

Civil Engineer's Pillow Fort

Grade: 1-2

Time: 1.5 + hrs

Activity Overview :

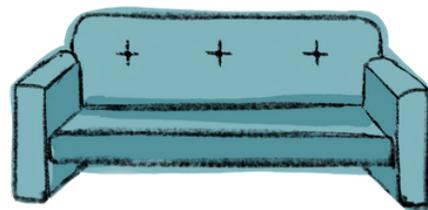
Today we are going to be civil engineers! You will be using design and construction knowledge to build the ultimate pillow fort in your home much like how architects and civil engineers design and build buildings.

Before we begin think about the following questions:

- What materials are best used for the frame of the fort?
- What materials are best used for the roof of the fort?

Materials:

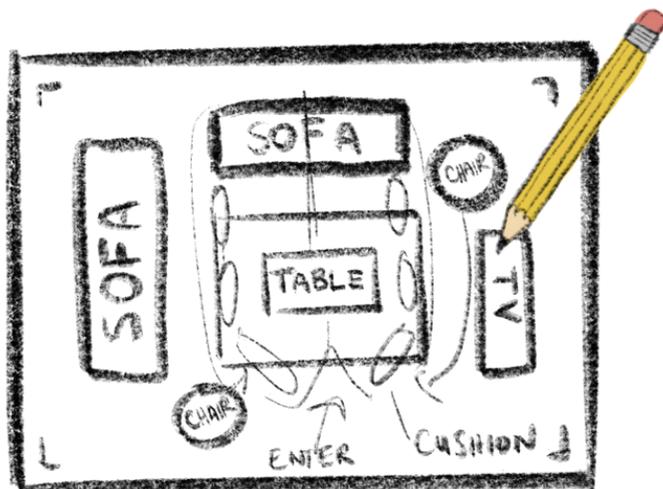
- Pencil and eraser
- Blank sheet of paper
- Pillows of various sizes
- Blankets
- Sheets
- Couch cushions
- Furniture (tables, chairs etc.)
- Broom or Mop handle
- String
- Books
- Clothespin or binder clips
- Snacks, books, lights, toys



Don't worry if you don't have all these supplies. Experiment with other everyday items and see what you can make!

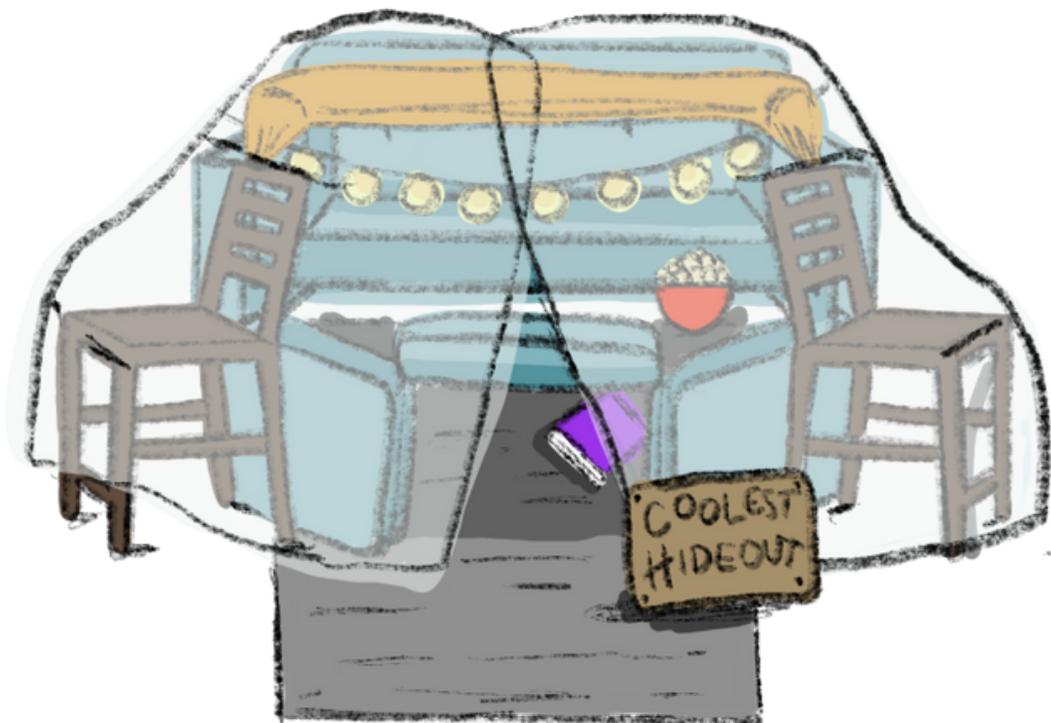
Activity (Blueprint):

- 1 Choose a good spot in your house to start building. Try to find an open area with lots of space and make sure your fort won't be blocking any doors or passageways.
- 2 Make a blueprint of the design of your pillow fort from a birds eye view, on a blank sheet of paper.
- 3 Start by drawing the furniture and objects that you will be using to make the frame of your pillow fort, in the layout and shape that you want to build your fort in. Use strong and sturdy material that will not easily collapse under weight or move when bumped into. Frames are made of beams and columns, these will help support your roofing.
- 4 Draw where you want the entrance to your fort to be.
- 5 Next, add in the furniture and other materials that you will be using to make the walls of your fort e.g. couch cushions. Make sure you are not blocking your entrance with any material.
- 6 Add in the furniture and material you will have in your fort to section off different areas of your fort.
- 7 Add an outline of the materials you will be using for the roofing. Make sure you show the separation between the different materials. Try to use light material such as sheets, as heavy materials are harder to support and might collapse.
- 8 Label different parts of your fort (entrance, space A, Space B ect) and materials that are unclear in your blueprint.



Activity (Pillow Fort):

- 1** Gather the material that you will be need to build your fort. Start by building the frame for your pillow fort. Arrange furniture and different objects in the arrangement and shape that you drew on your blueprint. Suggestion: Use chairs as the columns, to finish your frame, take the handle of a broom or mop and place it horizontally on top of the chairs to act as the beam. You can tie the handle to the chair with string to make sure it is secure.
- 2** Add walls to your pillow fort and then add the roof to your fort. Make sure that it's secure by using different heavier objects or by clipping/tying it in place. Suggestion: Wrap or hang sheets on the pieces of furniture that you used for your frame and walls. The sheets will act as your roof and as additional walls for your fort. To keep the sheets in place use heavy books and pillows as weights. You can also use clothespin and binder clips to keep them in place or pin the sheets to the floor using the legs of a coffee table.
- 3** Use smaller sheets as tent flaps for entrances.
- 4** Decorate your fort with lots of blankets and pillows and don't forget to add some lights, snacks, books, and your favourite toys!
- 5** Give your fort a creative name, make a sign and hang it up!



Engineering and Science Connections

Civil Engineering deals with the design, maintenance and construction of infrastructure projects such as buildings, dams, roads, and bridges.

Architects design buildings and supervise the construction of those buildings. Architects and civil engineers often work together on projects.

A **blueprint** is a design plan or a technical drawing. Architects and civil engineers use blueprints to plan and design a project before they start building.

Framing is the fitting of pieces together to give the structure shape and support in construction. Materials such as wood and structural steel are usually used. Frames are made of components called **beams** and columns. **Beams** are horizontal components that can bend. Columns are vertical components which can be compressed (squished down).

Extensions:

Expand your fort! Experiment with some different materials to see what else you can use to build your fort. Are there better materials that you can use to make your fort stronger? Split your fort into different sections such as the snack area, nap area and reading room! Make your fort bigger by adding a column to hold up the roof. You can use a broom, an umbrella, a long pole or any other material you find that can balance upright.

Build a fort outside! Ask your parents/guardians what material you can use to help make a fort outside in your backyard such as a tarp or patio furniture. Add branches, leaves and other things you find outside to add to your fort.

Add arches to your fort! Arches are very strong, curved, structural components that are used often in bridges. If you have any hula hoops at home you can make an arched roof or entrance to your pillow fort. Tie your hula hoops to your chairs using string and drape your blanket over the top of it, this will make your roof arches like in some castles. You can also make the hula hoop the doorway into your pillow fort!

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?