PART B

LESSON PLANS, LINE MASTERS, AND TESTS

UNIT 1

LESSON 1 Creation Theories and Stories (Topic 1, pp. 10–16)

FOCUS Physical Geography

Description

- Students review and analyze creation stories from two or more cultures to develop an understanding of the similarities and differences in the ways cultures explain and understand the origins of the universe.
- Students demonstrate an understanding of the Big Bang Theory and Nebular Hypothesis by completing *Review and Reflect* questions 1–3 on page 16.
- They then develop their own creation story outlining how the universe and planet Earth came into being.

TIME: 60 to 70 minutes

RESOURCES
- Student Textbook pages 10–16
- LM 1-1 *Creation Stories*
- Selected Assessment Rubrics

Expectations Focus: CGF3M

SSV.01 Explain major theories of the origin and internal structure of the earth.
GI1.01 Describe the difficulties and limitations inherent in quantifying the processes and elements of the physical environment.

Preparation

- Prepare a transparency or handout of **LM 1-1 Creation Stories**.
- Provide students with information about assessment strategies you will be using.
- Big Myth website: http://www.mythicjourneys.org/bigmyth/2_eng_myths.htm. This site presents 25 myths from around the world, each available for download in Word format. The site includes teaching strategies.

Teaching Strategies

- **Prior Knowledge:** Introduce this activity after students have read Unit 1 Overview (pages 10–11) and Topic 1: The Origin of Our Universe (pages 12–16).
- Take up answers to *Review and Reflect* questions 1–3 on page 16.
- Discuss the creation story on page 12. What does this story have to say about the origin and internal structure of Earth? To what extent does the story link to the Big Bang Theory and the Nebular Hypothesis? Conclude the discussion with reflections about the difficulties and limitations inherent in quantifying the processes and elements of the physical environment for today's scientists as well as the writers of earlier times (see page 16 and question 1).

- Hand out **LM 1-1 Creation Stories**. Instruct students to analyze the stories in a similar way to the analysis completed in the class discussion (above). You may wish to have students work in pairs or small groups to read the two creation stories and complete the analysis.
- Students are now able to develop their own creation story outlining how the universe and Earth came into being. Have them present their finalized creation story in a storyboard.

Assessment

Post storyboards around the room to form a gallery. If time permits, have students present their storyboards to the class. **AM 1 Media Product Rubric** may be used for the storyboard; **AM 2 Oral Presentation Rubric** may be used if storyboards are presented; **AM 3 Small-Group Discussion Rubric** may be used if creation stories are analyzed in small groups.

LM 1-1 **Creation Stories**

PART A

Read the following creation stories with a partner. Then compare the similarities and differences between the two stories in a graphic organizer.

A CHINESE CREATION STORY

In the beginning, there was an enormous egg containing chaos. On the inside the chaos raged on and on—both yin and yang were mixed together. All the opposites were writhing together; male and female, cold and hot, wet and dry, dark and light.

Finally the egg burst open, and out leapt the giant dragon Pan-gu. Yin and yang swirled around him and he pushed the two shell halves apart. Thus the opposites were separated and the earth began to take shape.

Every day for 18 000 years Pan-gu grew ten feet [3.04 m] – thus the sky was raised a little higher every day. Once the sky was 30 000 miles [48 000 km] above the ground, Pan-gu stopped and began to hammer out the mountains and fill the valley with water to form great oceans.

He created rivers with his fingers and stamped the earth down to create flat lands. He gathered raw light and tossed them into the sky to become stars.

After 18 000 years, Pan-gu had grown old and tired. He had made the world with his hands and formed the basic principles of yin and yang. He wanted to lie down and sleep forever. Once he lay down he never rose again. When Pan-gu died, his body formed huge mountains. His skull formed the top of the sky, his hair formed all flowers and plants, his bones turned to jade and pearl and his arms and legs the four directions.

His blood became the rivers, his breath turned into the wind and his voice to thunder. One eye became the sun and the other the moon.

For many years the world was a very beautiful place but also lonely; there were no people.

The half-dragon goddess Nuwa was born after Pan-gu died, from part of the mixture of yin and yang that he had separated. She decided to create humans to have some other beings to talk to and share ideas with, but mostly just to love.

Nuwa went down to the edge of the Yellow River where there were vast, soft mud banks. She began forming figures out of clay. She decided that it would be much more practical for her creations to have legs instead of a dragon tail, thus her humans were not made in her image.

No sooner did she set the first little mud man on the ground did he start to jump and dance and sing. He began to speak. "Look at me!"

Nuwa was delighted and began making more and more humans.

She made hundreds and hundreds of mud humans, but soon realized that it would take centuries for her to make enough people to fill the vast earth completely. Nuwa grabbed hold of a muddy stick and flung drops of mud across the land.

As the sun dried each drop, it became a new man or woman. Some say that these humans were the less intelligent ones. Those formed by Nuwa's own hands became great leaders.

She told them to go and populate the earth. As they grew she loved them and protected them, and was revered as the mother of all humans.

Source: http://www.mythicjourneys.org/bigmyth/myths/english/2_chinese_full.htm

A NORSE CREATION STORY

Ginnungagap was the great emptiness before there was a world, or any living things in it.

Far to the South of the Ginnungagap was the fiery realm of Muspell, with its long, hot rivers full of poison and vast lakes of fire. Nothing could grow in this burning realm.

To the North was the dark and cold realm of Niflheim, where icy fountains spewed forth freezing rivers. Nothing could grow here either, for the sky was always dark and the mountains were blocks of solid ice.

Slowly, over years and years and years, the fiery blasts from Muspell began to melt the icy mountains of Niflheim.

Out of the melting ice, the giant Ymir emerged, the first being of the vast Ginnungagap.

Next to him there emerged a cow from the ice. The cow licked the salt from the ice mountains and Ymir drank the cow's milk. Ymir grew larger and larger.

The cow licked away entire mountains of ice. Slowly she licked the ice from two more beings, this time the god Buri and his goddess wife. They had a son named Bor, and his son was named Odin, who became the king of all the gods.

Ymir was cruel and brutal. Odin and the other gods could no longer abide by his evil acts and together the gods slew him.

Ymir's huge body formed the earth. His blood became the sea, his flesh became the land, his bones the mountains and his hair the trees. Odin and the other gods formed the sky with his skull, held up by four towering pillars.

Odin gathered sparks from the fiery depths of Muspell and created the sun and moon. These he set in the sky.

As the sun and moon shone over the new world in the Ginnungagap, the ice began to melt and plants and trees began to grow.

The greatest tree of all was the Yggdrasil, which grew in the very center of the earth. Its roots penetrated into the bottom of creation and its leaves reached the very top of the sky.

Odin was satisfied with the new world, and named it Midgard, "The Middle Land."

But the world still needed people.

On one of his walks, Odin found two fallen trees, an ash and an elm. He lifted them from the mud and formed the first man and woman from them. Odin breathed life into the beings, gave them reason and feelings, hearing and sight.

He named the man Ask and the woman Embla. From these two sprang the entire human race.

The humans had the task of looking after Midgard, while the gods ascended to Asgard, their realm in heaven.

However, not everyone was pleased with Odin's work. Ymir's giant sisters were still mourning his death and were looking for a way to take their revenge on the gods who killed him.

They gathered at the foot of Yggdrasil and began carving lines into it.

Each line was a human life, filled with twists and turns, beginning with a man's birth, and ending with his death. At the end of each line they made a deep cut to ensure that humans would never be as powerful as the gods.

These spells were so powerful that not even Odin could do anything to change them.

Thus Yggdrasil became known as "The Tree of Life" and humans knew death and suffering in their world.

Source: http://www.mythicjourneys.org/bigmyth/myths/english/2_norse_full.htm

PART B

Now write your own creation story about how Earth was created. Begin by brainstorming ideas with your partner. Then, working on your own, create an outline of your creation story. When you have completed your outline, plan your story in sequence. Create a storyboard by dividing a letter-sized sheet of blank paper into 4 or 6 equal sections, and using a ruler to insert 1–3 lines per section. Write one or two short sentences describing each main event in your story. Then sketch and colour a small picture to go with each description. When you have finished, give your story a title. Then prepare to present your creation story to the class.

UNIT 1

LESSON 2 Mars versus Earth (Overview, pp. 10–11; Topic 2, pp. 21–24)

FOCUS Physical Geography

TIME: 60 to 70 minutes

RESOURCES
- Student Textbook pages 10–11 and 21–24
- LM 1-2a *Characteristics of Earth and Mars*
- LM 1-2b *Student Worksheet: Comparing Earth and Mars*
- LM 1-2c *Answer Key for Student Worksheet: Comparing Earth and Mars*

Description

Students will demonstrate their understanding of why life on Earth is possible by comparing and contrasting the physical characteristics of Earth and Mars, and then formulating an opinion in support of, or in opposition to, the colonization of Mars.

Expectations Focus: CGF3M

- **SSV.02** Demonstrate an understanding of the principal features of the earth's major components: the lithosphere, atmosphere, hydrosphere, and biosphere.
- **SS1.01** Describe how the earth's orbit and tilt relate to the seasons and annual variations in climate.
- **GI2V.01** Use geographic skills, methods, and technologies to gather, analyse, and synthesize ideas and information.

Preparation

- Prepare transparencies or handouts of **LM 1-2a Characteristics of Earth and Mars** and **LM 1-2b Student Worksheet: Comparing Earth and Mars**.
- Provide students with information about assessment strategies you will be using.

Teaching Strategies

- **Prior Knowledge:** Introduce this activity after students have reviewed Unit 1 Overview (pages 10–11) and Topic 2: The Nature of the Solar System (pages 21–24).
- Ask students why knowledge about Mars might be important to scientists today. Students might point out that:
  - By studying Mars, scientists may learn if life ever existed on the planet, and if it did, why it disappeared. Some of this knowledge may be applicable to situations on Earth.
  - Greater knowledge about Mars may also help scientists learn how humans can survive in space over long periods of time.

If needed to prompt discussion, provide the following suggestion by a NASA scientist:

> Approximately 3.8 billion years ago, Mars and Earth are believed to have been very similar. Understanding what happened to Mars may help us understand our own planet and its future.
>
> —NASA life scientist Chris McKay, Washington, DC, July 1996

- Distribute **LM 1-2a Characteristics of Earth and Mars** and **LM 1-2b Student Worksheet: Comparing Earth and Mars**. In pairs or small groups, students can work together to complete Part A questions. When they have finished, take up and/or collect student answers.
- Discuss the possibility of colonizing Mars and whether students think this is a reasonable goal. As a class or in student groups, complete the Cost/Benefit Chart of colonizing Mars (Part B, Question 1). **LM 1-2c** provides possible responses.
- Students should individually complete the last question of Part B, expressing their point of view (*Should we send people to establish a colony on Mars? Why or why not?*).

Assessment

- **AM 4 Exposition Rubric**

LM 1-2a **Characteristics of Earth and Mars**

Name: _____ Date: _____

Earth	**Characteristic**	**Mars**
149 597 870 km	Distance from the Sun	227 940 000 km
−88 °C	Minimum surface temperature	−87 °C
58 °C	Maximum surface temperature	−5 °C
12 756 km	Diameter at Equator	6794 km
23 h 56 min	Time for full rotation per day	24 h 37 min
365.2 Earth days	Period of orbit around the Sun	686.98 Earth days
23.5 degrees	Tilt of axis	25 degrees
9.80 m/s^2	Acceleration due to gravity	3.71 m/s^2
Luna (Moon)	Satellites	Phobos, Deimos
11.19 km/s	Escape velocity	5.03 km/s
78% nitrogen 21% oxygen	Composition of atmosphere	96% carbon dioxide 2.7% nitrogen 1.6% argon
Yes	Presence of liquid water	No
H_2O ice	Composition of polar caps	CO_2 ice
Land: blue and green Sky: blue	Physical appearance	Land: orange/red Sky: pink/orange
Basalt and granite	Surface materials	Silicon and iron
148 000 000 km^2	Area of land surface	144 000 000 km^2
Mt. Everest (8848 m)	Highest elevation	Olympus Mons (27 000 m)
Mariana Trench 11 km below sea level	Lowest elevation	Hellas basin 4 km below surface
Yes	Presence of life	Unknown

LM 1-2b **Student Worksheet: Comparing Earth and Mars**

Part A

1. Which planet:
   a) is larger?
   b) is colder?
   c) has the most moons?
   d) has seasons?
   e) has ice?
2. Compare and contrast the climate, atmosphere, and calendar of the two planets.

Planet	**Climate**	**Atmosphere**	**Calendar**
Earth			
Mars			

3. Why is human life possible on Earth but not on Mars? Describe two specific characteristics to explain your response.
4. In a short paragraph, describe what you would see and experience if you were an astronaut standing on the surface of Mars.

Part B

Many scientists believe that of all the planets in the solar system, Mars is the best candidate for colonization. Based on what you have learned about the extreme environment on Mars, complete a cost/benefit analysis on the issue of colonizing Mars. Consider the following questions in formulating your ideas:

- *What basic data would be needed to plan a mission to Mars?*
- *What might be the consequences for Earth if a colony existed on Mars?*
- *What would need to be done to turn Mars into a habitable planet?*

Record your ideas in an organizer with these column headings:

Costs of Colonizing Mars	**Benefits of Colonizing Mars**

After you have completed your analysis, write an opinion paragraph expressing your point of view on the following question:

- *Should we send people to establish a colony on Mars? Why or why not?*

Review **LM X: Writing Opinion Paragraphs** before you begin this activity.

LM 1-2c Answer Key for Student Worksheet: Comparing Earth and Mars

Part A

1. Which planet:
   a) is larger? **Earth**
   b) is colder? **Mars**
   c) has the most moons? **Mars**
   d) has seasons? **Earth and Mars**
   e) has ice? **Earth and Mars**
2. Compare and contrast the climate, atmosphere, and calendar of the two planets.

Planet	Climate	Atmosphere	Calendar
Earth	• Hot and cold temperatures vary by season and location relative to the Equator • Lies within the continuously habitable zone (CHZ) of −80 °C to 100 °C	• Abundance of oxygen enables planet to support life • Atmospheric composition includes nitrogen (78%) and oxygen (21%)	• Time for full rotation per day = 23 h 56 min • Period of orbit around the Sun = 365.2 Earth days • Tilt creates four seasons
Mars	• Sub-zero temperatures throughout most of the year • Lies within the continuously habitable zone (CHZ)	• Lack of oxygen prohibits the support of life • Atmospheric composition includes carbon dioxide (96%), nitrogen (2.7%), and argon (1.6%)	• Time for full rotation per day = 24 h 37 min • Period of orbit around the Sun = 686.98 Earth days • Tilt creates four seasons

3. *Why is human life possible on Earth but not on Mars? Describe two specific characteristics to explain your response.*
   Students' responses should include the following:
   - Earth's atmosphere contains oxygen in large enough quantities to support life because of gravity. Because of outgassing and lower gravity, much of Mars's atmosphere has evaporated.
   - The presence of water in its liquid form is essential to life on Earth. Carbon dioxide ice at the poles and in the soil on Mars suggests life could once have existed there.
4. *In a short paragraph, describe what you would see and experience if you were an astronaut standing on the surface of Mars.*
   Students' responses should contain a physical description of the planet, including the moons, gravity, atmosphere, and topography based on the information in **LM 1-2a**.

Part B Possible Responses

Costs of Colonizing Mars	Benefits of Colonizing Mars
• Extensive research needed to determine how humans could survive on Mars • High cost of equipment needed to travel to the planet • High cost of equipment needed to adapt to life on the planet due to a lack of water, oxygen, and arable soils • Potential negative impact on human health • Billions of dollars would be diverted from projects on Earth • Could lead to international competition and conflict • Moral and ethical consequences of human intervention in other planets	• Could learn if life exists, or ever existed, on Mars • Knowledge about how and why the planet evolved could help scientists understand patterns on Earth • Investment in new technology creates jobs • Could build positive international relations if colonization was a cooperative venture

UNIT 1

LESSON 3 Diagnostic: Knowing What We Don't Know (Introduction, pp. 2–4)

FOCUS The Environment and Resource Management

TIME: 60 to 70 minutes

RESOURCES
- Overhead Projector
- LM 1-3 *Key Concepts in Environment and Resource Management*
- Overhead transparency with student groups prepared

Description

- Students are introduced to important themes that are woven throughout the course, first independently, then by working in small groups.
- They complete a diagnostic to activate prior knowledge regarding the components and functions of ecosystems, and to act as a review of several concepts. They then reflect on the activity using a journal entry.

Expectations Focus: CGR4M

GI1.02 Define and use terms associated with the environment and resource management correctly (e.g., global commons, carrying capacity, ecological footprint, sustainable development, sustained yield, silviculture).

Preparation

Prepare a transparency or handout of **LM 1-3 Key Concepts in Environment and Resource Management**. (*Note*: If desired, teachers may add terms to the handout using the Word files on the CD that accompanies this Teacher's Resource.)

Teaching Strategies

- Distribute **LM 1-3 Key Concepts in Environment and Resource Management**. Students work independently to complete the worksheet.
- After about 10 minutes, use the overhead to move students into pairs to share prior knowledge and answers to the worksheet.
- Take up the worksheet with the class, providing definitions for the terms. *Note:* All terms are defined in the Glossary (pages 456–463).
- Have students write a journal entry beginning with the phrase, *A sustainable world requires…*

Assessment

Student journal entries can be assessed using **AM 4 Exposition Rubric**. If the course has been designed with a portfolio component, students may complete **AM 6 Portfolio Reflection Strip**. If desired as part of a summative assessment plan, students can revisit this journal entry at the end of the course, in conjunction with all other portfolio products, and apply their learning by making any revisions they deem appropriate.

LM 1-3 **Key Concepts in Environment and Resource Management**

In your own words, define or describe the following:

a) Ecosystem

b) Sustainable development

c) Ecological footprint

d) Biocapacity

e) Food chain

f) Global commons

g) Biogeochemical cycles

h) Carbon footprint

i) Deforestation

UNIT 1

LESSON 4 Thermodynamics in Winter—Learning from the Locals (Topic 5, pp. 47–51)

FOCUS The Environment and Resource Management

TIME: approximately one 60–70 minute period for the game; part of another class for the performances

RESOURCES
- LM 1-4a *Winter Energy Quest Game Instructions*
- LM 1-4b *North American Morning*
- LM 1-4c *Sample Clue Cards to Use with Compass Activity*

Description

- Students are placed in one of three groups. Each group then uses a compass to locate clues that will identify the species their group will role-play in the *Winter Energy Quest* game, which is a variation of Tag (see **LM 1-4a**). By simulating the interactions of species in an ecosystem, students reinforce their understanding of the laws of thermodynamics, particularly the second law.
- **LM 1-4b A North American Morning** provides students with the opportunity to contrast the energy consumption patterns of humans and wildlife.
- Students are then able to reflect on their current consumer behaviours and understand the importance of energy conservation.

Expectations Focus: CGR4M

SS2.03 Explain interactions between producers, consumers, and decomposers within a selected ecosystem.

HEV.02 Analyse and evaluate interrelationships between the environment, the economy, and society.

Preparation and Teaching Strategies

- **Prior Knowledge:** Introduce this activity after students have read Topic 5. Assigning the activity in Figure 1.5.3 on page 50 (*Using this diagram as a model, create your own example of energy flow along a food chain*) and taking it up in class will ensure students are well prepared to benefit from this lesson.
- *The day before …* Create clue cards for three species you want to represent. **LM 1-4c** gives clues for field mice, weasels, and the lynx.
- Take bearings for three different learning journeys around the schoolyard (three or more stops, depending on time). Make sure that all three begin at the same starting point and end where you would like to continue with your lesson. Write the bearings on the cards and place them in the appropriate location just before class, if possible. If you have to put them out the day before, put them inside ziplock bags first.
- Gather the materials you need to play the survival game:
  - 3 sets of clue/flash cards with species quick facts, and instructions on back
  - Compasses (1 per species group)

- 50+ large tokens: these can take the form of tennis balls, empty pop cans, clothes from the lost and found, and so on. Make sure they stand out in the snow!
- One hula hoop or piece of rope at least 2 metres long
- 10+ pylons or markers; empty margarine or yogurt containers will work fine
- 1 bucket
- 3 different-coloured t-shirts, pinnies, arm bands or bandanas to distinguish among the species. Face paint is also a fun way to encourage role-playing.
- A copy of the *Winter Energy Quest* game rules (**LM 1-4a**)
- Story: *North American Morning* (**LM 1-4b**)
- Optional: animal or tree mask/costume and toy microphone to interview the different species as a fun way to conclude the game

- *The day of …* Divide students into three groups. Groups will differ in size to represent the population relationships in an ecosystem, e.g., 60% mice, 30% weasel, 10% lynx. Do not tell students which species their group represents; their first task is to locate the clue cards you have placed outside (e.g., **LM 1-4c**) that will provide them with this information.
- Provide each group with a compass. Emphasize that students need to get into the mind-set of their species because they will role-play a member of that species in a survival game—*Winter Energy Quest*—later on in the lesson.
- While students are out gathering clues, set up the *Winter Energy Quest* playing field. Depending on snow depth, length of students' legs, student and student energy levels, half the size of a soccer field should be marked off. A bucket representing the food cache should be placed off to one side, either inside a hula hoop or encircled with a rope. The area inside the rope or hula hoop represents the mouse den. Scatter energy balls/tokens across field. Count them first!
- *To start the game …* Once students have collected clues and gathered at the designated location, share and discuss the different survival strategies each species might adopt.
- Introduce the game concept of conserving energy to survive predation, climate, starvation, and so on. Read and clarify rules to the game (**LM 1-4a**). Emphasize the role of the teacher, which is essentially that of Nature. Nature can wipe out entire populations, but can also regenerate them.
- Play game.
- *After the game …* Before debriefing, ask students to search for and pick up all the energy tokens that may be hidden under the snow. Then conclude the game by assuming the role of an animal reporter and interviewing players, for example, "What was your strategy for reducing energy loss?"
- *Shifting gears to humans …* "Come gather round, animals, I'm going to tell you about an animal that lives not too far from here… you may have seen them. They don't like to be outside much, but when they are, they make a lot of noise. Close your eyes and listen carefully. We are going to find out how they survive the winter."
- Read *North American Morning* (**LM 1-4b**).
- Debrief student interpretation, ideas.
- Divide students into groups of 4–6.

- Challenge groups to reconceptualize the current human strategy for surviving winter, using some of the animal strategies. They are to come up with a creative way to share their ideas with the rest of the class: skit, song, story, free-expression dance.

Assessment

- **AM 2 Oral Presentation Rubric**
- **AM 3 Small-Group Discussion Rubric**

LM 1-4a **Winter Energy Quest Game Instructions**

Note to teacher: This role-play game is a variation on Tag. Animals die when tagged, and their energy is transferred to the tagging animal. The teacher, in the role of Nature, intervenes to diminish populations (with storms, for example) or to increase them.

You may need to adjust or add rules as you see fit, depending on the age and competitiveness of your students. For example, "No hiding energy tokens on other species."

Object of the Game: Each player's task is to role-play a member of an assigned species (in this example, mice, weasels, and lynx), and to collect as much energy as possible with the least amount of entropy. Success will involve two key strategies: (1) to be prepared for winter conditions, and (2) to make wise decisions about obtaining energy.

Rules:

1. All cans and balls equal one unit of energy, and may not be thrown among animals, or in and out of nest.
2. Mice begin the game with 0 energy tokens, weasels with 2 tokens, and each lynx with 3 tokens.
3. The game begins with mice accumulating energy, then unleashing the weasels, followed by the lynx.
4. When on the ground, energy tokens can be consumed only by the mice.
5. Mice can carry only one energy ball at a time into the nest.
6. Weasels and lynx must wait for the mice to transfer the energy into a useable form (i.e., pick up the token). Weasels tag the mice to gain energy, and lynx tag weasels or mice to gain energy.
7. Weasels and lynx must carry all their energy with them, and each mouse must carry 4 energy tokens at all times.
8. If they have more than 4 energy tokens, the mice may choose to deposit energy in their cache (bucket) and stay safe in their den (hula-hoop), *but they can stay in their den for only one minute at a time.*
9. The weasels may attack mice in the nest if more than two mice are hiding within—the concentrated smell gives them away!
10. Weasels hunt only mice, but the lynx hunts both.
11. When chasing, weasels must drop one unit of energy on the ground and the lynx, two. Chased mice and weasels also lose one unit of energy when hunted (works on honour system).
12. Chased mice may not immediately recover lost energy units.
13. The teacher(s) represent climate: harsh blizzard, hail, difficult snow travel, and take 1–3 energy tokens from all three species when caught. (Teachers return the energy tokens to the ground to keep the game going.)
14. When killed (tagged), the mouse or weasel gives up 3 energy tokens.
15. SPEND YOUR ENERGY WISELY!

LM 1-4b **A North American Morning**

Beep, beeeeep, beeeeep. Your day begins. Groggy, you fumble to silence the impatient bleating of your alarm clock. You pull the covers down over your head and try not to think about the hard day ahead of you. "I'll be lucky if I make it through alive," you think.

Beep, beep, beeeeeeep. Your fist reaches out of the cocoon you've created and comes crashing down on the dream intruder. Swinging your bare legs over the side of the bed, your toes feel the floor, then your heels… It is warm, and dry.

Your feet pad slowly across the room. You flick on the light switch, and curse the shock it sends to your eyes. You turn on your computer with the tip of your forefinger, and decide not to wait for it to go through its various stages of waking up.

In the hall you automatically reach for the two switches at shoulder height to the left. ON. More squinting as you make your way down the hall, down the 14 stairs to the next set of switches by the door. It's drafty, and you shiver. This time you reach for the thermostat and hope that higher temperatures will kick in soon.

In the kitchen you flick on the light, turn on the tap, fill the coffee pot, plug in the coffee maker, pop two pieces of toast in the toaster, and take the milk, butter, jam and cheese out of the fridge, all the while eyeing the remains of last night's pizza delivery.

While you are waiting for your toast to turn golden brown, you eagerly make your way to the front door to fetch the morning paper. As you open the door, cold white air rushes in. It's freezing out there, but you're willing to risk it for the morning news. With your prize under arm you make your way back to the kitchen where the warm aroma of coffee fills the air … mmmmnnn.

You pop the toast down again for a quick warm-up, pour coffee in your favourite oversized mug, slather your toast with jam, and sit down at the table with the daily news. As you open up the paper, the headline shouts, "World Energy Crises Looming."

Bringing your mug slowly up to your chin, you inhale deeply. Mnnn. Eager for the warm wake-up to come with the first few sips, you take a test sip and burn your tongue. You'll have to wait for it to cool. You don't have time, so you add more milk to the mug and eat your toast quickly. The next page's headlines read, "Bigger Homes for All Your Winter Entertaining," "Oil Prices Expected to Rise on Monday," and "Famine South of 0 Degrees." Hmm, better gas up before work.

You load your dishes in the dishwasher, add soap, and push all the necessary buttons. With half a piece of toast in your mouth and the newspaper under your arm, you expertly flick off the series of light switches on your way upstairs with your elbow as you pass them by.

Sounds of flushing, taps gushing, and the bathroom fan all bounce around off the tile bathroom walls. You wait until the shower temperature is as hot as your back can stand, but not tooo hot, before hopping in. Ahh, soap, shampoo, conditioner, think about the day. You don't want to get out. It is so warm and relaxing. Ahhh. Mornings would be impossible without a shower.

More sounds compete for air time as you shave, wash, brush your teeth, and blow-dry your hair.

Now that you are clean, fed, and awake, you dart outside to start your car. Brrrr. The cold air attacks your skin. "I hate mornings," you grumble. Back inside, you fill your travel mug with coffee and make your way back upstairs to check your email while your car warms up. Eleven emails crowd your inbox. "Oh, man. I hope I make it through this day alive."

LM 1-4c Sample Clue Cards to Use with Compass Activity

Note to teachers: Sample text for clue cards is provided below. Create three clue cards for each species. Write the compass bearing for the next clue on one side of the card, and the clue on the other.

Mice

1. I live in burrows and tunnels built below the ground, either by myself or other animals. *WHAT AM I?*
2. I basically eat seeds, and store them if abundant. *WHAT AM I?*
3. Between the months of February and October, females of my species produce about 4 litters of 5–7 offspring. *WHAT AM I?*

Weasel

1. I vary in length, from 12 to 45 centimetres. *WHAT AM I?*
2. I have a long, slender body, allowing me to follow my prey to small burrows. *WHAT AM I?*
3. I feed on small mammals. *WHAT AM I?*

Lynx

1. I am common throughout the boreal forest. *WHAT AM I?*
2. I love eating the Snowshoe Hare, but have been known to prey on other smaller mammals. *WHAT AM I?*
3. I am a member of the feline family. *WHAT AM I?*

UNIT 1

Test **Physical Geography**

Name: _____ Date: _____

PART A: Multiple Choice (10 × 1 = 10 marks)

Read each of the following questions and circle the correct answer.

1. According to the Nebular Hypothesis, which of the following bodies was the first to develop?
   a) the atmosphere
   b) planetesimals
   c) protoplanets
   d) the protosun

2. The asteroid belt lies between which two planets in our solar system?
   a) Mercury and Venus
   b) Venus and Earth
   c) Earth and Mars
   d) Mars and Jupiter

3. Which of the following is NOT a characteristic of Terrestrial planets?
   a) small diameter
   b) rapid rotation
   c) absence of rings
   d) weak magnetic field

4. According to the Asteroid-Impact Hypothesis, which of the following events was the most significant for the extinction of the dinosaurs?
   a) the force of impact
   b) a tsunami
   c) temperature extremes
   d) fire

5. Which of the following pieces of evidence does NOT support the Asteroid-Impact Hypothesis?
   a) the presence of fractured crystals
   b) the presence of impact ejecta
   c) fossil records
   d) the absence of iridium

6. Which of the following is NOT a source of energy for Earth's internal heat engine?
   a) solar radiation
   b) radioactive decay of rock
   c) compression of rock due to gravity
   d) collision with celestial bodies

7. Which of the following is Earth's thickest layer?
   a) the inner core
   b) the outer core
   c) the mantle
   d) the crust

8. Which of the following processes is responsible for the breakage of the lithosphere into plates?
   a) differentiation
   b) accretion
   c) gravity
   d) convection currents

9. Which of the following characteristics is NOT unique to planet Earth?
   a) habitable temperatures
   b) heavily oxygenated atmosphere
   c) the orbit of a moon
   d) the presence of water vapour

10. Which of the following elements is common to all living things?
    a) aluminum
    b) carbon
    c) helium
    d) nickel

PART B: True or False (20 × 1 = 20 marks)

Read each of the following statements and circle the correct response.

11. According to astronomers, the universe began approximately 30 billion years ago.
    TRUE FALSE

12. Scientists believe the Moon was created when Earth collided with another celestial body.
    TRUE FALSE

13. Pluto is the smallest planet in our solar system.
    TRUE FALSE

14. The same side of the Moon always faces Earth.
    TRUE FALSE

15. The planet farthest from the Sun is Neptune.
    TRUE FALSE

16. Venus is considered to be a Jovian planet.
    TRUE FALSE

17. −273 °C is also known as absolute zero.
    TRUE FALSE

18. Earth's escape velocity is higher than that of the outer planets.
    TRUE FALSE

19. Halley's Comet collided with Jupiter in 1994.
    TRUE FALSE

20. NEOs are comets and asteroids that have orbits that cross that of Earth.
    TRUE FALSE

21. According to NASA, a small NEO may collide with Earth every 100 years.
    TRUE FALSE

22. The process of homogeneous equation resulted in the separation of Earth's elements into distinct layers.
    TRUE FALSE

23. The pressure is so great on Earth's core that it cannot melt.
    TRUE FALSE

24. Earth's magnetic field is responsible for the creation of convection currents.
    TRUE FALSE

25. Peridotite contains nutrients required to sustain plant life.
    TRUE FALSE

26. Continental crust is less dense than oceanic crust.
    TRUE FALSE

27. The deepest that humans have drilled into Earth's crust is 16 km.
    TRUE FALSE

28. Earth's early atmosphere contained volatile elements released by outgassing.
    TRUE FALSE

29. The Moon has a very thin atmosphere.
    TRUE FALSE

30. According to the theory of evolution, free oxygen in the atmosphere is a result of photosynthesis.
    TRUE FALSE

SCORE: /30

UNIT 1

Test **Environment and Resource Management**

Name: _____ Date: _____

PART A: Multiple Choice (10 × 1 = 10 marks)

Read each of the following questions and circle the correct answer.

1. Which of the following elements is part of the geosphere?
   a) rock
   b) water
   c) air
   d) living things

2. Which of the following energy sources is NOT a main contributor of Earth's energy budget?
   a) solar energy
   b) geothermal energy
   c) tidal energy
   d) wind energy

3. At what trophic level do consumers receive the most energy from plant material?
   a) primary
   b) secondary
   c) tertiary
   d) quaternary

4. Which of the following essential elements is a mineral nutrient?
   a) carbon
   b) hydrogen
   c) nitrogen
   d) oxygen

5. Which of the following processes does NOT release carbon into the atmosphere?
   a) respiration
   b) decomposition
   c) volcanic eruptions
   d) photosynthesis

6. Which of the following outcomes is NOT a result of the use of synthetic fertilizers?
   a) an increase in agricultural productivity
   b) deforestation
   c) an increase in cancers among humans
   d) eutrophication

7. Which of the following elements is a key component of photochemical smog?
   a) nitrogen
   b) oxygen
   c) hydrogen
   d) carbon

8. What is the term given to a group of the same species interacting in the same geographic area?
   a) community
   b) genetic diversity
   c) habitat
   d) population

9. Which of the following terrestrial biomes can be found in Canada?
   a) desert
   b) tundra
   c) tropical savannah
   d) dry shrub/woodland

10. Which of the following groups are NOT heterotrophs?
    a) producers
    b) herbivores
    c) carnivores
    d) omnivores

PART B: True or False (20 × 1 = 20 marks)

Read each of the following statements and circle the correct response.

11. The hydrologic cycle is an example of a closed system.
    TRUE FALSE

12. The Earth Summit took place in Rio de Janeiro in 1992.
    TRUE FALSE

13. Water vapour is part of the hydrosphere.
    TRUE FALSE

14. According to the laws of thermodynamics, energy cannot be created or destroyed.
    TRUE FALSE

15. An ice cap has a lower albedo than a forest.
    TRUE FALSE

16. The more trophic levels that exist in a food chain the greater the loss of usable energy.
    TRUE FALSE

17. The ocean is an important carbon sink.
    TRUE FALSE

18. Nitrogen fixation turns ammonia into nitrates.
    TRUE FALSE

19. Temperate and tropical rainforests contain 35 percent of the world's plant and animal species.
    TRUE FALSE

20. Rainforests help to regulate global climate patterns.
    TRUE FALSE

21. Debt is a key factor in the deforestation of tropical rainforests.
    TRUE FALSE

22. Approximately 50 million species have been discovered and described.
    TRUE FALSE

23. Water is an abiotic component of an ecosystem.
    TRUE FALSE

24. Canada's national parks cover 14 percent of the country.
    TRUE FALSE

25. Ottawa's Rideau Canal has been declared a cultural World Heritage Site by UNESCO.
    TRUE FALSE

26. Head-Smashed-In Buffalo Jump was Canada's first national park.
    TRUE FALSE

27. Phytoplankton are the most significant producers in aquatic ecosystems.
    TRUE FALSE

28. Skunks are omnivores.
    TRUE FALSE

29. The planting of a sugar cane field is considered to be monoculture.
    TRUE FALSE

30. Fast-breeding insects can develop genetic resistance to pesticides.
    TRUE FALSE

SCORE: /30

UNIT 1

Answer Key **Unit 1 Tests**

Physical Geography	**The Environment and Resource Management**
PART A: Multiple Choice	**PART A: Multiple Choice**
1. d) protosuns	**1.** a) rock
2. d) Mars and Jupiter	**2.** d) wind energy
3. b) rapid rotation	**3.** a) primary
4. c) temperature extremes	**4.** c) nitrogen
5. d) the absence of iridium	**5.** d) photosynthesis
6. a) solar radiation	**6.** b) deforestation
7. c) the mantle	**7.** a) nitrogen
8. d) convection currents	**8.** d) population
9. c) the orbit of a moon	**9.** b) tundra
10. b) carbon	**10.** a) producers
PART B: True or False	**PART B: True or False**
11. False	**11.** False
12. True	**12.** True
13. False	**13.** False
14. True	**14.** True
15. True	**15.** False
16. False	**16.** True
17. True	**17.** True
18. True	**18.** False
19. False	**19.** False
20. True	**20.** True
21. False	**21.** True
22. False	**22.** False
23. True	**23.** True
24. False	**24.** False
25. False	**25.** True
26. False	**26.** False
27. True	**27.** True
28. True	**28.** True
29. False	**29.** True
30. True	**30.** True