Important Concepts . . .

Preview Review

Science Grade 7 TEACHER KEY

W1 - Lesson 3A: Environmental Impacts of Human Activities

W1 - Lesson 3B: The Particle Model of Matter, Temperature, Heat, and Change of State

V5-07

Important Concepts of Grade 7 Science

W1 - Lesson 1 ..... Interactions and Interdependencies
W1 - Lesson 2 ..... Nutrient Cycles, Energy Flows, and Changes in Ecosystems
W1 - Lesson 3A ..... Environmental Impacts of Human Activities
W1 - Lesson 3B ..... The Particle Model of Matter, Temperature, Heat, and Change of State
W1 - Lesson 4 ..... Heat Transfer
W1 - Lesson 5 ..... Understanding Heat and Temperature in Nature and Technology
W1- Quiz
W2 - Lesson 1 ..... Life Processes and Structure of Plants
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W3 - Lesson 1 ..... Forces on and within Structures
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W3 - Quiz.....

Materials Required.

Textbook:
Science in Action 7

Science Grade 7
Version 5
Preview/Review W1 - Lesson 3 TEACHER KEY

Publisher: Alberta Distance Learning Centre
In-House Teacher: Barb Philips
Reviewer: Norene Pinder

Project Coordinator: Dennis McCarthy
Preview/Review Publishing Coordinating Team: Nina Johnson, Laura Renkema, and Donna Silgard

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Preview/Review Concepts
for
Grade Seven Science

TEACHER KEY

W1 - Lesson 3A:
Environmental Impacts
of Human Activities

OBJECTIVES

By the end of this lesson, you should be able to

- explain some of the major ways humans affect the environment
- describe and predict positive and negative effects of various human behaviours on the environment
- define and describe examples of bioinvasion and their effects on the ecosystems
- describe ecological footprints

GLOSSARY

bioinvasion - movement and settling of a non-native species into an area

ecological footprint - a measurement of the effect of a person's lifestyle on the earth

endangered - a species approaching extinction

extinct - a species that no longer exists anywhere

extirpated - a species that no longer exists in a particlar area

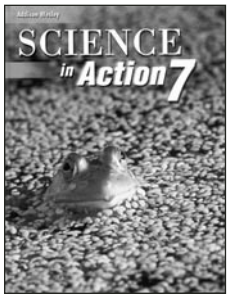
habitat - the place where an organism lives

pollution - something added to the environment that harms living things

threatened - a species whose numbers are declining to low levels

W1 - Lesson 3A: Environmental Impacts of Human Activities

People have always changed the environments they live in. The more technologically advanced a group of people is, the more they tend to change things around them. This lesson will look at some of the things people have done and perhaps are continuing to do to the environment. The effects of these activities will be studied.



Destruction of Habitat

Humans have changed the environment in a major way damaging and destroying habitat. An example of this in Western Canada is the farming of Native Prairie grasslands. These grasslands now cover only a small percentage of their original area.

Sometimes even well-meaning decisions can destroy the habitats of organisms . Read page 20 of *Science in Action 7*. Decisions that cause climate change can also lead to destruction of habitat. (See page 60 of your textbook.)

1. If you were the decision maker, what would you do about the beaver situation in Yoho Park? Why? (See page 20 of the textbook.)

   Answers will vary. Should support answer.

2. How can climate change harm living organisms? (See page 60 of the textbook.)

   Resulting floods and fires can destroy habitat and kill organisms directly. Temperature and precipitation changes can also lead to habitat change.

3. Describe an example of habitat destruction with which you are familiar. Tell what has happened and describe the effects.

Answers will vary.

Bioinvasion

Read page 56 of *Science in Action 7*. As humans move around the world, they take living things with them from their original homes. Some of these are deliberately taken; others unknowingly hitch a ride. Unfortunately, once these organisms reach another location, they may cause problems there.

4. Why do bioinvading organisms cause problems in their new habitats?

They often lack natural enemies and can over-run an area. They out-compete native species.

5. What sorts of problems does purple loosestrife cause?

It takes over wetlands; organisms (e.g., ducks) can not get through it.

6. Name some purposely released organisms that have caused problems in their new locations.

Answers will vary. e.g., starlings in North America, rabbits in Australia.

Pollution

Pollution can harm humans as well as other living organisms. It can be in the form of chemicals released into the environment or garbage. Read pages 21, 23, 67 to 69 of your textbook.

7. Why is garbage made of plastic a greater problem than waste plant material?

   Plant material is biodegradable; plastic is not.

8. What sorts of waste materials are important to keep out of the water system? Why?

   Water soluble materials, micro-organisms, etc., move through water systems, are had to remove, and cause harm to living organisms.

9. Discuss how sanitary landfills should be built to reduce harm to the environment.

   Landfills should be designed to keep everything in them: lining of clay, plastic, etc., pipes to carry off leakage safely, compacted, and covered.

10. Name a chemical released into the environment. Then explain the problems caused by it.

    Answers will vary.

What About the Organisms?

We know that our activities can negatively affect living organisms. What happens to them as a species? See page 69 of *Science in Action 7*. Not all organisms can deal with fairly rapid changes to their environments. The more specialized they are, the less they can deal with change. Sometimes they can become threatened, endangered, or even extinct. They are said to be **extirpated** from a particular location if they disappear from there but are found elsewhere.

11. What is the difference between threatened, endangered, and extinct?

Threatened - declining numbers to low levels

Endangered - approaching extinction

Extinct - no living members

12. Name a species that has become extinct in the last 150 years.

passenger pigeon, etc. - many examples.

13. Name a species that people are trying to save from extinction.

Many examples, such as kit fox, burrowing owl,

Vancouver Island marmot.

Ecological Footprint

A method of measuring our impact on nature has been developed. It is called the **ecological footprint**. Our ecological footprint is a measure of the amount of land necessary to support us in our activities. People in developed nations have a much larger footprint than those in developing nations such as Peru. Canadians on average have a footprint that measures 7.7 ha (hectares). Read pages 78, 79, and 82 of *Science in Action 7* for more details.

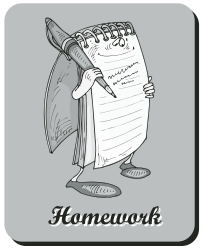
14. Compare the ecological footprint of Canadians and the average for all people worldwide.

Canadians 7.7 ha each; Worldwide 2.2 ha each

15. What are some ways to reduce our ecological footprint?

decrease water and energy use; reduce, reuse, recycle, etc.

In this lesson, you learned about many ways that humans affect the environment. We do this by adding or removing materials in ecosystems. We can influence the movement of other organisms, which then affect yet other living things. Some of our actions have positive effects on the environment; others have negative effects. In your homework, you will look at the effect that you and your family have on the environment. Will you find ways you can reduce your ecological footprint? Will you make those actions a part of your lifestyle?



Homework

1. At home, look at the garbage that has been accumulated over the last few days. Estimate how much there is. What sorts of materials are in it? Identify them as biodegradable or not biodegradable.

Answers will vary.

2. Identify some ways that you could easily reduce the ecological footprint of your family.

decrease water and energy use; reduce, reuse, recycle, etc.

Preview/Review Concepts
for
Grade Seven Science

TEACHER KEY

W1 - Lesson 3B:
The Particle Model of Matter, Temperature, Heat, and Change of State

OBJECTIVES

By the end of this lesson, you should be able to

- state the Particle Theory of Matter
- describe characteristics of the three states of matter
- identify and define phase changes
- define heat and temperature and describe how they affect matter
- recognize and understand the information given by time-temperature graphs

GLOSSARY

condensation - to change from gaseous to liquid state

evaporation - to change from a liquid to a gaseous state

freezing - to change from a liquid to solid state

heat - energy that flows from matter at a higher temperature to matter at a lower temperature

melting - to change from a solid to a liquid state

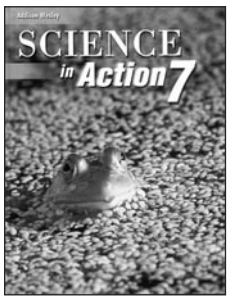
sublimation - to change from a gas to a solid or solid to a gas

temperature - the average kinetic energy of particles of a substance

W1 - Lesson 3B: The Particle Model of Matter, Temperature, Heat, and Change of State

To learn about heat and temperature, you must be aware of some basic information. This lesson covers that information.

The Particle Theory of Matter



Through observation and experimentation, scientists have discovered some basic facts about the building blocks of matter. They have called them the **Particle Theory of Matter**. This theory has four points. They are listed below and explained on page 193 of *Science in Action 7*.

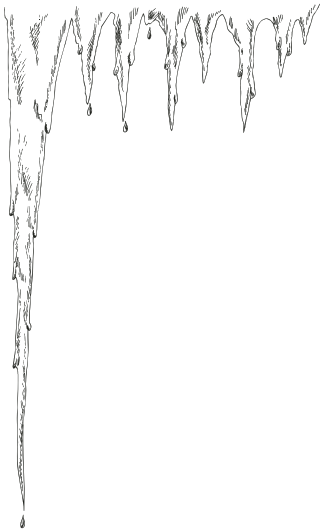
- All matter is made of particles.
- The particles are in constant motion.
- The particles are separated by space.
- A change in heat changes the speed of the particles' motion.

1. How does the motion of a particle change as heat is removed from the particle?

   it will slow down

2. When a group of particles increase speed, do the spaces between the particles become larger or smaller?

   the spaces will become larger



Temperature

Temperature is a term we use in everyday life to describe how hot or cold something is. That is correct, but it has a specific scientific meaning in addition to that. It means "the average **kinetic energy** of all particles in a substance". Kinetic energy is the energy of motion. Read pages 198-200 in *Science in Action 7* for more details. **Thermal energy** is different from temperature because it is the total rather than the average kinetic energy of the particles in a substance. We have technology to measure temperature – the **thermometer**.

3. What happens to the temperature of a substance (not at a phase change) if energy moves into it?

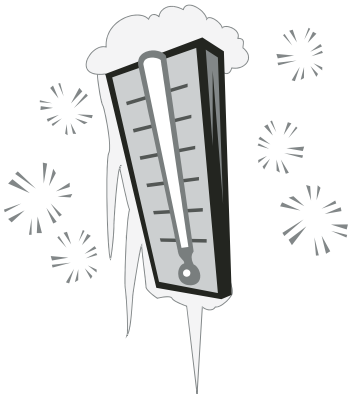
   The temperature will increase.

4. In what units do we measure temperature?

   degrees - Celsius/Centigrade/Fahrenheit

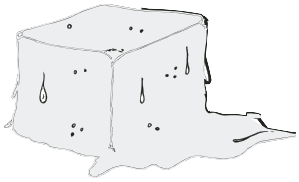
5. When the average kinetic energy of a group of particles decreases, what happens to their temperature?

   It will decrease.



Heat

The term **heat** is often used interchangeably with temperature. But heat has a specific scientific meaning also. Heat is energy that is transferred from where there is more kinetic energy to where there is less kinetic energy. In other words, heat energy moves from something at a higher temperature to something at a lower temperature. Read page 199 of your text.



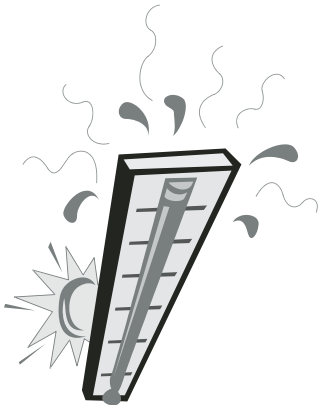
6. When you put your hand on an ice cube, why does your hand cool?

   Heat moves from your hand to the ice. Note: cold does not move into your hand. Cold is a lack of heat - not a separate entity.

7. When you put your hand on a hot burner, in which direction does heat move?

   from the burner to your hand

States of Matter and Change of State



Matter exists in one of three states — solid, liquid, or gas. Read pages 194, 196, 205, and 206 of *Science in Action 7*. As heat goes into or leaves matter, changes occur. The changes are in temperature, volume, and state. Particles commonly respond to an increase in heat by speeding up and moving apart. This causes an increase in volume and an increase in temperature. At a certain point, although heat is still entering the particles, the temperature will remain constant while the substance changes state.

The opposite occurs while heat is leaving a substance. The particles slow down and move closer together. Temperature drops. At a phase change, heat continues to leave but the temperature remains constant until the substance changes state.

8. What are the characteristics of matter in each of the three states? List them and give two examples of each state.

   a. solid ***(e.g., brick, ice) has a definite shape and volume; attractive forces hold the particles together. The particles have less kinetic energy than liquid and gas forms.***

   b. liquid ***(e.g., water, oil) has a definite volume but not shape. Less attractive forces than solids, more kinetic energy than solids.***

   c. gas ***(e.g., oxygen, carbon dioxide) No definite volume or shape. Attractive forces don't hold particles together. Have the most kinetic energy .***

9. Why are expansion joints used on bridges and similar structures?

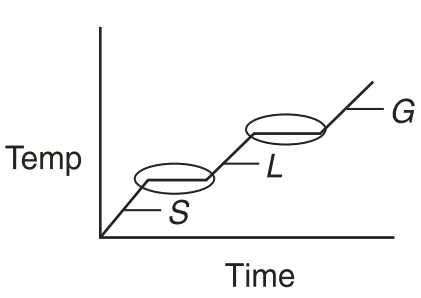
   To allow contraction/expansion of the material without breaking the structure.

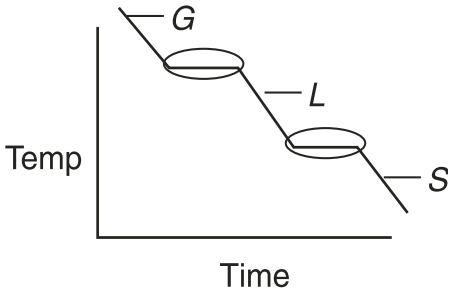
10. James is having difficulty removing the metal lid from a jar of pickles. His teacher suggested that he hold the lid end of the jar under hot running water. Why was he told to do this?

to expand the metal lid

11. Although heat is still entering the particles, at a certain point, the temperature will remain constant while the substance changes state. The same occurs while heat is leaving a substance. On a time-temperature graph, the phase change is shown by a flattening or plateauing of the line. This is where the temperature stays the same.

Circle the phase changes on the graphs below. Then, label where the substances are liquid, solid, and gas.





12. What happens to the temperature of a substance at its phase changes?

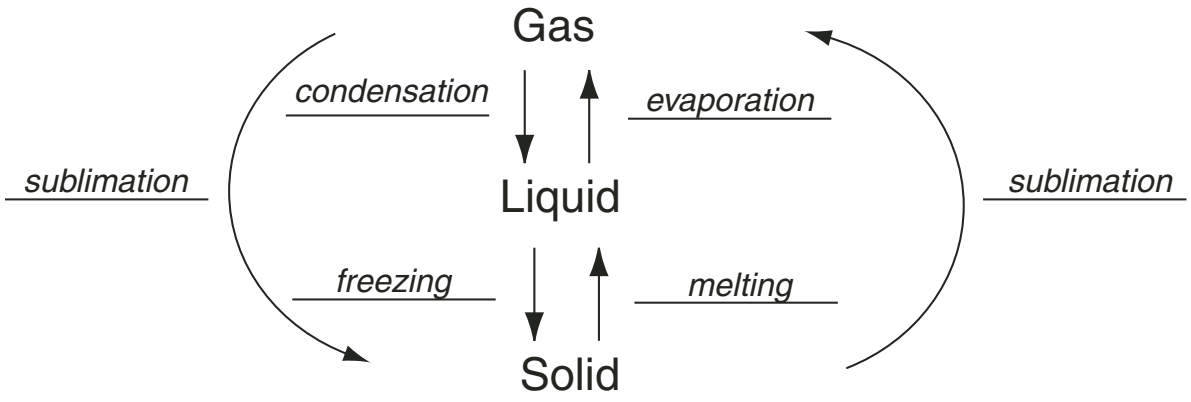
The temperature stays constant until the phase change is finished.

Phase Change List

condensation
sublimation
freezing
melting
evaporation

13. Each phase change has a name. For example, when a gas cools and becomes a liquid, **condensation** occurs. **Sublimation** occurs when a substance changes directly between a solid and a gas, and misses the liquid phase.

    Label each phase change on the diagram below, using words from the list on the left.

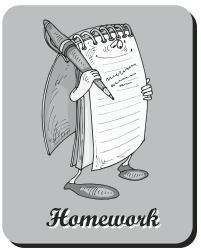


14. Which states volume is affected the most by heat transfer?

    gas

15. Which states volume is affected the least by heat transfer?

    solid



Homework

At home, look for and list substances that can be changed between phases easily without destroying them.

Answers will vary. Should include water.