Scientific models

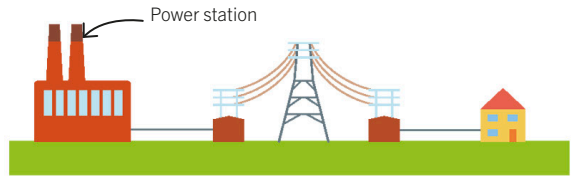
We often use models to help us understand scientific ideas. Like hypotheses, models can be tested by experiments. There are five main types of scientific model: descriptive, computational, mathematical, spatial, and representational.

Key facts

- ✓ **Models help us understand or describe a scientific idea.**
- ✓ **Models can be used to make predictions, which can then be tested by experiments.**
- ✓ **Types of model used in physics include descriptive, computational, mathematical, spatial, and representational.**

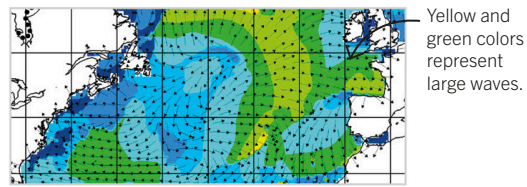
Descriptive models

These models use words and sometimes diagrams to describe something. This diagram showing how electricity travels from power stations to our homes is a descriptive model.



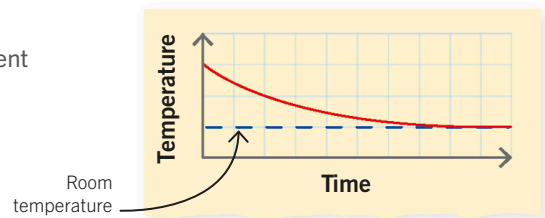
Computational models

Computational models use computers to simulate complex processes. Weather forecasts are made using computational models of the atmosphere. The image shown here is a forecast for the waves in the Atlantic Ocean.



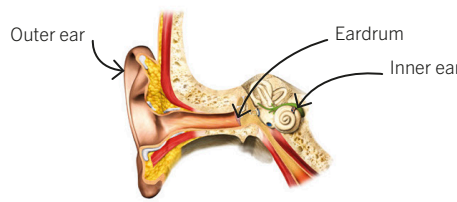
Mathematical models

These are models that use equations to represent what happens in the real world. For example, a mathematical equation can model the fall in temperature as a hot object transfers heat to its surroundings. The results of mathematical models can be shown on graphs.



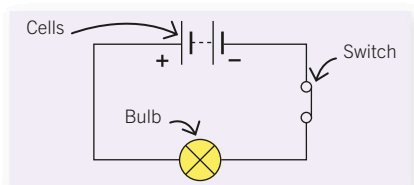
Spatial models

A spatial model shows how things are arranged in three-dimensional space, such as the way the parts of our ears fit together. This scale model is not the same size as a real human ear, but all the parts are the correct sizes relative to each other.



Representational models

These models use simplified shapes and symbols to represent more complex objects in the real world. For example, this circuit diagram helps us understand how the electrical circuit in a flashlight works.



Working safely

Physics experiments can involve electricity, moving objects, and heat, so there's a risk of being injured. It's important to conduct investigations safely, so be sure to follow these guidelines.

Protecting your eyes
Safety glasses or goggles protect your eyes against splashes of liquids or small particles such as iron filings. They should also be used if you are stretching wires or springs, in case the wire breaks and flies at your face.

Heating water
When heating water, take care to avoid splashing it on your skin. If scalded, run cold water over your skin as soon as possible.

Protecting your feet
Some physics experiments use weights that could fall on your feet and injure them. A cardboard box full of crumpled newspaper will catch a falling weight and stop you from putting your feet in the wrong place.

Slips and spills
If you spill water on the floor, clean it up right away in case someone slips on it.

Working with electricity
When working with electricity, always turn off or disconnect the power supply or battery before making changes to a circuit. Ask your teacher to check the circuit before you switch it on.

Dangerous substances
Some science experiments involve radioactive materials or dangerous chemicals. These substances should only be handled by specially trained people wearing appropriate safety equipment. Experiments involving dangerous substances should not be carried out at home.

Bunsen burners
When using a Bunsen burner, keep the area around it clear. Tie back loose hair and clothing to keep them from getting near the flame. Allow hot equipment to cool before handling, or use heat-resistant gloves.

Beware of the Sun
When doing experiments with light, never look directly at the Sun—it can permanently damage your eyes. The danger is even greater if using binoculars or a telescope.