

Grade 1: Materials, Objects and Everyday Structures Investigating Properties of Materials and Making Frames

Purpose: To introduce students to making frames and then using those frames to create structures that serve a variety of purposes.

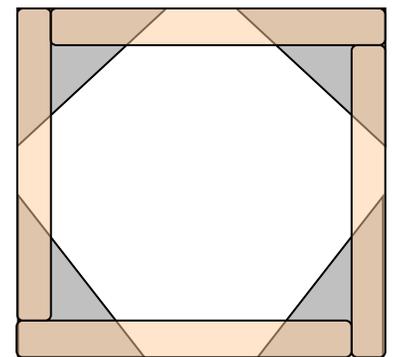
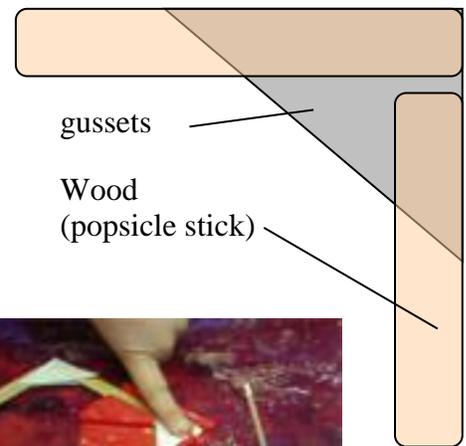
The first task is to teach students how to join two wooden pieces using glue, gussets (paper or thin cardboard triangles) and a template. This skill will serve them well for later applications such as soldering metals and sewing materials.

Safety Considerations:

Work on a surface such as a plastic table cloth or other drop sheet that will keep the floor or desks clean. Avoid wiping hands on mouth during building and wash hands after construction.

The “sandwich” method of making a framing joint

- Lightly glue one side of the gusset
- Place it into a template such as a jinx connector
- Place one piece of wood (popsicle stick or other wood that will fit into template) onto the gusset
- Place second piece of wood onto the gusset so that it aligns with the first piece.
- Lightly glue one side of a second gusset
- Place it onto the two pieces of wood to join them
- Press down on gusset and count to 20
- Release the corner joint gently from the template.



Making the frame

There are several ways to build the frame as a four-sided figure. Students can try out a serial method, whereby they build one corner and then rotate 90° and build the next corner. They could also use a parallel method and build two angles first and then join the two together. This would be a good opportunity to let them try both ways and then choose with justification.

As an extension, and if a saw and mitre box are available, have students cut wood at 45° angles to make their corners meet. They could also cut wood to different lengths to make rectangular frames rather than square ones.

Investigating the strength of various fasteners and fastening methods

Purpose: to investigate properties of materials and make appropriate use of materials for joining purposes when designing and making objects.

- Have students brainstorm different ways that things are held together (prompt with materials such as wood, paper, fabric) or closed (zippers, buttons, Velcro, magnets etc.) and use the term fastener to describe anything that holds materials together.
- Relate the brainstorming to the frames and that there are different types of glues available.
- Ask the question, “How many different ways are there for putting gussets and wood pieces together?”
- Try to elicit at least 5 different responses (i.e., carpenter's glue, white glue, water and flour, 2-sided tape, glue stick, masking tape, etc.)
- Have students hypothesize which glue the best for is probably connecting wood and paper (a hypothesis is a guess based on some previous knowledge)
- Ask students how they might test to see which glue is the best and how they would make a fair test to try out their hypothesis (You will want to guide their plans to suit the classroom and record their plans on chart paper).

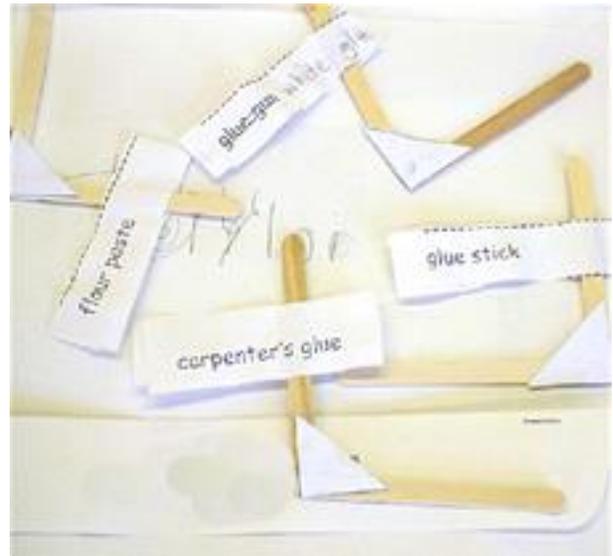
Carry out the investigation over 2 days, one to build the frame angles and label them, and one for testing them.

(Suggestions for testing the strength of the frame angles: Tape the frame angle vertical to the side of a desk leg to secure it. Load the horizontal part with a small light sand bucket so that bottom of the bucket is about 10 cm above the floor).

Have students (groups of three suggested) load the suspended sand bucket with a non-standard measuring device (e.g. film canister, minigo yogurt cup or other small container) one student being responsible for tallying, one for loading and one for observing.

Student add sand to the bucket and angles until they break. (the highlight is when the angle breaks)

Compare the strength of each glue type based on the amount of sand put into the bucket.



Uses for frames:



Picture frames

- Decorate with crayons, markers and glue a picture to front or back
- Encourage appropriate use of materials at this stage. Avoid using excessive glue, try to make frames straight and apply gussets appropriately.

Hot plate/hot pad

- Add several sticks across the simple frame and decorate with permanent markers (if it is to be used with hot items!)



Suncatcher

- One frame with an acetate film (or coloured cellophane) cover.
- Decorate film with permanent marker.
- Glue a loop of thread or wool to frame and when dried, hang in a sunny window.

Weaving

- Glue two or three more sticks onto the frame and weave through strips of material, paper and other materials (foil, wax paper, plastic wrap, sandwich baggies etc.)

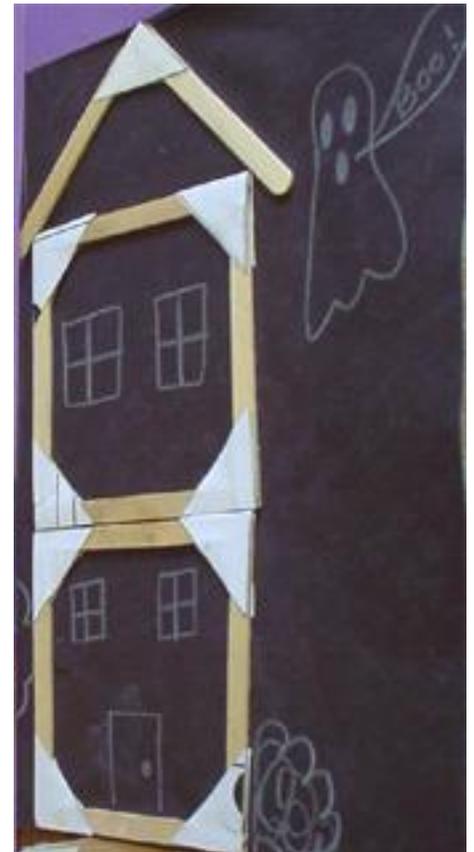


Wall Hanging

- Drape several different colourful streamers and hangers from a frame, attach a hook or string to hang on the wall.

House or other 2-d structure

- Combine frames and frame elements and glue onto a backing to create a theme for various times of the year.



Snowflake

- Make 2 frames, placing them on top of each other. Rotate the top frame 45° and glue on top of another frame. Decorate and add either a clamp for topping a tree or as a hanging adornment for windows or walls.

Many other applications can evolve from this rather simple frame. If a student shows some aptitude to building, you might allow them to use thicker wood, cut it using a cutting jig (mitre box) and a junior saw and develop more complex framing applications.

A final design task could be to build a model playground using nothing, but frames organized into various shapes and placed on an appropriate map.



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