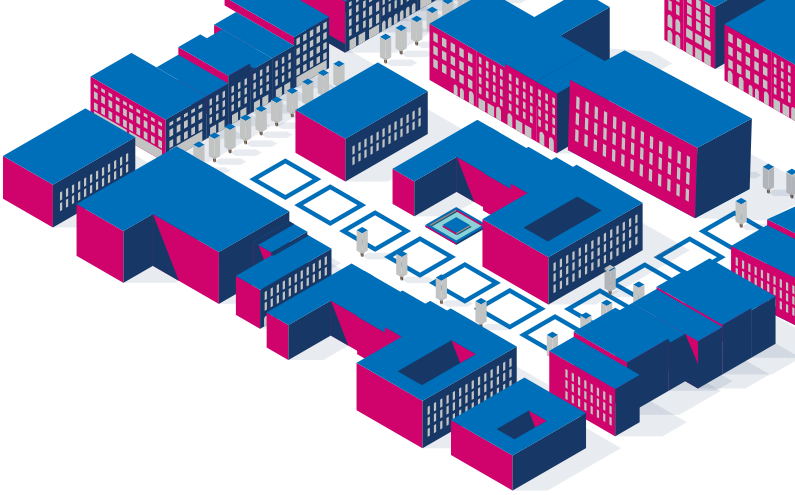
Formech
Perfectly formed



# 3D State Map

Completion time: 2 Lessons

## Materials and Resources:

- Pencil, paper, and a ruler
- A map of the chosen state
- Thick cardboard, and card of varying thicknesses
- Scissors, string, newspaper, glue, and a pin
- Formech vacuum forming machine and suitable vacuum forming plastic material
- https://formechusa.com/case-studies/formech-at-the-italian-blind-association-catania

## Skills at a glance:

**Mathematics**

Measurement, scale

**Language**

Discussion, reading, listening

**Thinking skills**

Design, applied thought,research and development, material selection, independent thought, creativity, and problem solving

**Science**

Heating plastics and effects, plastic/polymer material knowledge, and understanding geographical land features

## Project Outline:

Students are to mold and vacuum form a 3D map of their home state, using thick cardboard as their principal mold material. This design should reflect not only the shape of the home state, but also the land gradients, mountain ranges, and terrain of the different areas. Cardboard can be cut and layered in varying patterns and heights to represent these landscape features. This project is great for use within both History and Geography classes. These vacuum formed maps may be used for wall displays, gifts, or even food molds.

## Method:

Individually or in small groups, students can begin this project by looking at an existing state map, examining both the state's shape and topography. Discussion around the distinctive land features, and decisions about what to include can be noted.

Using a large piece of thick cardboard, which fits within the forming area of the vacuum forming machine, students must accurately draw the shape of the state with a pencil, and carefully cut this shape out. This provides the base of their mold to be vacuum formed later.

Using the map and observations made earlier, students can now begin cutting to shape smaller pieces of cardboard to represent land features, and begin the layering process, gluing each piece securely as they go. If the state has larger mountains, then these will require more layering of cardboard, cut in decreasing sizes and layered to represent their size and shape. In layering the cardboard, students can go relatively high and may choose to accentuate physical land features rather than represent them to scale for increased visual effect.

If a state has lakes, rivers, or other flatter land features, these might be represented by gluing string to the mold to outline their shape or path. If a state has heavily wooded or forest areas, these might be represented with small balls of scrunched up newspaper, glued securely in place. Once completed, students' molds should be allowed to dry completely before being vacuum formed.

## Homework Tasks:

Students might be tasked with researching the physical land features of the chosen state prior to the initial lesson, and independently map and draw the state at home. This will mean they have a much clearer and in-depth knowledge about the geography and features of the state before starting the mold design process in class.

Students can perhaps research state history, and having produced their vacuum formed 3D state map, write about and identify where a certain historical event took place within their state, which can then be presented to the class. This element of the project links in with other subjects, such as History, or Geography.

## Optional Extras:

Once the final vacuum formed product has been produced, it will be rich in texture and clearly display the land features of the chosen state. In addition to the mold making and vacuum forming processes, students may also wish to decorate their pieces. This can be done using a variety of paints (e.g. acrylic). Using a variety of suitable colors, students are able to represent water, dense woodland or forest, desert, and snow accurately and inform the person observing the piece as to the physical features of the land.

## Method: (Continued)

To increase the definition obtained during the vacuum forming process, venting holes may be added around the completed mold. This can be done very simple using a long pin, pushing it through the mold material from top to bottom applying holes around any area with indentations or fine detail.

The mold can now be vacuum formed using plastic material suitable for the finished product's intended purpose (display purposes, or food mould etc.)

The mold can now be removed from the completed vacuum formed piece, and students will now have a finished 3D map of their home state.

## Student Accomplishments:

- The production of a 3D map
- Understanding of land features, gradients, and water
- Map reading
- Creativity within material selection
- Multi-media design and manufacture
- Develop skills using a variety of small hand tools and materials
- Following instructions
- Practical hands on experience using a vacuum forming machine, and understanding its wider application
- Potential to examine state history

## Teachers notes:

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