

**CAREER
PATHS**

Science

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Book

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Scope and Sequence

Unit	Topic	Reading context	Vocabulary	Function
1	Science	Magazine article	branch, discover, evaluate, improve, lab, progress, question, research, science, study	Showing agreement
2	Lab Equipment 1	Memo	beaker, buret, dropper, Erlenmeyer flask, funnel, graduated cylinder, pipette, test tube, volumetric flask, wash bottle	Correcting someone
3	Lab Equipment 2	Safety poster	burner, clamp, forceps, hot plate, mortar, pestle, spatula, stirring rod, tongs, tubing	Making an assumption
4	Lab Equipment 3	Product listing	analytical balance, balance, centrifuge, desiccator, incubation oven, microscope, orbital shaker, pH meter, spectrophotometer, thermometer	Describing necessity
5	The Microscope	Manual	arm, base, coarse focus, fine focus, head, magnification, objective lens, ocular lens, slide, stage	Asking for help
6	Safety Procedures	Handbook excerpt	coveralls, eye wash station, flammable, fume hood, glove, goggles, hazardous, respirator, safety can, toxic, MSDS	Giving a warning
7	Measurements 1	Conversion guide	convert, foot, imperial, kilogram, length, meter, metric, ounce, pound, weight	Asking for clarification
8	Measurements 2	Employee manual	Celsius, cubic centimeter, degree, Fahrenheit, kelvin, liter, milliliter, scale, temperature, volume	Recognizing an error
9	SI Units	Poster	amount, base unit, derived unit, force, joule, molar mass, mole, newton, pascal, pressure, SI	Making a realization
10	Numbers and Basic Math	Chart	add, divide by, equal, -hundred, less, minus, multiply by, over, plus, subtract, times	Working with numbers
11	Large Numbers	Email	cubed, exponent, integer, leading zero, rounding error, scientific, notation, significant figure, squared, to the nth power, trailing zero	Making an apology
12	Analyzing Quantities	Guide	decimal number, fraction, improper fraction, mixed number, -out of, percent, percentage, point, quantity, reduce, whole number	Making an apology
13	Tables and Graphs	Report	bar graph, column, legend, line graph, pie chart, row, scatter plot, table, x-axis, y-axis	Making a suggestion
14	Describing Change	Newspaper article	climb, decline, decrease, expand, fluctuate, increase, plummet, rise, shrink, stabilize	Describing expectations
15	Education	Webpage	bachelor's degree, doctoral, graduate, master's degree, PhD, postgraduate, prerequisite, program, thesis, undergraduate	Describing requirements

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Get ready!

- 1 Before you read the passage, talk about these questions.

- 1 What features are shared by all branches of science?
- 2 What are some important qualities in a scientist?

The Stellar Monthly | A Journal of Science and Technology



From the Editor

This week's issue is all about the history of **science**. You'll find articles on everything from paleontology to computer technology. Each **branch** has its own properties and applications. However, some features are common to all of them.

Every branch of science seeks to **study** or **evaluate** something. Some people naturally **question** the world around them. Those people make excellent scientists. They are eager to **discover** new ideas. But they know it's not easy. Science requires extensive time and **research**. Most scientists spend countless hours in the **lab**. But that's how we make **progress**. When you actually **improve** something, it's worth the effort.

So enjoy our special history issue!

Ed.

Reading

- 2 Read the magazine article. Then, choose the correct answers.

- 1 What is the main idea of the article?
 - A predictions about the future of science
 - B the most important branches of science
 - C preparing for a career in science
 - D similarities between different areas of science
- 2 Which of the following is NOT mentioned in the editor's letter?
 - A articles about various branches of science
 - B a historical overview of different fields
 - C ongoing experiments in various labs
 - D features shared by all branches of science
- 3 According to the article, what makes a good scientist?
 - A an ability to work well with other scientists
 - B a desire to start his or her own lab
 - C a habit of seeking information
 - D an understanding of current technology

Vocabulary

- 3 Match the words (1-6) with the definitions (A-F).

- | | |
|--------------|---------------|
| 1 __ lab | 4 __ branch |
| 2 __ study | 5 __ discover |
| 3 __ science | 6 __ question |

- A to learn about something in a formal context
- B a broad field that examines various processes
- C to find new information about something
- D a place where experiments are conducted
- E to assess the truth of something
- F an area or subfield of a larger field

4 Read the sentence pairs. Choose which word best fits each blank.

1 improved / evaluated

- A After the developers _____ the drink formula, it tasted much better.
B Several scientists _____ the problem before investigating further.

2 research / progress

- A The student performed extensive _____ for her final report.
B After months of inactivity, the project finally started to make _____.

5 Listen and read the magazine article again. What leads to successful experiments?

Listening

6 Listen to a conversation between two scientists. Mark the following statements as true (T) or false (F).

- 1 ___ The scientists in the lab made a major discovery.
2 ___ The man performed some research for the experiment.
3 ___ The results of the experiment will likely be widely useful.

7 Listen again and complete the conversation.

Scientist 1: Hey, Kim. Did you hear about the experiment at Finmoore Labs?

Scientist 2: Yes, it sounds really interesting. 1 _____ fuel efficiency in cars, right?

Scientist 1: Well, they're trying. So far, 2 _____.

Scientist 2: I suppose that's 3 _____.

Scientist 1: Of course. Successful experiments require 4 _____. And lots of time in the lab.

Scientist 2: Exactly. In any case, 5 _____ to hear what they discover.

Scientist 1: Yeah, so am I. Their findings will be 6 _____.

Speaking

8 With a partner, act out the roles below based on Task 7. Then, switch roles.

USE LANGUAGE SUCH AS:

Did you hear ...?

They're ..., right?

So am I.

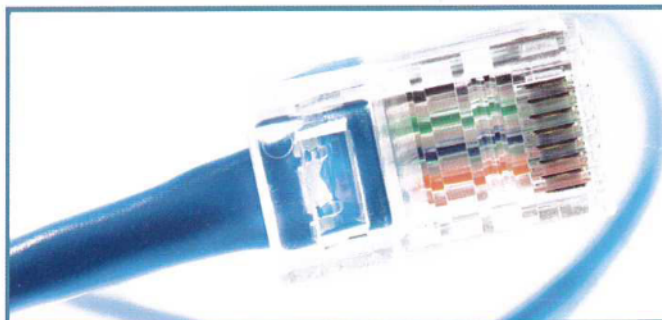
Student A: You are a scientist. Talk to Student B about:

- an experiment
- the purpose of the experiment
- the progress of the experiment

Student B: You are a scientist. Talk to Student A about the purpose and progress of an experiment.

Writing

9 Use the magazine article and the conversation from Task 8 to fill out the article about a current experiment.



| The Stellar Monthly |

A Journal of Science and Technology

Scientists at Fillmore labs are working on a new experiment. Its purpose is _____.

According to the lead scientist, Dr. Jennifer Tyler, their progress is _____.

Dr. Tyler expects the experiment to be a success because _____.

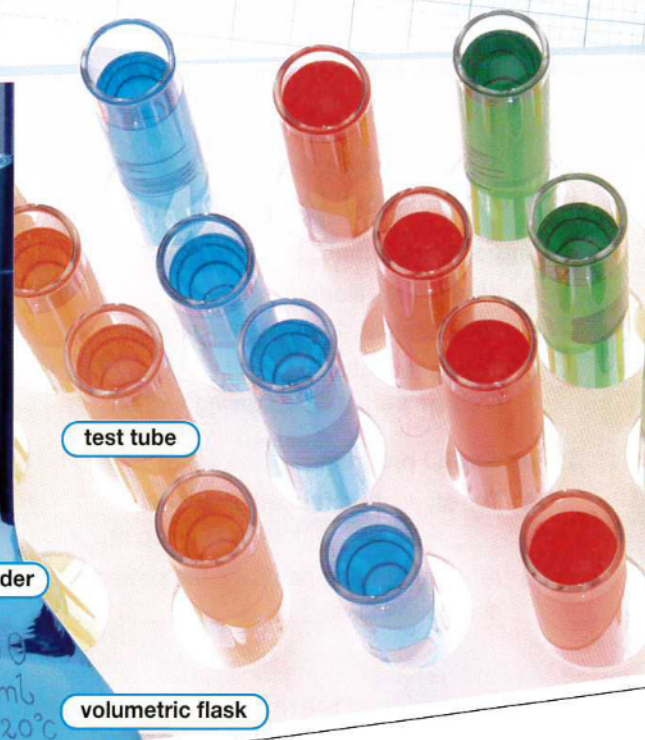
Read more at stellarmonthly.org.



dropper



graduated cylinder



test tube

volumetric flask

memo

To: Lab staff

From: Tony King, Lab Supervisor

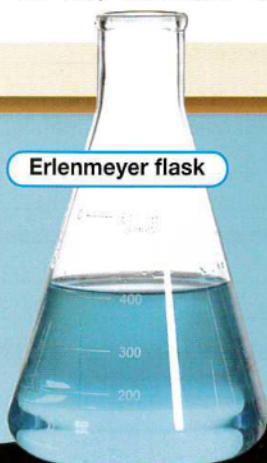
Hi everyone,

Last week, I noticed some careless use of glassware. Remember our equipment safety practices:

- Some glassware cannot stand on its own. Keep **test tubes** and **burets** in their racks. Otherwise, they tip over or roll away.
- **Droppers** and **pipettes** are for transferring substances. Do not store materials in these containers for long periods.
- Avoid spillage. Pour carefully into narrow containers like **graduated cylinders**. Use a **funnel** when appropriate.
- Use equipment for its designated purpose. Only use a **volumetric flask** for particular volume and temperature precision. Otherwise, use a **beaker** or **Erlenmeyer flask** instead.
- Water is the only substance allowed in the **wash bottles**.

Tony

Erlenmeyer flask



beaker



Get ready!

1 Before you read the passage, talk about these questions.

- 1 What types of glassware are used in a lab?
- 2 What are some important safety practices when working with glassware?

Reading

2 Read the memo. Then, choose the correct answers.

- 1 What is the main idea of the memo?
 - A policies for using equipment in a lab
 - B equipment that needs to be replaced
 - C new equipment that a lab is receiving
 - D an accident caused by poor equipment handling
- 2 Which of the following is NOT required in the lab?
 - A Store burets in their designated racks.
 - B Avoid keeping substances in test tubes for long periods.
 - C Use a funnel to avoid spillage while pouring.
 - D Keep all substances except water out of wash bottles.
- 3 What is true about volumetric flasks?
 - A They pose the highest risk of spillage.
 - B They serve the same purpose as beakers.
 - C They typically contain just water.
 - D They are used to ensure special precision.

Vocabulary

- 3 Match the words or phrases (1-5) with the definitions (A-E).

- 1 ___ beaker 4 ___ volumetric flask
2 ___ dropper 5 ___ Erlenmeyer flask
3 ___ test tube

- A a container for general use with a flat base and narrow neck
B a tube and a squeezable bulb used for transferring substances
C a small, narrow container with a rounded base
D a cylindrical, wide-mouthed container with a flat base
E a container used for precise calibration of temperature and volume

- 4 Place the words or phrases from the word bank in the correct box.

word BANK

wash bottle funnel pipette
graduated cylinder buret

Transferring substances	_____
Measuring substances	_____
Cleaning equipment	_____

- 5 Listen and read the memo again. What equipment is a funnel used with?

Listening

- 6 Listen to a conversation between a scientist and an assistant. Check (✓) the items that the man needs.

- 1 ☐ dropper 4 ☐ test tube
2 ☐ Erlenmeyer flask 5 ☐ funnel
3 ☐ graduated cylinder

- 7 Listen again and complete the conversation.

Scientist: I'm transferring some substances onto a microscope slide.
Assistant: You probably want a 1 _____ for that.
Scientist: Right. Then, I'm measuring some volumes. A twenty-five-milliliter 2 _____ will work.
Assistant: That's the little one 3 _____, right?
Scientist: No, 4 _____ a test tube. I need the one with a flat base.
Assistant: Oh, right. I always get 5 _____.
Scientist: 6 _____, too. The graduated cylinder has a narrow neck.

Speaking

- 8 With a partner, act out the roles below based on Task 7. Then, switch roles.

USE LANGUAGE SUCH AS:

*I need some ... / You probably want ...
No, you're thinking of ...*

Student A: You are a scientist. Talk to Student B about:

- equipment you need
- what you will use the equipment for
- an error that he or she makes

Student B: You are an assistant. Talk to Student A about equipment that he or she needs.

Writing

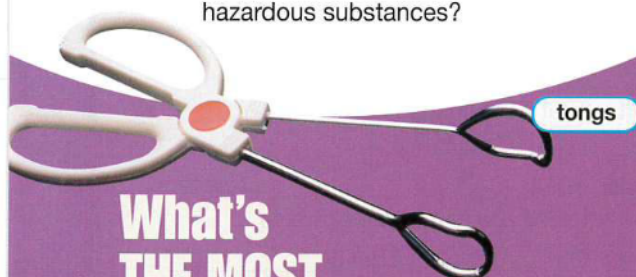
- 9 Use the memo and the conversation from Task 8 to fill out the email to a lab assistant.

Hi Ken,
Please remember to use the lab equipment correctly.
The _____ are for _____.
It is important to use them correctly because _____.
When working with _____, remember to _____.
This is important because _____.
Thanks,
Lois

Get ready!

1 Before you read the passage, talk about these questions.

- 1 What are some ways to prevent burns in a lab?
- 2 How can lab workers protect themselves from hazardous substances?



tongs

**What's
THE MOST
IMPORTANT THING
to remember
IN THE LAB?
It's safety!**

PREVENTING BURNS

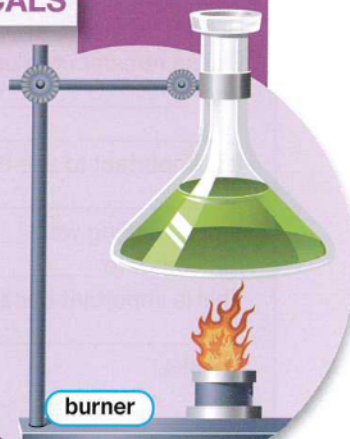
You will work with **burners** and **hot plates** in the lab. Turn them off when not in use. Also, use **tongs** to handle materials after heating.

PROTECTING THE SKIN

Many substances in the lab are hazardous to the skin. Never touch anything with your bare hands. Use **stirring rods** and **spatulas** to manipulate materials. Crush substances with a **mortar** and **pestle**.

CONTROLLING CHEMICALS

Careless use of chemicals can cause damage or injury. Use **forceps** for precise transfer of materials. To stop a container from moving or tipping, use a **clamp**. Disconnect **tubing** with care. It may still contain some liquid.



burner



tubing

Reading

2 Read the safety poster. Then, mark the following statements as true (T) or false (F).

- 1 ☐ The poster recommends using hot plates instead of burners.
- 2 ☐ According to the poster, using a spatula prevents damage to the skin.
- 3 ☐ Tubing is typically used to prevent burns.

Vocabulary

3 Write a word or phrase that is similar in meaning to the underlined part.

- 1 The scientist created a powder in the bowl in which materials are crushed. or
- 2 The technician picked up the heated object with a pair of hinged pieces using for grabbing something. t s
- 3 The beaker of liquid is being heated on the surface used to make something hot. o l a
- 4 The tool for crushing materials is nearly always used with a mortar. s t

4 Read the sentence pairs. Choose which words best fit each blank.

1 burner/stirring rod

- A A _____ prevents direct contact with hazardous liquids.
B Be careful around the open flame on the _____.

2 clamp/spatula

- A The test tube was held in place by the _____.
B Spreading materials is much easier with a _____.

3 forceps/tubing

- A A pair of _____ is useful when handling very small objects.
B Liquids can be transferred between containers with _____.

5 Listen and read the safety poster again. How can a clamp prevent damage or injury?

Listening

6 Listen to a conversation between a manager and a lab technician. Choose the correct answers.

- 1 What is the conversation mostly about?
A an upcoming equipment safety training
B new tools that will improve lab safety
C an injury from a recent accident in the lab
D how lab equipment became damaged
- 2 What equipment was not used properly?
A burner B clamp C tubing D tongs

7 Listen again and complete the conversation.

Manager: Ron, I heard there was a problem in the lab. What happened?
Technician: Sam 1 _____. It's not too serious, though.
Manager: Even so, these situations 2 _____. How did he do it?
Technician: He didn't secure his test tube properly 3 _____.
Manager: So the tube 4 _____ the clamp?
Technician: Right. And it was over the 5 _____ at the time.
Manager: I 6 _____ what happened next. He grabbed it with his bare hands, didn't he?

Speaking

8 With a partner, act out the roles below based on Task 7. Then, switch roles.

USE LANGUAGE SUCH AS:

What happened?
It's not too ...
I can guess ...

Student A: You are a manager. Talk to Student B about:

- an accident in the lab
- the cause of the accident
- the equipment involved in the accident

Student B: You are a lab technician. Talk to Student A about an accident in the lab.

Writing

9 Use the safety poster and the conversation from Task 8 to fill out the accident report.

GREEN HILLS LAB ACCIDENT REPORT

Employee: _____

Was the employee injured? Y / N
Please explain:

Was equipment damaged? Y / N
Please explain:

How can accidents like this be prevented?

4

Lab Equipment 3



Lab Suppliers, Inc. > Products

Bacterial Growth

Our **incubation oven** gives you precise temperature control. Every built-in digital **thermometer** displays Fahrenheit, Celsius, and Kelvin measurements. For controlled cooling, keep moisture out with a **desiccator**.

Balances

Lab Suppliers' **analytical balances** provide the most accurate mass measurements available.

Magnification

Lab Suppliers' has an extensive lineup of **microscopes** and microscope supplies. No lab is complete without them!

Meters

Try our new **spectrophotometer**. It recognizes small light changes that previous models couldn't detect. For acidity tests, you won't find a better **pH meter** anywhere.

Motion Devices

Do you need to mix materials? Check out our **orbital shakers**. Or maybe you're trying to separate them. In that case, you need a **centrifuge**.

Get ready!

- 1 Before you read the passage, talk about these questions.

- 1 What are some different measuring equipment used in a lab?
- 2 What devices are used to combine and separate materials in a lab?

Reading

- 2 Read the product listing. Then, mark the following statements as true (T) or false (F).

- 1 ___ Each incubation oven accommodates multiple temperature scales.
- 2 ___ The company recently released a new spectrophotometer.
- 3 ___ The listing advertises a centrifuge that the company will release soon.

Vocabulary

- 3 Match the words (1-6) with the definitions (A-F).

- | | |
|------------------|-------------------------|
| 1 ___ desiccator | 4 ___ thermometer |
| 2 ___ balance | 5 ___ centrifuge |
| 3 ___ microscope | 6 ___ spectrophotometer |

- A a device that makes objects appear larger
- B a tool that is used to measure temperature
- C a device that spins substances very quickly
- D a device that determines the mass of something
- E a tool for measuring the intensity of light
- F a sealable container used to preserve items from moisture