

**Age Level:**

Third grade and up

Subjects:

Visual Arts
Language Arts
Social Studies
Math
Science

Time:

This lesson works best in more than one session and needs to be preceded by reading “*The Evolution of Egansville*” published by PAE Consulting Engineers. If you would prefer a hardcopy of the book instead of using the digital version, please contact Kim Knowles at AFO, kim@af-oregon.org.

<https://bit.ly/egansville-ebook>

- This lesson incorporates the three sided pyramid shape from “What Makes Structures Stand Up?” in Section 4. Take about a half hour to talk about shapes in structures and create the pyramid shape for their special structure, unless you are doing the entire “What Makes Structures Stand Up?” lesson.
- Have students do research on their special bug client outside of class, before filling out the “Design Development Sheet.” Have them answer the following questions:
 1. What are some of their bug’s characteristics? (appearance, behaviors, abilities)? What do they eat? What kind of habitat do they like?
 2. What do they do that benefits our environment?
 3. Write at least a sentence or two about how designing spaces in a way that takes care of our environment would help even our beneficial bugs!
- Give students about a half hour in class to work on their “Design Development Sheet” and another half hour to draw their client and elevation. Encourage them to also think about where different rooms or spaces will go inside the structure. If you want to introduce drawing floor plans in another session, you

can use the Section 4 lesson “Drawing a Floor Plan of Things That Don’t Move.”

- When you are ready, give students about an hour for the construction – the students will not want to quit.

Materials:

- Assemble a variety of scrap materials, such as drinking cups, straws, paper, plastic, cardboard, fabric, etc., as well as any jars or bottles – like Buggs uses!
- Have each student bring a box no larger than a shoe box and only one per student
- Copy of the Design Development Sheet for each student
- Three-inch by five-inch cards
- One Client Slip for each student
- Scissors, tape, glue and string

Learning Objectives:

- To increase creativity through manipulation of Presenting the Activity: objects, recording and drawing
- To gain an understanding of relative scales and two and three-dimensional relationships
- To understand a process for implementing a project
- To learn to work with design criteria
- To create something from beginning to end using the design process

Design Professional:

Students love this type of activity and will quickly forget the criteria in the fun of making a little building. It will be important for you to keep the focus on the learning objectives - what they are doing and how it relates to their Client Slip.

Teacher:

Because student enthusiasm will be very high in implementing this activity, it is easy for the students to lose track of the reasons for doing this.

As you walk around the room, make comments about things the students are doing that demonstrate ways



they are using their Client Slips to provide the elements in their design criteria.

Rationale:

This is an activity in creative problem solving through architectural design and construction techniques that can stimulate interest in developing a variety of three-dimensional forms.

The activity also demonstrates the process for developing criteria and using it as a guide for creating a solution.

The students will be able to be more creative if they have previously done the activity, "How it Feels to be a Structure" and "What Makes Structures Stand Up?"

Presenting the Activity:

Students are apt to become quite carried away with their structures, so it is advisable to keep the design solutions fairly simple, and to limit both the size and construction time. The involvement should be commensurate with the learning taking place.

While this activity could be done in small groups, the students enjoy it more as an opportunity for individual expression.

Suggested dialogue...

"We all know how much Bugs loves bugs! Let's talk for a minute about how important bugs are to our environment – all over the world – but, definitely here in Oregon. For this next activity, you are to be the architect and builder of a structure for a special bug client who needs a new home here where we live. Your project is to develop the design of and build a model of a structure for the very special client that will be described on the client slips you will receive. As I go around the room with this container, you will each receive one slip. You are not to exchange slips. Each person will keep the one they have drawn. When architects accept clients that come to them, it is their job to listen to what the client needs and make sure the client gets what they are hoping for. Since you are the architect for this structure, you will need to address your client's needs."

Skip this part of the lesson if you've already done "What Makes Structures Stand Up?"

"First, we are going to talk about one of the strongest shapes that help structures stand up. Can anyone guess what shape that might be?"

Give students a chance to guess, give them hints like "It has three sides." if necessary.

"Any three dimensional form that has triangular sides coming to a point at the top is considered a pyramid, it usually means a form with a square base and four triangular sides-like the great pyramids in Egypt. To make this form, fold a square across the diagonal way. Open it up and fold it diagonally the other way. Make a cut in the middle of each of the triangles almost all the way to the center point, but not quite. Overlap each of these cuts just a little bit, and tape or glue them together. For a three-sided pyramid, start out the same way, making the diagonal folds. However, this time you will make only one cut in the middle of one of the triangles that goes all the way to the center point. Overlap this cut completely over the opposite side, so it forms a triangle that is the same size as the other two sides."

"Now that we have the outside structure of our space, as I go around the room with this container, you will each receive one slip. You are not to exchange slips. Each person will keep the one they have drawn. When architects accept clients that come to them, it is their job to listen to what the client needs and make sure the client gets what they are hoping for. Since you are the architect for this structure, you will need to address your client's needs."

Give them a few minutes to read their client slips. You might have the students share them. It doesn't matter if some have the same client. It will be interesting to see how their solutions differ.

Hand out a copy of the Design Development Sheet to each student. Go through it with them as they fill it out. Explain that the design criteria for this project will be the things the students will have to think about as they design the structure that will meet the needs of their client.

A SPECIAL STRUCTURE FOR A BUG CLIENT

The Evolution of Egansville



“From the design criteria you will develop by filling in the blanks on this sheet, you are going to design and build a structure that will meet the needs you have determined for your special client. Another part of your criteria is your structure must be built from the materials that are available, and that you must make the structure the right size for your client. Let’s go down the sheet. First, write the name of your client. It will be important that you know what your client looks like and what size they are before you build the client a structure.

Hand out three-inch by five-inch cards and ask the students to draw a picture of what they think the client would look like. If the client is small, it may not fill the card. If the client is large, the drawing should fill the whole card. Using three by five-inch cards keeps the scale small enough to keep the size of the structures down to a manageable size.

“When you have finished your picture, cut your client out and tape it on the top of the client sheet. This will remind you that you must design your structure to fit the size of the client – not too big or too little, but the right size for going through doors and looking out the windows. This picture gives you the scale of your structure. Now look at number three. You are to list the things that you think will meet the needs of your client. Think about things like recreation, food, entertainment, hobbies, etc. Be sure to fill in all the blanks – write on the margin if you think of more things than there are spaces. Under number four, list the things you will design to meet the needs you have listed for your client. Some examples are given on the sheet. Ask for help if you need it.

“The next step is to design and build your model structure. Be as creative and original as you can. You may want to make some sketches before you start. Architects usually do that. Keep your Design Development Sheet handy, so you can refer to it as you design the structure to meet the needs you have determined should be met for your client.”

Keep reminding the students that they are developing a design to meet specific needs and they will likely want to think about some of the sustainable design elements discussed in the previous lesson.

“The last steps on the sheet will be filled in after you have completed your structure.

“Now you are ready to decide what materials you will need from what is available and get started on your structure.”

The students should be encouraged to do the structure as they interpret the steps in the design program. The fewer ideas given on how it is to be done, the better. This is a test of their ability to use the design criteria and materials creatively. However, because their enthusiasm for the building process usually reaches a high level, it will be necessary to remind them to refer to their Design Development Sheet as they work.

The drawing of a floor plan and the elevations of the front and a side emphasizes the three-dimensional relationships. Placing the drawing of the client in the drawing emphasizes comparative scales.

Encourage them as they build their models to continue creating different elements until they convey the space they envisioned in their planning and elevations. Remind them that if something doesn’t work the way they want the first time, they can work to improve it.

When you feel the building project has reached its limits of productivity, give a 10-minute warning, then call time.

Have the students assemble their models, drawings and hand-out sheets in a nice display format.

**Closure:**

Have each student present their project to the class, explaining what they did and how it met the design criteria. Having this visual reference is an aid to students in verbalizing ideas.

Ask the students to critique the designs in relation to creativity of the solutions, meeting of design criteria and overall aesthetic quality of the presentation.

Suggested dialogue...

"I loved seeing the work that all of you did for your special bug clients and hearing your presentations. Design professionals like me need to present our work to clients and to the general public. We work just like you to make sure that our clients are getting what they need and that we are taking good care of our communities and our natural resources. Buggs from Egansville would be really excited about what you all have accomplished!"

Teacher Evaluation:

"This activity is extremely beneficial to the students. For one thing, it is one time during the year everyone seems so totally involved and committed to a project.

"Regardless of anyone's reading ability or math expertise, students can feel successful in this activity. It involves so many educational steps that really make students think and draw out their individual creative abilities.

"It leads students into the higher levels of thinking, such as application, analysis, synthesis and evaluation, which sometimes get slighted. Students must brainstorm, or in some way share ideas that will benefit their bug client. They must then apply these ideas to the design of their structure, analyze the reasons for their decisions, synthesize or create the actual structure, and evaluate the end product.

"The fact that there is an actual concrete end product, is also a positive aspect of this project. The decision making steps and cooperation required by the group is a terrific experience for the students. We feel this activity is, overall, one of the most effective we have ever used with students. It is "their" project, totally using "their" ideas and a concrete example of "their" success."



This lesson is a partnership between Architecture Foundation of Oregon and PAE Consulting Engineers and was adapted from Architecture as a Basic Curriculum Builder, the Architects in Schools Curriculum Guide from Architecture Foundation of Oregon. "A Special Structure for a Special Bug Client" is one lesson recommended to be used with instruction that supports "The Evolution of Egansville," a text published by PAE Consulting Engineers.

CLIENT SLIPS – SPECIAL BUG CLIENTS*A Special Structure for a Bug Client*

Design and build a home for a painted lady butterfly who is a talented artist, likes to knit and would like her structure designed for a living roof to grow flowers.

Design and build a home for an overworked honeybee who always has a project going in his home, but also likes to unwind and appreciate his honeycomb.

Design and build a home for a glamorous Western tiger swallow tail butterfly who is good at dancing and likes to keep her wings in shape to fly long distances.

Design and build a home for a green lacewing, who likes peace and quiet in the garden and would like to collect rainwater to take care of their flowers.

Design and build a home for a ladybird beetle who lives on a farm, likes natural light and enjoys the outdoors.

Design and build a home for a shy Northern Golden Orb Spider who wants a place to be alone and write poems after a day of hard work.

DESIGN DEVELOPMENT SHEET FOR A BUG CLIENT**4.104***A Special Structure for a Bug Client*

NAME	DATE
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You are to be the architect and the builder of a special structure for a special bug client. Architects and builders design and build their buildings to fit the needs of the client who will live in the building. You will need to fill in the blanks below, and then use the information as you design and build the model of your structure.

1. Your client's name

2. Draw a picture of your client (or clients) on your three by five-inch card. If you drew your client life-size, it would be hard to build a structure that would fit and still get it in this room, so this drawing will become the scale for the building.

3. List the activities you think your client would like to do or need to do in their daily life. They probably all like to eat. Some may like to play musical instruments, watch TV, have hobbies, etc. Think about ideas. Try to be specific about them, as you list them. Don't just put down, "sleep." Think about where and how they would sleep. Architects call these things design criteria.

A.	E.
B.	F.
C.	G.
D.	H.

4. Now list the spaces you will have to design to be built to fulfill the needs you have determined for your client. For example, if there is a need to eat, you will have to provide places for cooking, storing food and dishes and for eating. If there is a need for exercise or comfortable relaxation, you will need to provide for that.

A.	E.
B.	F.
C.	G.
D.	H.

5. Draw a picture of your structure from the front, one side and looking into it straight down from the top. You will then have a front elevation, a side elevation and a floor plan. Put the cut-out of your client against the front of the structure and include the client in the drawing.

6. On the back of this sheet, write a paragraph about why you think your client likes the structure you have designed.