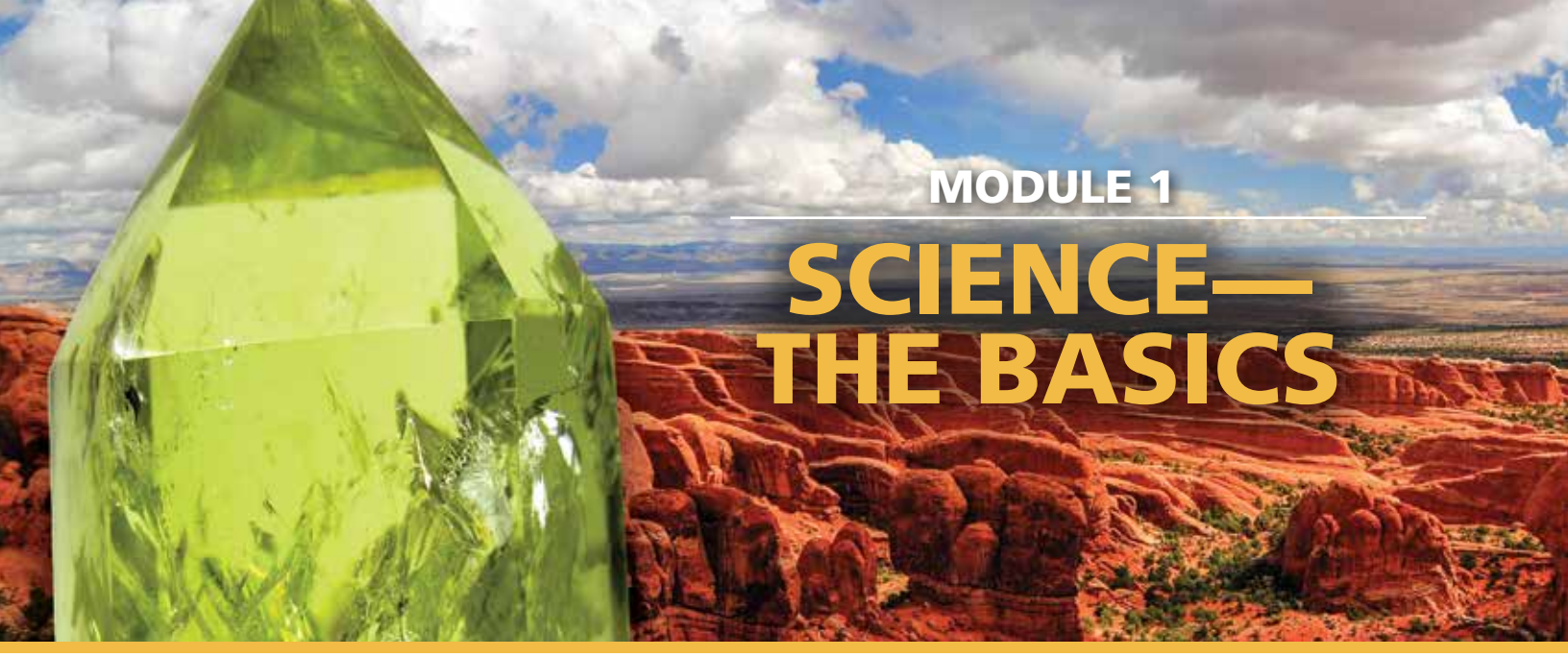


MODULE 1

SCIENCE—THE BASICS

NOTETAKING

Remember, taking notes are a way to help you learn new information by making connections to things you already know. There are no right answers. As you read each day, write your notes in your own words by responding to the given prompts. If what you read sparks any thoughts or maybe a question you would like to look up later, turn to the Personal Notes page (there is one at the end of each module before the Study Guide questions) and jot it down.

WHAT TO DO

Week 1, Day 1

- ❑ **Read** pages v–viii in the text so you understand how the book is designed to be used. Also read pages 13–14 in this notebook.
- ❑ **Read** pages 1–4 in the text: the introduction and What is Science section, including subsections, Science and Technology and What is Physical Science.
- ❑ While you read, **take notes** using the following prompts. You should also write any thoughts or questions you have on the Personal Notes page.
- ❑ **Answer** On Your Own questions 1.1–1.3. When you are finished, check your answers by turning to the back of your textbook module. If you answer is correct, well done! If your answer is not correct, do not despair. Take a moment to review what you learned to see where you made your mistake and fix your answer in your notebook.
- ❑ **Check off** Day 1 on your Daily Schedule in the front of this notebook.

WHAT IS SCIENCE

As you read pages 1–4, write down some examples from your own life of how you thought like or behaved like a scientist. Then write a sentence or two summarizing what you learned about science and technology.

1.1 ON YOUR OWN

What is science?

Check this box once you've checked your answer.

1.2 ON YOUR OWN

How are science and technology related?

1.3 ON YOUR OWN

What is physical science and why is it an important course?

WHAT TO DO

Week 1, Day 2

- ❑ **Read** pages 4–8 in the text, section The Scientific Process; and subsection: Making Observations.
- ❑ **Take notes** using the following prompts and write any thoughts or questions you have on the Personal Notes page.
- ❑ **Write** the definitions to any vocabulary words you come to in the space provided.
- ❑ **Answer** On Your Own question 1.4 and check your answers and fix any mistakes.
- ❑ **Conduct** Experiment 1.1 (turn to the lab report form in the lab section of this notebook).
- ❑ **Check off** this day on your Daily Schedule in the front of this notebook.

THE SCIENTIFIC PROCESS

VOCABULARY

Observation—

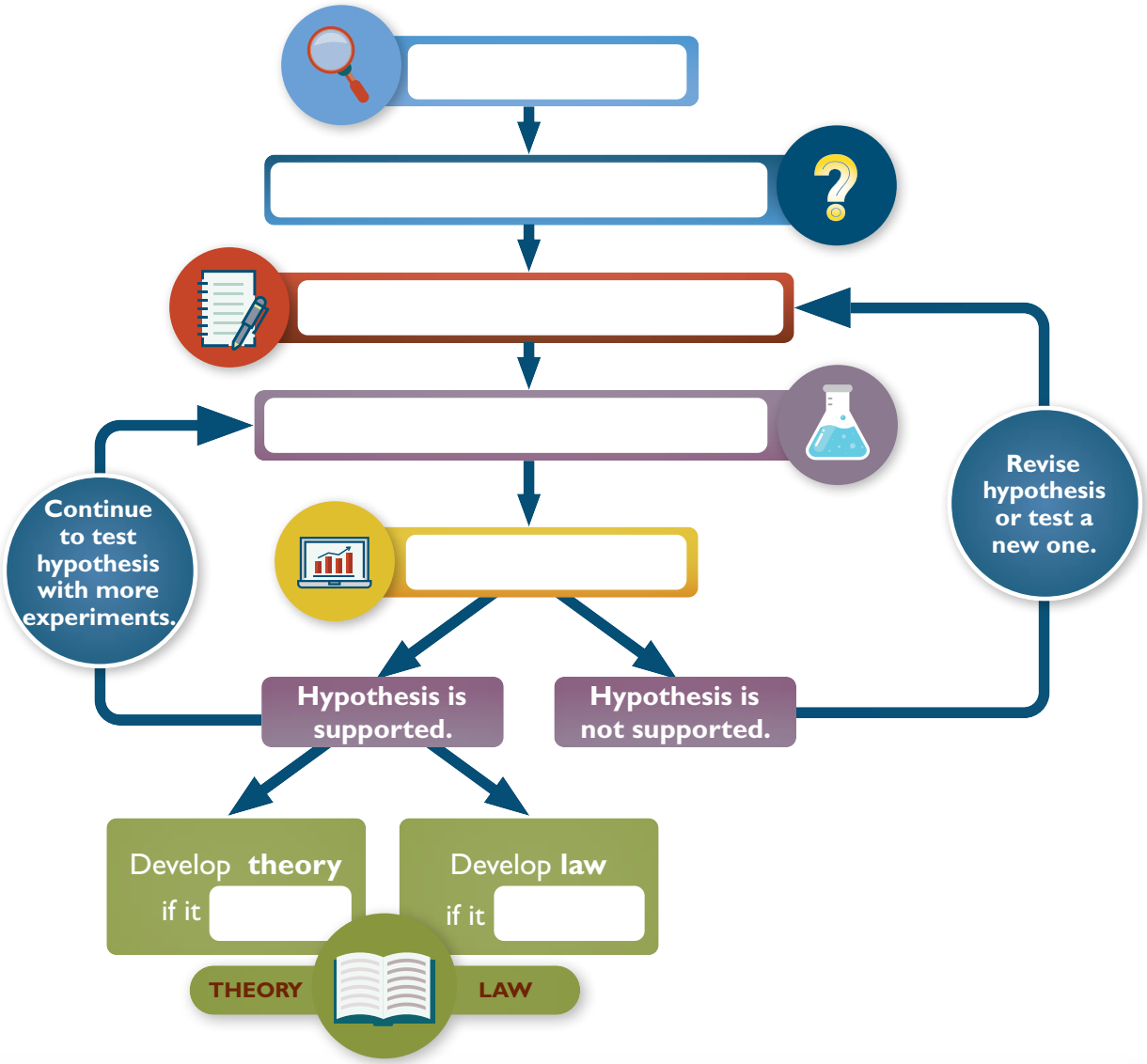
Qualitative observation—

Quantitative observation—

As you read pages 4–6, explain (in a couple sentences) how you can tell a qualitative observation from a quantitative observation and use an example.

Making Observations

Study Figure 1.5 on page 5 of your textbook. Fill in the missing parts on the image below to help you remember the processes involved in the scientific method.



1.4 ON YOUR OWN

Label each of the following observations as qualitative or quantitative.

a. It is light blue in color.

b. It makes a loud popping sound.

c. It is 8.3 centimeters long.

d. It smells sweet.

e. The temperature increases by 6 degrees C.

WHAT TO DO

Week 1, Day 3

- ❑ **Read** pages 8–12 in the text, subsections: Forming Hypotheses, Testing Hypotheses, and Experiments.
- ❑ **Take notes** using the following prompts and write any thoughts or questions you have on the Personal Notes page.
- ❑ **Write** the definitions to any vocabulary words you come to in the space provided.
- ❑ **Answer** On Your Own questions 1.5–1.7 and check your answers.
- ❑ **Check off** this day on your Daily Schedule in the front of this notebook.

Forming Hypotheses, Testing Hypotheses, and Experiments

VOCABULARY

Hypothesis—

Controlled experiment—

Variables—

Note Prompt	Notes
What example did the text give of two good hypotheses for burning? Why were they considered good hypotheses?	
How would you test the oxygen hypothesis?	
Using the pendulum experiment described in the text, explain how controlling all the variables except one allows scientists to identify what causes the result.	

1.5 ON YOUR OWN

For a hypothesis to be considered useful, it should be

a. in mathematical terms.

b. a creative guess made without observations.

c. capable of being tested.

d. general and broad in scope.

1.6 ON YOUR OWN

What are variables? How are they important in controlled experiments?

1.7 ON YOUR OWN

What is the difference between independent and dependent variables?

WHAT TO DO

Week 1, Day 4

- ❑ **Read** pages 12–17, subsections: Analyzing Data, Drawing Conclusions, Scientific Theories and Laws, Science Does Not Prove, and When the Scientific Method Isn't Possible.
- ❑ **Take notes** using the following prompts and write any thoughts or questions you have on the Personal Notes page.
- ❑ **Write** the definitions to any vocabulary words you come to in the space provided.
- ❑ **Answer** On Your Own questions 1.8–1.10 then check your answers.
- ❑ **Check off** this day on your Daily Schedule in the front of this notebook.

Analyzing Data, Drawing Conclusions, Scientific Theories and Laws, Science Does Not Prove, and When the Scientific Method Isn't Possible

VOCABULARY

Scientific theory—

Scientific law—

Inference—

Scientific model—

What is data? Why is analyzing data important?	
What should you do if you find your data does not support your hypothesis?	
How are scientific theories and laws different? What do they have in common?	
Explain what an inference is. What example did the text give?	
How are scientific models helpful?	

1.8 ON YOUR OWN

Match the term with the definition.

a. hypothesis	A well supported description of a natural phenomenon
b. scientific theory	A possible, testable explanation for an observation
c. scientific law	A well supported explanation of a range of phenomena

1.9 ON YOUR OWN

Why do we say science cannot prove anything?

1.10 ON YOUR OWN

What is meant by a model in science?

WHAT TO DO

Week 2, Day 1

- ❑ **Read** pages 17–24, section, Measuring and Manipulating Data, subsections: The Metric System, Mass, Length, Time, and Temperature.
- ❑ **Take notes** using the following prompts and write any thoughts or questions you have on the Personal Notes page.
- ❑ **Check off** this day on your Daily Schedule in the front of this notebook.

MEASURING AND MANIPULATING DATA

<table>
<tr><th>Note Prompt</th><th>Notes:</th></tr>
<tr><td>Why are units important?</td><td></td></tr>
<tr><td>List the base metric unit and base English unit for the following physical qualities.</td><td>
<table>
<tr><th>Physical Quantity</th><th>Base Metric Unit</th><th>Base English Unit</th></tr>
<tr><td>length</td><td></td><td></td></tr>
<tr><td>mass</td><td></td><td></td></tr>
<tr><td>time</td><td></td><td></td></tr>
<tr><td>volume</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>List the number, prefix, and symbol for the following metric quantities.</td><td>
<table>
<tr><th>Name</th><th>Number</th><th>Prefix</th><th>Symbol</th></tr>
<tr><td>thousand</td><td></td><td></td><td></td></tr>
<tr><td>hundredth</td><td></td><td></td><td></td></tr>
<tr><td>thousandth</td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>What did the text say was an interesting fact about volume?</td><td></td></tr>
<tr><td>What are the different temperature scales? Which will you use in this course?</td><td></td></tr>
</table>

WHAT TO DO

Week 2, Day 2

- ❑ **Read** pages 24–27 in the text, subsection Converting Units.
- ❑ **Take notes** using the following prompts and write any thoughts or questions you have on the Personal Notes page.
- ❑ **Answer** On Your Own questions 1.11–1.12 then check your answers.
- ❑ **Check off** this day on your Daily Schedule in the front of this notebook.

Converting Units

Study Example 1.1. Which option of solving the problem makes more sense to you?

Study Example 1.2. Why is the factor-label method valuable for converting units?

1.11 ON YOUR OWN

Give the name and symbols for the following base SI units (Hint: look back at Table 1.1):

	a. time	b. mass	c. length
Name:			
Symbol:			

1.12 ON YOUR OWN

If a glass contains 0.121 L of milk, what is the volume of milk in mL? What is the volume of milk in gallons (gal)? (1 gal = 3.78 L, show all work)

WHAT TO DO

Week 2, Day 3

- ❑ **Read** pages 27–32, section: Organizing and Presenting Scientific Data; subsections: Data Tables and Analyzing Data with Graphs.
- ❑ **Take notes** using the following prompts and write any thoughts or questions you have on the Personal Notes page.
- ❑ **Investigate** the You Do Science activity.
- ❑ **Check off** this day on your Daily Schedule in the front of this notebook.

ORGANIZING AND PRESENTING SCIENTIFIC DATA

What are the parts of a good data table?

What are three different types of graphs and what is each best used for?

YOU DO SCIENCE: Graphing Activity

Using the data in data table below create a line graph in the space provided. Remember to include all the parts shown in Figure 1.29 in your textbook.

Testing Length of a Pendulum Released from the Same Spot					
Length (m)	Mass (g)	Trial 1 Time for 10 Full Swings (s)	Trial 2 Time for 10 Full Swings (s)	Trial 3 Time for 10 Full Swings (s)	Average Time for 10 Full Swings (s)
1.0	45	19.7	20.1	20.3	**20.0**
0.8	45	17.0	16.9	17.0	**17.0**
0.6	45	14.7	14.8	14.7	**14.7**
0.4	45	11.8	12.1	12.0	**12.0**
0.2	45	8.5	8.4	8.2	**8.4**

WHAT TO DO

Week 2, Day 4

- ❑ **Conduct** Experiment 1.2, on pages 32–35 in the text. (Turn to the lab report form in the lab section of this notebook.)
- ❑ **Check off** this day on your Daily Schedule in the front of this notebook.

WHAT TO DO

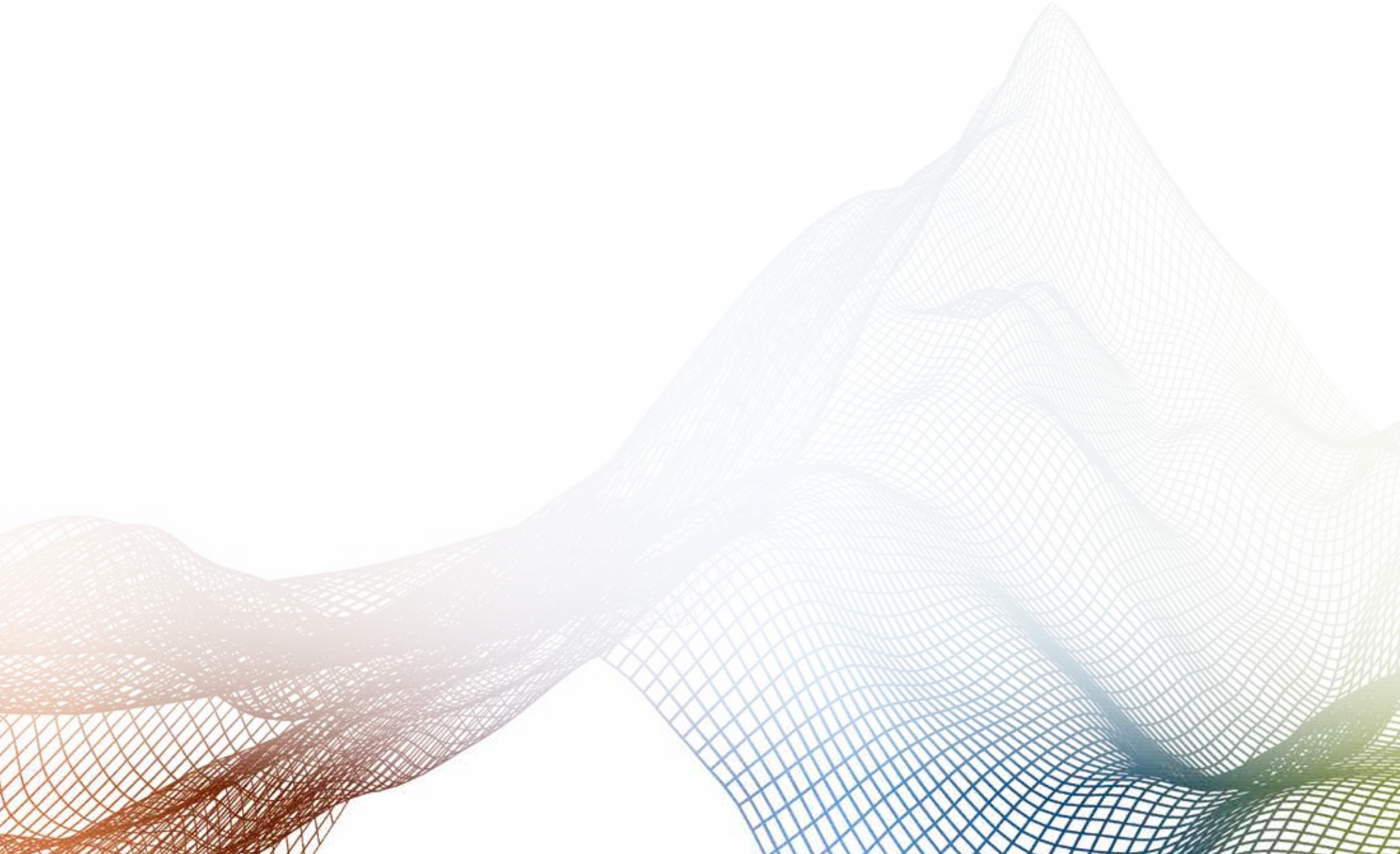
Week 3, Day 1

Now that you've read the module, taken notes, conducted experiments, and completed all the On Your Own questions, it's time to study! To do that, begin by completing the checklist below.

- ❑ **Choose** one of the experiments you conducted in this module and using the full lab report form in the lab section of this notebook, **write** your full lab report.
- ❑ Before you start the study process, you might want to take a moment and think about all that you've learned in this module. Do you view the world differently than you did before reading it? *If you like,* **write down** your thoughts and questions on the Personal Notes page.
- ❑ **Prepare for the exam** by reviewing your notebook pages. What does this mean? Well, take some time to look at all your notes and review what you have learned so far.
- ❑ **Answer** the Study Guide questions—it works best if you first try to do this without "looking back" at your notes and textbook. When you are done, you can use your text and notes to fill in any answers you did not know.
- ❑ **Check** your answers (or have your parent check your answers) with the *Solutions and Tests Manual*. **Review** and fix anything you got wrong and reread parts of the text if needed.
- ❑ **Check off** this day on your Daily Schedule in the front of this notebook.

PERSONAL NOTES

Write down any thoughts, questions, and creation connections that may be sparked after reading this module.



STUDY GUIDE FOR MODULE 1

1 Match the word with its definition by drawing a line from one to the other.

a. Quantitative observation	Tentative explanation for an observation
b. Qualitative observation	A well-supported, in-depth explanation of a broad range of phenomena
c. Hypothesis	Observations made using 5 senses
d. Variable	Observations made using numbers or measurements
e. Scientific Theory	Conclusions based on observations, previous knowledge, and available information
f. Inference	Any factor that changes in an experiment

2 Which type of data can you graph, quantitative or qualitative data? Why?

3 Give the numerical meaning for the following prefixes:

a. *centi-* _____

b. *milli-* _____

c. *kilo-* _____

4 If you wanted to make the following measurements, what metric unit would you use?

a. mass _____

b. length _____

c. solid volume _____

d. liquid volume _____

5 What is a conversion factor (give an example of one)? Why is it helpful in solving problems in physical science?

6 To convert 3.8 cm to m, you should multiply by which conversion factor? (Circle it)

a. $\frac{1\text{ km}}{1{,}000\text{ m}}$ b. $\frac{1{,}000\text{ m}}{1\text{ km}}$ c. $\frac{0.01\text{ m}}{1\text{ cm}}$ d. $\frac{1\text{ cm}}{0.01\text{ m}}$

7 In the SI symbol km, the "m" stands for ___? (Circle it)

a. minute b. meter c. *milli-* d. metric

8 The SI unit for power is the watt (W). One kW must be equal to ___? (Circle it)

a. 1,000 W b. 1,000 m c. 0.001 W d. 0.001 m

9 How many centimeters are in 1.3 meters?

10 If a person has a mass of 75 kg, what is their mass in grams?

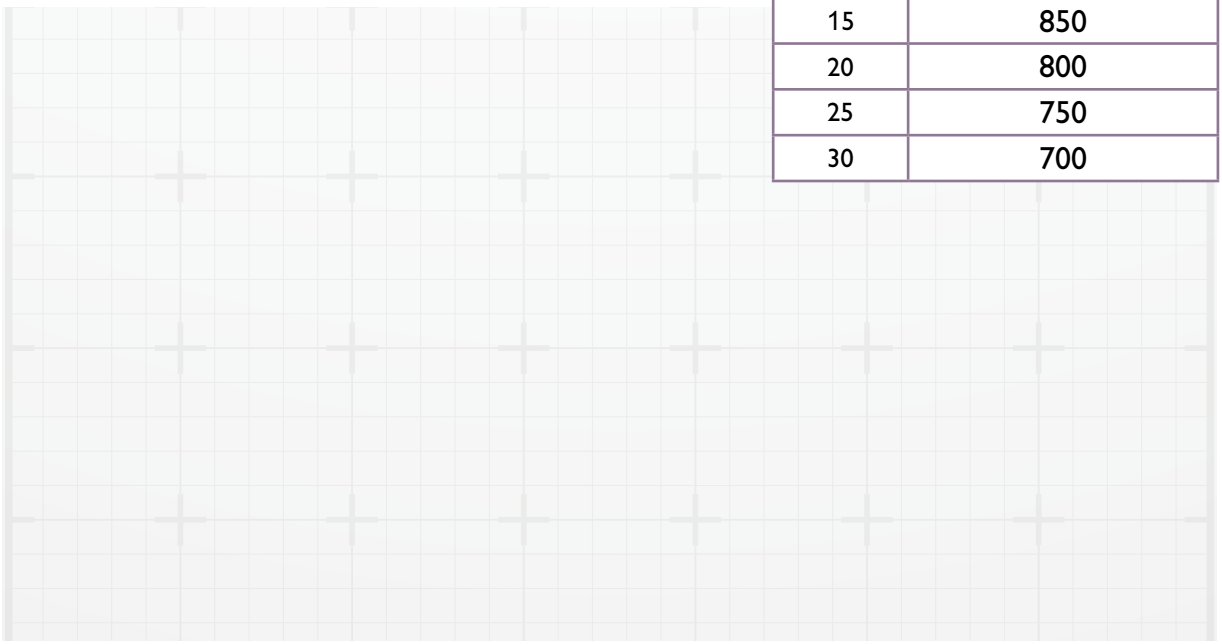
11 A meterstick is 100.0 centimeters long. How long is it in inches (in)? (1 in = 2.54 cm)

12 A small pool filled with water is being drained. Table 1.6 shows the volume of water remaining in the pool at different times.

TABLE 1.6

Time (min)	Volume of Water Remaining in Pool (L)
0	1,000
5	950
10	900
15	850
20	800
25	750
30	700

a. Make a graph showing how the volume of water changes as time passes. Include title, labeled axes, and units. (Hint: time is the independent variable.)



b. What type of relationship between the independent and dependent variable does your graph show? (Hint: use the Think About This box to help you describe it.)

c. Predict how long it will take for half the water to drain out. How long will it take to drain the pool? (Hint—you will need to extrapolate on your graph as you did in Experiment 1.2.)

WHAT TO DO

Week 3, Day 2

- ❑ Take about 20 minutes to **review for the exam** (review your notes in this notebook and the Study Guide questions).
- ❑ **Take the exam** (it can be found in the *Solutions and Test Manual*). Remember for this module you may use your text, notes, and Study Guide questions to help you take the test—if you need it.
- ❑ With a parent, **check your test answers** against the answers in the *Solutions and Tests Manual.*
- ❑ Go back in the text and **review anything you got wrong** on the test.
- ❑ **Check off** this day on your Daily Schedule in the front of this notebook.