

A 4D™ BOOK

INVESTIGATING THE

SCIENTIFIC METHOD

by Donald B. Lemke | illustrated by Tod G. Smith and Al Milgrom

WITH
MAXAXIOM
SUPER SCIENTIST





GRAPHIC SCIENCE

INVESTIGATING THE
**SCIENTIFIC
METHOD**



4D An Augmented Reading Science Experience

by Donald B. Lemke | illustrated by Tod G. Smith and Al Milgrom

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Max Axiom as he explains the scientific method.

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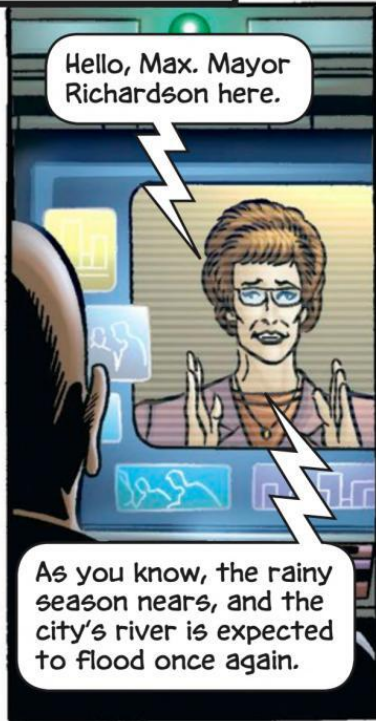
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Inside his high-tech laboratory, Super Scientist Max Axiom receives an important video message.



Sounds like a big problem.


Luckily, scientists have a process for solving problems and answering questions. This process is known as the scientific method and often has a few basic steps.

- 
- Ask a question
 - Gather information
 - Form a hypothesis
 - Design an experiment
 - Collect data
 - Analyze data and draw conclusions
 - Communicate results




DEFINITION

levee (LEV-ee)
a bank built up near a river to prevent flooding



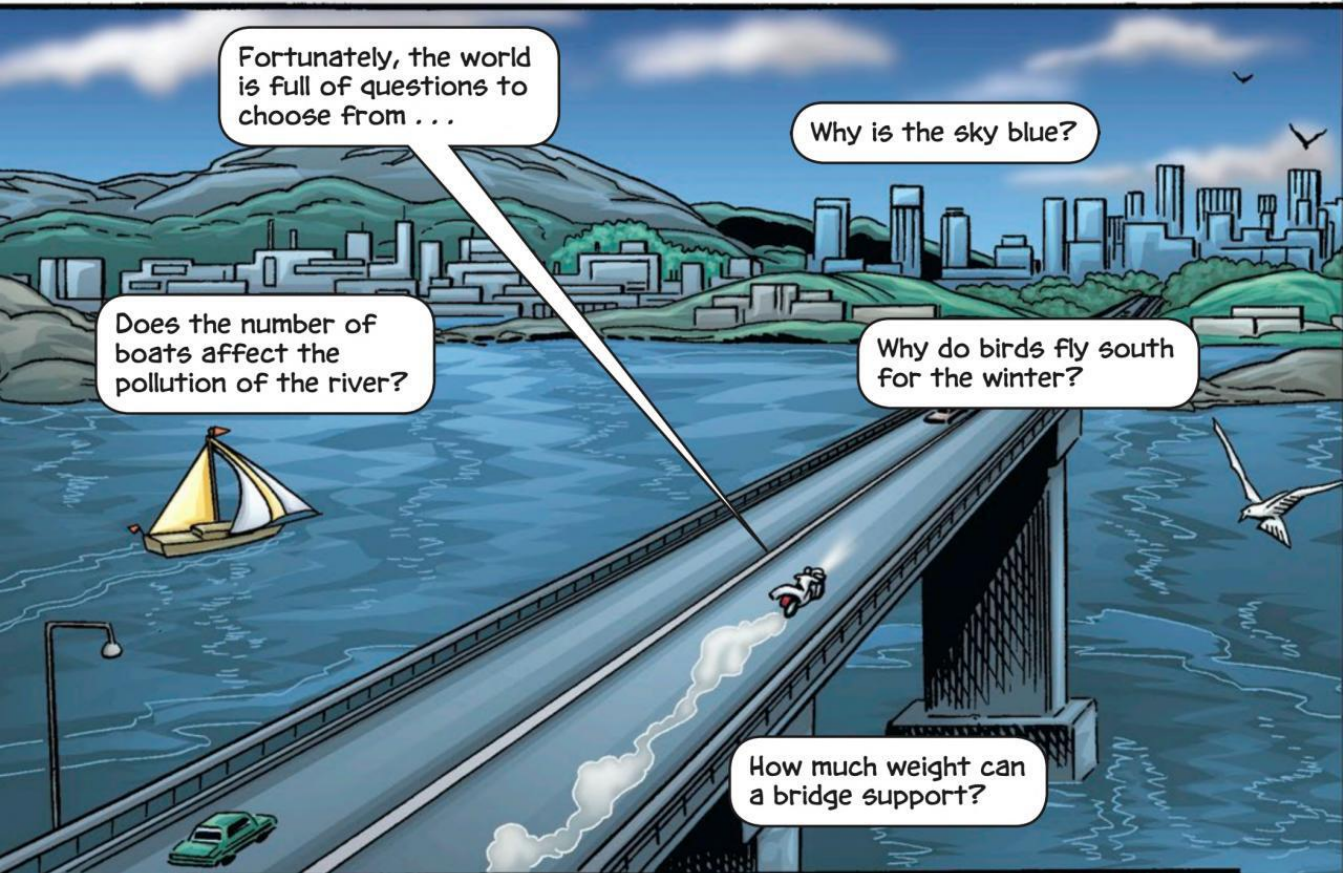
The order or number of these steps can always change, but scientists often rely on these basic methods to organize information.

Come on. I'll take you through the scientific way to find answers.



Asking a question is the first step in the scientific method.

Sometimes, scientists begin with an assigned problem. Other times, choosing a question can be a task in itself.




Fortunately, the world is full of questions to choose from . . .

Why is the sky blue?

Does the number of boats affect the pollution of the river?

Why do birds fly south for the winter?

How much weight can a bridge support?



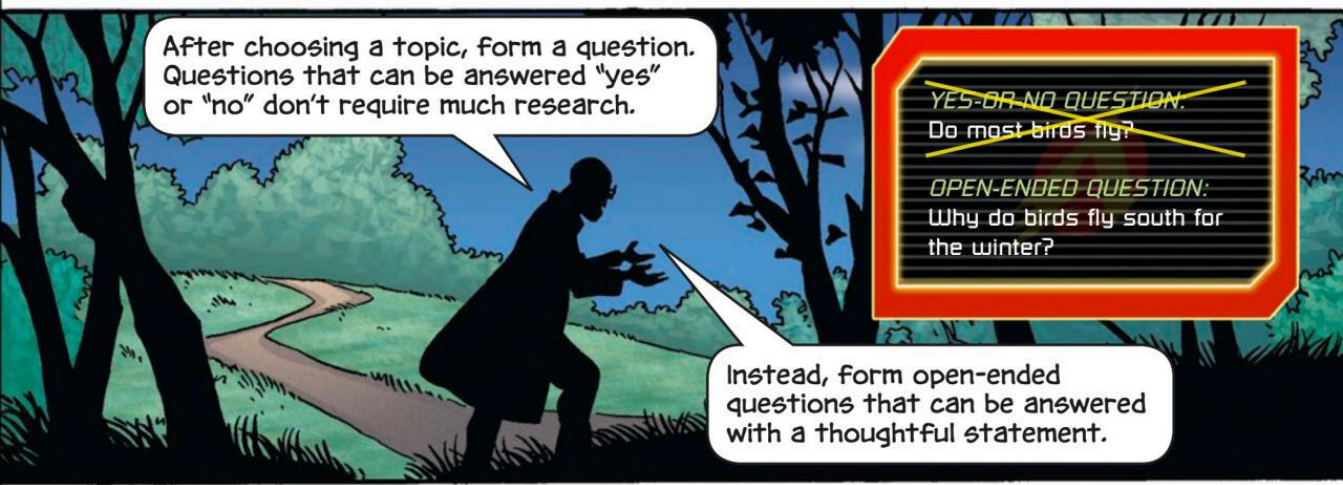
With so many options, choosing one can seem impossible.

But following a few quick tips can make this decision much easier.



First, choose a topic that interests you.

Scientists work in many fields. Plants, weather, animals, and even video games are great science topics to investigate.



After choosing a topic, form a question. Questions that can be answered "yes" or "no" don't require much research.

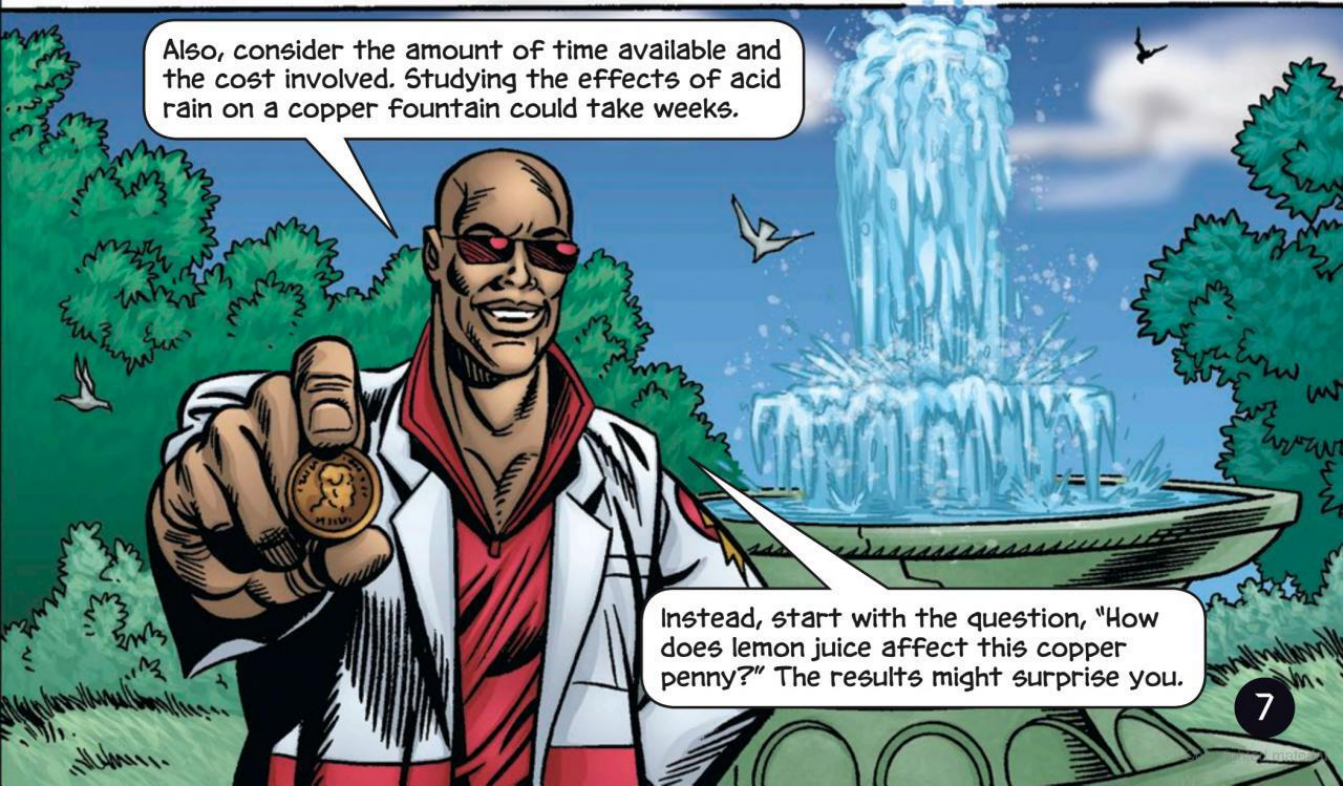
~~YES-OR-NO QUESTION:~~

~~Do most birds fly?~~

OPEN-ENDED QUESTION:

Why do birds fly south for the winter?

Instead, form open-ended questions that can be answered with a thoughtful statement.



Also, consider the amount of time available and the cost involved. Studying the effects of acid rain on a copper fountain could take weeks.

Instead, start with the question, "How does lemon juice affect this copper penny?" The results might surprise you.

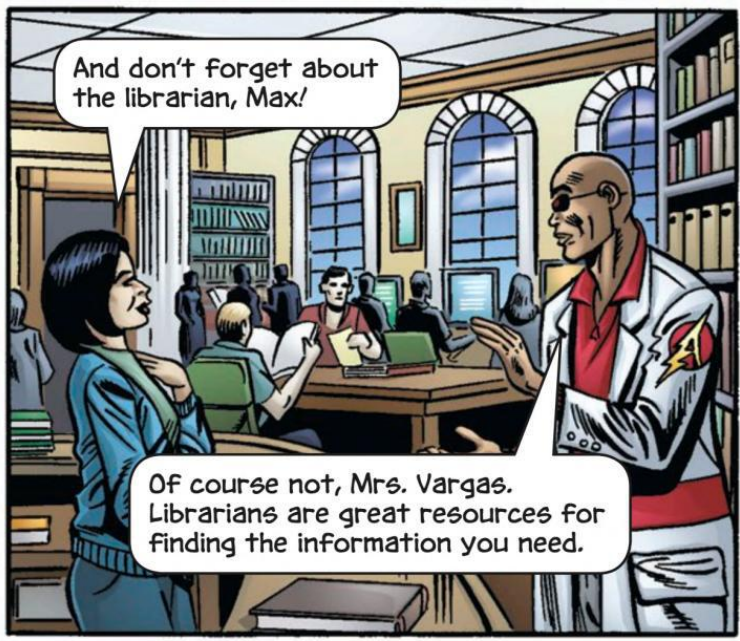


After forming a question, the next step is gathering information on the topic.

The library is a great place for me to learn about levees and local materials.

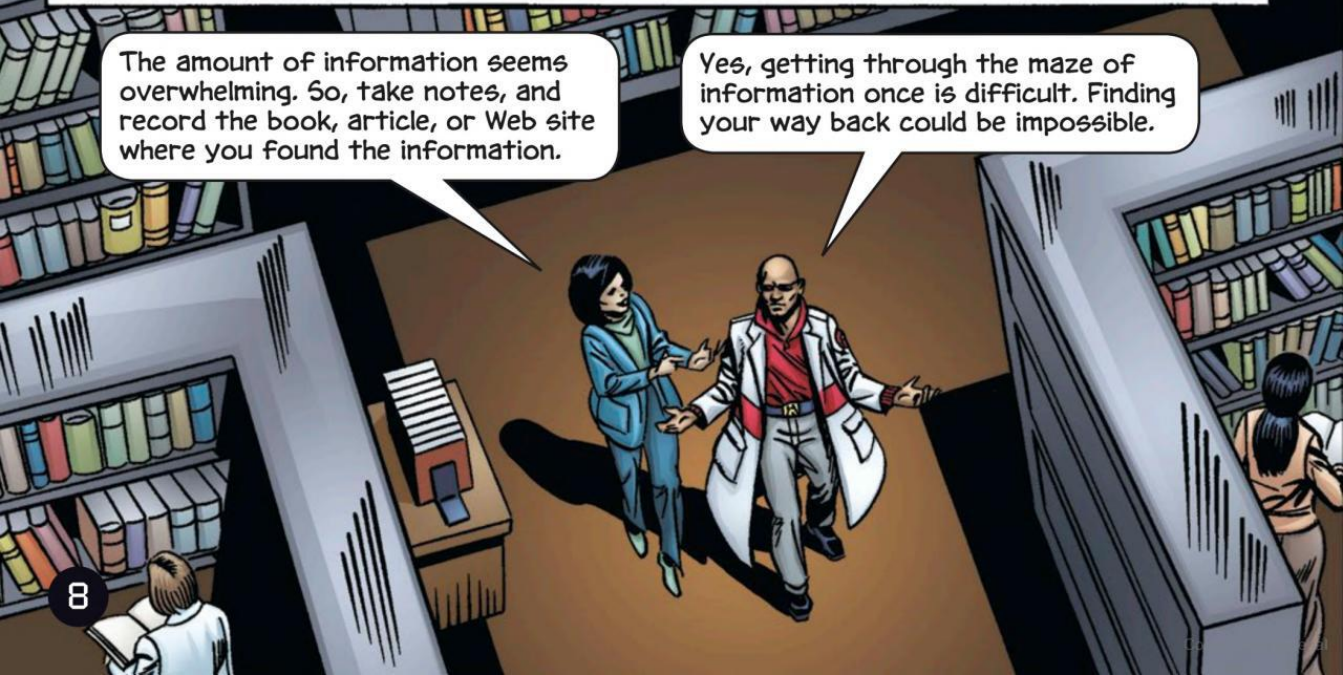


It has books, magazines, newspapers, the internet —



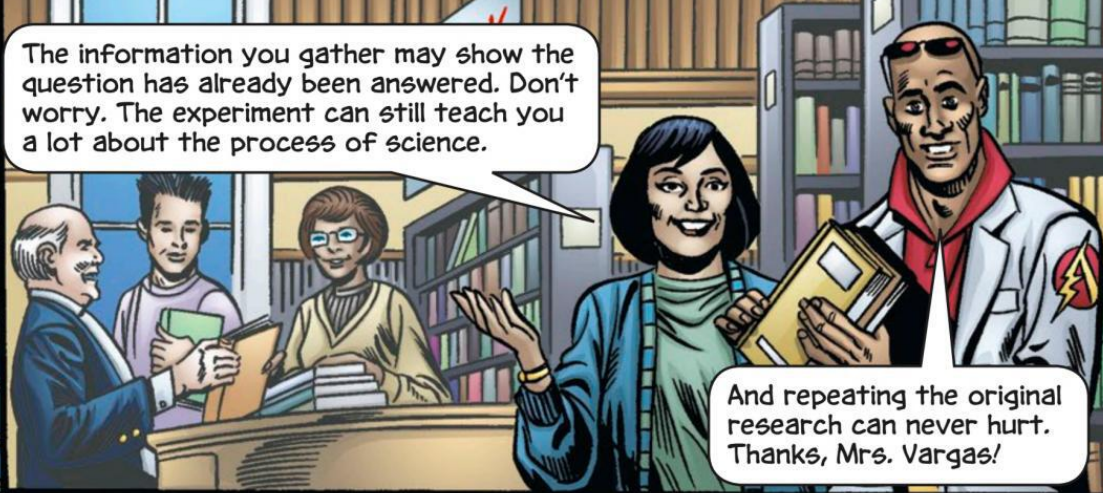
And don't forget about the librarian, Max!

Of course not, Mrs. Vargas. Librarians are great resources for finding the information you need.



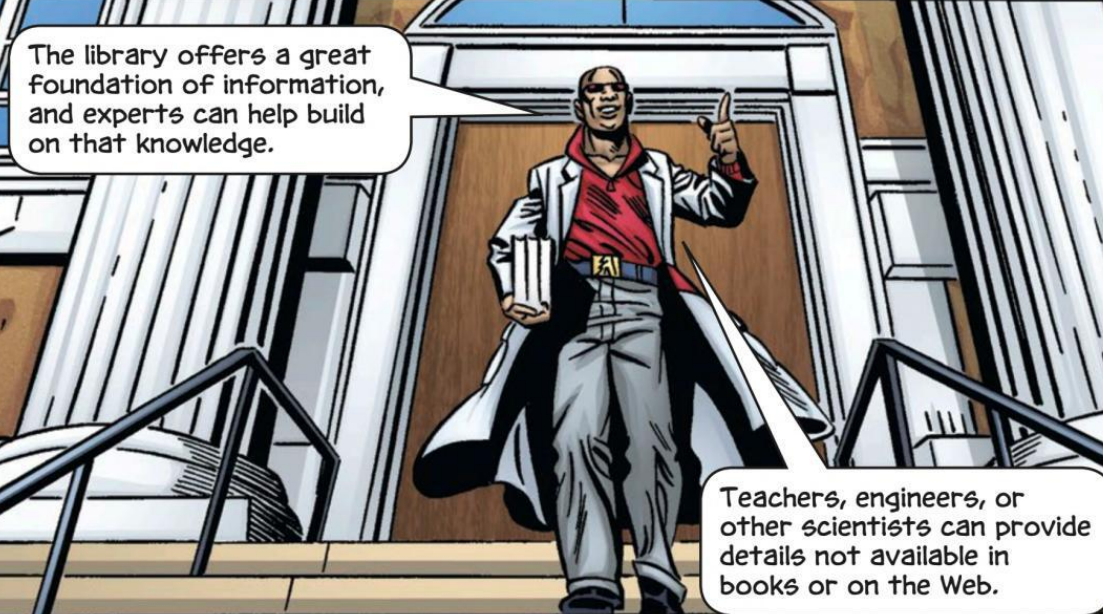
The amount of information seems overwhelming. So, take notes, and record the book, article, or Web site where you found the information.

Yes, getting through the maze of information once is difficult. Finding your way back could be impossible.



The information you gather may show the question has already been answered. Don't worry. The experiment can still teach you a lot about the process of science.

And repeating the original research can never hurt. Thanks, Mrs. Vargas!



The library offers a great foundation of information, and experts can help build on that knowledge.

Teachers, engineers, or other scientists can provide details not available in books or on the Web.



THE INTERNET

ACCESS GRANTED: MAX AXIOM

With hundreds of millions of web sites, the Internet is an information gold mine. But even gold miners dig through a lot of rubble to find a shiny nugget. Fortunately, one word can guide anyone toward the riches of the Internet.

Note the date: Is the information current?

Evaluate the source: Is the Web site reliable?

Track the information: Does the Web site say where the information came from?



After research, scientists dig into the next step in the scientific method.

They form a hypothesis.



Hypothesis sounds like a complicated term. Really, it's nothing more than a prediction based on evidence.

And with a solid understanding of the topic, writing a statement to answer the original question should be no sweat.



For example, I've learned the local materials for building a levee include soil, rock, and clay.

From the information I gathered, I predict that clay is the best barrier against water leaking.



CLAY



SOIL