

Clay Houses

Grade: 5-6

Time: 2 hours

Activity Overview :

Today we are going to learn how to make our own oven-bake clay. Then we are going to design our own 3D houses and build them using the clay we made. We are going to learn about the engineering design cycle as well as how civil engineers and architects design and build structures such as houses.

Before we begin think about the following questions:

- What does your dream house look like?
- What features are important for a house to have?
- What do you think civil engineers and architects have to think about before building a house?

Materials:

- 2 cups of flour
- 1 cup of salt
- 4 teaspoons of vegetable oil
- 1 cup of water
- Mixing bowl
- Wooden spoon
- Rolling pin
- Plastic butter knife
- Toothpick
- Baking tray
- Blank paper
- Pencil
- Hot glue gun
- Paint



Activity (Designing your Home):

1

Before we build our clay houses, we have to think like civil engineers and architects and design our house!

2

We have provided you with an outline for the house which you can cut out and use to trace the pieces of clay you will build your house out of. You can use this design as is, make modifications to the design, or create your own design!

3

Go outside and look at your own house or your neighbours' houses for inspiration of what kind of house you want to create.

4

Any house will need at least four walls and a roof. There are a variety of elements you can add onto this basic design to make your house feel more like home! Here are some ideas you can use to modify the outline we provided, or to create your own design:

- Cut out the windows so you can see inside your house
- Make shutters for your windows
- Make tiles for your roof
- Make a front door and a small roof above the door held up by columns
- Make a multi-level house by cutting out multiple windows above each other
- Give your house a front porch with a roof above it held up by columns
- Give your house a balcony or terrace
- Give your house a garage

5

Draw your house design on a piece of paper. It is helpful to draw out each piece you want to cut out of your clay (like how we have made our outline). This way you can cut out the paper pieces and trace them onto the clay.

6

Now that we have designed our house, let's start making it!



Activity (Making the Clay):

- 1 Preheat the oven to 350°F
- 2 Mix together two cups of flour and 1 cup of salt together in a bowl.
- 3 Add four teaspoons of vegetable oil and one cup of water to the salt and flour and mix it in.
- 4 Knead the dough until all the ingredients are well combined, the dough should feel quite stiff when you are finished, but not crumbly.
- 5 Roll out your dough with a rolling pin (or flatten it with your hands) until it is about 1 or 1.5 cm thick.

Step 2



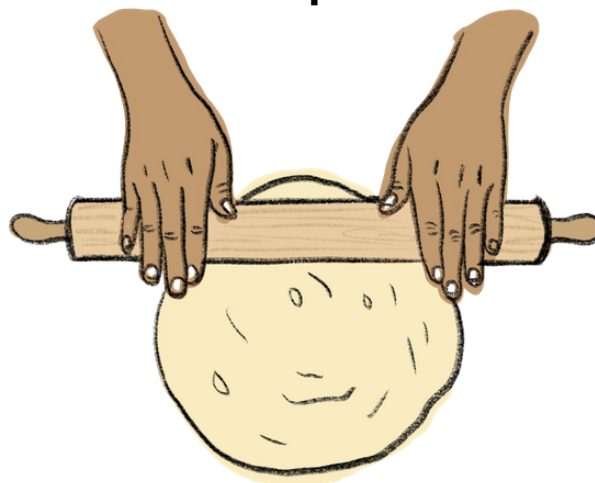
Step 3



Step 4



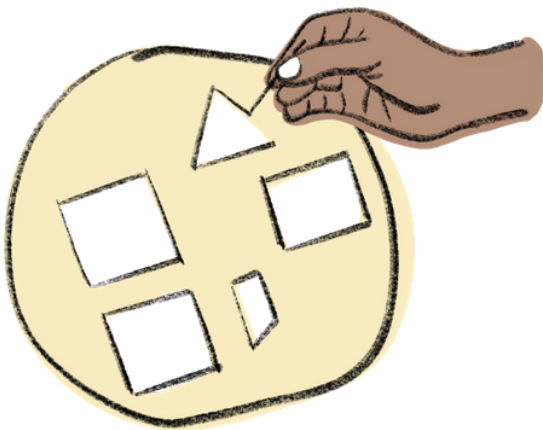
Step 5



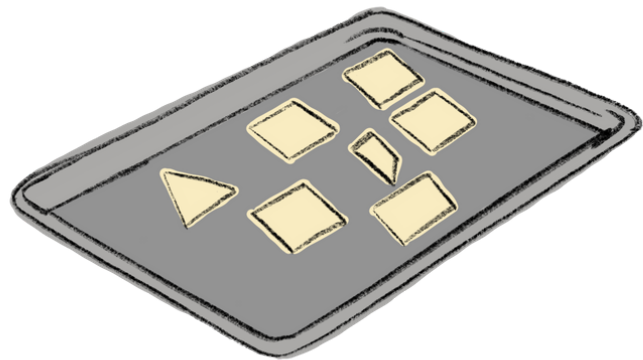
Activity (Building your House):

- 6 Cut out the pieces for your house using either the outline provided on page 7 or the outline that you designed. To do this, cut out the paper templates, then trace them onto your clay with a toothpick or pencil, and finally cut out those pieces with a knife.
- 7 Put the pieces you cut out onto the baking sheet and place them in the oven.
- 8 Bake the clay for 45 minutes. Depending on how thick the clay is or the type of oven you have, it may take up to 1 hour. You want to bake the clay until it is hard. e pieces you cut out onto the baking sheet and place them in the oven.
- 9 Take your clay pieces out of the oven and let them cool completely.

Step 6



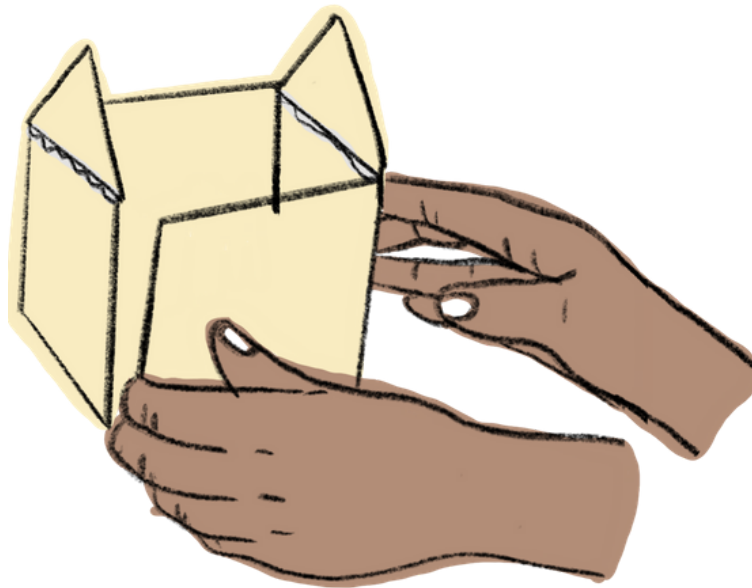
Step 7



Activity (Making the Clay):

- 1 After your clay pieces have cooled, you can start building your house! Building this house is going to be similar to building a gingerbread house.
- 2 Start by using a hot glue gun to glue the front, back, and side walls of your house together, this creates a frame for your house.
- 3 Wait for the glue on the walls to dry before gluing on the roof of your house.
- 4 The design you created for your house might be more complicated than the template we provided. Always start from the bottom and work your way up. Start by gluing together pieces that form the foundation or frame of your house, then add on other walls or the roof.

- 5** Let the glue on your house dry, then it is time to start decorating your house!
- 6** Start painting the outside walls of your house. Think about what colour you want it to be and what material you want it to look like. Maybe your house has a brick exterior or wood siding.
- 7** If you did not cut out windows or make a door for your house, paint them on! If you did cut out windows, you can leave them hollow or you can glue some plastic wrap in the window frame to make your windows.
- 8** Paint any trimming that your house might have around the windows, door, or roof.
- 9** Paint the roof of your house next, think about what kind of shingles you want the roof to have and what colour they will be. If you made tiles for your roof, glue them on and paint them.
- 10** Paint or decorate any other parts of your house that you want to, get creative with the design, think like an architect!



Engineering and Science Connections

Civil Engineers use their knowledge of math and physics to design and oversee the construction of structures such as houses, bridges, dams, roads and tunnels.

Architects use their knowledge of physics and art to design buildings such as houses, apartments, offices, museums, and schools. Architects and civil engineers often work together when designing and building structures.

The engineering design cycle is a process that engineers go through when they are designing and building something. When you are an engineer, you cannot build something without first having a plan because that could be very dangerous. Today you were the engineers that designed and built a house, and you started with a plan before you built your house. The first step of the design cycle is to understand the problem, today that was needing to build a house. The second step is to design a solution, today we drew a design of our house on paper. The third step is to build a model, today we build our houses out of clay. The last step is to test your model, today we put our house together and made sure it stood up. If the model does not work, that is okay, you start the process all over again!

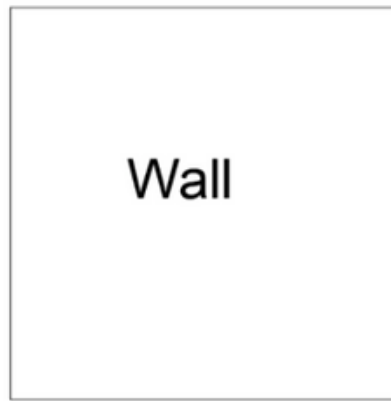
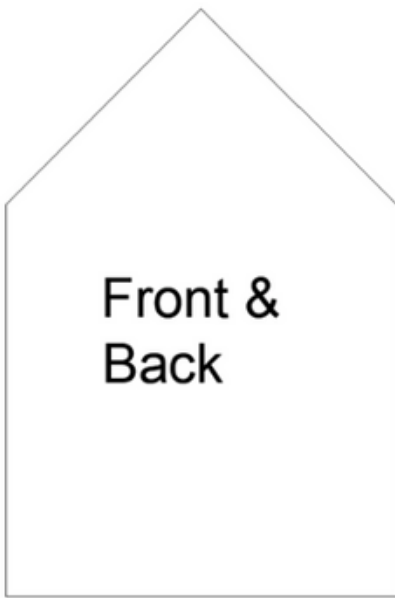
Structures are built out of a variety of 3D pieces and can hold up their own weight, the weight of other things, and can stand up on their own. Examples of structures include your school, house, hospitals, grocery stores, apartments, bridges, and dams. The clay house you build today is a structure. Structures are built on foundations which is the most bottom part of a building which keeps it stable. Different components such as columns and frames are used to build houses. Columns are straight, vertical components which hold other parts of a structure upright. A frame is made of two columns and usually a beam (a straight, horizontal component) on top. The walls of your house make a simple frame for your house.

Extensions

Make a neighbourhood!

If you enjoyed building your clay house, you can design and build a whole clay neighbourhood! Architects often work with urban planners. Urban planners design the layout of cities or suburbs, they think about how neighbourhoods are going to be designed and where houses will go in the neighbourhood. Try becoming the urban planner and design your own neighbourhood and build it out of clay! As you make more houses, you can glue them onto a piece of cardboard or plywood. Think about where you want to put the houses, if your neighbourhood is going to have any roads, if there are going to be fences between houses, or if the houses will have backyards. You can also make more than just houses for your neighbourhood, make schools, grocery, stores, apartments, mailboxes, and parks. Design your neighbourhood on a piece of paper before you start building it, then watch your design come to life!

Clay House Outline



*Cut out two pieces of clay with each outline

Share your creations! 

Don't forget to share your experiments and creations with us! We would love to see what you've made. You can Email us at: esqinfo@uwaterloo.ca or send us a message/tag us on our social media!

Facebook: @uwengoutreach **Twitter:** @UWEngOutreach **Instagram:** @uwengoutreach

Thanks for exploring, discovering, and learning with us!

3, 2, 1 Done!

3 - Write or draw 3 things you learned from this activity

2 - Write or draw 2 things you found super interesting or cool and want to learn more about

1 - Do you have any questions about the activity? Did something make you wonder...what if? how? or why?