Name _____ Date_____ Class_____

EXPERIMENTING SKILLS

Working with Hypotheses

When people do scientific experiments, they try to shed light on the unknown or figure out how the world works. How do scientists know where to start? Well, they ask questions.

In order to get answers, scientists start with a puzzling question. Scientists have tried to answer the following:

- How do birds know where to migrate?

- How can we predict earthquakes?

- Is there life elsewhere in our solar system or in the universe?

- Do elephants use sound to communicate?

Then they try to answer their question by making an educated guess. The following are guesses to answer the first question:

- Birds tell direction by watching the sun rise and set.

- Birds have a built-in "road map" to follow.

- Birds can tell direction by sensing the Earth's magnetic field.

- Birds remember their course by spotting familiar landmarks.

These four sentences are examples of hypotheses. A **hypothesis** is an educated guess or possible answer to a question. Scientists test their hypothesis by doing an experiment. The following is an example:

Question: How do birds know where to migrate?
Hypothesis: Birds are directed by the Earth's magnetic field.
Experiment: Create an electric circuit that produces a magnetic field. Attach this circuit to a bird so that the bird's ability to *sense the Earth's magnetic field*—if such an ability exists—is disrupted. If the bird can still migrate normally, then the hypothesis is probably wrong.

Identifying a Good Hypothesis

Not all hypotheses are useful. Consider the following hypothesis:

Hypothesis: Birds are guided by the spirits of dead antelopes.

Could you design an experiment to test such a hypothesis? Even if you could find spirits of dead antelopes, they would probably be hard to control in an experiment. The point is that a *good* hypothesis is one that can be tested.

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Evaluate each hypotheses based on whether it can be tested, and place an *X* in the appropriate column.

Hypothesis	Can be tested	Cannot be tested
If the polar ice caps begin to melt, the amount of salt in ocean water will change.		
Dogs use mind control on their owners to be taken for walks and car rides.		
If an animal is deaf, then it cannot hear.		
A propeller with large blades can propel an airplane faster than a propeller with smaller blades can.		

More on Hypotheses

Hypotheses help explain puzzling situations or events. Hypotheses answer "how," "what," and "why" questions. Explain each of the following situations with a hypothesis:

1. You hang a bird feeder, fill it with food, but no birds come to it.

Hypothesis: _____

_____

2. In your new house, you see fewer stars from your bedroom window. You're looking at the same place in the sky.

Hypothesis: _____

_____

3. After you put a plastic food container in the dishwasher, its lid no longer fits correctly.

Hypothesis: _____

_____

TROUBLESHOOTING
Create a two-column table. Label one column "Cause" and the other "Effect." Put a puzzling situation or event in the "Effect" column. Think of some causes, and list them in the "Cause" column. Every cause you write is actually a hypothesis!

TRY THIS!
You've probably heard that you can prove a hypothesis wrong but that you can't prove it right. Explain why this is true.