



MAX AXIOM: SCIENTIFIC METHOD NOTES

Name: _____ Date: _____

Before You Begin

As you read **Max Axiom's Scientific Method**, use this page to record important ideas, vocabulary, and examples. **Write in your own words and think like a scientist—don't just copy from the book!**

CLICK HERE FOR AUDIO VERSION: <https://youtu.be/gFW1cmwmpsc>

1. It Starts With a Question

Scientists often begin investigations by making an **observation** and asking a question.

What is an observation?

Write one observation Max Axiom makes in the book:

What scientific question comes from the observation?

What makes a GOOD scientific question?

Write TWO characteristics:

1. _____
2. _____



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2. Research Before You Experiment

Why should scientists gather information before beginning an experiment?

Write ONE piece of background information that could help a scientist plan an investigation.

3. Form a Hypothesis

A **hypothesis** is more than a guess. It is a **testable prediction supported by scientific reasoning**.

The CER HARDEN Hypothesis Formula

IF _____,
THEN _____,
BECAUSE _____.

IF = What you will change

THEN = What you predict will happen

BECAUSE = The scientific reason for your prediction

Write a hypothesis for an experiment from the book:

If _____

then _____

because _____



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4. Know Your Variables

Independent Variable

The factor the scientist **intentionally changes**.

Independent Variable in an experiment from the book:

Dependent Variable

The factor the scientist **measures or observes** because of the change.

Dependent Variable:

Constants

Things that must be **kept the same** so the experiment is fair.

List THREE possible constants:

1.

2.

3.

Control

The normal or unchanged condition used for **comparison** when an investigation has an appropriate control group.

Control:

Why is a control useful?



MAX AXIOM: SCIENTIFIC METHOD NOTES



5. Design & Perform the Experiment

Why is it important to follow the same procedure every time?

Why should a scientist change **only ONE independent variable** in a controlled experiment?

Put It in Order

Number these steps in the order they should happen:

- _____ Analyze the data
- _____ Ask a question
- _____ Conduct the experiment
- _____ Form a hypothesis
- _____ Communicate results
- _____ Draw a conclusion
- _____ Gather background information



6. Collect the DATA!

Quantitative Data

Information involving **numbers or measurements**.

Example from the book:

Qualitative Data

Information involving **descriptions or characteristics**.

Example from the book:



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Which type is it?

“The plant grew 7 centimeters.” _____

“The liquid changed from clear to cloudy.” _____

“The object had a mass of 24 grams.” _____

“The rock felt rough.” _____



7. Analyze the Results

Scientists don't just collect data—they must figure out **what the data means**.

What patterns or trends does Max Axiom discover in his data?

Why might a scientist use a **table, chart, or graph**?

Think Deeper

Suppose these are the results of an experiment:

Amount of Water	Plant Growth
20 mL	3 cm
40 mL	6 cm
60 mL	9 cm
80 mL	7 cm

What pattern do you notice?



MAX AXIOM: SCIENTIFIC METHOD NOTES

Does MORE water always result in MORE growth? Explain using the data.



8. Draw a Conclusion

A conclusion should answer the original question using **evidence from the experiment**.

Your conclusion should explain:

- What happened?
- Was the hypothesis supported or not supported?
- What evidence proves it?
- What could the scientist investigate next?

Was Max Axiom's hypothesis supported? Explain.

Evidence:



WAIT...THE HYPOTHESIS WAS WRONG?!

A scientist's hypothesis is **NOT** supposed to be changed just because the results don't match the prediction.

If an experiment does NOT support the hypothesis, what should the scientist do?



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Why can an unexpected result still be valuable to science?



9. Communicate the Results

Why is it important for scientists to share their results with other scientists?

What are TWO ways scientists can communicate their findings?

1.

2.



THINK LIKE MAX AXIOM

Scenario #1 — Plants

Kennedy wants to determine whether fertilizer affects plant growth. She gives one plant no fertilizer, another 5 grams, another 10 grams, and another 15 grams. All plants receive the same amount of water, sunlight, and soil. After four weeks, she measures their heights.

Independent Variable:

Dependent Variable:

Control:

ONE Constant:

Write Kennedy's hypothesis:

If

then



MAX AXIOM: SCIENTIFIC METHOD NOTES

because _____

Scenario #2 — Dissolving Sugar

Trenton places equal amounts of sugar into cups of water at different temperatures. He measures how many seconds it takes the sugar to completely dissolve.

What question is Trenton investigating?

Independent Variable: _____

Dependent Variable: _____

Name TWO constants:

1. _____
 2. _____
-

Scenario #3 — Paper Airplanes

Leila tests whether the number of paper clips attached to the nose of a paper airplane affects how far it flies. She tests each airplane five times.

Why is performing **multiple trials** better than throwing each airplane only once?



SCIENTIST CHALLENGE

Raylen conducts an experiment and gets results that are completely different from what he predicted.

His partner says:



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“Our hypothesis was wrong. Let's change our data so it matches.”

What's wrong with that statement?

What should Raylen do instead?

What could happen if scientists changed data to match their predictions?



THE SCIENTIFIC METHOD

Complete the pathway using what you learned from Max Axiom:

OBSERVE



ASK A _____



RESEARCH



FORM A _____



DESIGN & CONDUCT AN _____



COLLECT _____





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_____ THE RESULTS



DRAW A _____



_____ THE RESULTS



Vocabulary Check

Define each term **in your own words**:

Observation: _____

Hypothesis: _____

Independent Variable: _____

Dependent Variable: _____

Constant: _____

Control: _____

Qualitative Data: _____

Quantitative Data: _____

Evidence: _____

Conclusion: _____

Trial: _____



FINAL CHALLENGE



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Max Axiom receives a mystery box containing a plant that isn't growing well.

Design an experiment to determine **ONE** factor that could improve the plant's growth.

Your response must include:

- A testable **scientific question**
- A hypothesis using **IF, THEN, BECAUSE**
- The **independent variable**
- The **dependent variable**
- A **control**
- At least **THREE constants**
- What **data** you would collect
- How many **trials** you would conduct
- How the data would help you form a **conclusion**

Scientific Question

Hypothesis

If _____

then _____

because _____

Variables

Independent: _____

Dependent: _____

Control: _____

Constants: _____

Data I Would Collect

My Experiment



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REMEMBER

Good scientists don't experiment to prove themselves right. They experiment to discover what the evidence says.

CER HARDEN SCIENCE