

**CAREER  
PATHS**

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# ENVIRONMENTAL ENGINEERING



**Express Publishing**

## Scope and Sequence

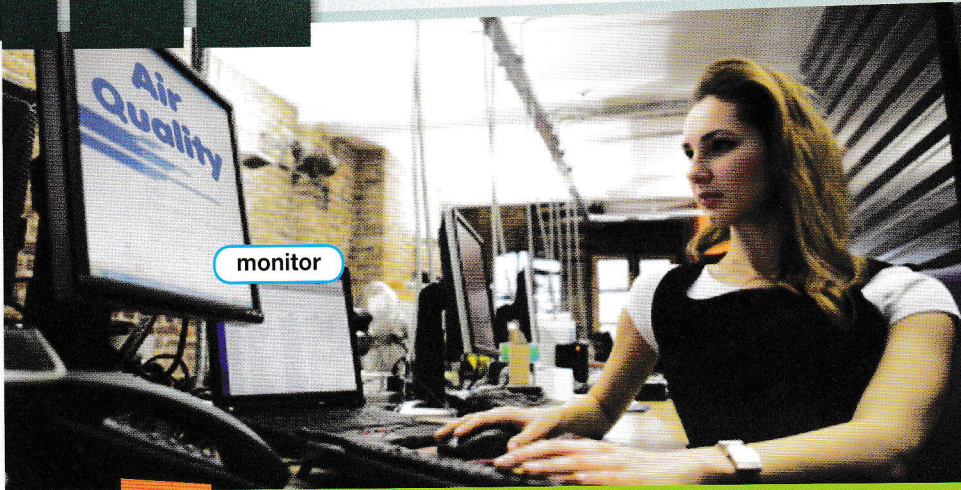
Unit	Topic	Reading context	Vocabulary	Function
1	The Environmental Engineer	Article	advise, apply, conservation, environment, environmental engineer, evaluate, impact, monitor, pollution, prevent, resources	Asking about interests
2	The Earth	Course description	atmosphere, biosphere, core, crust, geosphere, hydrosphere, lithosphere, mantle, stratosphere, troposphere	Describing order
3	Ecosystems	Letter	abiotic, biotic, community, component, ecosystem, genetic diversity, habitat, organism, population, species	Describing positive changes
4	Biomes and Aquatic Systems	Webpage	aquatic life zone, biome, coastal zone, coral reef, desert, grassland, inter-tidal zone, ocean, open sea, rainforest, saltwater, savanna, tundra	Expressing excitement
5	Weather	Blog	cloud cover, humidity, meteorology, moisture, precipitation, pressure, short-term, temperature, weather, wind speed	Asking for repetition
6	Climate	Textbook	average, climate, current, elevation, Equator, latitude, pattern, pole, prevailing wind, range, rotation, terrain	Talking about averages
7	Basic Units of Life	Textbook	cell, chromosome, DNA, eukaryotic, gene, genetic information, multicellular, nucleus, prokaryotic, unicellular	Making a comparison
8	Measurements 1	Chart	acre, Celsius, Fahrenheit, gallon, hectare, imperial, kilogram, kilometer, liter, meter, metric, mile, pound, yard	Making a request
9	Basic Numbers and Math	Chart	add, divide by, equal, hundred, less, minus, multiply by, over, plus, subtract, times	Giving a reminder
10	Measurements 2	Employee guide	amount, area, base unit, concentration, cubic meter, derived unit, Kelvin, mole, SI, square meter, thermodynamic temperature, volume	Asking for clarification
11	Tables and Graphs	Email	bar graph, column, legend, line graph, pie chart, row, scatter diagram, table, x-axis, y-axis	Correcting an error
12	Describing Change	Article	decline, decrease, expand, fluctuate, increase, plummet, rise, shrink, skyrocket, stabilize	Describing changes
13	Presentations	Letter	body language, cue card, eye contact, handout, presentation, project, review, signpost, summarize, visual aid	Giving a compliment
14	Properties of Matter	Textbook	atom, atomic number, compound, electron, element, ion, mass number, matter, molecule, neutron, proton	Correcting yourself
15	Energy	Information excerpt	conserve, electromagnetic radiation, energy, energy efficiency, energy quality, heat, kinetic energy, potential energy, transfer, work	Giving a summary

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# 1

# The Environmental Engineer



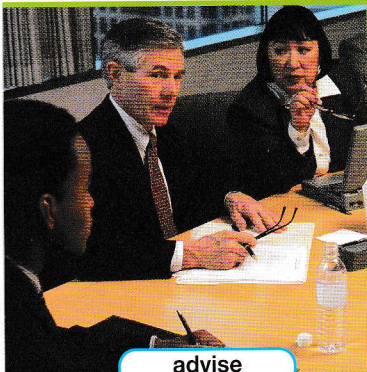
monitor

## Is Environmental Engineering Right for You?

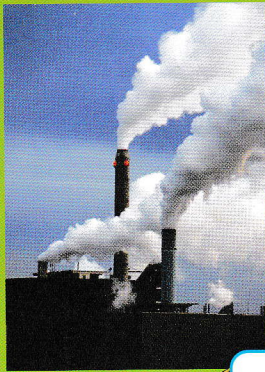
Many people want to help the **environment**. **Environmental engineers** make it their career. They **apply** engineering skills to environmental problems. Here are some common duties of environmental engineers:

- **Evaluate** the **impact** of proposed projects. The goal is to **prevent** or minimize any harm to the environment.
- **Monitor** air and water **pollution** levels. They may **advise** authorities about how to reduce them.
- Design systems to increase **conservation** of **resources**. A typical project might be a waste water system.

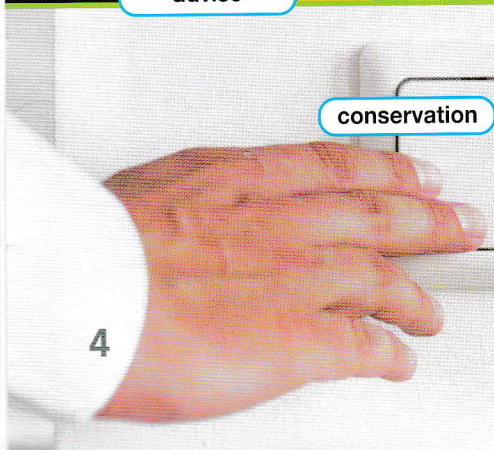
Environmental engineers work with various organizations. Working together, they try to protect our environment. If this sounds interesting, consider learning more!



advise



pollution



conservation



resources

### Get ready!

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

- 1 What are some problems that the environment is facing?
- 2 What kinds of skills does a person need to be an environmental engineer?

### Reading

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

- 1 What is the purpose of the article?
  - A to recruit environmental engineers
  - B to list a job opening for an environmental engineer
  - C to describe what an environmental engineer does
  - D to describe how to become an environmental engineer
- 2 Which of the following is NOT listed as a duty of an environmental engineer in the article?
  - A monitoring air pollution levels
  - B evaluating soil conditions
  - C designing waste water systems
  - D assessing future projects
- 3 What is the main goal when evaluating potential projects?
  - A to reduce air pollution
  - B to improve water quality
  - C to safely deal with solid waste
  - D to prevent harm to the environment

## Vocabulary

3 Match the words (1-8) with the definitions (A-H).

- |             |                  |                   |
|-------------|------------------|-------------------|
| 1 __ apply  | 4 __ evaluate    | 7 __ pollution    |
| 2 __ advise | 5 __ resources   | 8 __ conservation |
| 3 __ impact | 6 __ environment |                   |

- A the act of trying to save resources  
 B to give an expert opinion  
 C the area in which a person or thing lives  
 D to look at something closely and critically  
 E a large change  
 F things that people use for fuel, food, or shelter  
 G damage caused to water, air, and land by harmful substances  
 H to use something for a particular purpose

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

- 1 **environmental engineer / pollution**  
 A The \_\_\_\_\_ came up with a new water cleaning system.  
 B Cars can cause a lot of \_\_\_\_\_ in the air.
- 2 **monitor / prevent**  
 A If we are careful we can \_\_\_\_\_ environmental degradation.  
 B It is our duty to \_\_\_\_\_ our water consumption.

5 Listen and read the article again. What are some duties of an environmental engineer?

## Listening

6 Listen to a conversation between an interviewer and an interviewee. Mark the following statements as true (T) or false (F).

- 1 \_\_ The man will study environmental engineering this year.  
 2 \_\_ The man has experience in wastewater management.  
 3 \_\_ The man has not worked in soil remediation.

7 Listen again and complete the conversation.

- Interviewer: I'm glad to hear that. What kind of 1 \_\_\_\_\_ do you have?  
 Interviewee: I have a degree in environmental engineering. I also have 2 \_\_\_\_\_ of experience in my current position.  
 Interviewer: What exactly 3 \_\_\_\_\_?  
 Interviewee: Mainly wastewater and solid 4 \_\_\_\_\_.  
 Interviewer: I see. Do you have any experience with 5 \_\_\_\_\_?  
 Interviewee: 6 \_\_\_\_\_, yes.

## Speaking

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

### USE LANGUAGE SUCH AS:

What brought you to environmental engineering?  
 What kind of experience do you have?  
 Do you have any experience with ...?

**Student A:** You are an interviewer. Talk to Student B about:

- why he or she chose the field of environmental engineering
- his or her experience in the field
- a specific skill you're looking for

**Student B:** You have an interview for an environmental engineer position. Talk to Student A about the position.

## Writing

9 Use the conversation from Task 8 to complete the interview sheet.

### GREEN TECHNOLOGIES INTERVIEW SHEET

CANDIDATE NAME: \_\_\_\_\_

INTERVIEWER NAME: \_\_\_\_\_

MOTIVATION FOR ENTERING THE FIELD:  
 \_\_\_\_\_  
 \_\_\_\_\_

EXPERIENCE:  
 \_\_\_\_\_  
 \_\_\_\_\_

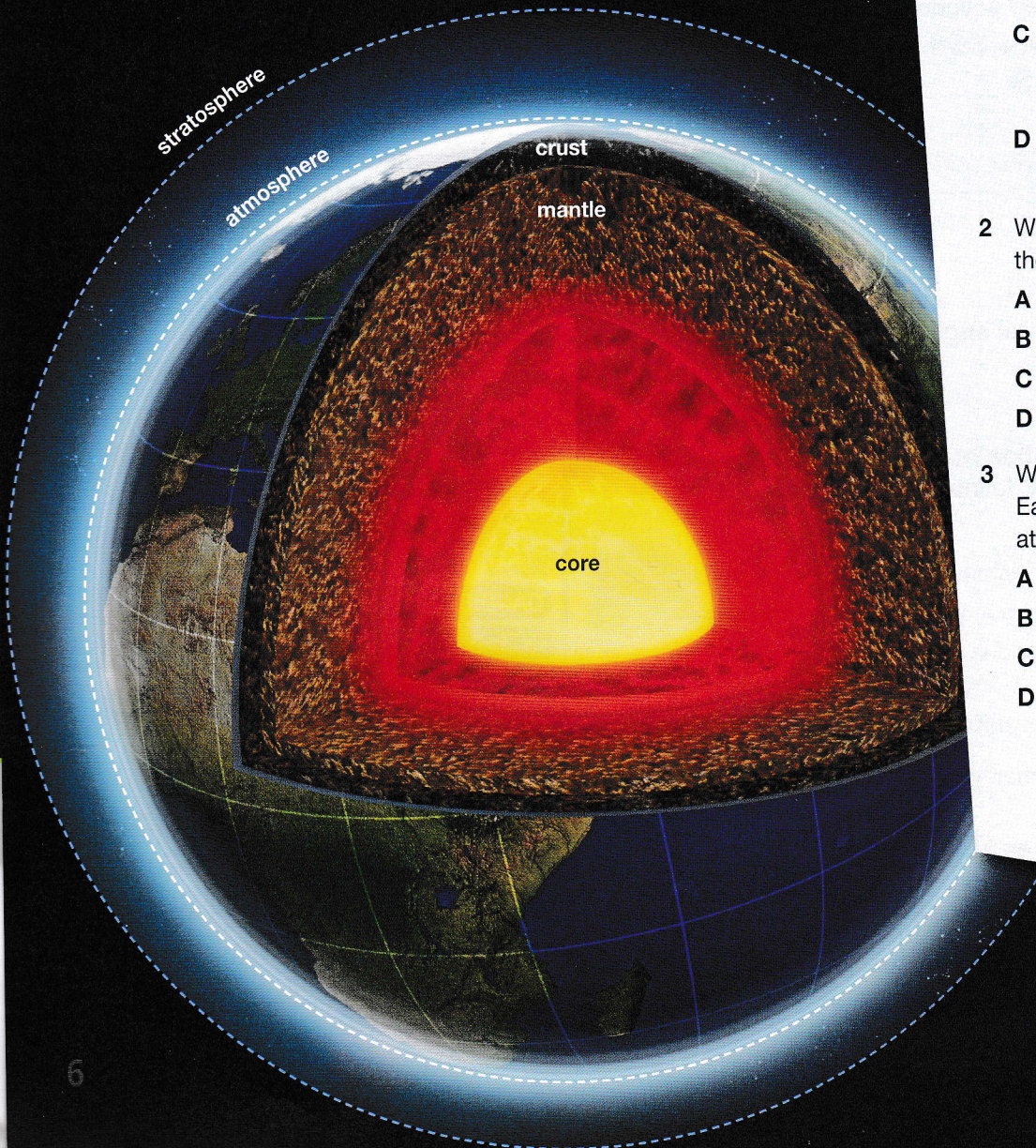
## EPS 101

## INTRO TO EARTH SCIENCES

This course introduces students to the different Earth layers. We begin with the **geosphere**. Students identify the **mantle** and **crust**. These make up the **lithosphere**. We also discuss the Earth's **core**.

Next, we move above the Earth's surface. We'll talk about the layers of the **atmosphere**. These are the **troposphere** and the **stratosphere**. The last topic we cover is the **hydrosphere**. The hydrosphere includes all water on Earth. It also includes water vapor in the atmosphere.

The **biosphere** is of interest throughout the course. We'll learn how each sphere contributes to life. This is the overarching theme of the course.



## Get ready!

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

- 1 What are the layers of the Earth's surface?
- 2 In which layer of the Earth is life found?

## Reading

2 Read the course description. Then, choose the correct answers.

- 1 What is the purpose of the class?
  - A to compare how pollution impacts different layers of the Earth
  - B to examine life and the layers of the Earth
  - C to introduce students to the field of environmental engineering
  - D to show the impact of one layer of the Earth on the others
- 2 Which of the following make up the lithosphere?
  - A the geosphere and the crust
  - B the core and the mantle
  - C the crust and the core
  - D the mantle and the crust
- 3 Which of the following is part of Earth's surface and the atmosphere?
  - A the stratosphere
  - B the hydrosphere
  - C the lithosphere
  - D the troposphere

## Vocabulary

3 Place the words from the word bank under the correct headings.

### Word BANK

lithosphere    hydrosphere    mantle    troposphere  
 atmosphere    geosphere    biosphere    stratosphere

At or below Earth's surface	Above Earth's surface	Can be above Earth's surface

4 Read the sentences and choose the correct words.

- The **biosphere/core** is at the center of the Earth.
- The surface of the Earth, made of rock and soil, is called its **crust/hydrosphere**.
- The **atmosphere/mantle** is a layer below Earth's crust.

5 Listen and read the course description again. What is the unifying theme of the course?

## Listening

6 Listen to a conversation between a student and a professor. Mark the following statements as true (T) or false (F).

- The woman is confused about the order of the spheres.
- The man recommends starting at the top of the atmosphere.
- The woman states the order of the spheres incorrectly.

7 Listen again and complete the conversation.

Student: I'm confused about the **1** \_\_\_\_\_ of the spheres.  
 Professor: Okay, let's start with the geosphere. Starting at the surface, which layer **2** \_\_\_\_\_?  
 Student: First is the **3** \_\_\_\_\_, right? And then comes the **4** \_\_\_\_\_?  
 Professor: Not quite. Those two make up the **5** \_\_\_\_\_. But the crust comes first.  
 Student: Oh, I see. And then the core is next.  
 Professor: Exactly. That's the geosphere. But the **6** \_\_\_\_\_ has more layers.

## Speaking

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

### USE LANGUAGE SUCH AS:

*The ... comes first, right?*  
*Then the ...*  
*What's next?*

**Student A:** You are a student. Talk to Student B about:

- a problem you're having with the Earth's atmosphere
- which sphere comes first
- which sphere comes after

**Student B:** You are a professor. Talk to Student A about the Earth's spheres.

## Writing

9 Use the course description and the conversation from Task 8 to complete the worksheet.

EPS 101

## Earth's Spheres Worksheet

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Name 3 layers in the geosphere:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name 2 spheres that can be found in the Earth's atmosphere:

\_\_\_\_\_

\_\_\_\_\_

## Get ready!

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

- 1 How are the species in an ecosystem connected?
- 2 Why is genetic diversity important?

## Reading

2 Read the letter to the editor. Then, choose the correct answers.

- 1 What is the main purpose of the letter?
  - A to describe genetic diversity at the Darby River
  - B to classify the Darby River ecosystem
  - C to give information about the southern pygmy perch
  - D to explain a threat to the Darby River ecosystem
- 2 Which is NOT a part of the Darby River ecosystem?
  - A fish
  - B birds
  - C plants
  - D humans
- 3 How is the toxic waste affecting the fish?
  - A It kills a plant they rely on for food.
  - B It reduces the oxygen levels in the water.
  - C It damages the fish's eggs.
  - D It kills the fish directly.

Sunday Edition

# JACKSON TIMES

## Letter to the Editor

I am concerned about the Darby River. The river is home to a rare **species** of fish. They are called southern pygmy perch. This particular **population** is shrinking quickly.

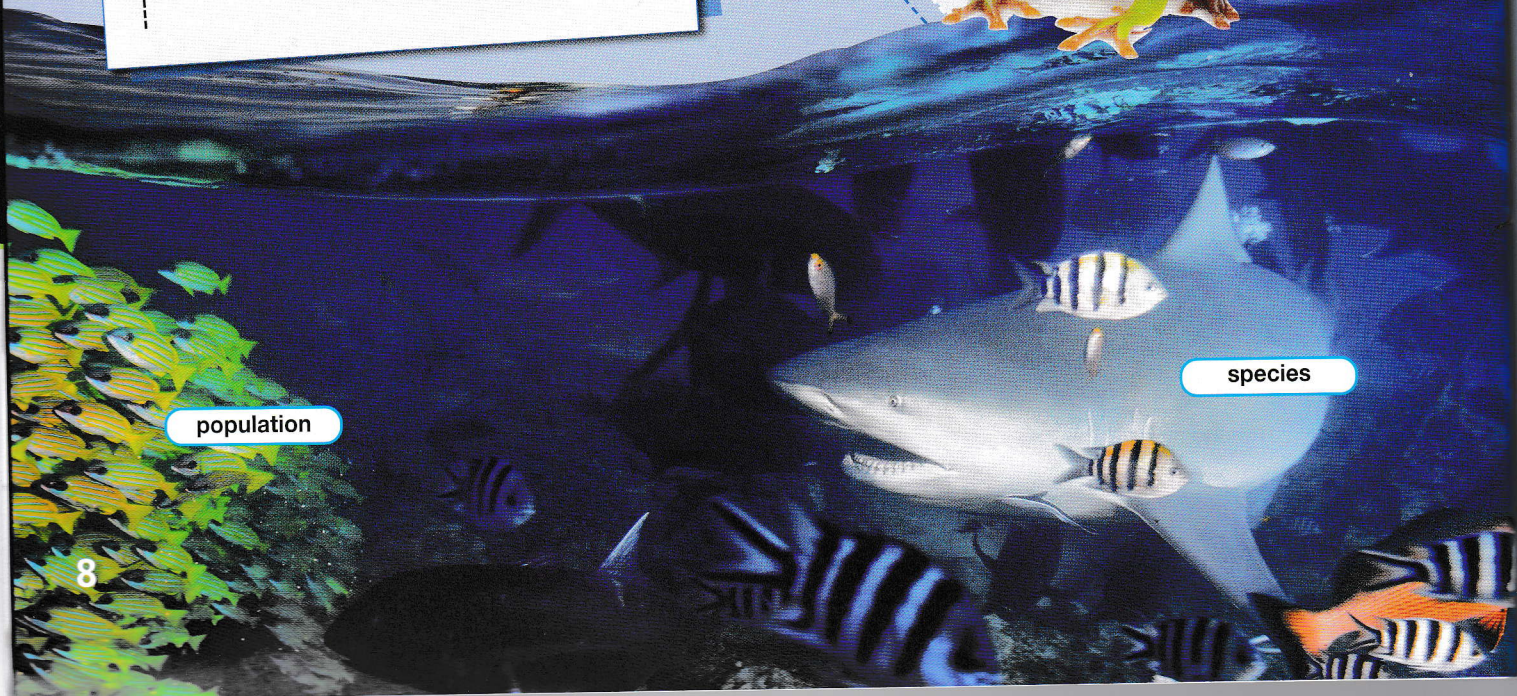
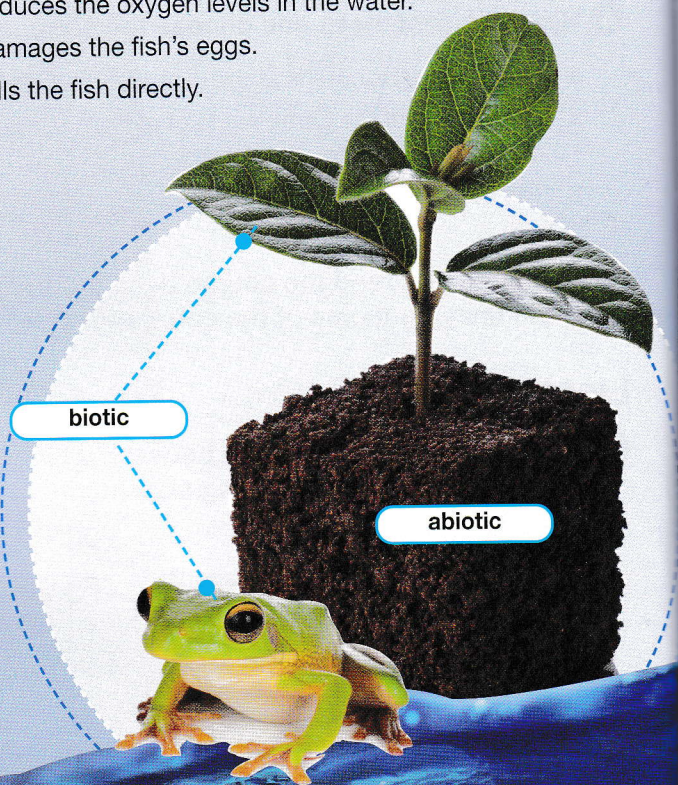
Their **habitat** is in danger. Industrial waste negatively impacts the **ecosystem**. The fish are running out of food. Waste in the water kills plant life. Without those plants, these **organisms** have fewer food options.

As fish numbers dwindle, other **biotic** creatures suffer. Birds that eat the perch will starve and die.

The whole **community** is connected. Even if an **abiotic component** is compromised, it will affect everyone.

We must put a stop to this. We must preserve the **genetic diversity** of the Darby River!

Respectfully,  
Edwin Jace  
Environmental Engineer





## Vocabulary

3 Match the words or phrases (1-8) with the definitions (A-H).

- |              |                        |
|--------------|------------------------|
| 1 __ biotic  | 5 __ community         |
| 2 __ abiotic | 6 __ organism          |
| 3 __ species | 7 __ ecosystem         |
| 4 __ habitat | 8 __ genetic diversity |

- A the area where a population lives  
 B a group of all living things in an area  
 C a group of organisms that are biologically similar  
 D an individual living thing  
 E living  
 F not living  
 G the degree of biological variation among individuals of a species  
 H the living and nonliving things in a particular environment

4 Write a word that is similar in meaning to the underlined part.

- 1 Water is an important part of any ecosystem.  
 \_ \_ m \_ \_ n \_ \_ t
- 2 This group of the same species is very healthy.  
 p \_ \_ u \_ \_ t \_ \_ \_
- 3 Soil and rocks are not living things of an ecosystem. a \_ \_ o \_ \_ c

5 Listen and read the letter again. What is the impact of the toxic waste on bird populations?

## Listening

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

- 1 \_\_ The chemical plant stopped dumping in the river.  
 2 \_\_ The Cadell fish population is back to normal levels.  
 3 \_\_ The birds have not returned to Darby River.

# Darby River

7 Listen again and complete the conversation.

**Engineer 1:** Hey, did you look at **1** \_\_\_\_\_ from the Darby River?

**Engineer 2:** I did! Things are looking a **2** \_\_\_\_\_, aren't they?

**Engineer 1:** Definitely! I'm glad the **3** \_\_\_\_\_ stopped dumping.

**Engineer 2:** Me too. The perch population is already up by twenty five percent. They'll be **4** \_\_\_\_\_ in no time.

**Engineer 1:** Yeah, and **5** \_\_\_\_\_ are coming back, too.

**Engineer 2:** And all because of one **6** \_\_\_\_\_ the fish need for survival.

## Speaking

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

### USE LANGUAGE SUCH AS:

- Things are looking a lot better.*  
*The ... population has risen by ...*  
*The ... are coming back.*

**Student A:** You are an environmental engineer. Talk to Student B about:

- a positive change in a local ecosystem
- what caused the change
- a population increase in one species

**Student B:** You are an environmental engineer. Talk to Student A about a change in a local ecosystem.

## Writing

9 Use the letter to the editor and the conversation from Task 8 to complete the report.

### Darby River: Status report

Perch: The population has \_\_\_\_\_.  
 This is likely due to the \_\_\_\_\_.  
 Herons: We have seen \_\_\_\_\_.  
 This is related to \_\_\_\_\_.

## Get ready!

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

- 1 What kind of biome do you live in?
- 2 Why do different living things live in different biomes?

**EcoFriends Environmental Engineering Firm: Who We Are**

Meet our experienced team! Our engineers have experience in almost every **biome**.

Lydon Fraser works in **aquatic life zones**. He's primarily concerned with **saltwater** habitats. He has experience with all parts of the **ocean**. Recently he compared pollution levels of **coastal zones** to the **open sea**. He's also studied **coral reefs** and **inter-tidal zones**.

Ron Warren is a **grassland** expert. His latest work compared soil erosion in **savannas** and **tundras**. He also works on water conservation in **deserts**.

Brenda Leigh is our newest team member. She works in **rainforests**, both tropical and temperate. Her work so far concentrates on deforestation.

desert

tundra

coastal zone

rainforest

coral reef

ocean

## Reading

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

- 1 What is the main purpose of the webpage?
  - A to provide information about the firm's different locations
  - B to recruit new customers for an engineering firm
  - C to introduce members of an engineering firm
  - D to describe threats to various biomes and aquatic areas
- 2 Which of the following has Ron Warren NOT worked in?
 

A a desert	C a tundra
B a rainforest	D a savanna
- 3 What does the most recently hired employee work on?
 

A deforestation	C water conservation
B soil erosion	D pollution levels

## Vocabulary

3 Match the words or phrases (1-8) with the definitions (A-H).

- |             |                        |
|-------------|------------------------|
| 1 __ tundra | 5 __ savanna           |
| 2 __ ocean  | 6 __ grassland         |
| 3 __ biome  | 7 __ aquatic life zone |
| 4 __ desert | 8 __ saltwater         |

- A a warm grassland with distinct wet and dry seasons
- B a liquid with high concentrations of salt
- C a hot, dry region with little plant life
- D a cold grassland, usually covered in snow
- E an area in a body of water with a particular set of characteristics
- F a large body of water
- G a region with abundant grass, but not much other vegetation
- H an area of the planet with a specific set of characteristics

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

1 rainforest / open sea

- A Many primates live in the \_\_\_\_\_.
- B Large mammals, like whales, can live in the \_\_\_\_\_.

2 inter-tidal zone / coral reef

- A A(n) \_\_\_\_\_ is made up of mineral structures and is host to many different species of marine life.
- B When the tide is low, many people like to visit the \_\_\_\_\_ to see the tide pools.

3 coastal zone / desert

- A In the \_\_\_\_\_ it is hot and dry.
- B Sometimes, dolphins visit the \_\_\_\_\_ often to the delight of tourists.

5 Listen and read the webpage again. What was the latest work done in aquatic life zones?

### Listening

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

- 1 \_\_\_ The woman is going to a savanna.
- 2 \_\_\_ The woman has been to the area before.
- 3 \_\_\_ The woman will work on logging programs.

7 Listen again and complete the conversation.

Engineer 1: Hi Brenda. I heard you got a new  
1 \_\_\_\_\_. Where are you headed?

Engineer 2: Oh yeah, they're sending me to the Fiera 2 \_\_\_\_\_.

Engineer 1: Really? Wow, that 3 \_\_\_\_\_.

Engineer 2: I know, 4 \_\_\_\_\_.  
I've always wanted to go there.

Engineer 1: What are you going to 5 \_\_\_\_\_  
\_\_\_\_\_?

Engineer 2: We'll implement more 6 \_\_\_\_\_  
\_\_\_\_\_ practices.

### Speaking

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

#### USE LANGUAGE SUCH AS:

*Where are you headed?*

*I can't wait.*

*I'm going to be ...*

**Student A:** You are an environmental engineer. Talk to Student B about:

- where his or her next assignment is
- how excited he or she is to go there
- what he or she is going to do there

**Student B:** You are an environmental engineer. Talk to Student A about your new field assignment.

### Writing

9 Use the webpage and the conversation from Task 8 to complete the status reports.

## Project Status Reports

Project 1: \_\_\_\_\_

Engineer: \_\_\_\_\_

Region/Biome: \_\_\_\_\_

Focus of Project: \_\_\_\_\_

Project 2: \_\_\_\_\_

Engineer: \_\_\_\_\_

Region/Biome: \_\_\_\_\_

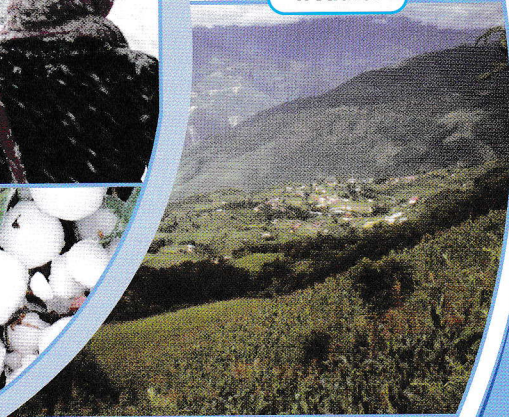
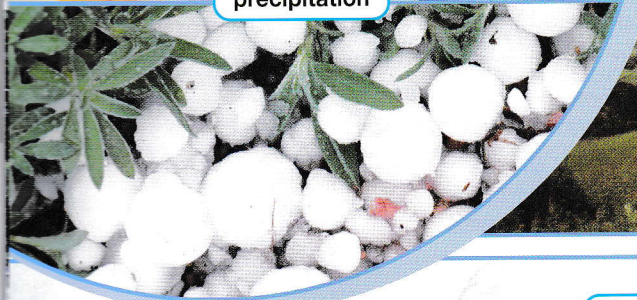
Focus of Project: \_\_\_\_\_



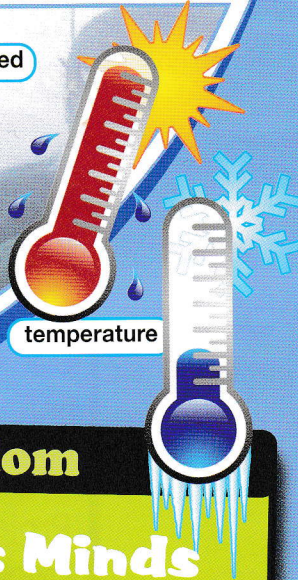
precipitation



weather



wind speed



temperature

### William's Wisdom

#### A Blog for Curious Minds

Readers, I have a question. What is the difference between **weather** and climate? Don't know? I didn't think so. A lot of people confuse them.

Climate refers to long-term weather patterns. Weather refers to **short-term** atmospheric conditions. Both include information about **temperatures** and **moisture** levels. The difference is the time frame.

Still not clear? Think about watching **meteorology** reports on TV. What kind of information do you get? Things like **precipitation**, **cloud cover**, and **wind speed** for the day. You hear about **pressure** and **humidity**. What about when you read about an area's climate? You learn about the average weather conditions of that specific area over many years.

### Get ready!

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

- 1 What are some factors that affect the weather?
- 2 What are some different forms of precipitation?

### Reading

2 Read the blog entry. Then, choose the correct answers.

- 1 What is the main purpose of the blog entry?
  - A to describe the difference between climate and weather
  - B to explain how to understand a meteorology report
  - C to define changes in climate over time in an area
  - D to state which factors have the strongest impact on weather
- 2 How is climate different to weather?
  - A Climate does not take temperature into account.
  - B Weather is only concerned with changes in precipitation.
  - C Climate is long-term and weather is short term.
  - D Weather does not deal with pressure changes.
- 3 Which of the following would most likely NOT appear on a weather report?
  - A current wind speeds
  - B the expected high temperature
  - C the amount of precipitation received that day
  - D the average temperature for the year

## Vocabulary

6 Watch the words or phrases (1-8) with the definitions (A-H).

- |               |                    |
|---------------|--------------------|
| 1 __ weather  | 5 __ temperature   |
| 2 __ pressure | 6 __ precipitation |
| 3 __ moisture | 7 __ wind speed    |
| 4 __ humidity | 8 __ short-term    |
- A a measure of how hot or cold something is  
 B a slight amount of liquid that makes something a little damp  
 C a measure of how quickly air is moving  
 D water that falls from clouds to the Earth  
 E condition of the atmosphere during a given point in time  
 F a measure of the amount of moisture in the air  
 G the force or weight of air in the atmosphere  
 H happening for a small period of time

7 Read the sentence pairs. Choose the sentence that uses the underlined part correctly.

- 1 A The weatherman on channel 5 studied meteorology at college.  
 B A thermometer measures pressure.
- 2 A It was so damp today because the wind speed was so high.  
 B The cloud cover was thick enough to keep it from getting too hot.
- 3 A The heat wave was only a short-term inconvenience.  
 B Pressure measures the wind's speed.

8 Listen and read the blog again. What is the main difference between weather and climate?

## Listening

9 Listen to a conversation between two environmental engineers. Mark the following statements as true (T) or false (F).

- 1 \_\_ The temperature at the site seems high.  
 2 \_\_ The man is asked to repeat the humidity level.  
 3 \_\_ The site hasn't had any precipitation for days.

7 Listen again and complete the conversation.

Engineer 1: Hi, Darryl. Could I get the 1 \_\_\_\_\_ for site 13 from you?

Engineer 2: 2 \_\_\_\_\_, Holly. Let's see, it's 32 degrees.

Engineer 1: Wait, could 3 \_\_\_\_\_ please?

Engineer 2: Of course. The 4 \_\_\_\_\_ here is 32 degrees.

Engineer 1: Wow, 5 \_\_\_\_\_ for this time of year. Okay, go ahead.

Engineer 2: All right. 6 \_\_\_\_\_ is sixty five percent. Winds are from the southeast at twenty miles per hour.

## Speaking

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

### USE LANGUAGE SUCH AS:

- Can I get the weather report for ...?  
 Wait, can you repeat that?  
 That's ... for this time of year.

**Student A:** You are an environmental engineer. Talk to Student B about:

- the weather conditions at a site
- a figure you didn't hear
- your reaction to conditions

**Student B:** You are an environmental engineer. Talk to Student A about a weather report.

## Writing

9 Use the conversation from Task 8 to complete the report.

### EnviroCorp Weather Report

Site #: \_\_\_\_\_

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Weather conditions: \_\_\_\_\_

## Get ready!

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

- 1 What is the climate like where you live?
- 2 Why should we be concerned about changes in climate?



Equator

latitude

## CHAPTER 10

## INTRODUCTION TO CLIMATE

Climate refers to long-term **patterns** in weather. Every region experiences a **range** of weather conditions. Climate tells us what the **average** weather conditions are.

Different regions have different climate. There are several reasons for this. One is **elevation**. Higher areas tend to be cooler and dryer. Another is surrounding **terrain**. Mountain ranges can block air. This impacts the climate on both sides of the mountain. A final factor is **latitude**. Regions nearer the **Equator** are generally warmer. Regions closer to the **poles** are generally colder.

Furthermore, climates change seasonally. This is due to the Earth's **rotation**, primarily. Seasonal changes in ocean **currents** and **prevailing winds** also play a role.

## Reading

2 Read the textbook chapter. Then, choose the correct answers.

- 1 What is the main purpose of the passage?
  - A to explain how the Earth's rotation influences climate
  - B to describe the climate of a particular region
  - C to define what climate is and what affects it
  - D to give examples of types of climates
- 2 Which of the following does NOT influence climate?
  - A a region's distance from the Equator
  - B the elevation and terrain of an area
  - C the weather conditions at a given moment
  - D the changes in ocean currents
- 3 Which is a way that terrain can influence climate?
  - A Mountain ranges can block air flow to and from an area.
  - B Prevailing winds can bring warm air to an area.
  - C Being closer to the Equator makes regions warmer.
  - D Ocean currents can bring cold water to an area.

## Vocabulary

3 Match the words (1-8) with the definitions (A-H).

- |              |               |
|--------------|---------------|
| 1 __ pole    | 5 __ climate  |
| 2 __ range   | 6 __ terrain  |
| 3 __ Equator | 7 __ rotation |
| 4 __ current | 8 __ average  |

- A an imaginary line that circles the globe and is equidistant from both poles
- B the act of spinning around an axis
- C the pattern of weather conditions in an area
- D the movement of water in a particular direction
- E land with particular characteristics
- F having qualities that are typical or most common in a category
- G one of two points furthest from the Equator on the globe
- H a set of values in a category

8 Fill in the blanks with the correct words or phrases from the word bank.

**Word BANK**

latitude pattern elevation  
prevailing wind climate

- When things happen the same way over and over again, we can often see a(n) \_\_\_\_\_.
- An \_\_\_\_\_ is the way the wind usually blows in a particular time and place.
- Somewhere that is close to sea level has a low \_\_\_\_\_.
- Many people would like to live in a temperate \_\_\_\_\_.
- \_\_\_\_\_ measures how far places are from the Equator.

9 Listen and read the textbook chapter again. What are some seasonal factors that can affect climate?

**Listening**

10 Listen to a conversation between two environmental engineers. Mark the following statements as true (T) or false (F).

- \_\_\_ The woman wrote a report on the climate of Gilbert Valley.
- \_\_\_ Precipitation levels in Gilbert Valley have gone down.
- \_\_\_ Average temperatures in Gilbert Valley increased.

11 Listen again and complete the conversation.

Engineer 1: I can't believe 1 \_\_\_\_\_ changed that much in just 50 years!

Engineer 2: I know. It's really amazing, 2 \_\_\_\_\_?

Engineer 1: I'll say! What were 3 \_\_\_\_\_ differences, again?

Engineer 2: Well, the last five years 4 \_\_\_\_\_ about 16 inches of precipitation annually. But in the past it was around 30 inches.

Engineer 1: That's a 5 \_\_\_\_\_.

Engineer 2: I know. And the 6 \_\_\_\_\_ dropped by five degrees.

**Speaking**

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

**USE LANGUAGE SUCH AS:**

*I can't believe ...*  
*They averaged ...*  
*That's a significant ...*

**Student A:** You are an environmental engineer. Talk to Student B about:

- changes in a climate
- the average weather in the past
- the average conditions now

**Student B:** You are an environmental engineer. Talk to Student A about a change in a climate.

**Writing**

9 Use the conversation from Task 8 to complete the memo.

**ATTN: SIGNIFICANT CLIMATE CHANGE IN GILBERT VALLEY**

While monitoring Gilbert Valley I noticed these trends:

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This is significant and we need to research these changes further.

# The Cell

## CHAPTER 7

Cells are the building blocks of life. They hold all of an organism's **genetic information**. This material, called **DNA**, makes us what we are. For example, **genes** are DNA sequences. These genes code for things such as height and hair color. In **multicellular** organisms, the DNA is coiled into **chromosomes**. These reside in the cell's **nucleus**. Cells with a nucleus are called **eukaryotic** cells. Eukaryotic cells also include other membrane bound organelles. These perform various functions. Mitochondria, for example, create energy for the cell. Human cells are eukaryotes. Simpler **unicellular** organisms are **prokaryotic** cells. These cells do not have nuclei. They do, however, still have DNA. Many bacteria are prokaryotes.



## Get ready!

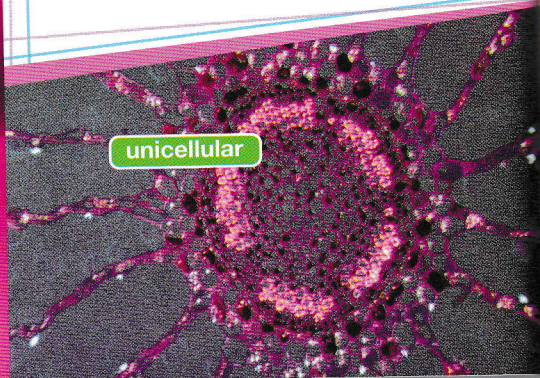
1 Before you read the passage, talk about these questions.

- 1 What are some examples of unicellular and multicellular organisms?
- 2 Where is genetic information found?

## Reading

2 Read the textbook chapter. Then, choose the correct answers.

- 1 What is the main purpose of the passage?
  - A to explain the difference between prokaryotic and eukaryotic cells
  - B to compare human cells to bacteria cells
  - C to explain what cells are and what's inside of them
  - D to describe how genes are expressed
- 2 Which of the following do NOT contain genetic information?
  - A mitochondria
  - B DNA molecules
  - C chromosomes
  - D nuclei
- 3 What can you infer about prokaryotic cells?
  - A They have longer chromosomes.
  - B They do not contain any genes.
  - C They are unable to produce energy by themselves.
  - D They store their DNA somewhere other than a nucleus.





## Vocabulary

3 Match the words (1-8) with the definitions (A-H).

- |           |                    |                  |
|-----------|--------------------|------------------|
| 1 __ cell | 4 __ nucleus       | 7 __ chromosome  |
| 2 __ gene | 5 __ multicellular | 8 __ prokaryotic |
| 3 __ DNA  | 6 __ unicellular   |                  |

- A having no nucleus or other membrane bound organelles  
 B made up of multiple cells  
 C the smallest unit of life  
 D the central part of a cell containing its DNA  
 E made up of one cell  
 F a piece of coiled DNA  
 G a sequence of DNA that codes for a particular trait  
 H the substance that carries genetic information

4 Read the sentences and choose the correct words or phrases.

- Mammals have **prokaryotic/ eukaryotic** cells.
- DNA contains **genetic information/nuclei**.
- People have a specific **gene/cell** for hair color.

5 Listen and read the chapter again. What is the main difference between prokaryotic and eukaryotic cells?

## Listening

6 Listen to a conversation between a student and a professor. Mark the following statements as true (T) or false (F).

- The man thinks bacteria are eukaryotic.
- The woman provides examples of unicellular organisms.
- The man cannot think of an example of a prokaryotic cell.

7 Listen again and complete the conversation.

**Student:** Well, I'm still kind of confused. I don't get the difference between prokaryotic and 1 \_\_\_\_\_.

**Professor:** That's 2 \_\_\_\_\_. Do you remember what kinds of organisms usually have prokaryotic cells?

**Student:** 3 \_\_\_\_\_ organisms, like bacteria, right?

**Professor:** Right. 4 \_\_\_\_\_, what has eukaryotic cells?

**Student:** 5 \_\_\_\_\_ and animals?

**Professor:** Exactly. So, what does 6 \_\_\_\_\_?

**Student:** That prokaryotic cells are less complex than eukaryotic cells.

## Speaking

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

USE LANGUAGE SUCH AS:

*I'm still confused about ...*  
*On the other hand ...*  
*Oh yeah, I remember.*

**Student A:** You are a professor. Talk to Student B about:

- prokaryotic cells
- eukaryotic cells
- how the two are different

**Student B:** You are a student. Talk to Student A about different kinds of cells.

## Writing

9 Use the textbook chapter and the conversation from Task 8 to complete the worksheet.

Bio 110

### CELLS WORKSHEET

Please compare and contrast prokaryotic cells and eukaryotic cells. Make sure to give an example of each.

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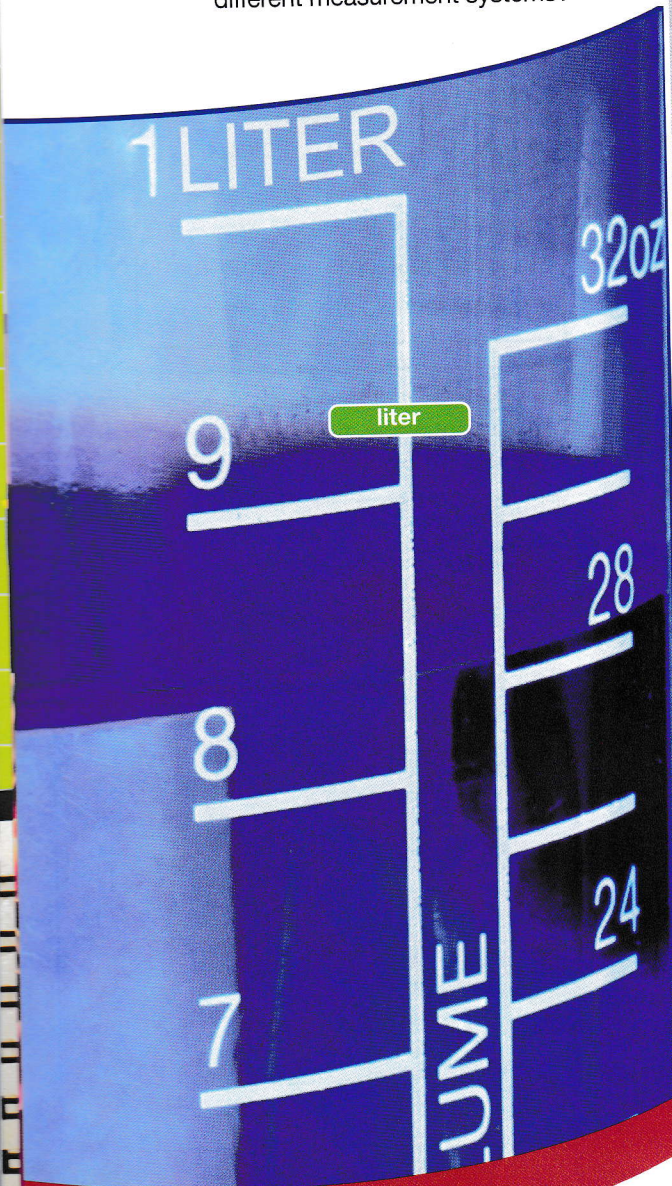
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cell

nucleus

## Get ready!

- 1 Before you read the passage, talk about these questions.
- 1 What are some different measurement systems?
  - 2 What are examples of units from different measurement systems?



## Essential Conversions

The following are conversions that everyone should know. It is often necessary to convert between metric and imperial measurements.

**DISTANCE** 1 kilometer = 0.62 miles

1 mile = 1.61 kilometers

1 meter = 1.09 yards

1 yard = 0.92 meters

**AREA** 1 hectare = 2.47 acres

1 acre = 0.4 hectares

**VOLUME** 1 liter = 0.26 gallons

1 gallon = 3.78 liters

**MASS** 1 kilogram = 2.2 pounds

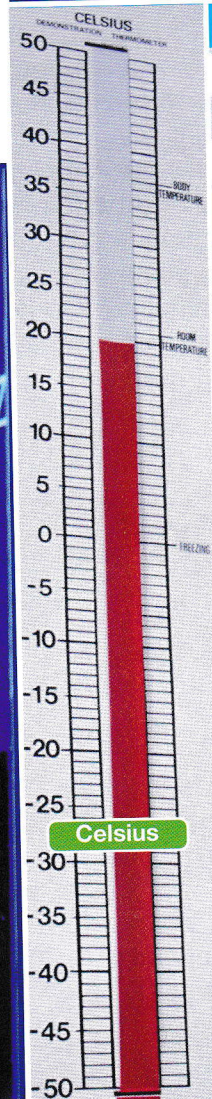
1 pound = 0.45 kilograms

**TEMPERATURE**

To convert from Celsius to Fahrenheit, follow this formula:  $^{\circ}\text{F} = (^{\circ}\text{C} \times 9/5) + 32$

To convert from Fahrenheit to Celsius, follow this formula:  $^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9$

Thus,  $0^{\circ}\text{C} = 32^{\circ}\text{F}$



## Vocabulary

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

1 \_\_\_ kilometer    3 \_\_\_ hectare    5 \_\_\_ gallon

2 \_\_\_ mile    4 \_\_\_ Celsius    6 \_\_\_ liter

- A a unit of volume used in the imperial system  
 B a metric measure of distance  
 C a unit of temperature  
 D a unit of volume used in the metric system  
 E a unit of area used in the metric system  
 F an imperial measure of distance

## Reading

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

- 1 \_\_\_ A meter and a mile both measure length.
- 2 \_\_\_ A liter is a larger amount than a gallon.
- 3 \_\_\_ One pound is the same as about half a kilometer.

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

- 1 kilograms / acres
  - A This field is 3.5 \_\_\_\_\_.
  - B The box weighs two \_\_\_\_\_.
- 2 meter / yard
  - A A \_\_\_\_\_ is an imperial measurement.
  - B A \_\_\_\_\_ is a metric measurement.
- 3 imperial / metric
  - A The system that uses the mile and gallon is the \_\_\_\_\_ system.
  - B The \_\_\_\_\_ system uses the kilometer and liter.
- 4 Fahrenheit / hectares
  - A To measure an area, you can use \_\_\_\_\_.
  - B To measure a temperature, you can use degrees \_\_\_\_\_.

7 Listen and read the chart again. How can you convert kilometers to miles?

### Listening

- 8 Listen to a conversation between two environmental engineers. Choose the correct answers.
- 1 What is the conversation mainly about?
    - A an error in a measurement conversion
    - B which measurement system to use
    - C the size of a contaminated site
    - D the best way to measure a site
  - 2 What will the man most likely do next?
    - A convert the measurement to metric units
    - B measure the volume of the contaminant
    - C correct the error in his conversion
    - D take a measurement of the area's temperature

7 Listen again and complete the conversation.

**Engineer 1:** Hi, Jim. We've finished 1 \_\_\_\_\_ the site.

**Engineer 2:** Oh great! What did you 2 \_\_\_\_\_ ?

**Engineer 1:** The contamination covers a 3 \_\_\_\_\_ . It's thirty-five miles by twelve miles.

**Engineer 2:** That's 4 \_\_\_\_\_ I thought. So what's the area, then?

**Engineer 1:** It's 268,800 5 \_\_\_\_\_ .

**Engineer 2:** Okay. Thanks for doing that. Could you get that in 6 \_\_\_\_\_ , too?

**Engineer 1:** Oh sure, of course. It's a simple conversion. I'll get right on it.

### Speaking

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

#### USE LANGUAGE SUCH AS:

*We finished measuring ...*  
*What is the area?*  
*Could you get that in ... too?*

**Student A:** You are an environmental engineer. Talk to Student B about:

- the measurements of a site
- which measurements to use
- how to convert the measurements

**Student B:** You are a student. Talk to Student A about the measurements of a site.

### Writing

9 Use the chart and conversation from Task 8 to complete the table.

#### Important conversions

Weight: 1 \_\_\_\_\_ = \_\_\_\_\_

Distance: 1 \_\_\_\_\_ = \_\_\_\_\_

Volume: 1 \_\_\_\_\_ = \_\_\_\_\_

## Get ready!

- Before you read the passage, talk about these questions.
  - What are some common mathematical operations?
  - What kinds of things would environmental engineers need to use math for?

## Reading

- Read the chart. Then, mark the following statements as true (T) or false (F).
  - \_\_\_ Ten minus four is fourteen.
  - \_\_\_ Fifteen divided by three equals five.
  - \_\_\_ Two times six comes to twelve.

## Vocabulary

- Place the words or phrases from the word bank under the correct headings.

### Word BANK

subtract   multiplied by   less  
times   add   minus   plus

+	x	-

## How do we say it?

Symbol	In words	Example
=	is, equals, comes to	$0.125 = 1/8$ Point one two five equals one eighth.
+	and, plus, add	$5 + 3 = 8$ Five plus three equals eight.
-	minus, less, subtract	$5 - 3 = 2$ Five minus three is two.
x, *	times, multiplied by	$5 \times 3 = 15$ Five times three comes to fifteen.
÷, /	over, divided by	$10 / 2 = 5$ Ten over two is five.
2500	two thousand five hundred or twenty-five hundred	The pond holds twenty five hundred liters of water.

4 Read the sentences and choose the correct words or phrases.

- 1 Twenty multiplied by/divided by four is five.
- 2 Nine minus five equals/subtract four.
- 3 Eleven plus/hundred is the same as one thousand one hundred.
- 4 Sixteen over/times four is four.
- 5 Seven plus three comes to/less ten.

5 Listen and read the chart again. What are the different ways to say to take one number away from another?

### Listening

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

- 1  The man and woman need to visit twenty sites this month.
- 2  The speakers missed visits to several sites last month.
- 3  The speakers should visit four sites a week.

7 Listen again and complete the conversation.

Engineer 1: Hey, Julie, 1 \_\_\_\_\_ sites do we have to visit this month?  
 Engineer 2: 2 \_\_\_\_\_ sixteen.  
 Engineer 1: Don't forget to add the ones we missed 3 \_\_\_\_\_.  
 Engineer 2: Oh, yeah. There were four we 4 \_\_\_\_\_. Sixteen plus four is twenty.  
 Engineer 1: Okay, there are 5 \_\_\_\_\_ in the month. So how many do we need to get to each week?  
 Engineer 2: Let's see. Twenty 6 \_\_\_\_\_ four equals five sites a week.

### Speaking

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

#### USE LANGUAGE SUCH AS:

*How many sites do we need to visit?  
 Don't forget to add ...  
 ... plus ... equals ...*

**Student A:** You are an environmental engineer. Talk to Student B about:

- how many sites you need to visit this month
- how many sites you missed last month
- adding the two together

**Student B:** You are an environmental engineer. Talk to Student A about the number of sites you need to visit.

### Writing

9 Use the conversation from Task 8 to complete the email.

To: Julie.K@WesleyEngineering.com  
 From: James.R@WesleyEngineering.com  
 Subject: Visits this month

Hi Julie,

Here's a recap of what we talked about today regarding the number of sites we need to visit this month: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Get ready!

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

- 1 What are base units of the SI system?
- 2 Why are there different ways to measure the same property or substance?

## Reading

2 Read the employee guide. Then, choose the correct answers.

- 1 What is the main purpose of the guide?
  - A to define base units and derived units
  - B to introduce different units and when to use them
  - C to explain how to measure concentrations
  - D to demonstrate the superiority of SI
- 2 Which of the following is NOT a base unit?
  - A a mole
  - B a meter
  - C Kelvin
  - D a concentration
- 3 Which is used to measure amount?
  - A square meters
  - B moles
  - C cubic meters
  - D  $\text{kg/m}^3$

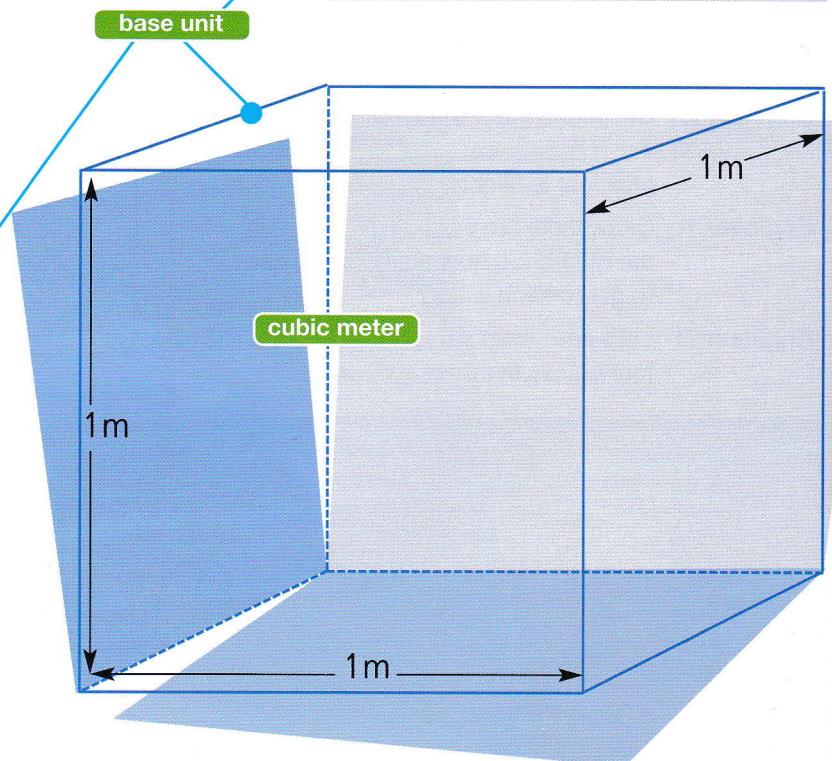
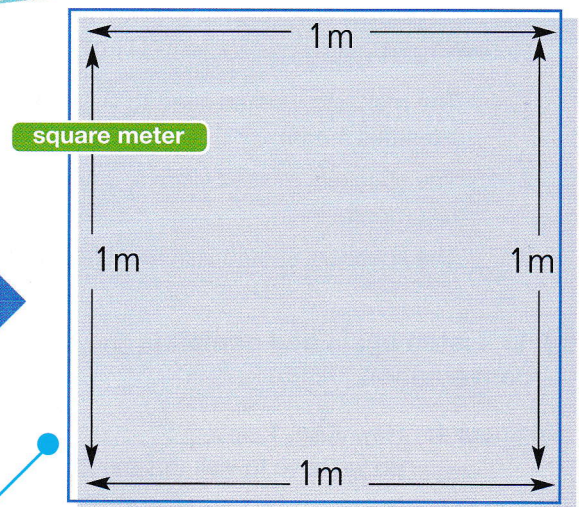
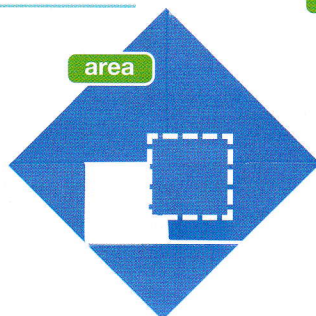
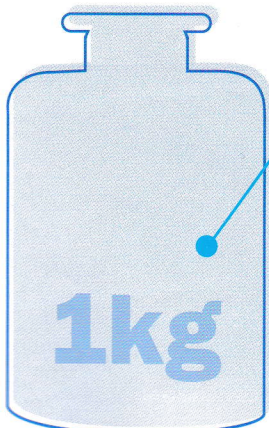
### EnviroLab Employee Guide:

# Measurements

Here at EnviroLab, we use **SI** for official purposes. SI is based on **base units**. From these, we get **derived units**. A meter is a base unit. When we measure **area**, we use **square meters**. When we measure **volume**, we use **cubic meters**. These are derived from the base unit of a meter.

Here are some more examples.

Degrees **Kelvin** is the base unit for **thermodynamic temperature**. A **mole** is the base unit for measuring **amount**. There are different units for **concentrations**. For example,  $\text{kg/m}^3$  is the SI unit of mass concentration.



## Vocabulary

③ Match the words or phrases (1-8) with the definitions (A-H).

- |             |                   |
|-------------|-------------------|
| 1 __ SI     | 5 __ base unit    |
| 2 __ volume | 6 __ derived unit |
| 3 __ mole   | 7 __ cubic meter  |
| 4 __ area   | 8 __ square meter |

- A a unit that describes the amount of space of an area one meter by one meter
- B a measure of how much three dimensional space something occupies
- C a unit that measures the amount of a substance expressed in grams
- D an abbreviation for the SI units
- E a unit from which other units are derived
- F a unit of volume that is equal to a cube with sides of one meter
- G a unit that is calculated from a base unit
- H a measure of how much two dimensional space something occupies

④ Read the sentences and choose the correct words or phrases.

- The base unit of temperature is **mole/Kelvin**.
- An absolute measure of how warm or cold something is, is called **thermodynamic temperature/volume**.
- A mole measures the **area/amount** of something.
- If you need to know how much of a substance is dissolved in a solution, you need to measure its **concentration/base unit**.

⑤ Listen and read the guide again. What are the derived units of a meter?

## Listening

⑥ Listen to a conversation between an environmental engineer and an assistant. Mark the following statements as true (T) or false (F).

- The man obtained the water sample from the surface of the pond.
- The man recorded the temperature in the wrong temperature scale.
- The woman asked for a new sample.

⑦ Listen again and complete the conversation.

**Engineer:** Did you get the 1 \_\_\_\_\_ I asked for?

**Assistant:** Yes. I obtained 0.5 2 \_\_\_\_\_ from Grenville Pond. I have all the data right here.

**Engineer:** Great, thanks. Was that straight from 3 \_\_\_\_\_ ?

**Assistant:** Yes, and the 4 \_\_\_\_\_ was 15.6 degrees.

**Engineer:** 15.6? Wait, is that in Celsius? I need it 5 \_\_\_\_\_ .

**Assistant:** Oh, I'm sorry. Let me see, how 6 \_\_\_\_\_ that again?

## Speaking

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

### USE LANGUAGE SUCH AS:

*Did you get the water sample?*

*Is that in ... ?*

*I need it in ...*

**Student A:** You are an environmental engineer. Talk to Student B about:

- data from a water sample
- what unit he or she used
- how to convert to the unit you need

**Student B:** You are an assistant. Talk to Student A about a water sample.

## Writing

⑨ Use the conversation from Task 8 to complete the report.

### Water sample report: Grenville Pond

I obtained \_\_\_\_\_ .

The temperature was \_\_\_\_\_ .

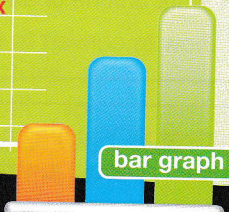
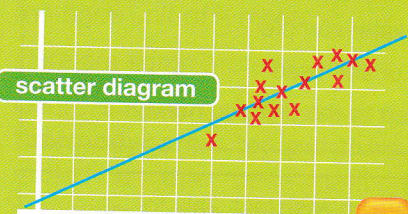
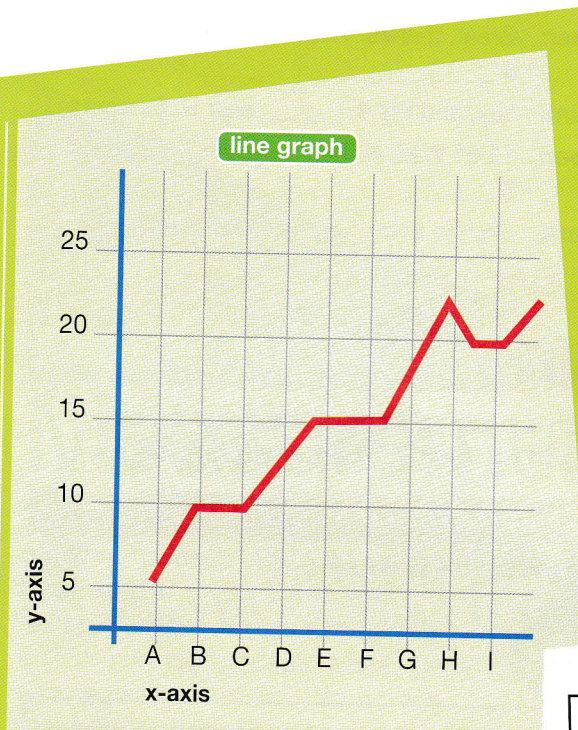
I converted to \_\_\_\_\_ by \_\_\_\_\_ .

This came out to \_\_\_\_\_ .

# 11 Tables and Graphs

## Get ready!

- Before you read the passage, talk about these questions.
  - What are some different kinds of tables and graphs?
  - Why are tables and graphs useful?



## Reading

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

- What is the main purpose of the email?
  - to explain what information to remove from graphs and charts
  - to provide data to be placed in graphs and charts
  - to ask for changes to several graphs and charts
  - to offer feedback on a presentation using charts and graphs
- Which of the following is NOT requested?
  - change the bar graph to a pie chart
  - add a row to the table
  - label the x axis of the line graph
  - add a legend to the scatter plot
- Why does the woman want a pie chart?
  - The bar graph is unclear.
  - More data will fit on the pie chart.
  - Pie charts are easier to create.
  - The bar graph doesn't have enough detail.

**columns**

POLLUTANT	DEFINITION	SOURCE
Aerosols		
Asbestos		
Carbon Monoxide (CO)		
Propelants		
Radon		

**rows**

**table**

TO: n\_hutter@globalsolutions.com  
 FROM: p\_erickson@globalsolutions.com  
 Subj: Changes needed for charts/graphs

**pie chart**

- Microorganisms
  - Carbon Monoxide
  - Nitrogen Dioxide
  - Chlorine
- legend**

Hi Nelson,

Thank you for making all those charts for me. The **scatter diagram** for the soil data looks great. Excellent job on that one! Some need a few changes, though. The water pollutant **table** is missing information. Please make a **row** for mercury. Also add a **column** for percentages. The soil composition **bar graph** looks nice, but it's a little unclear. Can you change it to a **pie chart**? I think that will make more sense. Also, the **line graph** about the bird population needs more detail. Please label the **x-axis** and the **y-axis**. Oh, and add a **legend** to the pie chart.

Thanks again for your help.  
 Phoebe Erickson



## Vocabulary

8 Match the words or phrases (1-8) with the definitions (A-H).

- |             |                      |                |
|-------------|----------------------|----------------|
| 1 __ table  | 4 __ legend          | 7 __ pie chart |
| 2 __ row    | 5 __ line graph      | 8 __ x-axis    |
| 3 __ column | 6 __ scatter diagram |                |

- A a chart that uses a circle to show proportions of a whole  
 B a visual representation of data with rows and columns  
 C a horizontal section of data in a table  
 D a part of a graph or chart that tells how to read it  
 E the horizontal axis  
 F a vertical section of data in a table  
 G a chart that connects data points with a straight line  
 H a chart that shows data points on a graph not connected

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

- The values along the vertical side of the graph represent the number of trees in the forest. \_ - \_ x \_ s
- The chart with all the bars gives information about a fish population over time. b \_ \_ \_ r \_ p \_
- If you can't understand the chart, look at the box in the corner that has instructions in it. \_ e \_ e \_ d

10 Listen and read the email again. Which chart doesn't need to be changed?

## Listening

11 Listen to a conversation between an engineer and an assistant. Mark the following statements as true (T) or false (F).

- \_\_ The man added rows and columns to a table.
- \_\_ The man incorrectly labeled the x and y-axes.
- \_\_ The woman wants more data in the pie chart.

12 Listen again and complete the conversation.

Assistant: I added the rows 1 \_\_\_\_\_ you needed to the table.

Engineer: Great, that 2 \_\_\_\_\_. What else?

Assistant: I did the pie chart and labeled the axes on the 3 \_\_\_\_\_.

Engineer: You did, but, look, you labeled them backwards. 4 \_\_\_\_\_ should be the dates.

Assistant: Oh, sorry, I totally 5 \_\_\_\_\_!

Engineer: That's all right. It's an 6 \_\_\_\_\_.

## Speaking

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

### USE LANGUAGE SUCH AS:

*I added the ...*

*Look, you ...*

*The ... should be ...*

**Student A:** You are an assistant.

Talk to Student B about:

- changes you made to a chart
- a mistake you made
- correcting the mistake

**Student B:** You are an environmental engineer. Talk to Student A about a chart.

## Writing

14 Use the email and the conversation from Task 8 to complete the email.

TO: d\_darr@globalsolutions.com  
 FROM: e\_brosam@globalsolutions.com  
 Subj: Changes needed for charts/graphs

Hi David,

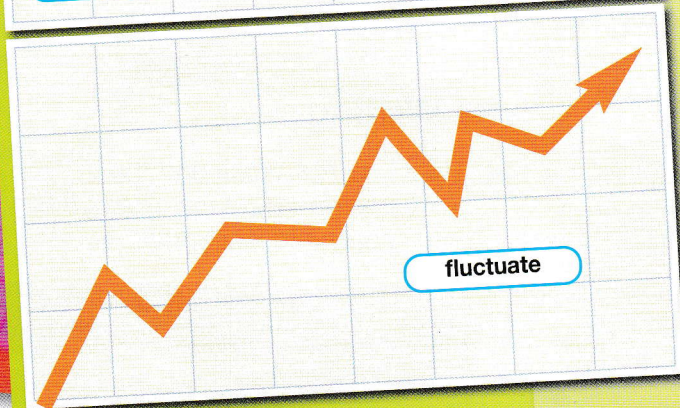
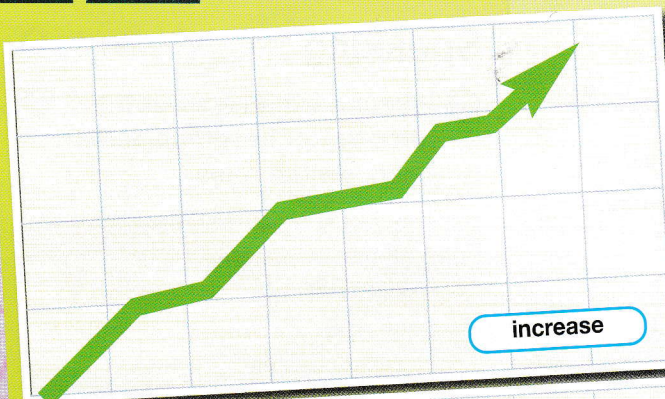
Please make the following changes to the charts you made: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Thanks again!

Eric

# 12 Describing Change



## CFCs!

### Then and Now

In the 1970s, scientists found a hole in the ozone layer. Researchers connected a **rise** in the use of CFCs (chlorofluorocarbons) to the ozone hole. Still, CFC use **skyrocketed** during the 1980s. The hole was **expanding**. Researchers' concern **increased**. In 1987, the Montreal Protocol passed. CFC production **plummeted** as a result. In turn, the hole **stabilized**. It eventually began to **shrink**.

This is good news, but the story isn't over yet. We have seen a **decline** in CFC use, however the size of the ozone hole still **fluctuates**. People still need to **decrease** their CFC use.

### Get ready!

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

- 1 What are some ways to talk about change?
- 2 Do you think the environment is changing positively or negatively? Why?

### Reading

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

- 1 \_\_\_ CFC use was higher in the 1980s than the 1970s.
- 2 \_\_\_ CFC use has gone down since the Montreal Protocol passed.
- 3 \_\_\_ The size of the ozone hole is shrinking steadily.

### Vocabulary

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

- |               |                 |
|---------------|-----------------|
| 1 ___ rise    | 4 ___ shrink    |
| 2 ___ decline | 5 ___ plummet   |
| 3 ___ expand  | 6 ___ skyrocket |

- A to go very high very rapidly
- B an upward trend
- C to get smaller in size
- D to grow larger in size
- E to go very low very quickly
- F a downward trend

6 Read the sentence pairs. Choose which word or phrase best fits each blank.

1 fluctuate / shrink

- A As development continues, the animals' habitat will \_\_\_\_\_.
- B During this time of change, I expect values will \_\_\_\_\_ until they reach a level of stability.

2 stabilize / increase

- A Pollution levels will continue to \_\_\_\_\_ until we put more restrictions in place.
- B The numbers of fish in the pond will \_\_\_\_\_ once they recover from this setback.

3 plummet / decrease

- A The fire caused deer population numbers to \_\_\_\_\_ last summer.
- B I hope that recycling will \_\_\_\_\_ the amount of trash we produce.

7 Listen and read the article again. Why is CFC use still a concern?

Listening

8 Listen to a conversation between a city official and an environmental engineer. Choose the correct answers.

- 1 What is the conversation mainly about?
  - A changes in recycling following a new program
  - B how to get people to recycle more often
  - C what kinds of waste are most problematic
  - D how to get a recycling program started
- 2 What does the woman say about paper waste?
  - A It is fluctuating.
  - B It increased slightly.
  - C It declined recently.
  - D It skyrocketed this year.

7 Listen again and complete the conversation.

**City Official:** Hi Jan, thanks 1 \_\_\_\_\_ with me.

**Engineer:** Of course Mr. Paulson. I'm excited about the 2 \_\_\_\_\_ progress.

**City Official:** That's great. What can you 3 \_\_\_\_\_ about it?

**Engineer:** Recycling increased 4 \_\_\_\_\_ since it started.

**City Official:** Wow, that's impressive! Are there any other 5 \_\_\_\_\_?

**Engineer:** Yes. There is a decline in 6 \_\_\_\_\_ at the landfills.

Speaking

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

USE LANGUAGE SUCH AS:

*Recycling increased ...*  
*Wow, that's great!*  
*Are there any other ...?*

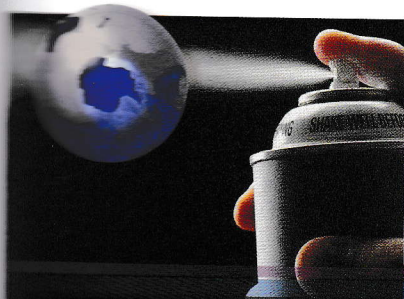
**Student A:** You are a city official. Talk to Student B about:

- a new recycling program
- increase in recycling
- other positive changes

**Student B:** You are an environmental engineer. Talk to Student A about a recycling program.

Writing

9 Use the conversation from Task 8 to complete the report.



Wilson County Recycling Program Update

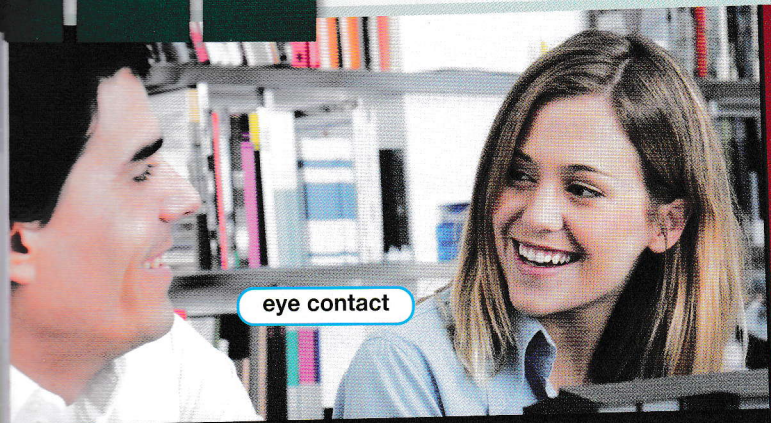
Since we implemented the program, we have seen the following changes:

\_\_\_\_\_

\_\_\_\_\_

Thanks to all for your cooperation.  
 Jan Richards

# 13 Presentations



eye contact

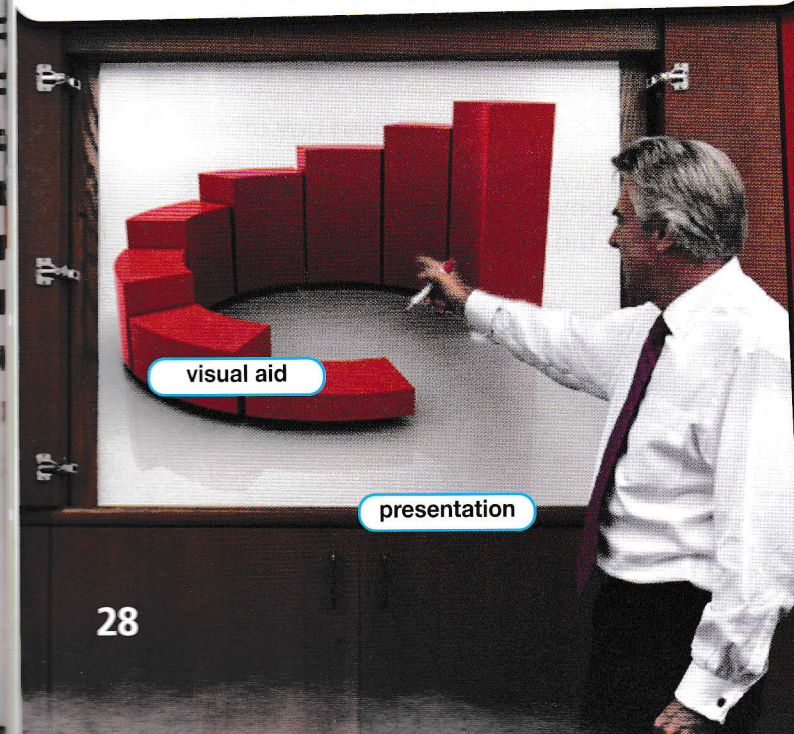
Carol,

You asked me to **review** your latest **presentation**. Here are my notes.

- Your **body language** was great. You maintained excellent **eye contact**. You looked confident throughout. Also, you **projected** your voice well.
- Your **handouts** were helpful. They made a nice addition to the presentation.
- The **visual aids** had some problems. For example, the chart on soil erosion was redundant. You gave that information in the handout.
- Sometimes it seemed that you lost your train of thought. Consider **signposting** so your audience knows exactly where you're going. **Cue cards** can also help if you find yourself lost.

To **summarize**, the presentation was fairly strong. Your visual aids and organization are your two weak points.

Best,  
Tim



visual aid

presentation

## Get ready!

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

- 1 What are some tips for giving a presentation?
- 2 When have you had to give presentations?

## Reading

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

- 1 What is the main purpose of the letter?  
A to provide feedback on a presentation  
B to explain company procedures for presentations  
C to suggest a topic for a presentation  
D to give an outline for an upcoming presentation
- 2 Which of the following is NOT a strength of the presenter?  
A her eye contact      C her visual aids  
B her handouts      D her voice
- 3 Why should the woman consider signposting?  
A It can help her maintain better eye contact.  
B It would replace the need for visual aids.  
C It can make her more confident.  
D It would help her be more organized.

## Vocabulary

③ Match the words or phrases (1-8) with the definitions (A-H).

- |                   |                  |
|-------------------|------------------|
| 1 __ review       | 5 __ signpost    |
| 2 __ project      | 6 __ handout     |
| 3 __ presentation | 7 __ visual aid  |
| 4 __ summarize    | 8 __ eye contact |

- A the act of looking someone in the eyes
- B to go over carefully and provide feedback
- C to briefly recap important points of something
- D to guide listeners through a speech
- E a tool distributed to an audience to support a presentation
- F to speak loudly and clearly
- G a speech given to an audience
- H a graphical element of a presentation to support the information

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

1 body language / visual aid

- A The poster was a great \_\_\_\_\_ for her presentation.
- B He needs to work on his \_\_\_\_\_. He kept fidgeting and playing with his notes.

2 project / summarize

- A This presentation will \_\_\_\_\_ all the data that I have collected over the past two years.
- B People would be able to hear you better if you would \_\_\_\_\_ your voice.

3 cue cards / handouts

- A Can you distribute these \_\_\_\_\_ for me, please?
- B Don't be afraid to use \_\_\_\_\_ to help you keep your pace.

5 Listen and read the letter again. What was wrong with the visual aids?

Listening

6 Listen to a conversation between an environmental engineer and a supervisor. Mark the following statements as true (T) or false (F).

- 1 \_\_\_ The woman needed to work on her body language.
- 2 \_\_\_ The man is most impressed with the woman's visual aids.
- 3 \_\_\_ The woman still needs to work on her organization skills.

7 Listen again and complete the conversation.

Engineer: Hi, Tim. How do you think I did on 1 \_\_\_\_\_ ?

Supervisor: You showed a lot 2 \_\_\_\_\_ .

Engineer: Thanks. I tried to work on my 3 \_\_\_\_\_ .

Supervisor: It shows. I'm impressed, especially with 4 \_\_\_\_\_ .

Engineer: Thank you. I know that was one of 5 \_\_\_\_\_ before.

Supervisor: Yes, and you overcame it beautifully in this presentation. 6 \_\_\_\_\_ . You see how it led the way?

Speaking

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

USE LANGUAGE SUCH AS:

*You showed a lot of improvement!*  
*I'm impressed with ...*  
*Great ...*

**Student A:** You are an environmental engineer. Talk to Student B about:

- your latest presentation
- how you improved
- specific things you worked on

**Student B:** You are a supervisor. Talk to Student A about his or her latest presentation.

Writing

9 Use the conversation from Task 8 to complete the report.

Notes from presentation:

Kate,  
 Here are my notes from this morning's presentation.

\_\_\_\_\_  
 \_\_\_\_\_

Overall, great job!  
 Tom

# 14 Properties of Matter

## Get ready!

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

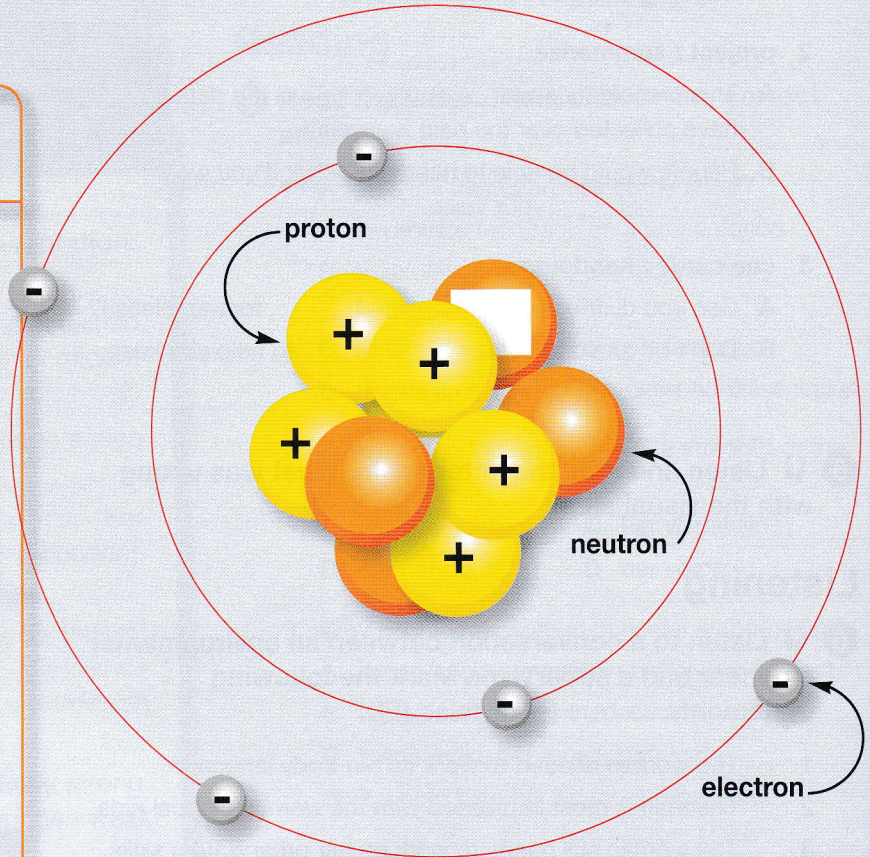
- 1 What are the basic components of matter?
- 2 What are some common compounds?

## THE WATER MOLECULE

All **matter** is made from the same basic materials. For example, water is one of the most important **compounds** on Earth. Water **molecules** are made up of two **elements**: hydrogen and oxygen. There are two hydrogen **atoms** and one oxygen atom in every water molecule.

The atomic number is the total number of protons of an atom. Hydrogen's **atomic number** is one. This means it has one **proton** and one **electron**. If an electron were absent, it would be an **ion**. The **mass number** includes the number of **neutrons** as well as protons. Oxygen atoms have eight protons and eight electrons, therefore its atomic number is eight.

# atom



## Vocabulary

3 Match the words (1-8) with the definitions (A-H).

- |              |                |                |
|--------------|----------------|----------------|
| 1 ___ matter | 4 ___ element  | 7 ___ neutron  |
| 2 ___ atom   | 5 ___ compound | 8 ___ electron |
| 3 ___ ion    | 6 ___ proton   |                |

- A a neutral particle in an atom
- B a positively or negatively charged atom
- C a combination of two or more elements
- D the smallest piece of matter that can exist by itself
- E anything that contains material and takes up space
- F a negatively charged particle in an atom
- G a basic substance made up of one type of atom
- H a positively charged particle in an atom

## Reading

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

- 1 \_\_\_ Hydrogen atoms have more electrons than oxygen atoms.
- 2 \_\_\_ The mass number of oxygen is eight.
- 3 \_\_\_ There are two oxygen atoms and one hydrogen atom in a water molecule.

- 6 Fill in the blanks with the correct words or phrases from the word bank.

### Word BANK

atomic number    molecule    ion  
mass number    element    matter

- The \_\_\_\_\_ measures how many protons and neutrons are in an element.
  - \_\_\_\_\_ is anything that occupies space and has mass.
  - If an atom has become electrically charged, we call it a(n) \_\_\_\_\_.
  - The \_\_\_\_\_ tells how many protons are in an atom.
  - If something is a(n) \_\_\_\_\_ it can be found on the periodic table.
  - A(n) \_\_\_\_\_ can have more than one type of atom in it.
- 7 Listen and read the chapter again. What is the difference between the atomic and mass number of an atom?

### Listening

- 8 Listen to a conversation between a student and a professor. Choose the correct answers.

- What is the conversation mainly about?
  - the difference between hydrogen and helium
  - what makes up a water molecule
  - how to understand scientific formulas
  - how to classify different elements
- What are the speakers going to do next?
  - discuss the structure of oxygen atoms
  - review the elements in table salt
  - learn about a new element
  - talk about other properties of water

- 7 Listen again and complete the conversation.

**Professor:** Let's go over it again. What are the 1 \_\_\_\_\_ in water?

**Student:** Oxygen and helium? No, wait, I mean oxygen 2 \_\_\_\_\_.

**Professor:** There you go! Now how many atoms of each element does a 3 \_\_\_\_\_ contain?

**Student:** Let's see. Two 4 \_\_\_\_\_ and one hydrogen atom?

**Professor:** Not quite. Remember the 5 \_\_\_\_\_  $H_2O$ ?

**Student:** Oh yeah, I forgot. So it's two 6 \_\_\_\_\_ and one oxygen atom.

### Speaking

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

#### USE LANGUAGE SUCH AS:

*No wait, I mean ...*

*How many atoms of each ...?*

*Do you remember the formula ...?*

**Student A:** You are a professor. Talk to Student B about:

- the structure of a water molecule
- a mistake he or she makes
- what to work on

**Student B:** You are a student. Talk to Student A about the structure of a water molecule.

### Writing

- 9 Use the conversation from Task 8 to complete the homework assignment.

## homework assignment

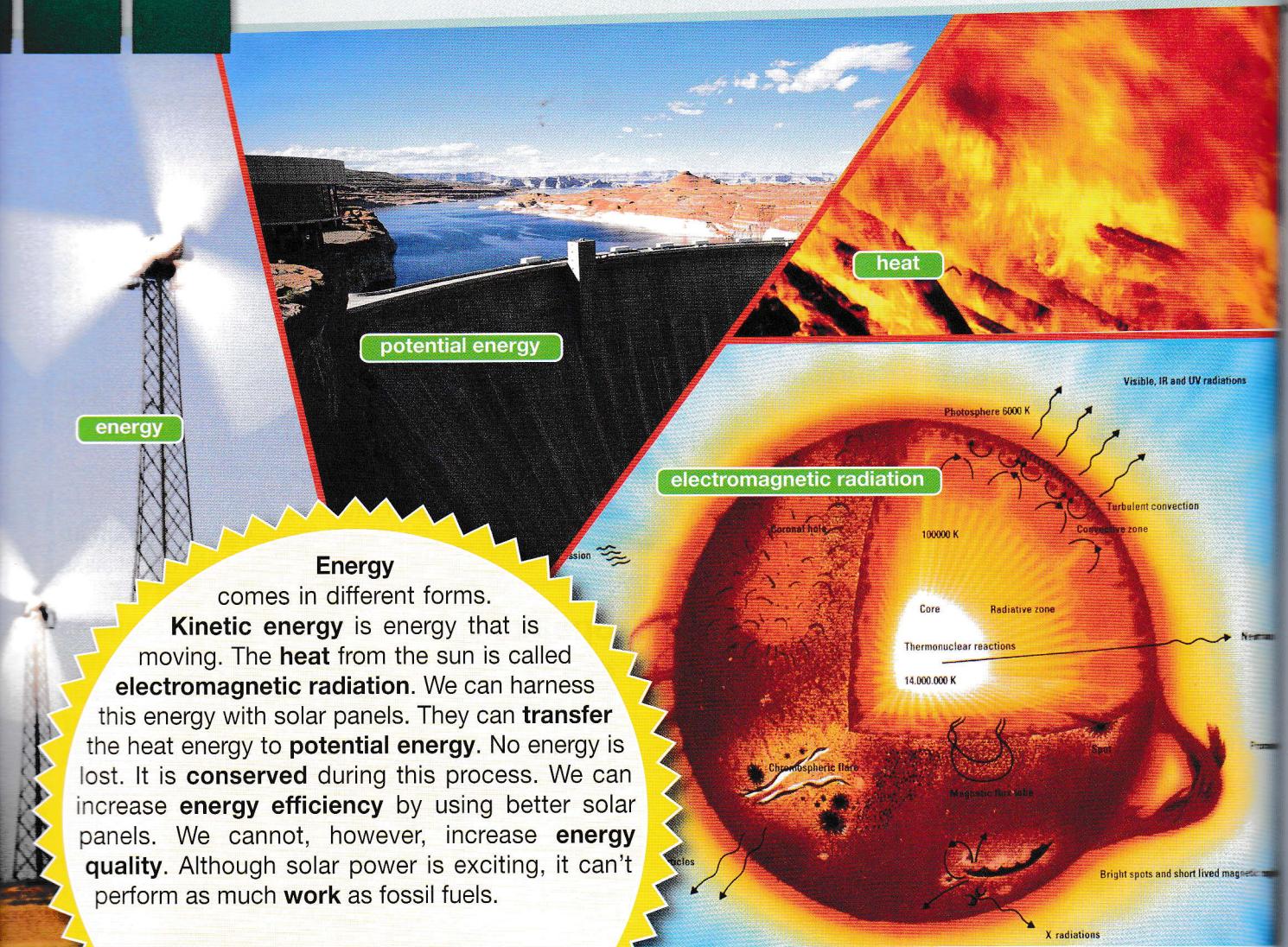
### Chem 101

Describe a water molecule: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## Energy

comes in different forms.

**Kinetic energy** is energy that is moving. The **heat** from the sun is called **electromagnetic radiation**. We can harness this energy with solar panels. They can **transfer** the heat energy to **potential energy**. No energy is lost. It is **conserved** during this process. We can increase **energy efficiency** by using better solar panels. We cannot, however, increase **energy quality**. Although solar power is exciting, it can't perform as much **work** as fossil fuels.

## Sustainable Living Energy

### Get ready!

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

- 1 What are some different sources of energy?
- 2 What is the difference between kinetic energy and potential energy?

### Reading

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

- 1 \_\_\_ Electromagnetic radiation is potential energy.
- 2 \_\_\_ A windmill turning would be an example of kinetic energy.
- 3 \_\_\_ Energy can be converted from potential to kinetic and back again.

### Vocabulary

3 Match the words or phrases (1-8) with the definitions (A-H).

- |                |                         |
|----------------|-------------------------|
| 1 ___ energy   | 5 ___ kinetic energy    |
| 2 ___ transfer | 6 ___ heat              |
| 3 ___ conserve | 7 ___ potential energy  |
| 4 ___ work     | 8 ___ energy efficiency |

- A energy that is not moving
- B energy that is moving
- C action or movement caused by energy
- D a measure of how much energy is required to do work without wasting a lot of it
- E to move from one place to another
- F the ability to cause movement or action or produce heat
- G to use a little or none of something so it will last longer
- H a form of energy that produces high temperatures



4 Choose the sentence that uses the underlined part correctly.

- 1 A The sun gives out electromagnetic radiation.  
B Many people try to transfer energy so we use less.
- 2 A Gasoline in a gas can has kinetic energy.  
B A measurement of an energy's potential to do useful work is energy quality.
- 3 A A fire gives off heat.  
B When you cook, heat from the stove is conserved to the pot.

5 Listen and read the excerpt again. How can we conserve energy?

## Listening

6 Listen to a conversation between an environmental engineer and a city official. Choose the correct answers.

- 1 What is the conversation mainly about?  
A the difference between potential and kinetic energy  
B why the city should build a hydroelectric dam  
C how a hydroelectric dam works  
D the benefits of hydroelectric power
- 2 What is the last step of the process the speakers discuss?  
A The water is stored.  
B The generator creates electricity.  
C The water flows through the dam.  
D The water turns a turbine.

7 Listen again and complete the conversation.

City Official: How exactly 1 \_\_\_\_\_ ?  
Engineer: Well, here's the basic idea. 2 \_\_\_\_\_ is converted into kinetic energy.  
City Official: How does 3 \_\_\_\_\_ ?  
Engineer: The potential energy of water in a reservoir 4 \_\_\_\_\_ when it flows through the dam.  
City Official: Okay, then what?  
Engineer: The kinetic energy of the 5 \_\_\_\_\_ turns a turbine. The turbine then turns a generator, which 6 \_\_\_\_\_ .

## Speaking

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

### USE LANGUAGE SUCH AS:

*Well, here's the basic idea.*

*The ... becomes ... when ...*

*The ... creates more energy.*

**Student A:** You are an environmental engineer. Talk to Student B about:

- a hydroelectric dam
- potential energy
- kinetic energy

**Student B:** You are a city official. Talk to Student A about a hydroelectric dam.

## Writing

9 Use the conversation from Task 8 to complete the email.



To: David.P@CityofLakeshore.gov  
From: Lauren.G@HydroSystems.com  
Subject: Hydroelectric dams

Mr. Park,

As you requested, I'm sending you a basic overview of how hydroelectric dams work.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

I hope you will consider building one for the city's energy needs.

Respectfully,  
Lauren

# Glossary

- abiotic** [ADJ-U3] If something is **abiotic**, it is not a living thing.
- acre** [N-COUNT-U8] An **acre** is an imperial unit of area equal to about 0.002 square miles or about 0.40 hectares.
- add** [V-T-U9] To **add** a number to another number is to increase it by that amount.
- advise** [V-T-U1] To **advise** is to give an expert opinion about something.
- amount** [N-COUNT-U10] An **amount** is a quantity of something.
- apply** [V-T-U1] To **apply** something is to use it for a particular purpose.
- aquatic life zone** [N-COUNT-U4] An **aquatic life zone** is an area in a body of water with a particular set of characteristics.
- area** [N-COUNT-U10] An **area** is a measure of how much two-dimensional space something occupies.
- atmosphere** [N-COUNT-U2] The **atmosphere** is the thin layer of air around the Earth.
- atom** [N-COUNT-U14] An **atom** is the smallest piece of matter that can exist by itself.
- atomic number** [N-COUNT-U14] An **atomic number** is a measure of the number of protons in an atom, and is used to identify atoms from different elements.
- average** [ADJ-U6] If something is **average**, it has qualities that are typical or most common in a particular group or category.
- bar graph** [N-COUNT-U11] A **bar graph** is a graph in which the heights of different bars represent differing frequencies of particular variables.
- base unit** [N-COUNT-U10] A **base unit** is a basic unit of measurement from which all other units are obtained.
- biome** [N-COUNT-U4] A **biome** is an area of the planet with a particular set of characteristics, including levels of temperature and precipitation.
- biosphere** [N-COUNT-U2] The **biosphere** is all of the living organisms on the Earth.
- biotic** [ADJ-U3] If something is **biotic**, it is a living thing.
- body language** [N-UNCOUNT-U13] **Body language** is any kind of communication that is not expressed verbally, including posture, eye contact, and hand gestures.
- cell** [N-COUNT-U7] A **cell** is the smallest unit of organization and function in an organism.
- Celsius** [N-UNCOUNT-U8] **Celsius** is a scale for measuring temperatures and establishes the freezing point of water at 0°C.
- chromosome** [N-COUNT-U7] A **chromosome** is a thread-like strand of DNA.
- climate** [N-COUNT-U6] A **climate** is the pattern of weather conditions over a long period of time.
- cloud cover** [N-COUNT-U5] **Cloud cover** is a measure of how dense the clouds are in a particular area.
- coastal zone** [N-COUNT-U4] A **coastal zone** is a warm, shallow area in an ocean that is along the edge of land.
- column** [N-COUNT-U11] A **column** is a vertical section of data in a table.
- community** [N-COUNT-U3] A **community** is a group of all the living things in a particular area.
- component** [N-COUNT-U3] A **component** is an important piece or part of something.
- compound** [N-COUNT-U14] A **compound** is a combination of two or more elements.
- concentration** [N-COUNT-U10] A **concentration** is a measure of the amount of some substance in a solution.
- conservation** [N-UNCOUNT-U1] **Conservation** refers to efforts made to reduce the amount of resources consumed by a person or population.
- conserve** [V-T-U15] To **conserve** something is to use little or none of something so that it will be available at a later time.
- coral reef** [N-COUNT-U4] A **coral reef** is an area in an ocean that is made up of a network of mineral structures and supports various types of marine life.
- core** [N-COUNT-U2] The **core** is the center part of the Earth that is very hot.
- crust** [N-COUNT-U2] The **crust** is the surface of the Earth, made up of rock and soil.

- cubic meter** [N-COUNT-U10] A **cubic meter** is a unit of volume that is equal to the volume of a cube with sides of one meter in length.
- cue card** [N-COUNT-U13] A **cue card** is an aid used to help a speaker remember what he or she is supposed to say next while giving a speech.
- current** [N-COUNT-U6] A **current** is the movement of water in a particular direction.
- decline** [N-COUNT-U12] A **decline** is a downward trend.
- decrease** [V-I-U12] To **decrease** is to get smaller in terms of number, size, or amount.
- derived unit** [N-COUNT-U10] A **derived unit** is a unit that is derived from a base unit.
- desert** [N-COUNT-U4] A **desert** is a hot, dry region with small plant life that is far apart.
- divide by** [V-PHRASE-U9] To **divide** a number (x) **by** another number (y) is to split x into y equal groups.
- DNA** [N-UNCOUNT-U7] **DNA** is a molecule that carries genetic information.
- ecosystem** [N-COUNT-U3] An **ecosystem** is a set of living and nonliving things that exist in a particular environment or area together.
- electromagnetic radiation** [N-UNCOUNT-U15] **Electromagnetic radiation** is a type of kinetic energy that travels in waves and often gives off light.
- electron** [N-COUNT-U14] An **electron** is a part of an atom with a negative electrical charge.
- element** [N-COUNT-U14] An **element** is a basic substance that is made up of one particular type of atom.
- elevation** [N-COUNT-U6] An **elevation** is the height of an area of land, usually measured against the level of the sea.
- energy** [N-UNCOUNT-U15] **Energy** is the ability to cause movement or action, or to transfer heat.
- energy efficiency** [N-UNCOUNT-U15] **Energy efficiency** is a measurement of how much energy is required to accomplish a particular amount of work without wasting a lot of it.
- energy quality** [N-UNCOUNT-U15] **Energy quality** is a measurement of an energy's potential to do useful work.
- environment** [N-UNCOUNT-U1] The **environment** is the natural area in which people live including the water, air, soil, and plant and animal life.
- environmental engineer** [N-COUNT-U1] An **environmental engineer** is a person who uses engineering skills from various disciplines to solve environmental problems.
- equal** [V-T-U9] To **equal** something is to be the same as something.
- Equator** [N-COUNT-U6] The **Equator** is an imaginary line around the middle of the Earth with a latitude of zero degrees that is equal distance from the north and south poles.
- eukaryotic** [ADJ-U7] If something is **eukaryotic**, it has complex cells with nuclei and may be either unicellular or multicellular.
- evaluate** [V-T-U1] To **evaluate** something is to look at it closely and critically.
- expand** [V-I or T-U12] To **expand** is to grow larger.
- eye contact** [N-UNCOUNT-U13] **Eye contact** is the act of looking members of an audience in the eyes.
- Fahrenheit** [N-UNCOUNT-U8] **Fahrenheit** is a scale for measuring temperatures and establishes the freezing point of water at 32°F.
- fluctuate** [V-I-U12] To **fluctuate** is to alternate between increasing and decreasing with no clear pattern.
- gallon** [N-COUNT-U8] A **gallon** is an imperial unit of volume equal to 128 fluid ounces or about 3.78 liters.
- gene** [N-COUNT-U7] A **gene** is a part of a DNA molecule that determines a particular trait.
- genetic diversity** [N-UNCOUNT-U3] **Genetic diversity** is the degree of biological variation among individuals in a population.

# Glossary

- genetic information** [N-UNCOUNT-U7] **Genetic information** is a sequence of codes that establishes which traits a particular organism has.
- geosphere** [N-COUNT-U2] The **geosphere** is the solid part of the Earth.
- grassland** [N-COUNT-U4] A **grassland** is a region where grass grows abundantly but large numbers of trees and shrubs do not.
- habitat** [N-COUNT-U3] A **habitat** is an area where a particular population lives.
- handout** [N-COUNT-U13] A **handout** is an aid distributed to members of the audience of a presentation or speech designed to help them follow along.
- heat** [N-UNCOUNT-U15] **Heat** is a form of energy that produces high temperatures and includes the kinetic energy of atoms and ions within an object.
- hectare** [N-COUNT-U8] A **hectare** is a metric unit of area equal to 0.01 square kilometers or about 2.47 acres.
- humidity** [N-UNCOUNT-U5] **Humidity** is a measure of the amount of moisture in the air.
- hundred** [N-COUNT-U9] **Hundred** is combined with another number to abbreviate numbers in the thousands. For example, the number 1,400 could be said "fourteen hundred."
- hydrosphere** [N-COUNT-U2] The **hydrosphere** is all of the Earth's water.
- impact** [N-COUNT-U1] An **impact** is a large change.
- imperial** [ADJ-U8] If a measurement is **imperial**, it uses the system that is based on the pound and the gallon.
- increase** [V-I-U12] To **increase** is to get larger in terms of number, size, or amount.
- inter-tidal zone** [N-COUNT-U4] An **inter-tidal zone** is an area along a coast that is underwater when the tide is high and exposed to the air when the tide is low.
- ion** [N-COUNT-U14] An **ion** is an atom or combination of atoms that has a positive or negative electrical charge.
- Kelvin** [N-UNCOUNT-U10] **Kelvin** is a unit that measures temperature.
- kilogram** [N-COUNT-U8] A **kilogram** is a metric unit of weight equal to 1000 grams or about 2.2 pounds.
- kilometer** [N-COUNT-U8] A **kilometer** is a metric unit of distance equal to 1000 meters or about 0.62 miles.
- kinetic energy** [N-UNCOUNT-U15] **Kinetic energy** is energy that is actively moving.
- latitude** [N-COUNT-U6] A **latitude** is a particular distance from the Earth's equator, measured in degrees.
- legend** [N-COUNT-U11] A **legend** is a part of a chart or graph that gives instructions on how to read the chart or graph.
- less** [PREP-U9] If one number is **less** another number, it is reduced by that amount.
- line graph** [N-COUNT-U11] A **line graph** is a graph that connects data points on x and y-axis with a straight line.
- liter** [N-COUNT-U8] A **liter** is a metric unit of volume equal to 1000 milliliters or about 0.26 gallons.
- lithosphere** [N-COUNT-U2] The **lithosphere** is the crust, or surface of the Earth, and mantle, or layer below the surface.
- mantle** [N-COUNT-U2] The **mantle** is the rocky layer between the Earth's crust and core.
- mass number** [N-COUNT-U14] A **mass number** is a measure of the number of protons and neutrons in an atom, and may differ among atoms of the same element.
- matter** [N-UNCOUNT-U14] **Matter** is anything that contains material and takes up space.
- meteorology** [N-UNCOUNT-U5] **Meteorology** is the science of weather and atmospheric changes.
- meter** [N-COUNT-U8] A **meter** is a metric unit of measurement equal to about 1.09 yards.
- metric** [ADJ-U8] If a measurement is **metric**, it uses the system that is based on the kilogram and the liter.
- mile** [N-COUNT-U8] A **mile** is an imperial unit of distance equal to 5280 feet or about 1.61 kilometers.
- minus** [PREP-U9] If one number is **minus** a second number, the second number is subtracted from the first.
- moisture** [N-UNCOUNT-U5] **Moisture** is an amount of liquid that makes something just slightly wet.

- mole** [N-COUNT-U10] A **mole** is a unit that measures the amount of a substance, expressed in grams.
- molecule** [N-COUNT-U14] A **molecule** is the smallest piece of a substance that contains all the elements in the substance.
- monitor** [V-T-U1] To **monitor** something is to watch it closely and note how it changes.
- multicellular** [ADJ-U7] If something is **multicellular**, it is made up of more than one cell.
- multiply by** [V PHRASE-U9] To **multiply** a number (x) **by** another number (y), means x is added to itself y number of times.
- neutron** [N-COUNT-U14] A **neutron** is a part of an atom with no electrical charge.
- nucleus** [N-COUNT-U7] A **nucleus** is the central part of a cell that contains DNA.
- ocean** [N-COUNT-U4] An **ocean** is a saltwater body of water that covers a very large area.
- open sea** [N-UNCOUNT-U4] **Open sea** is the vast area of deep water away from land.
- organism** [N-COUNT-U3] An **organism** is an individual living thing.
- over** [PREP-U9] If a number is **over** another number, it is divided by that number.
- pattern** [N-COUNT-U6] A **pattern** is a way that something happens repeatedly.
- pie chart** [N-COUNT-U11] A **pie chart** is a chart that shows percentages of a whole by shading corresponding fractions of a circle.
- plummet** [V-I-U12] To **plummet** is to fall very low very quickly.
- plus** [PREP-U9] If one number is **plus** another number, the two numbers are added together.
- pole** [N-COUNT-U6] A **pole** is one of two points that are furthest from the Equator and are based on the axis on which the Earth spins.
- pollution** [N-UNCOUNT-U1] **Pollution** is any kind of harmful foreign matter in a substance such as air or water.
- population** [N-COUNT-U3] A **population** is a group of organisms of the same species in a particular area.
- potential energy** [N-UNCOUNT-U15] **Potential energy** is energy that is not active or moving, and is stored for possible future use.
- pound** [N-COUNT-U8] A **pound** is an imperial measurement of weight equal to 16 ounces or about 0.45 kilograms.
- precipitation** [N-UNCOUNT-U5] **Precipitation** is water that falls from clouds to the Earth, usually in the form of rain or snow.
- presentation** [N-COUNT-U13] A **presentation** is a process of formally introducing or demonstrating an idea to a group of people.
- pressure** [N-UNCOUNT-U5] **Pressure** is the force or weight of air in the atmosphere.
- prevailing wind** [N-COUNT-U6] A **prevailing wind** is the typical direction that wind blows in a particular area or during a particular time.
- prevent** [V-T-U1] To **prevent** something is to keep it from occurring.
- project** [V-T-U13] To **project** one's voice is to cause it to be louder and carry further than normal.
- prokaryotic** [ADJ-U7] If something is **prokaryotic**, it has very simple cells that do not contain nuclei, and is typically a unicellular organism.
- proton** [N-COUNT-U14] A **proton** is a part of an atom with a positive electrical charge.
- rainforest** [N-COUNT-U4] A **rainforest** is a hot, wet region with many tall trees.
- range** [N-COUNT-U6] A **range** is set of things that belong to the same category but have different values.
- resources** [N-COUNT-U1] **Resources** are things that people use, such as water, mineral deposits, or oil.
- review** [V-T-U13] To **review** something is to go over it closely and provide feedback.
- rise** [N-COUNT-U12] A **rise** is an upward trend.
- rotation** [N-UNCOUNT-U6] **Rotation** is the process of turning around a central point.
- row** [N-COUNT-U11] A **row** is a horizontal section of data in a table.

# Glossary

**saltwater** [ADJ-U4] If something is **saltwater**, it is related to a body of water that contains salt, such as an ocean or estuary.

**savanna** [N-COUNT-U4] A **savanna** is a type of grassland with warm temperatures and distinct wet and dry seasons.

**scatter diagram** [N-COUNT-U11] A **scatter diagram** is a chart that shows data points on an x and y-axis not connected by any lines.

**short-term** [ADJ-U5] If something is **short-term**, it happens for a brief time.

**shrink** [V-I-U12] To **shrink** is to get smaller.

**SI** [N-UNCOUNT-U10] **SI** is the abbreviation for the International System of Units, the modern form of the metric system.

**signpost** [V-I-U13] To **signpost** is to guide listeners through your ideas using clear directional wording.

**skyrocket** [V-I-U12] To **skyrocket** is to go very high very quickly.

**species** [N-COUNT-U3] A **species** is a group of organisms that share the same biological structure.

**square meter** [N-COUNT-U10] A **square meter** is a unit of measurement that describes the area of a space 1 meter by 1 meter.

**stabilize** [V-I-U12] To **stabilize** is to become more regular.

**stratosphere** [N-COUNT-U2] The **stratosphere** is an outer layer of the atmosphere, farther from the Earth than the troposphere, which filters out harmful rays from the sun.

**subtract** [V-T-U9] To **subtract** one number from another number is to reduce it by that amount.

**summarize** [V-T-U13] To **summarize** something is to briefly present its main points.

**table** [N-COUNT-U11] A **table** is a visual representation of data made up of rows and columns.

**temperature** [N-COUNT-U5] A **temperature** is a measure of how hot or cold something is.

**terrain** [N-COUNT-U6] A **terrain** is land that has particular characteristics.

**thermodynamic temperature** [N-UNCOUNT-U10] **Thermodynamic temperature** is the absolute measure of temperature.

**times** [PREP-U9] If one number is **times** another number, it is multiplied by that number.

**transfer** [V-T-U15] To **transfer** something is to change the location of something.

**troposphere** [N-COUNT-U2] The **troposphere** is the inner layer of the atmosphere, closer to the Earth than the stratosphere, which contains most of the planet's air.

**tundra** [N-COUNT-U4] A **tundra** is a type of grassland that is very cold and is typically covered with ice and snow.

**unicellular** [ADJ-U7] If something is **unicellular**, it is made up of only one cell.

**visual aid** [N-COUNT-U13] A **visual aid** is some kind of graphical representation of an important part of a speech or presentation designed to support the speaker's ideas.

**volume** [N-COUNT-U10] A **volume** is a measure of how much three-dimensional space something occupies.

**weather** [N-UNCOUNT-U5] **Weather** is the condition of the atmosphere, including the levels of temperature and precipitation.

**wind speed** [N-COUNT-U5] **Wind speed** is a measure of how fast air is moving through the atmosphere.

**work** [N-UNCOUNT-U15] **Work** is action or movement that is produced by kinetic energy.

**x-axis** [N-COUNT-U11] The **x-axis** is the horizontal axis on a line graph.

**y-axis** [N-COUNT-U11] The **y-axis** is the vertical axis on a line graph.

**yard** [N-COUNT-U8] A **yard** is an imperial unit of measurement equal to three feet or about .91 meters.