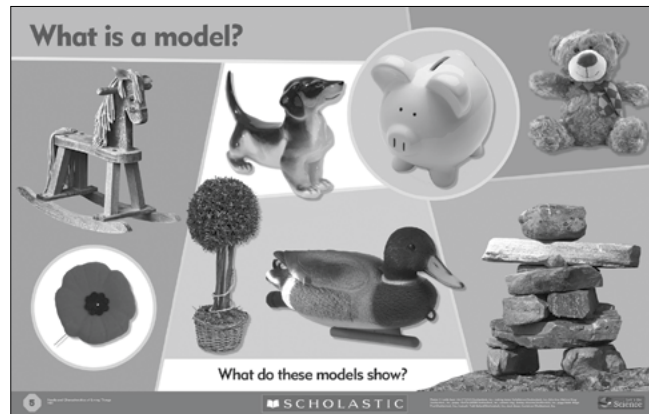


How Can We Model Living Things?



Focus: Following the design process, students select an animal and design and build a model of that animal that is as accurate as they can make it.

Specific Curriculum Outcomes

Students will be expected to:

- 32.0 compare and evaluate personally constructed objects [GCO 2]

Performance Indicators

Students who achieve these outcomes will be able to:

- describe how they used the design process to make accurate models of animals
- explain why they made the design choices they did in making their models
- compare their finished models with a photograph of the animal they are modelling and evaluate the accuracy of their model

NOTES:

Attitude Outcome Statements

Encourage students to:

- appreciate the importance of accuracy [GCO 4]
- show concern for their safety and that of others in carrying out activities and using materials [GCO 4]

Cross-Curricular Connections

English Language Arts

Students will be expected to:

- use writing and other forms of representation to explore, clarify, and reflect on their thoughts, feelings, experiences, and learnings; and to use their imaginations [GCO 8]
- create texts collaboratively and independently, using a variety of forms for a range of audiences and purposes [GCO 9]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Science Card 5 • Unit 2, Science Card 6 (optional) • <i>What Is The Design Process?</i> poster • BLM <i>My Animal Model</i> • BLM <i>Animal Model Gallery Walk</i>	• a selection of models of animals such as stuffed toys, plastic figurines, wooden statuettes, and stone carvings • videos and photographs of animals • students' Science Journals • a wide variety of construction materials that might include construction paper, cardboard, newspaper, crayons, markers, paint, scissors, glue, tape, string; craft sticks, pipe cleaners, cardboard tubes, feathers, fun fur, modelling clay, papier mâché, foam balls, cloth • digital camera (optional)	• Invite students, in advance, to bring in models of animals from home. Give examples: a stuffed animal, a plastic animal figurine, a wooden animal statuette, or a stone carving of an animal.	• model

Science Background

- Models and modelling are central to science. A model is a visual, physical, verbal, or mathematical explanation of an object, living thing, phenomenon or concept. Scientists use models to help them visualize, explore, and explain a wide variety of things. For example, astronomers might use a model of our solar system to show how the planets orbit around the Sun. Engineers use computer models to help them test designs before they are actually built.
- Any physical representation of an animal or plant can be seen as a model, although many are produced for reasons other than accurately representing an organism for scientific study. So although a teddy bear resembles a real bear in some ways, the goal in designing it was cuddliness.

Possible Misconceptions

- The term “model” has many different meanings in English, and this may confuse students—they may think of a fashion model or a role model. Acknowledge that the term has different meanings in English and focus on the meaning as it relates to science. It may help to use familiar examples. For example, students may relate to model trains and model airplanes, which are scaled-down representations of the real objects. These are similar to the models of animals that students will be making.

ACTIVATE



Models of Plants and Animals

Have students look at the images of models of plants and animals shown on Science Card 5. Read and discuss the title question: *What is a model?* Ask:

- **What do these models show?**
- **Which models are more realistic? What characteristics make them realistic?**
- **Which models are more unrealistic? What characteristics make them unrealistic?**

Discuss attributes of the models such as scale, texture, colour, depiction of physical characteristics, and other features that contribute to accuracy.

Have students think about why and how the models were made. Ask questions such as:

- **What material is the model made of?**
- **How was this model made?**
- **What is the purpose of this model? Was it intended to be an accurate representation of a living thing?**

Students can also examine Science Card 6 from Unit 2 and discuss which, if any, of the stuffed animals are realistic models and which are not.

CONNECT

Exploring Models

Provide a variety of models of animals for students to explore and play with. If students have brought in animal models from home, ask their permission before adding these models to the Curiosity Centre. Prompt students to compare the animal models with the animals they represent, using photographs, videos, or prior knowledge. Ask:

- **In what ways is this model like the animal it represents? In what way is it different?**
- **What materials were used to make the model?**
- **Does the choice of material make the model more realistic?**

CONSOLIDATE



Design and Build a Model of a Living Thing

Tell students that they will be building a model of an animal that is as accurate as they can make it. First ask them to choose an animal to model. Students can use their Focus Animal or choose a different animal if they wish.

Direct students' attention to the *What Is the Design Process?* poster and review the steps of the design process with them.

Step 1: Identify a Problem, Think of a Solution, and Make a Plan



Tell students that the problem they need to solve is how to build a model of their chosen animal that is as accurate as possible. Ask students to make labelled drawings in their Science Journals to show how they will build their models. Ensure students have access to photographs of their chosen animal to use as reference. Help students plan by asking questions such as these:

- **How will you make your animal's body and limbs? What materials will you need?**
- **Will you make your model in several pieces? How will you join the pieces?**
- **What kind of body covering does the animal have? How will you represent that body covering in your model?**
- **How large will your model be?**

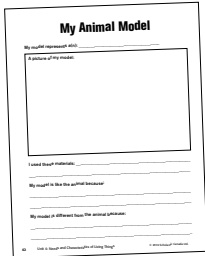
Step 2: Gather Materials and Build a Prototype

Provide a wide variety of materials for students to choose from such as:

- construction paper, cardboard, newspaper
- crayons, markers, paint
- scissors, glue, and tape
- string
- craft sticks
- pipe cleaners
- cardboard tubes
- feathers
- fun fur
- modelling clay
- papier mâché
- foam balls
- cloth

Students should gather their materials and any tools needed, and make their model. Students may choose to document the progress of their model using a digital camera (see the Explore More activity—Model-making Video).

Step 3: Test and Evaluate Your Solution/Device

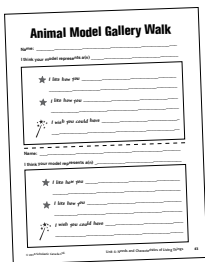
A worksheet titled "My Animal Model" with a large rectangular box for drawing a model. Below the box are several lines of text for reflection: "I used my materials...", "My model is like the animal because...", "My model is different from the animal because...", and "I can improve my model by...".

As they work, students should continuously compare their model to a photograph or photographs of the animal they are modelling. As you observe students at work, ask:

- In what ways is your model like the animal?
- In what ways is it different?
- Do you see any ways in which you could make your model more realistic?

Once students are satisfied with their model, they should complete BLM *My Animal Model*.

Step 4: Share Your Solution/Device and What You Learned

A worksheet titled "Animal Model Gallery Walk" with two identical sections. Each section has a box for drawing a model and three lines of text for feedback: "I like how you...", "I like how you...", and "I wish you could have...".

Set up a Gallery Walk so that students can view and comment on one another's models. Provide copies of BLM *Animal Model Gallery Walk* for students to display along with their models. Students viewing the model can fill in "two stars and a wish" to provide constructive feedback on other students' models. Provide students with an index card on which they can write the name of their animal. At first they should flip the card over so that viewers can try to identify the animal modelled before knowing its identity. Afterwards, students can show images of their animal for viewers to look at and compare with their model. After the Gallery Walk, allow students another opportunity to act on the feedback they have received to further improve on their models.

EXPLORE MORE

Model Environment

Students can add to their model by making a diorama scene depicting where the animal would live.

Model-making Video

Students can use the time-lapse feature on a digital camera, or take repeated images, to show the model at various stages of completion, and add voice-over describing the process, as well as the features of the finished model.

My Animal Model

Name: _____

My model represents a(n): _____

A picture of my model:

I used these materials: _____

My model is like the animal because:

My model is different from the animal because:

Animal Model Gallery Walk

Name: _____

I think your model represents a(n) _____

 *I like how you* _____

 *I like how you* _____

 *I wish you could have* _____

Name: _____

I think your model represents a(n) _____

 *I like how you* _____

 *I like how you* _____

 *I wish you could have* _____
