# FOCUS IN ACTION

# **Grade 7 Science Focus**

Unit A - Interactions and Ecosystems



http://www.edquest.ca

## **'Focus in Action' UNIT LEARNING PACKS**

These booklets are designed to provide Grade 7 students with all the resources needed to review or reinforce concepts, covered in the Alberta Science Curriculum, and included in the Grade 7 Science Final Exam in June. There are circumstances in which **an entire unit** may be missed and covering the concepts from that unit (for the final exam) can be difficult. This can happen for a number of reasons:

- Students new to the school register throughout the year (from other provinces, school jurisdictions or countries)
- Students may be ill or have surgery and often can miss one or more units
- Students have extended holidays throughout the year
- Transfers from another school, who have completed the units in a different order

For additional support, students are directed to the **Edquest Middle School Science Website** or, Scienceman Resource (www.scienceman.com/scienceinaction/pgs/hot\_8u1.html)

## Unit 1 – Interactions and Ecosystems

- Topic 1 Notes & Quiz
- Topic 2 Notes & Quiz
- Topic 3 Notes & Quiz
- Topic 4 Notes & Quiz
- Topic 5 Notes & Quiz
- Topic 6 Notes & Quiz
- Topic 7 Notes & Quiz
- Unit Summary
- Review Booklet
  - (Covered in class, prior to the Final Achievement Exam)
- Unit Test
- Answer Key for Section Quizzes and Unit Test

Additional support will be provided, in the form of practice Achievement Test Questions, during the course review in June. Multiple Choice Questions and Numerical Response Questions will be reviewed, as these are the types that will make up the Science 7 Final Exam

Handouts and other activities, to reinforce the concepts covered in this Unit, will be made available based on need. If you require further information or resources, email Edquest directly: edquest@gmail.com.

#### Finding Solutions to Problems, instead of Making Excuses



#### Student Instructions for use of this Learning Pack

The purpose of this Learning Unit Pack is to provide you with the resources that will help you cover the material from the curriculum that will be tested on the Final Exam in June. Follow these steps to successfully complete this Unit Learning Pack:

#### Step 1 – Read the Topic Notes

**Step 2** – Use a **highlighter** to identify the key words or phrases in the Topic Notes and reread the material again paying close attention to those words that you highlighted. If necessary, modify your highlights to make sure you understand the material in the notes.

#### Step 3 – Complete the Topic Quiz

**Step 4** – Correct the Topic Quiz by **checking the answers** in the back of this Learning Pack.

**Step 5** – Using your **textbook** and the **completed quiz**, find the page where the question and correct answer can be found and write it next to the question number in your Learning Pack.

Step 6 – Repeat Steps 1-5 for each of the other Topics in this Unit.

Step 7 – Look over the Unit Outline to review the Key Concepts once you have completed all of the Topics.

Step 8 – Complete the Unit Review, using your Learning Pack and Textbook.

**Step 9** – **Highlight** those sections of the Review that you had difficulty with and review those sections with your teacher prior to taking the Unit Test.

**Step 10** – Take the **Unit Test** and correct it using the answer key provided in the back of the Learning Pack.

**Step 11** – You should now be ready to answer any questions on the **Final Exam** related to this Unit.

Anything you still do not understand should be discussed with your teacher. Congratulations on your **Independent Study**, and Good Luck on the Final Exam. I hope you have made good use of this resource. Please provide feedback to your teacher, so that this resource can be improved.

Additional support is available in the form of practice Achievement Test Questions. **Multiple Choice Questions** and **Numerical Response Questions** will be made available on request, as these are the types that will make up the **Science 7 Achievement Exam**.

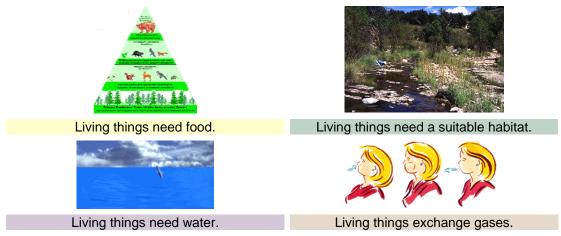
Handouts and other activities, to reinforce the concepts covered in this Unit may be acquired by visiting the Edquest Middle School Science Resource Website

http://www.edquest.ca

#### **Topic 1 - Interactions Within Ecosystems**

Ecology is the study of the relationship between living organisms and their environment. An ecologist is someone who studies those relationships.

#### The Needs of Living Things



Living things are always interacting with each other and with the non-living things in their environment.

#### Adaptations

Living things are adapted, so they 'fit' into their surroundings, to ensure survival. An adaptation is an inherited characteristic that helps an organism survive and reproduce in its environment. Sometimes adaptations are learned during the organism's lifetime.

#### **Ecosystems**

An ecosystem is the interactions between living and non-living things in a particular environment. An ecosystem is a place where these interactions occur, such as a rotting log, or a forest. All organisms and parts within this place are interacting all the time and adjustments must occur if the organism is to survive. Ecosystems vary in size and complexity. In order to study an entire ecosystem, scientists often study only a small aspect of an ecosystem and then work with other scientists to piece together the overall picture of how the ecosystem functions.

#### Interactions in Ecosystems

#### Symbiosis

When two species live closely together in a relationship that lasts over time symbiosis occurs. There are three forms of symbiosis:

#### **Mutualism**

Mutualism occurs when there is a relationship between two different organisms, in which each partner benefits from the relationship. Examples include:

## Mutualism between plants and their herbivores



3-way Mutualism between an ant, a butterfly caterpillar, and an acacia plant.



#### Parasitism

Parasitism occurs when there is a relationship between two different organisms, in which one partner benefits from the relationship, while the other partner is harmed. Typically in the parasitic relationship the partner that benefits (the parasite) lives on, or in the other organism (the host) and feeds on it.

Examples include:

Aphid mummy - the result of parasitism



A Shrik crucifies Kalahari barking gecko. They store them as a cache for a later meal.

#### Commensalism

Commensalism occurs when there is a relationship between two different organisms, in which one partner benefits from the relationship, whiles the other neither benefits, nor is harmed. Examples include:

**Tropical Sea Anemones** 

Anemone-fishes dwell among the tentacles of

Both partners apparently benefit from the relationship,

Insects and Flowers



Impacts on Ecosystems



Symbiotic relationships are only a few ways that organisms interact with one another within an ecosystem. Other interactions may involve the physical changing of the ecosystem by the organisms living in it and interacting with parts of it. Like when a family of beavers makes a dam, the stream below the dam dries up, killing the water organisms that need the water to survive. Above the dam, a pond changes the habitat and limits the kinds of organisms that can survive there. For every action in an ecosystem there is a resulting effect and reaction, which will change the make-up of the ecosystem in some way.

#### **Topic 1 - Interactions Within an Ecosystem**

- 1. Living things have basic needs. Throughout the first topic in this unit the needs of living things were examined in depth. The four basic needs of living things are:
- A. food, clothing, shelter, love
- B. food, water, habitat, space
- C. water, air, habitat, protection
- D. air, water, food, habitat
- 2. Some living things depend on each other in a very close relationship, which lasts over time. This relationship is called ...
- A. mutualism
- B. parasitism
- C. symbiosis

...

- D. commensalism
- 3. Adaptations are inherited characteristics that help an organism to survive and reproduce in its environment. Looking both ways before crossing a street helps us survive because it is
- A. inherited from our parents
- B. learned through experience
- C. a survival adaptation
- D. an inherited survival experience
- 4. A salamander hides under the bark, fungi grows on the rotting log and other forest dwelling organisms use the hollow core as a home. This rotting decaying log is an ...
- A. environment
- B. ecological subsystem
- C. ecotrust
- D. ecosystem
- 5. Tapeworms live inside organisms and feed on the nutrients of the food they eat. A tapeworm is an example of ...
- A. mutualism
- **B.** parasitism
- C. commensalism
- D. cannabalism

#### Topic 2 – Human Impacts on Ecosystems

Natural Resources are the materials and products that are found in nature, that people use to meet their basic needs.

The impact that people have on the use of resources can be very small, or can be huge, and can lead to positive or negative consequences. The needs of all living things now have to be met with the available natural resources. How we are able to satisfy these needs with minimal conflict will determine how resourceful we can be.

#### People and Nature – A Changing Relationship

The ways people interact with the environment has changed over time. Machines and advanced technologies have caused a higher impact than in the past. All of the needs people had in the past were satisfied by the natural resources they were able to find in the environment around them. Nowadays, resources are transported throughout the world, as the demand gets higher. Lifestyle changes over time have increased the pressure on different environments and the ecosystems we live in.

#### Gathering Food in Alberta: Then and Now

Head-Smashed-In Buffalo Jump



Buffalo were hunted by driving them to run off a cliff. The carcasses were then dragged to camps where they were processed into meat, hides, tools, and other necessary items.



All parts of the buffalo were used, with minimal impact on the environment.



livestock.

Early settlers kept mixed farms (livestock and crops). The improvements in technology allowed them to stay in one place (instead of following the food supply around). This lifestyle had a larger impact on the environment because farmland and ranchland had to be modified, to support the crops and Cattle Feedlots



A large area that has been fenced in to feed cattle for food is called a feedlot. Once the beef is slaughtered and processed, the products are transported all over the world. The impact of this activity is significant, because cattle waste can pollute the water system nearby, and the soil conditions can be negatively affected.

#### When Is a Need a Want?

Needs are basic to survival, whereas, 'wants' are things that just make survival more comfortable or enjoyable. Each time a need or a want is satisfied, natural resources or energy are used up. This impacts the environment we live in. Transporting food from all around the world, just so we can have the luxury of choice impacts other regions as well, because those regions had to clear land, use fuel (energy) and through the industrial processes caused pollutants to enter the air.

When our 'want' demands conflict with the health of our ecosystems, we need to begin making some more responsible choices. The needs of wildlife can be negatively impacted by the wants of people. When this happens we need to decide whether our want is more important than their need.

#### **No Simple Answers**

Setting a forest on fire (a controlled burn) is often necessary to maintain a balance in the ecosystem. These fires get rid of small trees, leaves, needles and other debris that settles on the forest floor. The new growth after a fire becomes food for elk, deer and other animals that need these nutrients from the forest floor.

[Find out more] <u>http://www.cws-scf.ec.gc.ca/hww-fap/hww-fap.cfm?ID\_species=32&lang=e</u> Knowing what effects you are having on the environment (or will likely have) will help you make decisions. The use of DDT (a chemical pesticide) was found to have a negative effect on Peregrine Falcons.

It wasn't until the species was almost lost completely that something was done. DDT was banned and recovery programs were put in place to restore the numbers of peregrine falcons. Swift foxes were accidentally poisoned because certain predators were seen as 'pests' or 'unnecessary' animals.

[Find out more] <u>http://www.cws-scf.ec.gc.ca/hww-fap/hww-fap.cfm?ID\_species=75&lang=e</u> When the Swift foxes used the poison instead, the species almost became extinct. Natural control is necessary in any ecosystem. If this natural control is upset, the impact can have ripple effects, which were never anticipated.

#### Topic 2 – Human Impacts on Ecosystems

- 1. The Nootka, an Aboriginal tribe from the West Coast of Canada, utilized the natural resources of the environment around them. They used the bark of the red cedar tree for ...
- A. clothing
- B. canoes
- C. tipis
- D. cooking utensils
- 2. Head-Smashed-In Buffalo Jump is in the Porcupine Hills, in southern Alberta. The Buffalo were hunted for their meat, hides, bones and sinew. Instead of hunting the Buffalo with spears and arrows they ...
- A. shot them with weapons provided by the settlers
- B. herded them into corrals
- C. ran them over a cliff
- D. cornered them up against a cliff
- 3. 'Wants' are things that make our life more enjoyable. The distinction between a 'need' and a 'want' has become blurred. Satisfying our needs and wants usually uses natural resources. Which of the following is an example of a luxury?
- A. water from a well
- B. potatoes from a garden
- C. greenhouse tomatoes
- D. crabapples from your tree
- 4. Using pesticides that contained DDT was very effective in controlling insect pests on many crops. It was subsequently banned because of this harmful side effect.
- A. birth defects in baby chicks
- B. soft egg shells
- C. bioaccumulation in wolves
- D. death of small mammals
- 5. Predators such as wolves and coyotes and even bears are moving closer and closer to highly populated areas. This is posing an increased danger to people, so predator populations are being culled (reduced in number). This can have a devastating effect on the ecosystem because without this natural control ...
- A. prey will also be reduced
- B. prey will become overpopulated
- C. prey will be kept in check
- D. vegetation will be overgrown
- 6. The peregrine falcon, the swift fox and the burrowing owl were all once on the brink of extinction until these practices helped save them, EXCEPT for ...
- A. banning of DDT
- B. alternative food supply
- C. captive breeding program
- D. relocation of predators

#### **Topic 3 – Environmental Choices**

#### Your Ecological Footprint

We depend on the environment and we are part of the environment. Sustainability means that the resources from the environment can be replaced as quickly as they are used. Are we putting back what we take out, or, are we using up all the resources before they can be replaced?

#### Impact Here and There

To calculate your ecological footprint, you need to determine the total area of land that you use and water needed to supply all of the energy and materials that you use, as well as absorb all of the waste that you produce.

Materials that are included are: food, water, supplies to build shelter and raw materials needed to produce the manufactured products you use.

Energy includes: electricity, natural gas, as well as all the energy needed to produce, and transport all of the manufactured products you use





Large Ecological Footprint



The ecological footprint of average Canadians is very large, because they are using many more resources and creating much more waste than is sustainable.

#### Ways to reduce ecological footprint include:

- Be aware of the products you consume in a typical day
- Reduce the energy you use
- Reduce the number of products you buy
- Reduce the amount of garbage you produce

#### Reduce, Reuse, Recycle



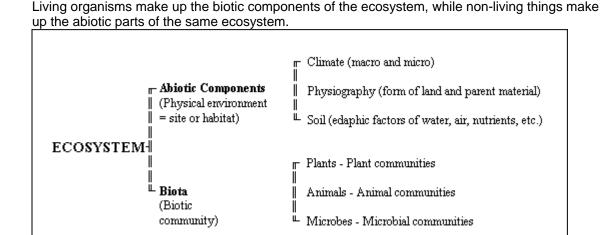
#### **Making The Connection**

Better understanding the principle of sustainability will enable people to realize the impact their wants and needs have on the life of this fragile planet. The more knowledge we have about how our actions positively or negatively affect sustainability, the more often we will make choices that will sustain our natural resources.

#### **Topic 3 – Environmental Choices**

- 1. Living beyond our means can have a devastating effect on our environment. So how much of an impact we make determines our ...
- A. sustainability
- B. ecosystem balance
- C. ecological footprint
- D. consumer bias
- 2. One way of changing our impact on the environment we live in is to ...
- A. using a car instead of a bus to get to work
- B. pack our garbage in smaller bags
- C. take a bath every day instead of showering
- D. become aware of all the resources you use
- 3. There are many waste-reducing practices, which are being suggested to lower the impact we are making in our environment. The most effective practice is ...
- A. recycling
- B. reusing
- C. reducing
- D. reclaiming
- 4. When used materials are turned into new materials like kitchen scraps placed in a compost bin the practice being used is ...
- A. recycling
- B. reusing
- C. reducing
- D. reclaiming
- 5. To determine your ecological footprint, all of the following calculations are necessary, EXCEPT for ...
- A. area of the house you need
- B. amount of water you use
- C. energy supply needed
- D. amount of waste you produce

#### **Topic 4 – How Organisms Interact**



#### The Roles of Organisms in an Ecosystem

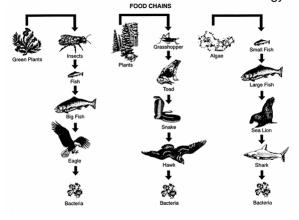
All of the organisms within an ecosystem have different roles. These roles are called niches. Organisms can have more than one niche and knowing the niches of an organism can help to explain why they act and interact the way they do. To determine an organism's niche, you need to identify what it eats, where it lives and how it interacts with the other organisms in the same ecosystem.

#### Niches include:

- Producers produce food energy for themselves and others
- Consumers consume the food made by the producers
- Herbivores eat producers (plant eating niche)
- Carnivores eat other consumers (meat eating niche)
- Predators eat prey
- Omnivores eat both producers and consumers

#### Food Chains

A food chain is a model that shows how energy stored in food passes from organism to organism.

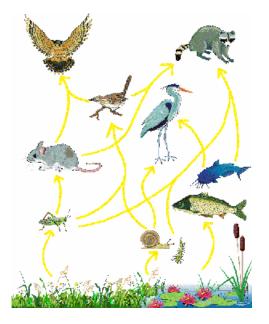


Energy flow is the movement of energy, starting with the sun, and passing from one organism to another.

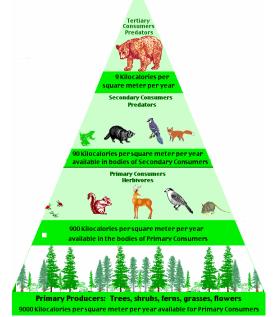
As energy flows from one organism to another a food chain is established. Food chains usually involve more than three organisms.

#### Food Webs

A food web is a combination of many different food chains, showing the interrelationships between and among many different producers and consumers in an ecosystem.



A Food Pyramid is a model, which represents the number of organisms consumed at each successive level of the pyramid.



The size of each level indicates the number of organisms at that level. There are always more animals being eaten than are eating.

To find out how much energy is being transferred from one level of the pyramid to the other, Biomass needs to be calculated. Biomass is the total of all the organisms in the ecosystem. As you move up the pyramid, there is less biomass. The most biomass is found at the base, where the producers are.



#### The Clean-Up Squads:

Decomposers are different from scavengers because they do not actually eat dead material. They grow on or in the dead or waste matter, absorbing the nutrients directly into their cells, which are then recycled back into the environment.





Scavengers are organisms that feed on dead or decaying plant or animal matter.





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#### **Topic 4 – How Organisms Interact**

- 1. An ecosystem thrives with biotic and abiotic component parts. An example of an abiotic part of an ecosystem is ...
- A. micro-bacteria
- B. fungus
- C. minerals
- D. decaying plants
- 2. To determine an organism's niche, all of the following must be determined, *EXCEPT* ...
- A. how it is classified
- B. what it eats
- C. where it lives
- D. what relationships it has with other organisms
- 3. Organisms in an eco system can be classified as producers or consumers. The producers provide food for the consumers. An organism that consumes both producers and other consumers is called a ...
- A. herbivore
- B. omnivore
- C. carnivore
- D. prey
- 4. Food chains and food webs are models in science which visually show us the different relationships within an ecosystem. The primary difference between the food chain and the food web is ...
- A. a food chain shows how energy is stored
- B. a food web shows how energy is used
- C. a food web is a complex system of food chains
- D. a food chain is a combination of different food webs
- 5. The clean-up crew is the decomposers. Decomposers and scavengers get rid of the garbage and waste in an ecosystem. Decomposers differ from scavengers because they
- A. only eat dead organisms
- B. do not eat dead organisms
- C. break down larger organisms
- D. only feed on dead plants and animals

#### **Topic 5 - Cycles in the Environment**

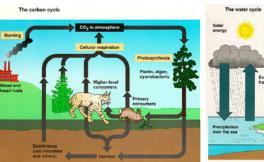
When organisms breathe, the gases are recycled in the air and used by other organisms. When organisms die, the nutrients they are composed of are recycled back into the environment and used as well.

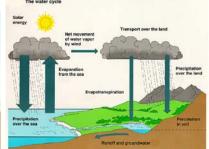
#### The Carbon Cycle

#### **The Water Cycle**

Carbon is necessary for all life to exist and is recycled in the environment.

All living things require water to survive and this water is also recycled over and over again. The water cycle (as illustrated) contains 4 processes: evaporation and transpiration – move water from the Earth to the atmosphere, condensation and precipitation return the water to Earth.





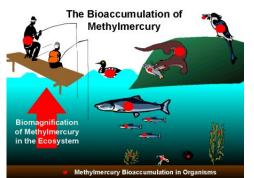
#### **Pollution in the Environment**

Pollution occurs when a substance is added to the environment at such a fast rate that it cannot be broken down, stored or recycled in the air, land, or water in a non-damaging form. Pollutants are substances that cause pollution.

Type of Pollutant	Acid Rain (high pH level)	Carbon Dioxide
Reason they are pollutants	Sulfur and Nitrogen at higher than normal levels in the air, which mix with water to produce acidic precipitation.	Burning of Fossil fuels puts higher than normal levels of CO2 into the atmosphere and the ozone layer (which protects us from radiation is being depleted.

The Movement of Pollution (accidental contamination of the air, water and ground- unsafe use)

**Bioaccumulation** is the process in which a substance builds up in a living organism from the surrounding air or water, or through the consumption of organisms that already have the substance that is being accumulated. It will vary for different species and will depend on sources of contamination, as well as water quality and temperature. It provides increasing levels harmful to species higher up the food chain, because of "**biomagnification**", where substances like mercury will increase in concentration from microorganisms, to fish, to fish eating predators like otters and loons, and to humans.



The accumulated mercury is shown by the red dots.

Source: Communication Canada

#### **Topic 5 – Cycles In The Environment**

- 1. Carbon is an integral part of an ecosystem. It is cycled throughout the ecosystem as it is used and then reused. It is necessary for all life to exist. Carbon is used by plants in the process of ...
- A. respiration
- B. photosynthesis
- C. transpiration
- D. decomposition
- 2. Petroleum products, which contain carbon, are burned, and the carbon escapes into the atmosphere, as carbon dioxide, BUT, how does it get into the petroleum in the first place?
- A. refineries
- B. plant respiration
- C. decomposing plankton
- D. photosynthesis in plants
- 3. Another very important cycle is the Water Cycle. All living things need water to live. This cycle has four main processes. The two processes that return water to the earth are ...
- A. evaporation and condensation
- B. condensation and precipitation
- C. transpiration and condensation
- D. evaporation and transpiration
- 4. The process in which water, in the water cycle, goes through a phase change, from a gas to a liquid, is called ...
- A. evaporation
- **B.** transpiration
- C. condensation
- D. precipitation
- 5. Pollution can cause problems within any ecosystem. The pollutants can enter this ecosystem by combining with the water vapour in the air. Their effect is felt when they become ...
- A. basic and cannot be decomposed
- B. acidic and cannot be decomposed
- C. basic and increase plant growth
- D. acidic and destroy the ecosystem

#### **Topic 6 – Succession and Change in Ecosystems**

The gradual process by which some species within an ecosystem replaces other species is called succession.

**Primary succession** is the gradual growth of organisms in an area that was previously bare – like a rocky slope. Organisms to first appear are those that can cling to the rock and grow, such as mosses and lichens. These organisms break down the rock and died. Other organisms use the nutrients to begin to grow.



Examples of areas in which a community has never lived before would be a new lava or rock from a volcano that makes a new island or a new landscape, or sand bar that arises from shifting sands in the ocean, from exposure of igneous rock surfaces by a land slide, or if a meteor makes a depression that fills with rainwater or fresh water from underground streams.



#### Secondary Succession



The gradual growth of organisms in an area after a disturbance, such as a fire, or when a large tree falls, is known as secondary succession.



#### **Changes Caused by Human Activity**

Humans affect the environments around them in many ways, including activities and technologies such as: forestry, industrial processes, transportation, urban development, construction and farming. When an ecosystem is changed by human activity, there can be unexpected consequences. Some species thrive when change occurs (eg. Cowbirds), while some species suffer (eg. Warblers)

#### Some Species Adapt Better Than Others



The cowbirds adapt to farmland easily, while others cannot.



The coyote has been able to adapt to the spread of urban areas, whereas other animals, such as the wolf have not.

#### **Pest Control**

Pests that can affect human health and crops are a major problem. Besides controlling the pest population a pesticide can also damage other organisms that are not targeted. This occurs with a pesticide that is designed to kill lygus bugs (who damage canola crops). The pesticide will also kill bees. If the pesticide kills the pest predators, then the pest population may actually increase.

#### **Biological Control**

Using their own natural enemies is another way to control pests. This method is known as biological control

#### **Introduced Species**

Biological control can however cause other problems. The species that is introduced may have no natural predators and will overtake the area (using up the food supply) so that other organisms cannot survive.

This happened when zebra mussels were introduced into the Great Lakes. It has become a major problem. Introducing a species not natural to a particular area can cause more problems than what it solves.

Purple loosestrife – sometimes called the "beautiful killer' – was introduced into North America has taken over valuable wetland habitat, pushing out native species.



#### **Species In Danger**

Many species in North America and in Canada specifically are in danger of extinction. If a species becomes extinct, it can no longer be found anywhere in the world. Sometimes the organism is only lost in a large region. If this occurs, the species is extirpated. If a particular species is in danger of becoming extinct, or extirpated, it is placed on the endangered species list. There are special protection programs and laws made to protect endangered species.

Canada's Endangered Species http://raysweb.net/specialplaces/pages/canada-es.html Alberta's Endangered Species http://www3.gov.ab.ca/srd/fw/escc/aeslist.html

#### How Can You Help?

Recovery programs are in place or being developed to assist the species with repopulating an area. Volunteering to help is a great way to get personally involved. Learn More at Alberta Government Website Sustainable Resource Development <u>http://www3.gov.ab.ca/srd/fw/wild/</u>

#### Topic 6 – Succession and Change In Ecosystems

- 1. Succession is a gradual process within an ecosystem in which some species replace other species. When a forest fire destroys a certain area, regeneration occurs. This is an example of ...
- A. micro-succession
- B. eco-succession
- C. primary succession
- D. secondary succession
- 2. A forested area has been cleared and redeveloped as prime agricultural land. This change to the forest ecosystem has resulted in ...
- A. an increase in the warbler population
- B. a decrease in the warbler population
- C. an decrease in the cowbird population
- D. both bird populations decline
- 3. Adapting to change is easier for some species than for others. A bushy-grassland area was cleared to make room for a new housing development, in a city suburb. The original area was home to many species that thrived. The species likely to adapt most easily to the new habitat was ...
- A. rabbit
- B. fox
- C. coyote
- D. wolf
- 4. Biological control is used to control pests. Unfortunately there are risks involved if the biological control is a new species to the area. The reason for this is because it ...
- A. might not have enough food to survive
- B. may get killed off more quickly than expected
- C. has no natural predators, so it will overpopulate the area
- D. could restore the balance and be ineffective
- 5. Numbers of organism populations, in a particular area, may increase and decline over time, depending on the conditions. Extinction means that there are no individual organisms of a particular species left. An extinct species in Canada is the ...
- A. blue walleye
- B. swift fox
- C. burrowing owl
- D. bull trout

#### **Topic 7 – Environmental Monitoring**

Ecosystem monitoring (also called - environmental monitoring) is a way to check the condition – health – of an ecosystem by comparing results of investigations done at different times. Monitoring helps scientists understand impacts of disturbances and changes – sudden and gradual – in order to try to reverse or reduce the impact. Biotic and abiotic factors are monitored.

#### **Ecosystem Monitoring Types**

**Physical**, uses satellites to track changes in the landscape over time. Environmental tracks changes in climate, temperature and weather

patterns.



assesses the quality of air, soil and water

Chemical.



**Biological**, tracks the changes in organisms or populations of organisms



#### When Do We Monitor?

Environmental monitoring usually begins after a disturbance has taken place. It can also begin before a disturbance occurs. A key part of the monitoring program is to provide the evidence on which environmental decisions can be made to maintain the balance between human needs and the needs of other organisms in the environment. Continuous monitoring gives us the scientific data we need to make informed decisions about how we affect the environment over time.

#### Long-Term Monitoring Programs

Amphibians are very sensitive to environmental change, which makes them an indicator species. By using this indicator species, scientists all over the word can study the effects of pesticides, acid rain, loss of habitat and introduction of non-native species on these amphibians. <u>http://www.biology-online.org/4/6\_monitoring\_populations\_2.htm</u> <u>http://www.earth.nasa.gov/outreach/biodiversity/paper1.html</u>

Monitoring programs may be qualitative, semi-quantitative, or quantitative. Monitoring involves the use of indicators, indicator species or indicator communities. The presence or absence of the indicator or of an indicator species or indicator community reflects environmental conditions. Dichotomous Key (<u>Identification Key for Alberta Amphibians</u>) sf p. 73 http://www3.gov.ab.ca/srd/fw/amphib/identify.html

Baseline Data gives scientists a starting point to compare changes in the environment. Scientists to monitor change use permanent plots, or study areas. The report that provides the data that has been collected – identifying how a certain activity will affect the environment - is called an Environmental Impact Assessment. Quadrant Sampling is a technique used to study a large are. The quadrant is selected and the species is counted in the quadrant. The number of quadrants in the area provides the multiplier to estimate the population of the species in the area. (see – sf p. 76-77)

#### **Using Science in Real Ecosystems**

The North River Basins Study (1991) was designed to see what impact the development of natural resources would have on the ecosystems in the region. The analysis of the results indicated that industries were having a negative impact.

#### **Topic 7 – Environmental Monitoring**

- Different kinds of monitoring can occur to ensure that changes in the ecosystem are noticed and addressed. If the population of caribou suddenly declined in a particular area, it would be noticed by this type of ecosystem monitoring ...
- A. physical
- **B.** environmental
- C. chemical
- D. biological
- 2. The aftermath of the Mt. St. Helen's Volcano eruption in 1980, was monitored to see just how quickly spiders would return to the area. This type of monitoring is called ...

Use this

Dichotomous Key to answer

the question

Alberta Organisms

No Scale

Scales

Reptile

legs

no legs

Fish

- A. physical
- **B.** environmental
- C. chemical
- D. biological
- A dichotomous key is used to identify things by their distinguishing structural characteristics.

The Alberta Organism that has scales, legs and no stripes is a ...

- A. Wood Frog
- **B.** Reptile
- C. Tiger Salamander
- **D. Northern Leopard Frog**
- 4. Whenever an ecosystem is monitored to see what types of changes occur over a period of time, it is very important to identify what the ecosystem was like before the change was noticed. This information is called ...
- A. impact assessment
- B. baseline data
- C. permanent plot
- D. quadrant sample
- 5. The economic development of the Northern River Basins Region in Alberta has threatened the lifestyle of the Aboriginal people living in this area. The Northern River Basins Study concluded that ...
- A. the pulp mills were environmentally safe
- B. industrial waste was being disposed of properly
- C. traditional Aboriginal knowledge of the area was not important
- D. low oxygen levels were responsible for decreased fish populations

## Interactions and Ecosystems REVIEW

**Topic 1 Interactions Within an Ecosystem** 

What is the Science of *Ecology*? (p. 6)

Describe the work an *ecologist* would do. (p. 6-7)

Describe the basic **needs** of all living organisms. (p. 8)

Explain what an *adaptation* is and provide examples of how organisms '*adapt*' to their environments. (p. 10-11)

Describe the *interdependent relationships* of organisms within a particular ecosystem. (p. 14-15)

Symbiosis	
Commensalism	
Mutualism	
Parasitism	

What impact do certain organisms have on their environment (give specific examples) (p. 16)

#### **Topic 2 Human Impacts on Ecosystems**

What are *natural resources* and how do humans use them? (p. 18-19)

How have the interactions that people have within an environment *changed over time*? (p. 20-21)

How do human needs and wants impact natural environments? (p. 22-23)

Can we predict what impacts humans have within an ecosystem? (p. 24-25)

How can natural disasters impact the environment?

#### **Topic 3 Environmental Choices**

What is an *ecological footprint* and how is it calculated? (p. 29-31)

How can our understanding and knowledge of **Science and Technology** enable us to how we affect our environment? (p. 30-31)

How can this assessment then be used to *reduce* our impact? (p. 33, 35)

#### **Topic 4 How Organisms Interact**

Explain the difference between *biotic* and *abiotic* parts of the environment. (p. 38)

What is a **niche**? (p. 38)

Describe different *niches* within a particular environment. (p. 40)

Explain the difference between a food chain and a food web. (p. 42-43)

Explain how the pyramid of numbers can demonstrate the health of an ecosystem. (p. 43)

#### Describe the roles of the scavengers and decomposers. (p. 44-45)

Scavengers	Decomposers		

#### **Topic 5 Cycles in the Environment**

Describe and Illustrate the *Energy cycle*. (p. 42)

#### Describe and Illustrate the Carbon cycle. (p. 49)

Describe and Illustrate the Water cycle. (p. 51)

Define *pollution* and give specific examples. (p. 52)

What is *bioaccumulation* (also called, *biomagnification*) and what effect does it have within the food chain?. (p. 53-54)

**Topic 6 Succession and Change in Ecosystems** 

Describe primary succession and secondary succession. (p. 56-57)

How well do organisms *adapt* to human invasion in an ecosystem? (p. 60)

Describe different ways that *pests* can be controlled in an ecosystem. (p. 61-62)

What impact can the introduction of *exotic species*, by humans, have on an ecosystem? (p. 62-63)

Describe the difference between extinction and extirpation? (p. 64)

What are the main reasons why a **species** could be *at risk*? (p. 64)

#### **Topic 7 Environmental Monitoring**

What are some techniques used to check (*monitor*) the condition of an environment? (p. 68-70)

What is an environmental impact assessment? (p.74, 78)

When would an *Environmental Impact Assessment* be done and what effect would it have on whatever is being planned?

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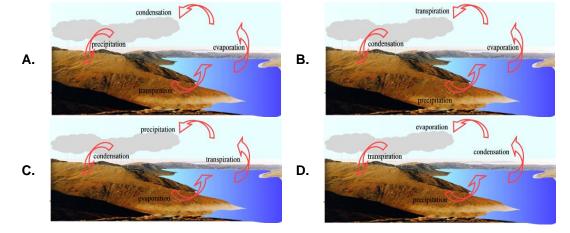
## Interactions and Ecosystems UNIT TEST

- **1.** Living things have basic needs. Throughout the first topic in this unit the needs of living things were examined in depth. The four basic needs of living things are:
- A. food, clothing, shelter, love
- B. food, water, habitat, space
- C. water, air, habitat, protection
- D. air, water, food, habitat
- **2.** Some living things depend on each other in a close relationship, which lasts over time. This relationship is called ...
- A. mutualism
- **B.** parasitism
- C. symbiosis
- D. commensalism
- **3.** Adaptations are characteristics that help an organism to survive and reproduce in its environment. Looking both ways before crossing a street helps us survive because it is ...
- A. inherited from our parents
- B. learned through experience
- C. a survival adaptation
- D. an inherited survival experience
- **4.** A salamander hides under the bark, fungi grows on a rotting log and other forest dwelling organisms use the hollow core as a home. This rotting decaying log is an ...
- A. environment
- B. ecological subsystem
- C. ecotrust
- D. ecosystem
- **5.** Tapeworms live inside organisms and feed on the nutrients of the food they eat. A tapeworm is an example of ...
- A. mutualism
- **B.** parasitism
- C. commensalism
- D. cannabalism
- **6.** The Nootka, an Aboriginal tribe from the West Coast of Canada, utilized the natural resources of the environment around them. They used the bark of the red cedar tree for ...
- A. clothing
- B. canoes
- C. tipis
- D. cooking utensils

- **7.** Head-Smashed-In Buffalo Jump is in the Porcupine Hills, in southern Alberta. The Buffalo were hunted for their meat, hides, bones and sinew. Instead of hunting the Buffalo with spears and arrows they ...
- A. shot them with weapons provided by the settlers
- B. herded them into corrals
- C. ran them over a cliff
- D. cornered them up against a cliff
- **8.** 'Wants' are things that make our life more enjoyable. Satisfying our needs and wants usually uses natural resources. Which of the following is an example of a luxury?
- A. water from a well
- B. potatoes from a garden
- C. greenhouse tomatoes
- D. crabapples from your tree
- **9.** Do we learn from our mistakes? Using pesticides that contained DDT was very effective in controlling insect pests on many crops. It was subsequently banned because of this harmful side effect.
- A. birth defects in baby chicks
- B. soft egg shells
- C. bioaccumulation in wolves
- D. death of small mammals
- **10.** Predators such as wolves and coyotes and even bears are moving closer and closer to highly populated areas. This is posing an increased danger to people, so predator populations are being culled (reduced in number). This can have a devastating effect on the ecosystem, because without this natural control ...
- A. prey will also be reduced
- B. prey will become overpopulated
- C. prey will be kept in check
- D. vegetation will be overgrown
- **11.** The peregrine falcon, the swift fox and the burrowing owl were all once on the brink of extinction until these practices helped save them, EXCEPT for ...
- A. banning of DDT
- B. alternative food supply
- C. captive breeding program
- D. relocation of predators
- **12.** Living beyond our means can have a devastating effect on our environment. So how much of an impact we make determines our ...
- A. sustainability
- B. ecosystem balance
- C. ecological footprint
- D. consumer bias
- 13. One way of changing our impact on the environment we live in is to ...
- A. using a car instead of a bus to get to work
- B. pack our garbage in smaller bags
- C. take a bath every day instead of showering
- D. become aware of all the resources you use

- **14.** There are many waste-reducing practices, which are being suggested to lower the impact we are making in our environment. The most effective practice is ...
- A. recycling
- B. reusing
- C. reducing
- D. reclaiming
- **15.** When used materials are turned into new materials like kitchen scraps placed in a compost bin the practice being used is ...
- A. recycling
- B. reusing
- C. reducing
- D. reclaiming
- **16.** To determine your ecological footprint, all of the following calculations are necessary, EXCEPT for ...
- A. area of the house you need
- B. amount of water you use
- C. energy supply needed
- D. amount of waste you produce
- 17. An ecosystem thrives with biotic and abiotic component parts. An example of an abiotic part of an ecosystem is ...
- A. micro-bacteria
- B. fungus
- C. water
- D. decaying plants
- 18. To determine an organism's niche, all of the following must be determined, EXCEPT ...
- A. how it is classified
- B. what it eats
- C. where it lives
- D. what relationships it has with other organisms
- **19.** Organisms in an eco system can be classified as producers or consumers. The producers provide food for the consumers. An organism that consumes both producers and other consumers is called a ...
- A. herbivore
- B. omnivore
- C. carnivore
- D. prey
- **20.** Food chains and food webs are models in science which visually show us the different relationships within an ecosystem. The primary difference between the food chain and the food web is ...
- A. a food chain shows how energy is stored
- B. a food web shows how energy is used
- C. a food web is a complex system of food chains
- D. a food chain is a combination of different food webs

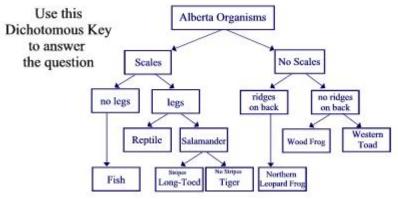
- **21.** The clean-up crew are the decomposers. Decomposers and scavengers get rid of the garbage and waste in an ecosystem. Decomposers differ from scavengers because they ...
- A. only eat dead organisms
- B. do not eat dead organisms
- C. break down larger organisms
- D. only feed on dead plants and animals
- 22. Carbon is an integral part of an ecosystem. It is cycled throughout the ecosystem as it is used and then reused. It is necessary for all life to exist. Carbon is used by plants in the process of ...
- A. respiration
- B. photosynthesis
- C. transpiration
- D. decomposition
- 23. Petroleum products, which contain carbon, are burned, and the carbon escapes into the atmosphere, as carbon dioxide, BUT, how does it get into the petroleum in the first place?
- A. refineries
- B. plant respiration
- C. decomposing plankton
- D. photosynthesis in plants
- **24.** Another very important cycle is the Water Cycle. All living things need water to live. This cycle has four main processes. The two processes that return water to the earth are ...
- A. evaporation and condensation
- B. condensation and precipitation
- C. transpiration and condensation
- D. evaporation and transpiration
- **25.** The process in which water, in the water cycle, goes through a phase change, from a gas to a liquid, is called ...
- A. evaporation
- B. transpiration
- C. condensation
- **D.** precipitation
- **26.** Pollution can cause problems within any ecosystem. The pollutants can enter this ecosystem by combining with the water vapour in the air. Their effect is felt when they become ...
- A. basic and cannot be decomposed
- B. acidic and cannot be decomposed
- C. basic and increase plant growth
- D. acidic and destroy the ecosystem
- 27. Succession is a gradual process within an ecosystem in which some species replace other species. When a forest fire destroys a certain area, regeneration occurs. This is an example of ...
- A. micro-succession
- B. eco-succession
- C. primary succession
- D. secondary succession



#### 28. Which of the following illustrations correctly represents the water cycle?

- **29.** Succession is a gradual process within an ecosystem in which some species replace other species. When a forest fire destroys a certain area, regeneration occurs. This is an example of ...
- A. micro-succession
- B. eco-succession
- C. primary succession
- D. secondary succession
- **30.** A forested area has been cleared and redeveloped as prime agricultural land. This change to the forest ecosystem has resulted in ...
- A. an increase in the warbler population
- B. a decrease in the warbler population
- C. an decrease in the cowbird population
- D. both bird populations decline
- **31.** Adapting to change is easier for some species than for others. A bushy-grassland area was cleared to make room for a new housing development, in a city suburb. The original area was home to many species that thrived. The species likely to adapt most easily to the new habitat was ...
- A. rabbit
- B. fox
- C. coyote
- D. wolf
- **32.** Biological control is used to control pests. Unfortunately there are risks involved if the biological control is a new species to the area. The reason for this is because it ...
- A. might not have enough food to survive
- B. may get killed off more quickly than expected
- C. has no natural predators, so it will overpopulate the area
- D. could restore the balance and be ineffective

- **33.** Numbers of organism populations, in a particular area, may increase and decline over time, depending on the conditions. Extinction means that there are no individual organisms of a particular species left. An extinct species in Canada is the ...
- A. blue walleye
- B. swift fox
- C. burrowing owl
- D. bull trout
- **34.** Different kinds of monitoring can occur to ensure that changes in the ecosystem are noticed and addressed. If the population of caribou suddenly declined in a particular area, it would be noticed by this type of ecosystem monitoring.
- A. physical
- **B.** environmental
- C. chemical
- D. biological
- **35.** The use of satellites, to track the changes in landscape over time due to construction of cities or deforestation, is an example of this type of monitoring ...
- A. physical
- **B.** environmental
- C. chemical
- D. biological
- **36.** A dichotomous key is used to identify things by their distinguishing structural characteristics.



The Alberta Organism that has scales, legs and no stripes is a ...

#### A. Wood Frog

- B. Long-Toed Salamander
- C. Tiger Salamander
- **D. Northern Leopard Frog**
- 37. Whenever an ecosystem is monitored to see what types of changes occur over a period of time, it is very important to identify what the ecosystem was like before the change was noticed. This information is called ...
- A. impact assessment
- B. baseline data
- C. permanent plot
- D. quadrant sample

- **38.** The economic development of the Northern River Basins Region in Alberta has threatened the lifestyle of the Aboriginal people living in this area. The Northern River Basins Study concluded that ...
- A. the pulp mills were environmentally safe
- B. industrial waste was being disposed of properly
- C. traditional Aboriginal knowledge of the area was not important
- D. low oxygen levels were responsible for decreased fish populations
- **39. Indicator species** are organisms that are very sensitive to change in the environment. Scientists can study the populations of these organisms to determine the overall health of our environment. The indicator species in Alberta that scientists study because they are affected by pesticides, acid rain, loss of habitat and the introduction of non-native species are ...
- A. reptiles
- B.fish
- C. amphibians
- D. insects
- **40.** When a study area is divided into sections, each 1m<sup>2</sup>, scientists can count and study samples from these areas and determine the overall health and population of a particular species. This technique is called ...
- A. baseline data
- B. quadrant sampling
- C. biological monitoring
- **D. ecosystem calculation**

#### Read over the **Numerical Response sample question** provided and then answer, in the same way, the **2 Numerical Response Questions** that follow it.

#### Sample ...

Plants and animals need to adapt to their surroundings in order to survive.

Match the plant or animal with the appropriate adaptation.

	1 2 3 4	curlew robin worm sea otter	
	f	lippers	4
	lo	ong bill	_1
special feet		2	
Br	eathe	through skin	3

4	1	2	3
	-		
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

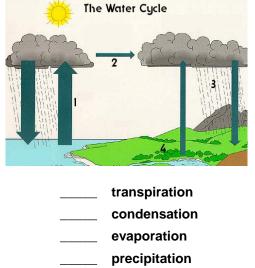
**NR1** - Protecting the environment by reducing the size of our ecological footprint. Match the action with its waste reduction description.

- 1 use it again
- 2 cut down on use
- 3 fix it
- 4 make it into something else

 reduce
 reuse
 recycle
 restore

	-	-		
0	0	0	0	
1	1	1	1	
0 1 2 3	1 2 3	1 2 3	2	
3	3	3	3	
4 5 6 7	4 5 6	4 5 6 7	1 2 3 4 5 6 7	
5	5	5	5	
6	6	6	6	
7	7	7	7	
8	8	8 9	8 9	
9	9	9	9	

**NR2 - Water Cycle** – the continuous movement of water through an ecosystem. Identify the parts as labelled.



	•		
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
0 1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Science Focus 7			Ques	stions		
Topic Quizzes	1.	2.	3.	4.	5.	6.
Topic 1 Interactions Within An Ecosystem	D	С	В	D	В	
Topic 2 Human Impacts on Ecosystems	Α	С	С	В	В	В
Topic 3 Environmental Choices	С	D	С	Α	С	
Topic 4 How Organisms Interact	С	Α	В	С	В	
Topic 5 Cycles In The Environment	В	С	В	С	D	
Topic 6 Succession and Change In Ecosystems	D	В	С	С	Α	
Topic 7 Environmental Monitoring	D	В	С	В	D	

## Interactions and Ecosystems Topic Quiz - Answer Keys

## Interactions and Ecosystems - Unit Test Answer Key

1	D	12	С	23	С	34	В
2	В	13	D	24	В	35	Α
3	С	14	С	25	С	36	С
4	D	15	Α	26	D	37	В
5	В	16	Α	27	D	38	D
6	Α	17	С	28	Α	39	С
7	С	18	Α	29	D	40	В
8	С	19	В	30	В	NR1	2143
9	В	20	С	31	C		
10	В	21	В	32	С	NR2	1243
11	Α	22	В	33	Α		