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6	**MODULE 3:** • Text pp. 81–87: Introduction; A History of the Atom; Ancient Atomic Models; Dalton's Atomic Theory; Thomson's Atomic Model • SNB pp. 55–59 • OYO 3.1–3.3	• Text pp. 87–91: Rutherford's Atomic Model; The Structure of Atoms; Subatomic Particles • SNB pp. 59–60 • OYO 3.4

*Video lessons correspond to text headings and experiments.

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• Text pp. 26–29: Organizing, Analyzing, and Presenting Scientific Data; Data Tables; Analyzing Data with Graphs; Bar Graphs; Circle Graphs; Line Graphs (stop before Exp. 1.2) • SNB pp. 18–19	• Exp. 1.2 (SNB pp. 396–402) • Text pp. 29–33: Line Graphs (cont.); Summing Up • SNB pp. 20–21 • Formal Lab Report (SNB pp. 403–404)
MODULE 2: • Text pp. 43–49: Introduction; Classifying Matter; Pure Substances and Mixtures; Pure Substances; Mixtures • SNB pp. 29–34 • OYO 2.1–2.3	• Text pp. 50–55: Solids, Liquids, and Gases; Kinetic Theory of Matter; Solids; Liquids; Gases (stop before Exp. 2.1) • SNB pp. 34–37
• Text pp. 61–63: Melting and Boiling Points • SNB pp. 40–41 • OYO 2.7–2.8	• Text pp. 63–69: Chemical Properties; Flammability; Reactivity; Changes in Matter; Physical Changes; Volume and Density Changes; Phase Changes; Solubility Changes • SNB pp. 42–45 • YDS

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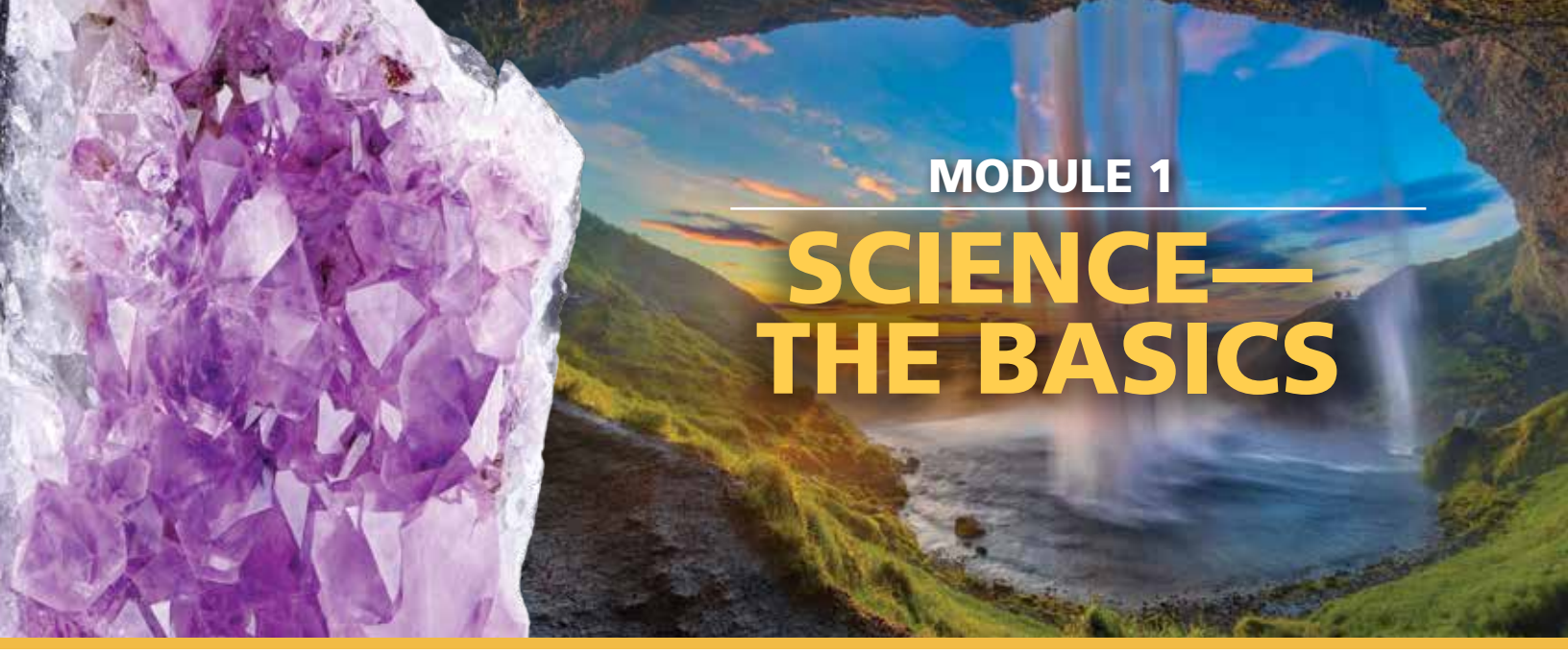
• Text pp. 92–98: Atomic Number and Mass Number; Modern Atomic Theory; Bohr's Atomic Model; The Electron Cloud/Quantum Mechanical Model (stop before Exp. 3.1) • SNB pp. 61–64 • OYO 3.5–3.6	• Exp. 3.1 (SNB pp. 419–421) • Text pp. 99–100: The Electron Cloud/ Quantum Mechanical Model (cont.) • SNB pp. 64–65 • OYO 3.7–3.8



MODULE 1

SCIENCE—THE BASICS

NOTETAKING TIP: INTRODUCTION

Taking notes is one of the most effective ways to remember what you read. Notetaking can be a very personal process—there is no single, correct way to do it. However, you can try different approaches to determine what helps you best learn and recall important concepts. In this notebook, I will provide you with various ways to practice notetaking. As you read each day, write your notes in your own words as you respond to the given prompts. If what you read sparks any additional thoughts or questions, jot them down on the Personal Notes page at the end of each module in this notebook (before the Study Guide questions). Also, as you read, you'll notice certain words, phrases, and sentences in blue. This blue text indicates key words and concepts to remember, so be sure to write them down in your notes.

WHAT TO DO

Week 1, Day 1

- ❑ **Read** pages v–viii and xxi–xxiii in the textbook so you understand how the book is designed to be used. Also, read pages iv–v in this notebook.
- ❑ **Read** pages 1–4 in the text: The **introduction, What is Science?, Science and Technology,** and **What is Physical Science?**
- ❑ As you read, **take notes** using the prompts in this notebook. **Write** any thoughts or questions on the Personal Notes page.
- ❑ **Answer** On Your Own questions 1.1–1.3. When you are finished, check your answers against the answer key at the end of Module 1 in your textbook. If your answers are correct, well done! If any answer is incorrect, do not despair. Take a moment to review the text to see where you made your mistake. Then, fix your answer in this notebook.
- ❑ **Check off** Day 1 on your Daily Schedule in the front of this notebook.

WHAT IS SCIENCE?: SCIENCE AND TECHNOLOGY AND WHAT IS PHYSICAL SCIENCE?

As you read pages 1–4, write down some examples of how you thought or behaved like a scientist. Then, write a few sentences 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?

WHAT TO DO

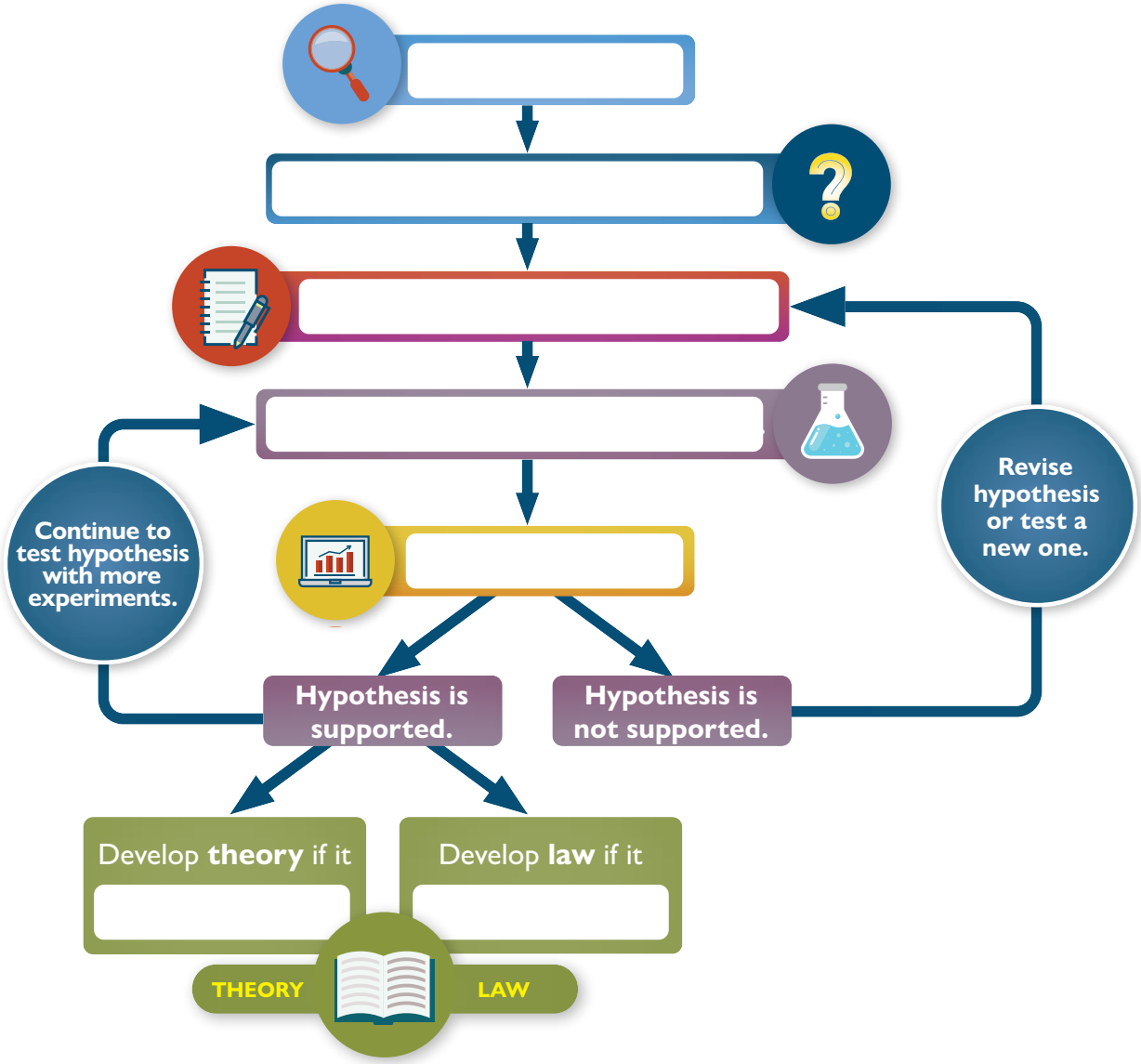
Week 1, Day 2

- ❑ **Read** pages 4–8: **The Scientific Process** and **Making Observations**.
- ❑ **Take notes** using the prompts in this notebook. **Write** any thoughts or questions you have on the Personal Notes page.
- ❑ **Write** the definitions of any vocabulary you come to in the space provided.
- ❑ **Explore** the You Do Science activity.
- ❑ **Read** the **Introduction to Labs** section on pages 381–389 of this notebook. Then, **conduct** Experiment 1.1 and **complete** the lab report form found in the lab section of this notebook.
- ❑ **Answer** On Your Own question 1.4, check your answer, and fix any mistakes.
- ❑ **Check off** this day on your Daily Schedule.

THE SCIENTIFIC PROCESS

What is the **scientific method**?

Study Figure 1.5 on page 5. Then, fill in the missing parts to help you remember the scientific method.



MAKING OBSERVATIONS

VOCABULARY

Observation—

As you read pages 5–6, explain (in a couple of sentences) how to tell a qualitative observation from a quantitative observation and give an example of each.

YOU DO SCIENCE

QUALITATIVE + QUANTITATIVE OBSERVATIONS

In the space provided, record two qualitative and two quantitative observations about the photo in Figure 1.6.

FIGURE 1.6
African Animals Near a Water Hole

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°C.

WHAT TO DO

Week 1, Day 3

- ❑ **Read** pages 8–11: **Forming Hypotheses** and **Conducting Experiments**.
- ❑ **Take notes** using the prompts in this notebook. **Write** any thoughts or questions you have on the Personal Notes page.
- ❑ **Write** the definitions of any vocabulary you come to in the space provided.
- ❑ **Answer** On Your Own questions 1.5–1.7, check your answers, and fix any mistakes.
- ❑ **Check off** this day on your Daily Schedule.

FORMING HYPOTHESES

VOCABULARY

Hypothesis—

What example does the text give of two reasonable hypotheses for burning?	
Why were these two hypotheses considered good?	

As you read, fill in the blanks.

When creating a hypothesis, do not include _____

_____ in this more formal mode of writing,

and make sure the hypothesis is testable by using an

_____ statement.

CONDUCTING EXPERIMENTS

VOCABULARY

Controlled experiment—

Variable—

As you read, fill in the blanks.

In a _____ _____,

the scientist should keep all variables the same except the one being tested. The changing variable is the _____ variable, and the responding variable is the _____ variable.

What was the goal in the toy boat example?

What was the independent variable in the toy boat example?

What was the dependent variable in the toy boat example?

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?

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: **Analyzing Data, Drawing Conclusions, Scientific Theories and Laws, Science Does Not Prove, When Direct Observation Isn't Possible in the Scientific Method,** and **Inferences**.
- ❑ **Take notes** using the prompts in this notebook. **Write** any thoughts or questions you have on the Personal Notes page.
- ❑ **Write** the definitions of any vocabulary you come to in the space provided.
- ❑ **Answer** On Your Own questions 1.8–1.9, check your answers, and fix any mistakes.
- ❑ **Check off** this day on your Daily Schedule.

ANALYZING DATA

What is data?

DRAWING CONCLUSIONS

Why is analyzing data necessary?

What should you do if your data does not support your hypothesis?

SCIENTIFIC THEORIES AND LAWS

VOCABULARY

Scientific theory—

Scientific law—

How are scientific theories and laws different? What do they have in common?

SCIENCE DOES NOT PROVE

If science doesn't prove or disprove ideas, what does it do?

Fill in the blanks as you read the Advanced Concepts section.

Like scientific _____, scientific _____ must be consistent with _____ and provide _____ _____.

If a law is determined to not be true under all conditions, _____ _____.

Can a scientific theory be raised to a scientific law if enough evidence is found to support it? Why or why not?

WHEN DIRECT OBSERVATION ISN'T POSSIBLE IN THE SCIENTIFIC METHOD: Inferences

VOCABULARY

Inference—

What example of an inference does the text give? How is an inference different from an observation?

How are scientific models helpful?

1.8 ON YOUR OWN

Match the term with the definition.

a. hypothesis	_____	A well-tested description of one phenomenon in the natural world that often includes mathematical terms
b. scientific theory	_____	A possible, testable explanation for an observation
c. scientific law	_____	A well-tested explanation of a phenomenon in the natural world

1.9 ON YOUR OWN

Why do we say science cannot prove anything?

WHAT TO DO

Week 2, Day 1

- ❑ **Read** pages 17–22: **Measuring and Manipulating Data, The Metric System, Mass, Length, Volume, Time,** and **Temperature**.
- ❑ **Take notes** using the prompts in this notebook. Write any thoughts or questions you have on the Personal Notes page.
- ❑ **Check off** this day on your Daily Schedule.

MEASURING AND MANIPULATING DATA

Why are units necessary?

THE METRIC SYSTEM

List the standard SI and corresponding English units for the physical quantities listed.

Physical Quantity	Standard SI Unit	Corresponding English Unit
length		
mass		
time		

List the number, prefix, and symbol for the metric quantities listed.

Name	Number	Prefix	Symbol
thousand			
hundredth			
thousandth			

Mass

What is mass?

Length

What metric unit do we use to measure large distances?	What metric unit do we use to measure small lengths?

Volume

What does volume measure? What does the text say is an interesting fact about volume?

Temperature

What does temperature measure?	What are the different temperature scales?	Which scale have scientists adopted?

WHAT TO DO

Week 2, Day 2

- ❑ **Read** pages 23–26: **Converting Units**.
- ❑ **Take notes** using the prompts in this notebook. **Write** any thoughts or questions you have on the Personal Notes page.
- ❑ **Answer** On Your Own questions 1.10–1.13, check your answers, and fix any mistakes.
- ❑ **Check off** this day on your Daily Schedule.

CONVERTING UNITS

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

Study Examples 1.2 and 1.3. What two reasons allow the factor-label method to work so well?

1.10 ON YOUR OWN

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

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

1.11 ON YOUR OWN

Convert 8.3 meters to centimeters.

1.12 ON YOUR OWN

A student measures the mass of a large tomato as 136 grams.

What is that measurement in kilograms?

1.13 ON YOUR OWN

If a glass contains 0.121 liters of milk, what is the volume of milk in milliliters (0.001 L = 1 mL)? What is the volume of milk in gallons (gal) (1 gal = 3.78 L)?

WHAT TO DO

Week 2, Day 3

- ❑ **Read** pages 26–29: **Organizing, Analyzing, and Presenting Scientific Data; Data Tables; Analyzing Data with Graphs; Bar Graphs; Circle Graphs;** and **Line Graphs** (stop before Experiment 1.2).
- ❑ **Take notes** using the prompts in this notebook. **Write** any thoughts or questions you have on the Personal Notes page.
- ❑ **Check off** this day on your Daily Schedule.

ORGANIZING, ANALYZING, AND PRESENTING SCIENTIFIC DATA

What is the goal of experimentation?

DATA TABLES

What three elements should every good data table have?

1.

2.

3.

ANALYZING DATA WITH GRAPHS

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

WHAT TO DO

Week 2, Day 4

- ❑ **Conduct** Experiment 1.2 on pages 29–31 and **complete** the lab report form in the lab section of this notebook.
- ❑ **Read** pages 31–33: **Line Graphs** (cont.) and **Summing Up**.
- ❑ **Take notes** using the prompts in this notebook. **Write** any thoughts or questions you have on the Personal Notes page.
- ❑ **Choose** one of the two experiments you conducted in this module and write a formal lab report using the template in the lab section of this notebook.
- ❑ **Check off** this day on your Daily Schedule.

Line Graphs

The text says that sometimes a hypothesis needs to be modified. Briefly explain when scientists modify hypotheses.

Match the three main relationships between independent and dependent variables with their meaning.

a.	no relationship	_____	when you increase the independent variable and the dependent variable decreases in response
b.	direct relationship	_____	when you change the independent variable but the dependent variable does not change in response
c.	inverse or indirect relationship	_____	when you increase the independent variable and the dependent variable also increases in response

Fill in the blanks as you read the Advanced Concepts section.

On a good graph you can _____ information by drawing a dashed line that extends beyond your data points. This is called _____, and it is another way we can use graphs to _____ and _____ data.

WHAT TO DO

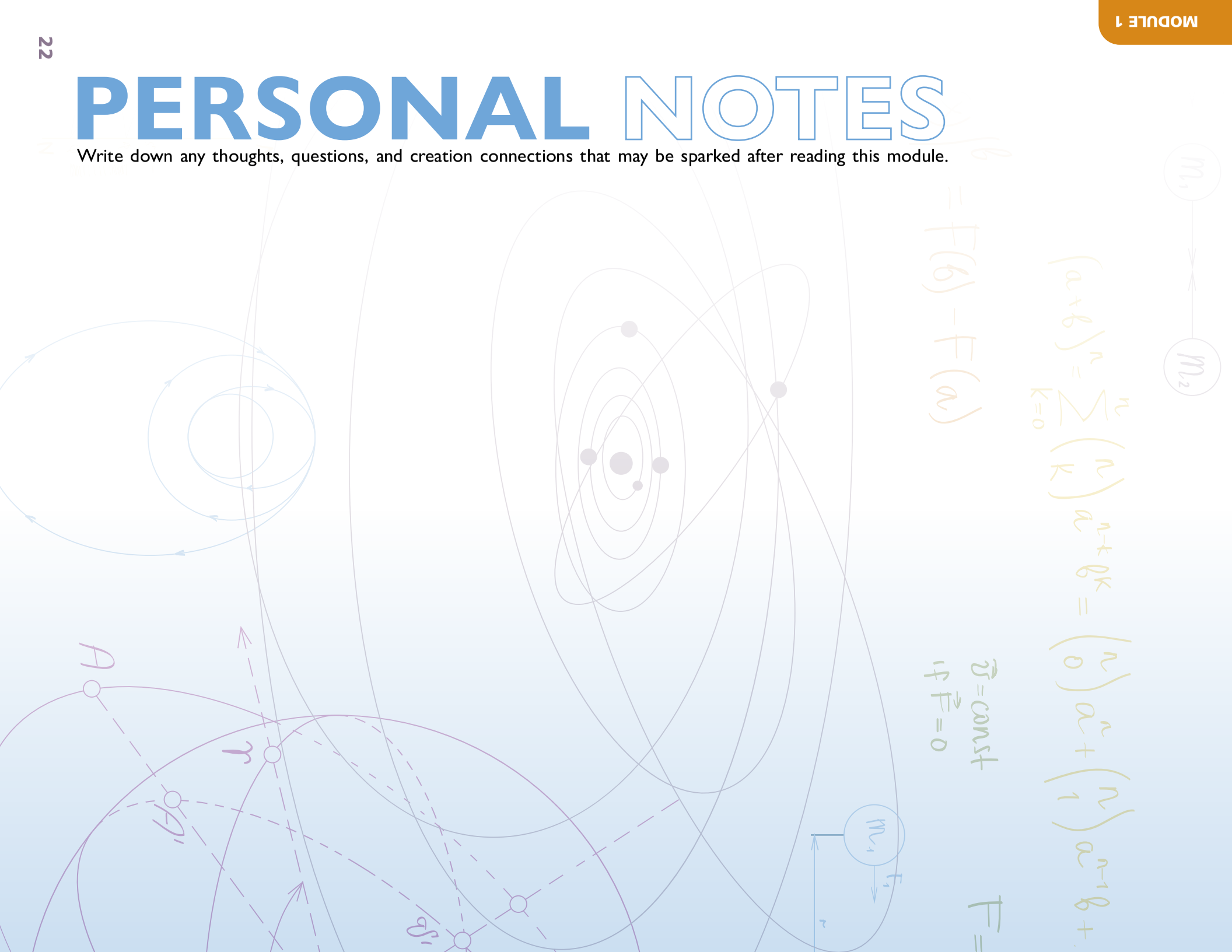
Week 3, Day 1

Now that you have read the module, taken notes, conducted experiments, and completed all the On Your Own questions, it's time to study! To do that, complete the following checklist:

- ❑ Before you begin to study, take a moment and think about everything you have learned in this module. Do you view the world differently than you did before reading it? *If you'd like,* **write** your thoughts and questions on the Personal Notes page.
- ❑ **Prepare for the test** by reading through your notes to review what you have learned so far.
- ❑ **Answer** the Study Guide questions. Try to answer the questions without looking back at your notes and textbook. When you are done, you can use your text and notes to fill in answers you did not know.
- ❑ **Check** your answers (or have your parents check your answers) using the Course Guide & Answer Key. **Review** and fix anything you got wrong. **Reread** parts of the text if needed.
- ❑ **Check off** this day on your Daily Schedule.

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 term to the correct definition.

a. Observation	_____	A factor that can change in an experiment
b. Hypothesis	_____	A well-tested explanation of a phenomenon in the natural world
c. Controlled experiment	_____	A possible, testable explanation for one or more observations or a suggested, testable answer to a question
d. Variable	_____	The gathering of information using senses or with the aid of instruments
e. Scientific theory	_____	An investigation in which the factors that influence the outcome are kept the same except for one—the factor being studied
f. Scientific law	_____	A logical conclusion drawn from observations, previous knowledge, and available information
g. Inference	_____	A well-tested description of one phenomenon in the natural world that often includes mathematical terms

2 Which *two* of the following are examples of an action using technology?

a. Calling on a cell phone

b. Observing rain fall

c. Describing the best type of wood for a construction project

d. Using a power drill to insert a screw

3 Which *two* of the following fall within the branch of physical science?

a. Counting the number of legs of an insect

b. Observing a beam of light from a flashlight

c. Measuring the time it takes for a ball to drop from a specific height

d. Recording the month of a year a plant produces flowers

4 You are testing how much weight a toy boat can hold while it remains afloat in a tub of water. You add weights to the boat, one at a time. Each weight weighs 5 grams. You discover that the boat floated a little lower with each weight and that it can hold 6 weights (30 grams total) but sinks when it has 7 weights (35 grams total). Give an example of a quantitative and a qualitative observation in this experiment.

Answer questions 5 and 6 based on the following paragraph:
A student wants to know if a generic candle burns more quickly compared to a brand-name candle. He decides he will conduct an experiment where he burns two 12-inch, tapered candles: one that is a brand-name candle and the other that is a generic candle. Because he wants to determine which candle burns more quickly, he thinks to himself, *If I time how long it takes for each candle to burn until it measures 6 inches in height, the brand-name candle will burn slower.* He conducts the experiment and records the time it takes for each candle to burn down to 6 inches in height.

5 Which of the following is a good hypothesis for the student's experiment?

a. Brand-name candles are better to buy.

b. I think that generic candles burn faster than brand-name candles.

c. If the candles are timed while they are allowed to burn until they measure 6 inches in height, then the brand-name candle will take a longer time to burn.

d. If a candle burns down to 6 inches in height, then I think I will get my money's worth.

6 Of the two variables (candle brand and time to burn), which one is the independent variable?

7 Can science actually prove anything? Explain your answer.

8 Match the following prefixes to their numerical meaning:

a. *centi-* _____ 0.001 (or 1/1,000)

b. *milli-* _____ 1,000

c. *kilo-* _____ 0.01 (or 1/100)

9 Match the following measurement types to the appropriate metric units:

a. mass _____ cubic meter

b. length _____ gram

c. solid volume _____ meter

10 You need to convert the measurement 6 meters to centimeters. The conversion relationship between meters and centimeters is 0.01 meter = 1 centimeter. To convert, you first set up your given measurement as a fraction of $\frac{6\text{ m}}{1}$.

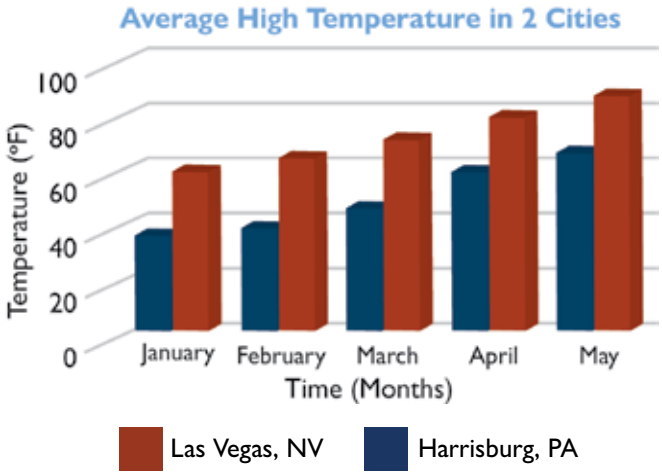
Which is the correct way to set up the conversion factor?

a. $\frac{0.01\text{ m}}{1\text{ cm}}$ b. $\frac{1\text{ cm}}{0.01\text{ m}}$

11 Convert 675 centimeters to meters.

12 If a person has a mass of 80 kg, what is his or her mass in grams?

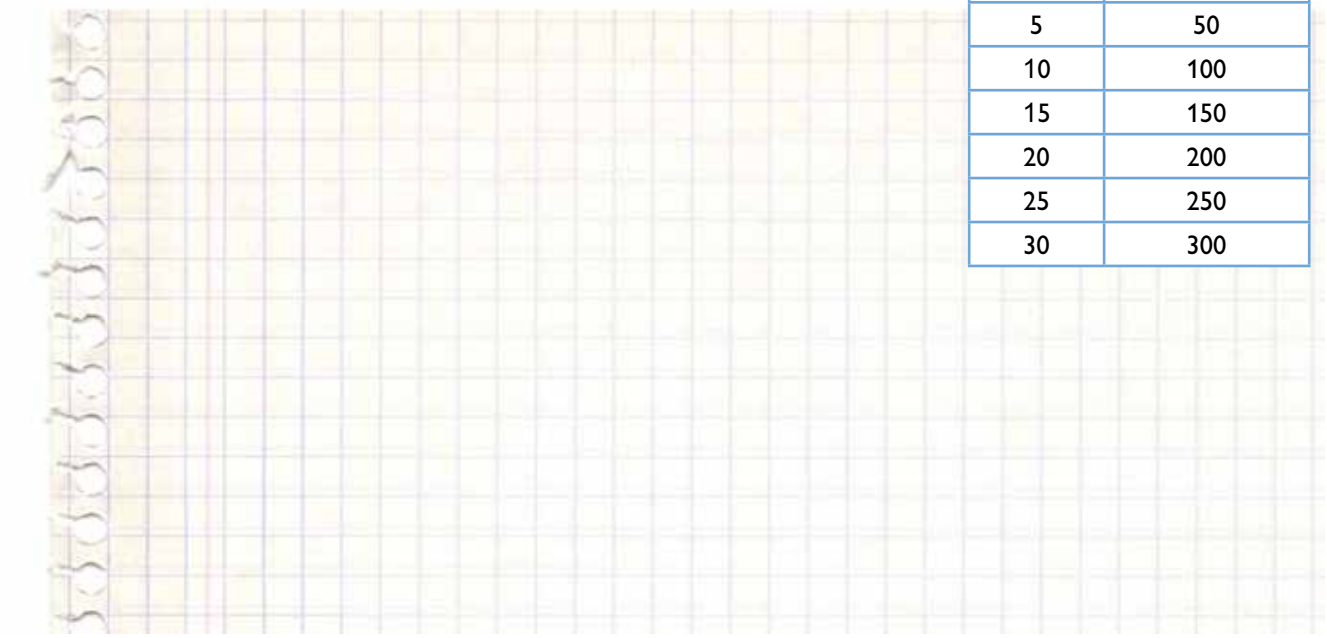
13 Based on the bar graph below, which of the two locations have overall higher temperatures from January through May? What is the average high temperature in Harrisburg, PA, in May?



14 A 300 L water storage tank is being filled. Table 1.5 shows the volume of water in the tank at different times. Create a line graph showing how the volume of water changes as time passes. Time is the independent variable. Make sure you include a title, labeled axes, and units.

TABLE 1.5

Time (min)	Volume of Water (L)
0	0
5	50
10	100
15	150
20	200
25	250
30	300



ADVANCED CONCEPTS

15 When scientific data is collected that is not explained by the current model, what happens to that model?

16 The owners of a theme park wanted to know when people were entering their park throughout the day. They kept track of how many people entered the park in hourly increments, beginning when the park opened at 9 a.m. and ending with its closing at 8 p.m. On a graph, which variable (time or number of people) is the independent variable, and which is the dependent variable? Which variable would go on the *x*-axis of a graph?

17 When considering relationships between variables, when you increase the independent variable and the dependent variable also increases, the result is a/an (direct/indirect) relationship.

18 Convert 67 centimeters to inches (1 in = 2.54 cm).

WHAT TO DO

Week 3, Day 2

- ❑ Take about 20 minutes to **review for the test**. To do that, review your notes in this notebook and the On Your Own and Study Guide questions.
- ❑ **Take the test** (found in the test packet). For this module, you may use your text, notes, and Study Guide questions to help you take the test if needed.
- ❑ With a parent, **check your test answers** against the Course Guide & Answer Key.
- ❑ Go back to the text and **review anything you got wrong** on the test.
- ❑ **Check off** this day on your Daily Schedule.