style="border: 1px solid black; width: 100%; height: 100%; grid-template-columns: repeat(12, 1fr); grid-template-rows: repeat(12, 1fr);"></div> </div>	<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); margin-right: 5px;">YOUR ROOM</div> <div style="border: 1px solid black; width: 100%; height: 100%; grid-template-columns: repeat(12, 1fr); grid-template-rows: repeat(12, 1fr);"></div> </div>	<div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; margin-right: 5px;">YOUR ROOM</div> <div style="border: 1px solid black; width: 100%; height: 100%; grid-template-columns: repeat(12, 1fr); grid-template-rows: repeat(12, 1fr);"></div> </div>

6' AFTER YOU HAVE YOUR MEASUREMENTS, SKETCH A SCALE IMAGE OF YOURSELF ON THE LEFT.

5'

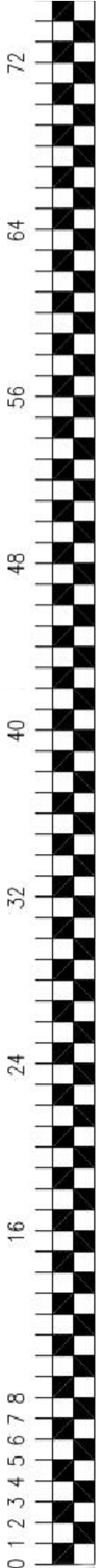
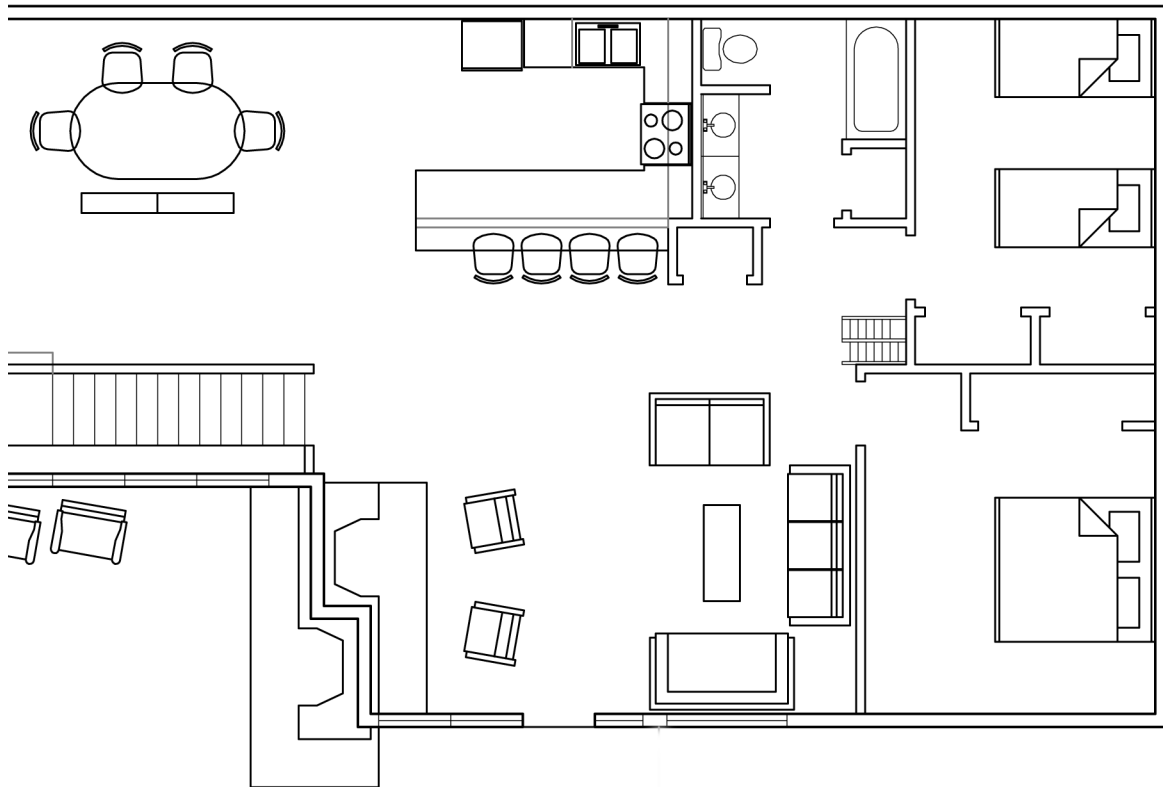
4' FOR YOUR CLIENT, RESEARCH OR ESTIMATE THEIR MEASUREMENTS.

3'

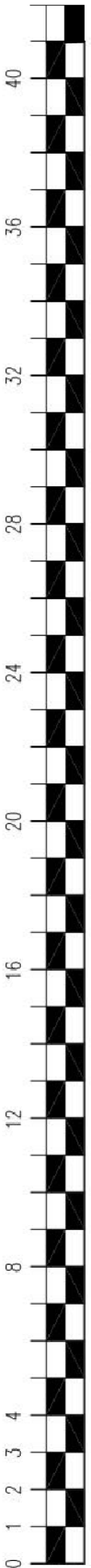
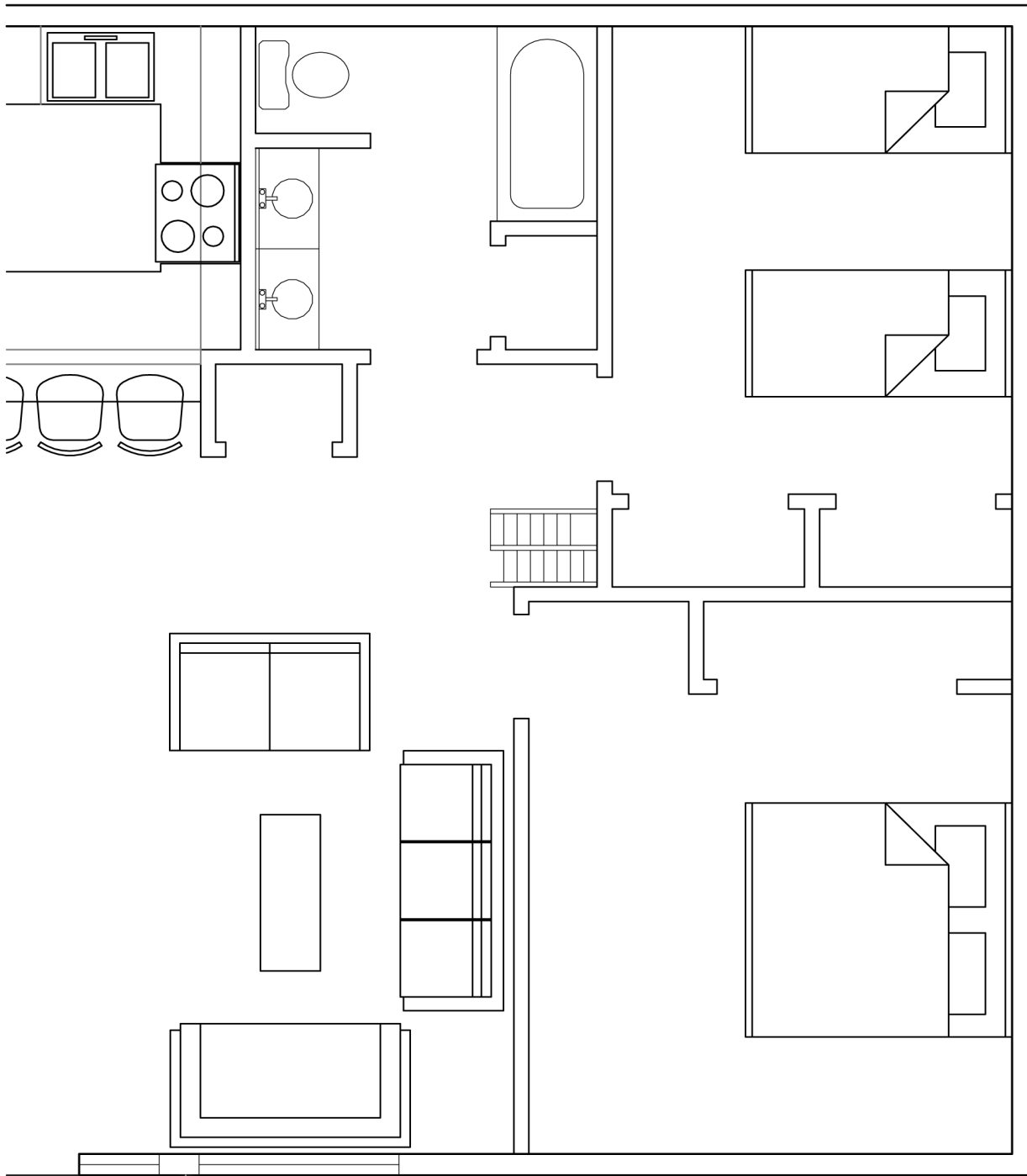
2' COPY OR TRACE YOUR SCALED CLIENT TO CARDBOARD AND CREATE A CUTOUT FOR YOUR DRAWING WORK, AND/OR A STAND-UP FIGURE FOR YOUR MODEL.

1'

9"
3"



FLOOR PLAN EXAMPLE
SCALE: 1/8"=1'-0"



FLOOR PLAN EXAMPLE: SAME PLAN AT DIFFERENT SCALE
SCALE: 1/4"=1'-0"

client & site selection

LEARNING OUTCOMES

- Students will understand what a client is in regards to the built environment and the process that goes into selecting your client.
- Students will understand what a site is in regards to the built environment and the process that goes into selecting your site.

MATERIALS NEEDED

- Digital Presentation
- Notebooks
- Pencils

This phase will be heavy on research and decision making. Ensure that your students are doing enough research to make good decisions about their structure and who it will be built for. In this section, teams should be forming and by the end of this class period, teams should be set if they were not already.

Sometimes the site is selected for a space and it directs who the client is, and sometimes the client directs where the site is going to be. If your students can handle the decision or if they already have a client or site in mind, allow them to decide which one will direct the other. If not, choose which one you think would be best for them to start with. Clients are sometimes an easier point to spring from, especially if they are looking to solve problems for their clients.

VOCABULARY

CLIENT - a person or organization using the services of a professional person or company

SITE - an area of ground on which a town, building, or monument is constructed

COLLECT EVERYTHING

Each team should keep a folder containing all items gathered about their site and client including: sketches, photos, images, nearby building types, maps, internet searches, etc. to use for their presentations to the class and for their project board at the end of the program.

CLIENT PHASE

WHO IS THE CLIENT?

- Remember that your client is who you are creating your space for. This could be a community, visitors to a location, an individual, or anyone you can think of.
- This does not have to be a single person or group – maybe multiple groups or people can use and enjoy this space.
- There are infinite options for clients. They can be realistic or imagined. If you are into animals, you can create a space for them. If you are into aliens or space, this can be a space for them - in space! There are no limits or wrong sites/clients, as long as you are answering the needs of your client(s).
- Ensure that all of the information collected during this lesson is kept in a folder. This is good information to put on your project board at the end of the program.

client & site selection

SITE SELECTION

WHERE WILL YOUR SPACE BE LOCATED?

- Fictional or Actual Location
- This should be based on what problems your space seeks to solve.
- Research your client to best place your space.

STARTER QUESTIONS

- Who is your client(s)?
- How will your client(s) use the structure you create?
- How will your structure impact your client(s)?
- What function(s) does your structure have?
- Try to think of one thing that will make your structure amazing - this can be related to its function or its aesthetics.
- How can this structure be built sustainably or influence a sustainable action?

GATHER INFORMATION

- Collect photos from the internet, magazines, or take photos yourself that have different types of play spaces in them.
- Research issues and innovative solutions surrounding play spaces.
- Research who could benefit from your space - who needs a space just like the one you will create?

ANALYZE INFORMATION

- Once you have gathered your research, you are prepared to make a good decision about who your client will be and where the space you create will be located.
- You need to identify the function(s) of your space.
- Write or illustrate how your space will meet the needs of your client. This can be done as a story, a short report, paragraph form, or as an illustration.

SITE STEP 1: SELECT SITE

- Your site can be anywhere in the world, or even an imagined place. For realistic locations, use:
 - Google Earth:
www.google.com/earth/
 - CAGIS (Cincinnati Area Geographic Information System):
<https://cagisonline.hamilton-co.org/cagisonline/index.html>
 - LINK-GIS (Northern KY Geographic Information System):
<https://linkgis.org/>
 - Your local County Auditor's Office or Website e.g.:
www.hamiltoncountyauditor.org
 - Physical maps also work great for this.
- Measuring tools to get an idea of how big your gathering space will be, such as: Measuring tape (100 ft or 25 ft), meter/yard sticks, trundle wheels. Arm spans and feet lengths also come in handy! (especially for younger students)

client & site selection

SITE STEP 2: ANALYZE & DOCUMENT THE SITE

ANALYZE THE SITE

What is the site like? Discuss the impact of building on a particular site. Students should think about features they want to add as well as existing conditions.

Natural Conditions

- Topography - Is the site flat? gently sloping? steep?
- Vegetation - Are there existing plants (trees, grass, bushes, gardens)?
- Climate - Is the site sunny or shady? Where does the sun rise and set?
- Geology/Hydrology - What is the ground like? Wet, dry, rocky, sandy?
- Wildlife - Are there animals that live where the site is? Deer? Birds?
- Natural Features - Waterfall, stream, hill, valley, etc.

Built Environment

- Land Use - study the adjacent built structures, if any exist.
- Traffic/Transit - autos, people. Are there side walks, roads or paved areas? Is there a bus stop nearby?
- Utilities - Do you see telephone poles, electrical wires, manholes, gas meters?
- Historic - Is it in a neighborhood made up of buildings that are old?

DOCUMENT THE SITE

- Take/find photos of the site.
- Draw a map so you can indicate features of the site while you walk around
- DRAW: show the shape of the existing site on drawing paper. Use the compass to mark North on your drawing. Note the time of day and the position of the sun. Measure and mark where the main features of the site are located, including natural features and the built environment.

To measure: Students can determine the length of their paces and use that to approximate dimensions and distances, or use tape measures, yardsticks, or trundle wheels.

Older students will be able to use the mathematical concept of similarity, using a yardstick and its shadow, a ruler held at arm's length, or a mirror on the ground. Here are a couple of YouTube videos about finding the heights of things:

www.youtube.com/watch?v=8-Vv-fAsuaY

www.youtube.com/watch?v=F6fltSqImFM

Younger students could count bricks and multiply by the height of a single brick or create other strategies. Let students brainstorm ideas.

gathering space cases

Some students may embrace endless possibilities when introduced to this theme. Others may need a more guided route.

The following scenarios will give students specific ideas to use as a springboard for their model concepts. Students are not required to use these.

Case 1: **CREATIVE OR ADAPTIVE REUSE**

Create a space that brings people together using reused materials or spaces. Your site and client options are infinite, but all of your building materials or the space must be repurposed. Think of abandoned buildings, building materials that need a new life, etc. You can find buildings like this right here in Cincinnati - Union Terminal was originally a Train Station and now it is the Cincinnati Museum Center! You can also focus on your building materials - are your walls made out of bricks that were salvaged from a construction site?

Case 2: **ANIMAL CROSSINGS**

People need to come together for so many reasons, but animals do too! What are the ways certain animals benefit from gathering? Are there natural spaces that we destroyed, but could rebuild to bring animals together? What can we build to draw wild or domestic animals together?

Case 3: **BETTER TOGETHER (COMMUNITY SPACES)**

We are all better together. In what ways does your community come together? Is it through festivals, picnics, parades, spiritual centers, community gardens,, or rec centers? How do you connect to your community or ways that you wish you could connect with it? Build a space that would bring your own community together in a unique way.

Case 4: **CELEBRATE GOOD TIMES!**

There are so many things in life to celebrate! Graduations, weddings, birthdays, and awards are a few that come to mind. What kind of celebration space can you build to keep the party going?

Case 5: **IN THE SPOTLIGHT**

If you've ever seen your favorite athlete, actor, or musician perform live, what kind of space was created for the performance? Build an arena that would create the best performance - but be careful here, you need to cater to the performer(s) and the audience.

2023 gathering spaces design ideas form

Name(s): _____ Grade: _____
_____ Teacher _____

Refine your ideas or switch them up if you'd like - this is the time to finalize your plan for your model. This form, in addition to the Site/Client Form and your sketches will build the groundwork for your model. The next time your class meets for Design LAB, use these documents to present your ideas for your model to your peers. This is your chance to change or refine your ideas if needed. Feel free to go back and change past forms if they need to be updated.

Give your gathering spaces a name: _____

What will your gathering spaces focus on? _____

ORGANIZING & DESIGNING: Describe your gathering spaces in each of the following areas. *If needed, use a separate piece of paper for each.*

SIZE: What dimensions do your gathering spaces need to be? (Think: width, length, height) _____

SHAPE: What shape will your gathering spaces be? How will that shape best suit your client(s) needs? _____

LOCATION: Where are your gathering spaces? (indoors vs. outdoors; rural vs. urban) _____

ORIENTATION: What direction(s) do your gathering spaces face? How does it relate to its surroundings? _____

TREATMENT: What will your gathering spaces be made of? How do those materials impact your gathering spaces? (Think: aesthetically pleasing, structurally sound, helpful to the environment) _____

What materials would your gathering spaces be made of if it were actually built? _____

SITE (How do your gathering spaces protect & work with the natural environment?) _____

WATER (Do your gathering spaces collect, use and protect water wisely?) _____

ENERGY (Do your gathering spaces produce energy? Do your gathering spaces use energy? How do you conserve energy?) _____

MATERIALS & RESOURCES (Are your materials, safe, efficient, recycled, recyclable, produced locally?) _____

ENVIRONMENTAL QUALITY (How do your gathering spaces benefit the environment?) _____

SUSTAINABILITY (How are your gathering spaces going to last for many years?) _____

What innovations could be used to make your gathering spaces more sustainable? _____

PEER PRESENTATION: Use the above questions to form a presentation about your project for your class. This can be verbal, use a Powerpoint, or even use an image board to relate your ideas to your classmates.

peer presentations



This process is at the core of how professionals work and evaluate.

DURATION

5 minute presentation + 5-10 minute discussion.

PREPARATION

Talk to the class about 'feedback' and 'criticism'. Do a little role-playing to show helpful versus negative criticism. Encourage students to each offer some critique or idea for at least one of the presentations. This is a process in which everyone is on the same team, so being helpful to one another and assisting in the refinement of ideas is the goal.

Make sure each student has access to or has seen the evaluation rubric (found on the following page) to give their peers feedback that is aligned with the project expectations.

THE PRESENTATION

With your classroom volunteer, and the class in attendance, each team presents their Image Board/PowerPoint/Verbal Presentation in 5-minutes or less. Students, teacher and volunteer offer suggestions, likes and dislikes to the team. One or more team members doing the presentation takes notes on the feedback for use.

When their presentation is complete, design teams re-group with their feedback and make any adjustments as necessary, recording major shifts on the Design Ideas form.

PROJECT NUMBER: _____ **JUDGE'S NAME:** _____

You will be evaluating Design LAB entries per criteria in four different award categories. Evaluation should include BOTH the model (50%) AND the tri-fold presentation (50%).

AWARD CATEGORIES & CRITERIA

SCORING (Circle One Score for Each Criteria)

COMPREHENSIVE CONSTRUCTOR

Project represents a well-researched, well-documented, and comprehensive design which appropriately addresses client needs.

	excellent	good	satisfactory	marginal	unsatisfactory
a. Entire project shows precision, accuracy & attention to detail.	5	4	3	2	1
b. Clearly meets the needs of chosen client and site.	5	4	3	2	1
c. Presentation represents design process & could be built in the real world.	5	4	3	2	1

TOTAL 'Comprehensive Constructor' Score: _____

SUSTAINABILITY SURVEYOR

Project strongly exhibits an awareness of the design's environmental impact and utilizes sustainable materials and solutions.

	excellent	good	satisfactory	marginal	unsatisfactory
a. Project is comprised entirely of recycled materials.	5	4	3	2	1
b. Effectively integrates at least one sustainable design solution.	5	4	3	2	1
c. Demonstrates innovative ways to limit or negate impact on environment.	5	4	3	2	1

TOTAL 'Sustainability Surveyor' Score: _____

INSPIRED INNOVATOR

Project is unique and represents excellence in inventive design thinking.

	excellent	good	satisfactory	marginal	unsatisfactory
a. Design solution clearly reflects effective collaboration.	5	4	3	2	1
b. Project is clearly unique in concept, materials, model, and presentation.	5	4	3	2	1
c. Concept and materials strongly reflect creativity & innovation.	5	4	3	2	1

TOTAL 'Inspired Innovator' Score: _____

JURORS' CHOICE

Jurors are invited to give this award to an outstanding project in each grade category.

	excellent	good	satisfactory	marginal	unsatisfactory
a. Project approach and solution exhibits critical thinking & originality.	5	4	3	2	1
b. Comprehensive presentation / expression of design thinking & process.	5	4	3	2	1
c. Demonstrates successful collaboration and teamwork.	5	4	3	2	1

TOTAL 'Jurors' Choice' Score: _____

INFORMATION, TIPS, & RESOURCES

REMINDER: your model base is 2'-0" x 2'-0" (24" x 24") MAXIMUM.

If selected SCALE is:	1/32" = 1'-0" , largest site is 768' x 768'	1/16" = 1'-0" , largest site is 384' x 384'
	1/8" = 1'-0" , largest site is 192' x 192'	1/4" = 1'-0" , largest site is 96' x 96'

GENERAL TIPS

Valuable Items such as dolls, building system toys (Legos, Tinker Toys, etc.), matchbox cars, dollhouse furniture, etc. are **STRONGLY DISCOURAGED** for projects that will be submitted for exhibition. While every effort will be made to keep projects safe, it is a highly trafficked public space and we cannot guarantee safety.

Hot Glue is a favorite for the speed it allows when putting together projects. Please be aware that some plastics such as polystyrene give off fumes when in contact with hot glue. Always work in a well-ventilated area and use caution with 'found' materials and hot glue.

White Glues such as Tacky-glue and Sobo (there are other 'craft' glues too) dry a little faster and are more viscous than Elmer's, so they stick better to what you're working on. With all typical white school and craft glues, tight connections and a "less is more" ethic work best for both speed of construction and the overall strength of the model.

Play-Doh or Clay allows students to show multiple designs in a short span of time and they can make edits to their first drafts without scrapping their initial model completely. To get a quick grasp of what shape they want their building to look like, give the students an equal amount of clay or Play-Doh to shape ideas they have for a building.

MODELING ACTIVITY: COLLECTING MODELING MATERIALS

As soon as possible, begin to collect the following: cardboard, construction paper, card-stock, thin-cardboard boxes of all shapes, cereal boxes, plastic cups, emptied (cleaned & dried) soda bottles, straws, sticks, rocks, formed plastic pieces from packaging, and any kind of clean packaging discards that do not have food or toxic residue.

OPTIONS

- Designate a team of students to develop a flier to print and send home in backpacks asking for materials.
- Have all students create a designated collection box at home, and ask their parents to bring materials home from the office.
- Place COLLECTION BINS around the school - Library, Office, Teacher's Lounge, Parent Center, Cafeteria, etc.
- Have students prepare a presentation to the teaching staff about the project and the materials they are looking for as the start of having the collection bins around the school.

MODEL REFERENCES

There are many websites that you can search for references of other models that were designed and mocked-up by professionals; this will give you an idea where to start when making your own 3D models. These websites also show examples of well designed buildings and spaces if you wish to research other structures of learning. These include but are not limited to:

Arch Daily - <https://www.archdaily.com>
 Architectural Digest - <https://architecturaldigest.com>
 Design Boom - <https://www.designboom.com>
 Dezeen - <https://www.dezeen.com>
 Pinterest - <https://www.pinterest.com>
 YouTube - <https://www.youtube.com>

3D MODELING

SketchUp 3D Digital Modeling:

<https://www.sketchup.com/3Dfor/k12-education> SketchUp® is a user-friendly 3D modeling program made available online for FREE (limited edition). In previous years, several classes have utilized this visualization tool successfully. A little time on the tutorials provided on SketchUp web pages can get students ready to build their models in cyber-space, and even upload them to the 3D Warehouse site for all to see! If you are uploading models, please use "DLAB2023" in the front of the file names so they stay together.

NOTE: Ask your volunteer for suggested tips for model making. Younger students will require assistance with the cutting and hot-gluing materials option. Invite older students, siblings and/or parents to help assemble, if possible. If additional time is needed outside of class to finish, lunchtime, recess and "Pizza Night" or "Super Saturday" events can be great community gatherings to complete projects.

tri-folds



Models that are submitted to the Design LAB Exhibit are required to have a tri-fold with them.

Since the models only show the final product, the tri-folds have the ability to tell the back-story of how the model came to be and describe why the decisions that went into creating the model were made.

Explain to your students that their model cannot speak – but if it could, what would it say? That’s what should go on the tri-fold.

■ **THE TRI-FOLDS ARE 24" X 42"**

- **ENCOURAGE STUDENTS TO GET CREATIVE** with their tri-folds, rather than slapping information on it. They can decorate it however they wish and the information can be presented in any way they can imagine.

REQUIRED INFORMATION:

- Project description
- Information on what problems this model solved

RECOMMENDED INFORMATION:

- Student sketches
- Inspiration or research photos/info
- Photos of students working on the project
- Team name, team individuals, student bios and "position" on the team
- Printouts of any work done on Google Earth, rendering software, or any other work done on the computer
- Model-related decorations and designs.

mini design lab exhibit

We are limited this year to one project per classroom at the Design LAB Exhibit. This has created an opportunity for classes to decide which project will represent them at the exhibit. This can be done on a small scale (ie. in a classroom during class time) or a large scale, if you want to make it a school-wide event or even invite parents. This is up to the teacher's discretion, as they will be the ones implementing it.

Students should be the ones deciding which project will move on the exhibit, but the teacher can determine how the voting process will work. They can use a rubric sheet (on the following page) to judge the projects in a similar way that the judges at the exhibit will during the Jury Review Night. This team will get the tri-fold board to prepare for the Design LAB Exhibit. Make sure students understand that the winning team will be representing their entire class at the library's exhibit, so they will want to send the best project there, not necessarily their best friend's project.

Have fun with this aspect of the project and give your students a chance to celebrate all of their hard work!



architecture and design vocabulary

BUILT ENVIRONMENT: Human-made surroundings, such as buildings, structures, parks, streets, and play spaces

CARDINAL DIRECTION, CARDINAL POINT: One of the four principal compass points: North, East, South and West also designated by N, E, S and W

CLIENT: A person or group that uses professional advice or services, for example from an accountant, architect, engineer, etc.

CROSS SECTION: A view into the inside of something made by a plane cutting through it

CONSERVE: To preserve and/or use the earth and resources in such a way as to avoid waste

DESIGN PROCESS: To create for a particular purpose or effect, usually in an arrangement of parts / details.

DURABLE: Products that are long-lasting and require little maintenance

ECOLOGY: The study of the relationships of organisms to one another and to their physical surroundings.

ECOSYSTEM: A community of organisms (plants, animals, microbes) in conjunction with the nonliving components of their environment

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 plants 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

INSULATION: A material that prevents or reduces the passage, transfer or leakage of heat, electricity or sound

LEARNING SPACE: the product of a design process created from the relationships between forms of space and style of learning.

LOCAL (MATERIALS): Materials extracted/manufactured/produced within 500 miles of building site

MODEL: A three-dimensional representation of a person, thing or proposed structure of a smaller scale than the original

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

PROGRAM: A list of types of spaces needed for a project and their associated areas, usually in square feet (area)

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

SCALE: 1. The ratio of a distance on a map to the corresponding actual distance. 2. The ratio of a linear dimension of a model to the same dimension of a full-scale original

SHAPE: The form of an object or its external boundary/outline

SITE, BUILDING SITE: A place or area where something is, was or will be built

SKETCH: A rough drawing that can express an idea

STORY, STORIES: A floor or level(s) of a building

STRUCTURES: Elements of a built object that are combined and organized to hold the object together and keep its shape.

SUBURBAN AREA: A developed area located outside the denser urban center characterized by a separation of uses and within commuting distance

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

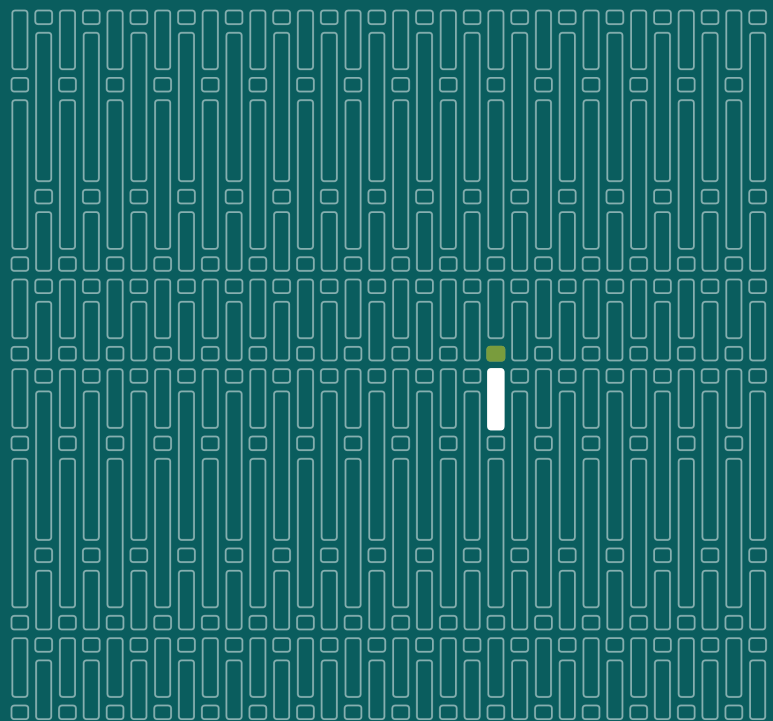
TWO-DIMENSIONAL (2-D): A shape that only has two dimensions and no thickness (x, y)

THREE-DIMENSIONAL (3-D): An object that has height, width and depth (x, y, z)

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

WATERPROOF: Designed to prevent water from entering or passing through; impervious to water

EXHIBIT AND COMPETITION requirements



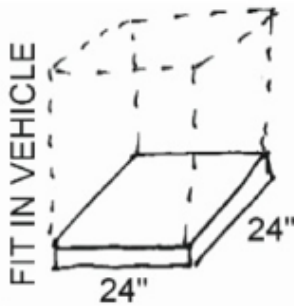
connection ■ community ■ togetherness

design lab exhibit



DESIGN LAB EXHIBIT & REQUIREMENTS

A Design LAB Exhibit will be held to showcase student work. In addition to a display of their three-dimensional models and tri-fold panels, the Design LAB Exhibit will offer students and volunteers the chance to talk with visitors about the entire planning and design process.

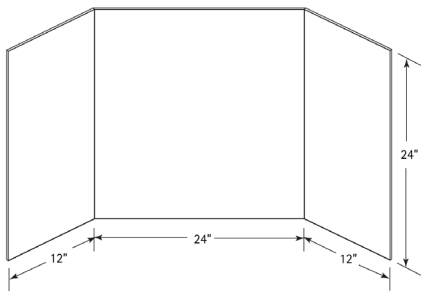


DESIGN LAB EXHIBIT ENTRIES

Each classroom may participate in the Design LAB Exhibit by creating **BOTH**:

1. a 3-dimensional tabletop architectural **model** not to exceed 24" x 24" (base)
2. a 24" h x 48" w **tri-fold panel** (provided by Design LAB)

Each class will submit the project that the students vote to send to the exhibit.



THREE (3) TRI-FOLD BOARDS WILL BE PROVIDED FOR EACH CLASSROOM

The tri-fold display gives students the opportunity to describe and illustrate the work they do leading up to the design and build of their model. Please have students collect and keep evidence of their Design Thinking in action. This evidence will help to tell the story of how they utilized the phases of the Design Process -- Discovery, Interpretation, Ideation, Experimentation, & Evolution to complete the challenge. As you determine which project will be selected for the Design LAB Exhibit, the student teams can use the tri-fold display to tell the story of their journey.

REQUIRED: DESIGN LAB EXHIBIT ENTRY LABEL

- Entry Label: Turn in at time of drop-off
- Project Description: Title of model and description needs to be on the front of the tri-fold somewhere.

**ALL PROJECTS MUST BE LABELED AT THE TIME OF SUBMISSION.
PLEASE USE ENTRY LABELS PROVIDED IN THIS PACKET.**

project submission

INFO & REQUIREMENTS

DESIGN LAB EXHIBIT FORMAT: Models and tri-fold displays will be viewed primarily from one side, lined up side-by-side along a table and back-to-back with other projects. Model and tri-fold orientation and any labeling of elements should take this into consideration.

TEXT & LABELING: Students should strive to communicate as much as possible about their designs through graphic representation. Information may be written or typed on the tri-fold boards, and should be legible, neat and organized. Any labeling of individual features on models should be discreet and not distract from the presentation.

STURDINESS: Submitted entries should be well-constructed and able to be moved without fear of destruction. Models and tri-folds will be shifted and re-arranged as needed after drop-off. While every effort is made to protect submitted projects, we cannot take responsibility for any accidental breakage of models. A "fix-it" station will be available upon arrival with supplies for emergency repairs.

SCALE: Scale is strongly encouraged for 6th–8th grade projects. Projects in the K-2 and 3–5 with at least some element of scale is also encouraged (but not required). Neatly and discreetly label drawings & models with the scale designation, e.g. Scale: 1/4" = 1'-0". More than one scale may be used for the tri-fold presentation. The **Project Description sheet** should be part of the tri-fold panel design.

CREATIVE WRITING: The **Project Description** is your students' chance to describe to the jurors and exhibit visitors how they approached the challenge, their sustainable design solutions, and tell the how and why of their designs. Using the information and ideas recorded on the **Design Ideas Form** and any additional records, have them write a project description summary; include important, descriptive language that will highlight ideas and help the jury visualize a trip to the designed space.

JURY REVIEW: The Jury will be made up of professionals from local architecture, construction, design, education and engineering communities. A team of approximately 3-4 jurors will be assigned for each of the three award categories. Jury members will consult one another for the Juror's Choice Award.

PRIZES: Students & educators selected for award categories will receive a prize and ribbon/certificate.

RECEPTION & AWARDS: We kindly ask that projects be left in-place for the duration of the reception to give students an opportunity to present their work, and everyone a chance to see all the projects. Often, this is the only occasion students have to see the work of others. Afterward, all projects are to be removed from the exhibition space.

PROJECT COLLECTION: Projects will be checked in the day before the exhibit begins and checked out the day of the awards ceremony. If you cannot be at the awards ceremony, please designate a parent to collect your class' project. We do not want to throw away any students' work, but must dispose of projects that remain uncollected after the awards ceremony.

CERTIFICATES: Educators will be offered digital or printed certificates of participation for their students. The digital certificates will be emailed out and the printed ones will be available for pick-up at the project drop-off and the awards ceremony.

design lab exhibit

RECOGNITION

All Design LAB Exhibit entries will be reviewed and evaluated by a Jury Panel of local professionals. The jury will review entries in these grade categories: K-2, 3-5, & 6-8. In the case of multi-grade groups, projects will be placed according to the highest grade level represented.

Awarded entries will be recognized at the Design LAB Exhibit Program. Three recognition awards will be given in each of the four grade categories to the participating students and their teachers.

ENTRIES WILL BE REVIEWED FOR THESE ELEMENTS:

- ■ ■ comprehensive, thorough and innovative ideas
- ■ ■ real world design solution success in meeting needs of client
- ■ ■ sustainable materials and green building solutions

AWARD CATEGORIES

INSPIRED INNOVATOR: *Project is unique and represents excellence in inventive design thinking*

- The learning space prompts the viewer to think, and reflects the designers' ability to creatively collaborate and express their work
- The space is energizing, inspiring, and motivating to promote learning and foster chosen activities
- The design concept and materials clearly demonstrate an innovative response including size, shape, orientation, treatment and functionality

COMPREHENSIVE CONSTRUCTOR: *Project represents a well-researched, well-documented, and comprehensive design, which appropriately addresses client needs.*

- The tri-fold and model tell the story of the entire design process and were created with precision, accuracy and attention to detail
- The gathering space could be built in the real world using the presented design and selected materials for a real world client
- The project demonstrates a thorough understanding of the chosen site and client needs, while expressing a developed design solution

SUSTAINABILITY SURVEYOR: *Project strongly exhibits an awareness of the design's environmental impact and utilizes sustainable materials and solutions*

- The gathering space design utilizes responsibly sourced materials and systems
- The space clearly and effectively incorporates sustainable design solutions, such as natural lighting, solar or wind power, water catchment or green roofing
- The project strongly demonstrates how the gathering space design limits its impact on the environment

JURORS' CHOICE: *Jurors are invited to give the Jurors' Choice Award to outstanding project(s) in each grade category.*

PEOPLE'S CHOICE: *A ballot box will be provided during Design LAB Exhibit Week for the general public to vote on a favorite design.*

SOCIAL BUTTERFLY: *The models who do not make it to the library will be displayed on a social media page where people can "vote" for them. The project with the most votes will win this award and it can be displayed at the library on the day of the awards ceremony.*

POLISHED PROFESSIONAL: *On the day of the awards ceremony, the group or individual who does the most outstanding job of presenting their award will win this award.*

DESIGN LAB LEARN + BUILD **EXHIBIT ENTRY LABEL**

IMPORTANT: Complete and affix label on model BEFORE dropping off at Main library and BRING EXTRA COPY for check-in

School _____ Teacher _____

Project Title _____

Student Designer / Design Team:

Name _____ Grade _____

Name _____ Grade _____

Name _____ Grade _____

Name _____ Grade _____

Name _____ Grade _____

Name _____ Grade _____

Classroom Volunteer Name(s) & Company / Organization:

Client _____ Location / Site _____

DESIGN LAB LEARN + BUILD **EXHIBIT ENTRY LABEL**

IMPORTANT: Complete and affix label on model BEFORE dropping off at Main library and BRING EXTRA COPY for check-in

School _____ Teacher _____

Project Title _____

Student Designer / Design Team:

Name _____ Grade _____

Name _____ Grade _____

Name _____ Grade _____

Name _____ Grade _____

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