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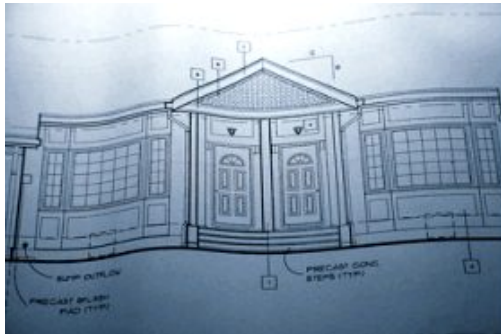
# Models

**Models** help to make abstract ideas, complicated systems, very small items, or large items easier to understand.

Models are valuable tools because they show how the thing that is being modeled works. There are many different kinds of models. They can be built, drawn, or designed on a computer.

## Types of Models

Different types of information can be shown using different types of models. For example, an architect might draw pictures to show what a new building will look like before it is built. However, he would need to build a 3-dimensional model to test how stable the design is.



An architect's drawing and a small 3-dimensional building are both types of models.

Other types of models include:

- **Maps**—Maps are models that show directions and distances. Maps may also show features like roads, rivers, towns, and even buildings.
- **Watershed Maps**—Drawings of watersheds are models that help show the terrain of the area, like hills, ravines, crests, and valleys.
- **Globes**—A globe is the only model that shows the whole Earth without distorting or changing its shape.
- **Concept maps**—Concept maps are drawings that can be used to show the relationships between ideas.

The video below shows several different kinds of models that can be used for the same purpose. To watch the video, click the play button



*Clip provided by Education Clip Library with permission from ITN Source*

## Uses of Models

Some models **show what something looks like** on a scale that is easy to see.

- A model of a cell made by using a plastic zipper bag as the cell membrane and water as the cytoplasm shows the parts of a cell large enough so that they can be easily seen.

Some models are used to **show how something functions**.

- Using a water pump as a model of a human heart shows how the heart functions. This makes the idea of the circulatory system easy to understand. Models of systems should be appropriate and simple.

Models can also help to **analyze and predict** what will happen in the real system.

- A terrarium filled with plants and water creatures can be used as a small-scale model of an ecosystem. This ecosystem can be used to analyze and predict how the small organisms most likely behave in their natural habitat.



## Models use Familiar Objects

Models can use familiar objects and events to explain new things. For example, the Earth can be compared to a peach.



The pit in the center of the peach is like the core of the Earth. It is a dense and compact solid located in the middle of the object. The flesh of the peach is like the Earth's mantle because it is in the middle and takes up the most space in the fruit.

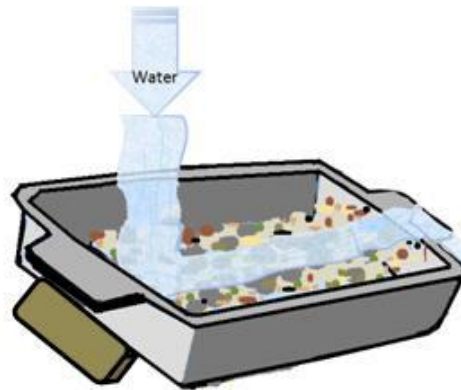
The skin is like the Earth's crust because it is on the surface of the fruit. It also takes up the least amount of volume of the fruit. The peach model is also called an **analogy**.

## Models have Limitations

All models have limitations, or ways that they are not exactly like the real things they are modeling. A model could be different from the thing it's modeling in many ways. It could be:

- smaller
- larger
- made of different materials
- missing some parts or details

Someone could make a very good model of a riverbed, for example, out of a baking pan, some pebbles, and some running water.



Although this might be a very good model, it is still much smaller than a real river bed. All models have some limitations, no matter how good or useful they are.

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