Guide to Beaver Scout Personal Achievement Badges

"Do not discount what you can learn from touch and from careful observation."

DGM

Written by Guy Morey

Canada Beaver

Objective: I will learn what it means to be Canadian.

Here are four ideas to help you start creating your own adventures:

- What are the five prominent symbols that represent Canada? Name three (3) common animals that are well known to Canada? Draw pictures of your three choices. Which one is your favourite? (page 5)
- Name the following provincial symbols of Ontario: flower, tree, bird. Name one fact or characteristic about each of the symbols. Which ones have you seen? (page 7)
- What is the rarest animal found in Canada? Where is the only place in Canada that it can be found? Why is it so rare? Draw, and colour a picture of this animal. (page 9)
- Learn about four (4) famous Canadian inventions that were developed and discovered in Canada and their inventors. Which one is the most important to you? (page 11)

Scientific Beaver

Objective: I will use my scientific mind to explore, discover, and experiment.

Here are four ideas to help you start creating your own adventures:

- Conduct an experiment to learn about the effect of height on potential energy. Report your conclusions to your Beaver Colony. (page 19)
- Conduct an experiment to learn about buoyancy. Report your conclusions to your Beaver Colony. (page 24)
- Conduct an experiment to learn about the density of liquids. Report your conclusions to your Beaver Colony. (page 28)
- Conduct an experiment with an adult, to determine if food colouring will spread out faster in hot water than in cold water. Watch what happens. (page 31)

Community Beaver

Objective: I will do something to help my colony, my family, and/or the animal community.

Here are three ideas to help you start creating your own adventures:

- Describe how a Beaver participant belongs to his/her community. Talk about what lessons they may go to (i.e. swimming, skating, skiing), or, a club of some sort. Relate this discussion of community to a beaver colony/community. (page 36)

- Identify some physical adaptations of animals and explain how these adaptations help animals meet their basic needs within their habitat community. (page 38)

- Take a walk around your favourite habitat community (forest, marsh, pond). List (or find signs) of some of the animals that are identified within each community. Identify the role that each animal would have in its community (i.e., predator, prey). (page 41)

Pet Care Beaver

Objective: I will learn about animals, which make good pets, and how to care for animals.

Here are four ideas to help you start creating your own adventures:

- Create a list of three (3) animals that you think would make good pets. Why did you choose these animals? Identify the four basic needs of your pet (and all living things) that are required for it to live. (page 42)
- Compare changes in the appearance and behaviour of three (3) animals as they go through a complete life cycle known as metamorphosis. (page 44)
- Describe changes in the appearance or behaviour of living things that are adaptations to seasonal changes. (page 48)
- Learn the biology of a fish and key fish facts. If you were to have a pet fish, what would you need to do to keep the fish healthy? (page 51)

Earth Beaver

Objective: I will learn about the Earth and help take care of the Earth.

Here are five ideas to help you start creating your own adventures:

- Build a toad abode or bird feeder with help and place it in your yard. (page 57)

- Go on a hike through your community. Watch for animals and signs of animals, like nests, holes, tracks, and poop. Try to identify as many signs as you can. Use your senses to guide you along the path. (page 60)

- The timber rattlesnake is the only native reptile known to be extinct in Ontario. When did it become extinct? How do rattlesnakes help humans? (page 62)

- Why is a rainforest such a unique place? Where is the only rainforest in Canada? What is happening to this rainforest? What would happen if the rainforest was all destroyed? (page 66)

- Coyotes are now commonly found in southern Ontario. What helps them survive in your area? Do they cause challenges for humans or other animals? Do humans cause challenges for the coyote? (page 70)

Symbols of Canada

Name: _____

1. What are the five (5) prominent symbols that represent Canada?

- _____
- _____
- _____
- _____
- _____

2. a. Name three (3) common animals that are well known to Canada?

- _____
- _____
- _____

b. Which is your favourite animal?

_____

c. Draw a picture on the back of this page of your favourite animal.

Answers:

1. What are the five prominent symbols that represent Canada?

    - *sugar maple tree*
    - *the beaver*
    - *the coat of arms*
    - *the flag*
    - *lacrosse (summer) & hockey (winter)*

2. Name three (3) common animals that are well known to Canada?

    moose, white-tailed deer, gray wolf, lynx, beaver, Blue Jay, Canada Goose, Monarch butterfly, wolverine, American marten, American bison, beluga whale, Black-capped Chickadee, black bear, grizzly bear.

Provincial Symbols of Ontario

Name: _____

1. Name the following provincial symbols of Ontario: flower, tree, bird.

Ontario's provincial flower: _____

Ontario's provincial tree: _____

Ontario's provincial bird: _____

2. Name one (1) fact or characteristic about each of the symbols.

Ontario's provincial flower: _____

_____

Ontario's provincial tree: _____

_____

Ontario's provincial bird: _____

_____

3. Which of these symbols have you seen?

_____

Answers:

1. Name the following provincial symbols of Ontario: flower, tree, bird.

   Ontario's provincial flower: *white trillium (Trillium grandiflorum)*

   Ontario's provincial tree: *eastern white pine (Pinus strobus)*

   Ontario's provincial bird: *Common Loon (Gavia immer)*

2. Name one (1) fact or characteristic about each of the symbols.

   Ontario's provincial flower: *white flower with three leaves*

   Ontario's provincial tree: *largest tree species in Ontario, has 5 leaves in a cluster*

   Ontario's provincial bird: *is black and white, eats fish*

Canada's Rarest Animal

Name: _____

1. What is the rarest animal found in Canada?

_____

2. Where is the only place in Canada that it can be found?

_____

3. Why is it so rare?

_____

_____

_____

_____

_____

4. Draw, and colour a picture of this animal on the back of this page.

Answers:

1. What is the rarest animal found in Canada?

   The Vancouver Island marmot (Marmota vancouverensis).

2. Where is the only place in Canada that it can be found?

   As its name suggest, this species occurs only on Vancouver Island, British Columbia. They were once found in many parts of the island but have disappeared from about two-thirds of their historic natural range. Today they are limited to sites on Mount Washington and the Nanaimo Lakes region. Populations plummeted in the 1990s, and by 2003, fewer than 30 wild marmots were recorded. It lives nowhere else in the world, making it uniquely Canadian.

3. Why is it so rare?

   Vancouver Island marmot populations declined drastically in the 1990s, due to habitat loss (clear-cutting) and alteration in once-isolated alpine environments. By 2003, only about 30 individuals remained in the wild.

   Another threat to the Vancouver Island marmot is climate change, which affects them in multiple ways. To hibernate, these marmots need specific conditions. If they are starting hibernation late or ending it early, they can be left vulnerable to predators, and natural predation (cougars, wolves, Golden Eagles) is the biggest threat to the Vancouver Island Marmot populations.

©Canada Beaver - Adventure 4

Name: _____

Canadian Inventions and Discoveries

There are several Canadian inventions and discoveries that owe their existence either partially or entirely to a person born in Canada, a citizen of Canada, or a company or organization based in Canada. The following four (4) inventions are recognized to be Canadian inventions or discoveries that still rule the world.

1. The Telephone

Alexander Graham Bell was born in Scotland in 1847. He moved with his family to Brantford, Ontario in 1870. He became a naturalized American citizen in 1882 while continuing to live and work in Canada. He is described as a Scottish-Canadian-American who significantly impacted all three countries as the inventor of the first practical telephone.

In 1874, at his parent's home in Brantford Ontario, Alexander Graham Bell began researching a new method of transmitting telegraph messages over a single wire, a method that would transmit a human voice. This method ultimately led to his invention of the telephone. On March 7, 1876, the Patent Office awarded Bell what is said to be one of the most valuable patents in history. On March 10, 1876, he called his laboratory assistant, Thomas A. Watson with the words, "Mr. Watson, come here, I want to see you". Later in August of 1876, Bell was on the receiving end of the first long-distance call, coming from Brantford to nearby Paris, Ontario over a telegraph wire.

Alexander Graham Bell is considered a Canadian icon, having founded the Bell Telephone Company of Canada. He died August 2, 1922, at the age of 75. He passed away at his home in Nova Scotia due to complications from diabetes.

2. The Discovery of Insulin

Insulin is a hormone in your body that is produced by the pancreas. The pancreas is a 15-cm (6-inch), pear-shaped organ located in the upper abdomen behind the stomach. All of your cells need energy. Insulin moves glucose (sugar/food) from your blood to the cells all over your body. Glucose is the main source of energy for your body. If your pancreas does not make enough insulin, or, if your body does not use insulin properly, glucose cannot get into your cells. Instead, it builds up in your blood. This leads to high blood sugar levels and a disease known as diabetes.

In May of 1921, a team of doctors and researchers, Dr. Frederick Banting, Charles Best, James Collip, and John James Rickard Macleod, began working to successfully isolate the hormone insulin for the first time at the University of Toronto. Initially, Frederick Banting and Charles Best figured out how to remove insulin from a dog's pancreas. With the help of colleagues J.B. Collip and John Macleod, they were able to develop a more refined and pure form of insulin, this time from the pancreas of a cow.

In January 1922, a 14-year-old boy dying from diabetes at Toronto General Hospital, became the first person to receive an injection of the newly developed insulin. Within 24 hours, the boy's dangerously high blood sugar levels dropped to near-normal levels. Diabetes, which had been regarded as a fatal disease, could finally be managed! In the eyes of most of the world this was Toronto's announcement of the discovery of insulin.

The news about insulin spread around the world like wildfire. This was a major breakthrough in modern medical history. In 1923, Dr. Frederick Banting and J.J.R Macleod received the Nobel Prize in Medicine, which they shared with Charles Best and James Collip. On October 6, 2021, Canada's walk of fame announced the induction of Sir Frederick Banting, Charles Best, John James Rickard Macleod, and James Collip.

3. The Alkaline Battery

Lewis Frederick Urry was born in Pontypool, Ontario in 1927. He graduated from University of Toronto in chemical engineering in 1950, and went to work at the Eveready Battery Company that same year. Lewis Frederick Urry was the creator of the world's first long-lasting alkaline battery. Today, his invention powers countless portable electronic devices around the world, from flashlights to cameras to computer games.

In 1955, Eveready sent Urry to work in its Eveready research laboratory in Parma, Ohio. There, he was asked to develop a longer-lasting battery than those currently available. At that time, carbon-zinc batteries were the most common ones used, but they were unpopular because they only lasted a short time. Urry decided rather than improve on the current version of the zinc-carbon battery, why not try to make cells that use an alkaline material? There had been attempts to experiment with alkaline components, but so far, none had been able to balance a combination that would last longer, and be worth the higher price.

Urry decided that creating a new type of battery would be better. He believed he could find the right combination of materials to solve this problem. Urry tested numerous materials before deciding that manganese dioxide and powdered zinc worked well with an alkaline substance as an electrolyte to conduct the electricity. Urry built test batteries, shaping them into cylinders rather than discs, and tried them in some toy cars he bought at a local toy store. His alkaline battery powered the cars for a very long time while the cars with the older type stopped very quickly. The new batteries were put into production to be sold right away.

Urry patented the alkaline battery, and the first Eveready alkaline battery hit store shelves in 1959. Today, alkaline batteries last up to 40 times longer than Urry's original prototype and comprise 80% of battery sales. The Energizer battery, with its slogan, "it goes and it goes and it goes", is the direct descendant of his alkaline model. The batteries were renamed as the Energizer brand in 1980, and chemical improvements have made them 40 times longer lasting than the ones that went on sale in 1959.

The first prototype alkaline battery and the first manufactured cylindrical alkaline cell can be found in the Smithsonian Institution in the United States. They were put on display in the same room as Thomas Edison's light bulb.

4. The Canadarm

Canada has played an important role in robotics, health science, and satellite technology in outer space. The development and construction of Canadarm was in response to a need announced by NASA in the early 1970s. At that time, NASA was developing a new Space Transportation System: the space shuttle. The challenge for Canada was to build a tool to function flawlessly in space with the ability to move like a human arm. The robotic arm was designed to fit on the space shuttle to function as a "helping hand" in space. It was to be operated manually by an astronaut to deploy and position other astronauts, maintain equipment, move cargo, and repair satellites (including the Hubble Space telescope).

The Canadarm was a remote-controlled mechanical arm, also known as the Shuttle Remote Manipulator System (SRMS). It was 15.2 m long and 38.0 cm in diameter, weighed 410 kg, and was able to lift and move payloads weighing up to 30,000 kg on Earth and 266,000 kg in the weightlessness of space. The Canadarm was developed by the Canadian Space Agency. In order to meet strength requirements, engineers used the latest aerospace materials in order for it to stand up to the harsh environment of space: titanium, stainless steel, and graphite epoxy.

A white insulated blanket with controlled heaters was added to keep Canadarm at an acceptable temperature. The robotic arm had to be protected from the intense heat of the Sun and the extreme cold at night. The robotic arm had rotating joints at the shoulder, the elbow and the wrist. Its "hand" was a wire-snare device that fit over special fixtures on the shuttle.

The Canadarm's first flight was with the Space Shuttle *Columbia* in November 1981. The mission crew deployed the giant robotic arm from the cargo bay of *Columbia* and, to everyone's great relief, it worked as expected, exceeding all design goals.

At a cost of $110-million, the development and construction of a highly sophisticated and manoeuvrable robotic arm in the 1970s, and its first voyage into space in 1981, launched the beginning of a new era in Canadian space exploration. The successful 1981 mission guaranteed Canada's continued participation in the American space program. From 1981 to 2011, Canadarm was utilized in 90 space shuttle missions,

Conclusions:

1. Which two (2) letters are missing from the old rotary phone dials?

- _____

- _____

2. Name one (1) difference between type 1 diabetes and type 2 diabetes?

Type 1 Diabetes

_____

_____

_____

Type 2 Diabetes

_____

_____

_____

3. Who is the mascot for the Eveready alkaline battery brand?

_____

4. Who was Canada's first astronaut in space to maneuver the Canadarm?

_____

5. Rank the four (4) inventions that are <u>most important to you</u>, starting with 1 as the most important to you and 4 as the least important to you.

1. _____

2. _____

3. _____

4. _____

6. Why did you pick your number one as the most important?

_____

_____

_____

_____

7. Rank the four (4) inventions that you think are <u>most important to all humans</u>, starting with 1 as the most important and 4 as the least important.

1. _____

2. _____

3. _____

4. _____

Answers:

1. Which two (2) letters are missing from the old rotary phone dials?

   Q and Z

2. Name one (1) difference between type 1 diabetes and type 2 diabetes?

Type 1 Diabetes

- *the pancreas produces little to no insulin, requiring daily, life-saving synthetic insulin administration;*
- *focuses on insulin injections or pump, carbohydrate counting, and blood sugar monitoring;*
- *cannot be prevented: generally caused by genetic predisposition and environmental triggers (e.g., virus); not lifestyle-related;*
- *accounts for roughly 5-10% of diabetes cases;*
- *symptoms often appear suddenly, frequently in children or young adults;*
- *people with Type 1 must take insulin daily to survive.*

Type 2 Diabetes

- *the body does not use insulin properly (insulin resistance) or does not produce enough, which may require insulin therapy;*
- *focuses on blood sugar monitoring, diet, exercise, weight loss, and oral medications (like metformin) to increase insulin sensitivity;*
- *often preventable or delayable through healthy eating, weight management, and physical activity;*
- *far more common, accounting for 90-95% of diabetes cases;*
- *usually develops slowly over many years and is more common in adults, though it is appearing more frequently in youth;*
- *people with Type 2 may manage with lifestyle changes (diet/exercise), oral medication, or insulin if necessary.*

3. Who is the mascot for the Eveready alkaline battery brand?

   The primary mascot for the Eveready battery brand is the Energizer Bunny in North America, which has been used in commercials since 1988.

4. Who was Canada's first astronaut in space to maneuver the Canadarm?

   Marc Garneau

5. Rank the four (4) inventions that are most important to you, starting with 1 as the most important to you and 4 as the least important to you.

   Answers will vary.

6. Why did you pick your number one as the most important?

   Answers will vary.

7. Rank the four (4) inventions that you think are most important to all humans, starting with 1 as the most important and 4 as the least important.

   Answers will vary.

Two Types of Energy

Name: _____

Energy is the ability to do work. Work is done when a force moves an object through a distance. Energy is not something that you see, but you can see the effects of it. That is, you can see what it does when it is released. Simply put, energy can make things happen to objects.

Energy that is stored up waiting to be released and energy that is released are the two basic types of energy known as potential energy and kinetic energy.

Potential Energy - is stored energy that can be released when an object moves. It is the energy something has because of its position or condition. Books on a bookshelf, the food you eat, an elastic, and a flashlight battery all have potential energy. It is energy that is being stored while it is not being used.

Kinetic Energy - is the energy of a moving object. Heat, sound, light, and movement all involve a moving object. The amount of kinetic energy of a moving object depends on two things: the object's speed and its mass. Water flowing, the Moon circling the Earth, a boy walking, and a ball bouncing all have kinetic energy. It is energy that is being used. It is energy in motion.

Energy Changes But Never Disappears

One of the most important things to know about energy is that it never disappears. It cannot be destroyed. It simply changes form. When energy changes form, it changes into a form that is no longer useful.

We know potential energy is stored energy that can be released when matter moves. For example, energy can be released by letting go of a book. When you let go of the book, it starts to move (fall). The potential energy in the book before it is released is changed into kinetic energy when the book is dropped. In less than a second, the book slams onto the floor. Where did the book's potential and kinetic energy go? Both have now changed into the energy of sound waves and some heat energy. That sound energy and heat energy is no longer useful.

The Effect of Height on Potential Energy Experiment

Purpose: To observe the effects of height on potential energy.

What You Need:

wooden block (or Lego)	1 board
6 books	toy car
ruler	

What You Do:

1. Slant your board by resting it against one book. Measure and record the height of the book. Record the height in your observations.
2. Place the wooden block 2 cm away from the board.
3. Place the car at the top of the board and allow the car to roll down it. Measure how far the car pushes the block upon striking it. Record your observations.
4. Raise the board by adding 1 or 2 more books to the existing book. Record the height.
5. Put the block back in its position (2 cm away from the board). Place the car at the top of the board and allow the car to roll down it. Measure how far the car pushes the block upon striking it. Record your observations.
6. Repeat the experiment, but increase the height of your hill by using more books to raise the board. Record your observations.

Observations:

Number of Books	Height of Books (cm)	Distance Block Moves (cm)

Conclusions:

1. How did the height of your hill change in your experiment?

_____

_____

2. What kind of energy did the car have at the top of the hill?

_____

3. What kind of energy did the car have as it was rolling down the hill?

_____

4. When did the car have the least energy – at one book, three books, or six books?

_____

5. When did the car have the most energy – at one book, three books, or six books?

_____

6. How does the height affect the amount of potential energy in an object?

_____

_____

_____

7. How did this experiment show that energy can be converted to other forms?

_____

_____

_____

8. The greater the mass of a moving object, the more kinetic energy it has. How you could prove this in this experiment?

_____

_____

_____

_____

Answers:

1. How did the height of your hill change in your experiment?

   The height of the hill increased as books were added.

2. What kind of energy did the car have at the top of the hill?

   Potential energy.

3. What kind of energy did the car have as it was rolling down the hill?

   Kinetic energy.

4. When did the car have the least energy – at one book, three books, or six books?

   With one book.

5. When did the car have the most energy – at one book, three books, or six books?

   With 6 books.

6. How does the height affect the amount of potential energy in an object?

   Increasing height increases the amount of potential energy.

7. How did this experiment show that energy can be converted to other forms?

   When the car is released (potential) it begins to move (kinetic).

8. The greater the mass of a moving object, the more kinetic energy it has. Explain how you could prove this in this experiment.

   Increasing the size of the car would increase the kinetic energy.

What is Buoyancy?

Name: _____

Why do some objects float in water while others sink? If you want to know which objects will float in water, you need to know more about buoyancy. Buoyancy is the name given to the force that pushes an object up making it seem to lose weight in a fluid.

Since a buoyant force acts upward, it is opposite to the downward force of the weight of the object. If the buoyant force is equal to the weight of the object, then the object will float. For example, if a piece of wood having a volume of 100 cubic centimetres weighs only half as much as 100 cubic centimetres of water, it will float on water. In other words, an object will float if it weighs less than the weight of the water it displaces (pushes aside).

The buoyancy of a fluid is related to a fluid's density (how tightly packed the particles are in the fluid). An object will float in a fluid if the density of that object is less than the density of the fluid. For example, it is easier to float in salt water than it is freshwater because salt water is more dense. It is more dense because of the salt in it. The added salt particles make the water more dense by taking up space between the water molecules.

Buoyancy is also affected by gravity. If the buoyant force that pushes up against an object immersed in a fluid equals the force of gravity (the weight) of the fluid that the object displaced (pushed aside), then the object will float.

Buoyant Forces Experiment

Purpose: To observe if different liquids exert a similar buoyant force.

What You Need:

beaker of water	salt
hard-boiled egg	teaspoon

What You Do:

1. Place an egg in a beaker half-full of water and observe what happens.
2. Stir salt into the water one teaspoon at a time. Stop when the egg floats.
3. When the egg is floating, carefully pour more tap water into the beaker until it is almost full. Add the water ***slowly*** and near the side of the beaker so the ***fresh water and salt water do not mix***.

Conclusions:

1. Why did the egg float in Step 2.

_____

_____

_____

2. If the buoyant force is less than the weight of an object immersed in a fluid, what will happen to the object?

_____

3. If the buoyant force is more than the weight of an object immersed in a fluid, what will happen to the object?

_____

4. Do all liquids have the same buoyant force? How do you know?

_____

_____

_____

5. Why are oil spills an ecological problem in oceans?

_____

_____

_____

6. How might the greater density of salt water help ocean creatures?

_____

_____

_____

Answers:

1. Why did the egg float in Step 2.

   As salt is added to the water, the water becomes more dense, which then pushes the eggs up until it is floating.

2. If the buoyant force is less than the weight of an object immersed in a fluid, what will happen to the object?

   It will sink

3. If the buoyant force is more than the weight of an object immersed in a fluid, what will happen to the object?

   It will float

4. Do all liquids have the same buoyant force? How do you know?

   No. Different liquids have different densities, and the buoyancy of a fluid is related to a fluid's density.

5. Why are oil spills an ecological problem in oceans?

   When a supertanker accidentally spills its cargo of crude oil into the sea, the crude oil is less dense than sea water so the oil floats on top of the water creating an oil slick. Oil slicks can cause serious ecological problems. Sea birds become coated with the oil and die. The oil sometimes floats to shore and fouls beaches. Sea life under the oil layer is threatened. Scientists and engineers are currently studying ways to clean up such oil slicks.

6. How might the greater density of salt water help ocean creatures?

   This will help ocean creatures float.

Name: _____

What is Density?

Density is the amount of mass or particles contained in a given space or volume. When you describe an object being light or heavy, you are referring to the density of the object. Different substances (including liquids) have different-sized particles. The size of the particles determines how many particles can fit into a given space. Therefore, each substance has its own density, based on particle size.

Make a Lava Lamp

Purpose: To see how substances with different densities interact.

What You Need:

- 1-L glass jar (lid optional)
- eye dropper
- 500 mL vegetable oil
- food colouring
- small cup
- 1 tbsp. of baking soda
- 60 mL vinegar

What You Do:

1. Add 1 tbsp. of baking soda to the glass jar. (A mason jar or pickle jar is a good choice).

2. Fill the glass jar half way up with vegetable oil.

3. In a separate small cup, pour the vinegar and add food colouring to colour the vinegar your favourite colour (repeat step three for different colour of food colouring).

4. Use the eye dropper to add the coloured vinegar to the vegetable oil. Add several drops full of your different coloured vinegar.

5. Watch the reaction of the mixture.

Conclusions:

1. After you added the coloured vinegar to the vegetable oil, what did you observe?

_____

_____

2. Which is heavier, the vinegar or the oil? How do you know?

_____

_____

_____

3. What do you think caused the bubbles to appear?

_____

_____

_____

Answers:

1. After you added the coloured vinegar to the vegetable oil, what did you observe?

   Colourful bubbles rise and fall throughout the jar.

2. Which is heavier, the vinegar or the oil? How do you know?

   The vinegar is slightly heavier than the oil so it sinks to the bottom of the glass when added to the oil.

3. What do you think caused the bubbles to appear?

   Once the vinegar (dilute acetic acid) hits the bottom of the glass, it reacts with the baking soda (sodium bicarbonate) and produces carbon dioxide gas. These gas bubbles attach to the vinegar and pull it to the top. Once at the top of the mixture the bubbles pop and the vinegar falls back to the bottom again to repeat the process.

Name: _____

Heat & Motion

In Science, the whole universe is made up of different kinds of physical "stuff". Scientists call this "stuff" matter. The three types of matter that we know are solids (rocks, books), liquids (water, milk) and gas (oxygen, carbon dioxide). Matter can be weighed and it takes up space. For example, you can weigh a rock. It might weigh 500 g. You can put it in your hand and it takes up space. You know this because you cannot put another rock in your hand where the original rock is sitting. Air is matter. How do you know? You can weigh it. It is very, very light and it takes up space. How do you know? If you blow into a balloon, the balloon expands. The air in the balloon is taking up the space in the balloon.

Now, all of this matter that you can touch, see, or breathe is made of atoms and molecules. All matter that exists - books, rocks, oxygen, water, trees, animals – as well as everything in our bodies, is made of teenzy, weenzy particles that you cannot see called atoms. If you take two or more atoms and join them together, you then have a molecule. The majority of atoms in nature cannot exist by themselves. They must join with another atom to form a molecule. For example, a hydrogen atom and an oxygen atom cannot exist on their own. But if they join together, they form water.

The molecules in matter are constantly moving. Remember, atoms are so tiny that you cannot see them. So, you certainly won't see them move! If you add heat to matter, it speeds up the movement of the molecules. This extra energy is called kinetic energy. When an object feels warm, it is because its particles are moving faster. The increase in movement is detected as heat. To understand this, if you hold your hands out, they probably feel warm. If you rub them together, they gain heat and feel warmer because you are causing the atoms in your skin to move faster because you are rubbing them. Because the atoms are gaining heat, they are gaining kinetic energy (energy in motion). Heat is a form of energy that can be measured. The heat, or temperature of a substance, is the measure of the kinetic energy of the atoms or molecules that make up that substance. Temperature is measured using a thermometer. As the atoms or molecules of a substance move faster, the temperature of the substance increases. Similarly, when the atoms or molecules of a substance slow down, the temperature decreases.

Investigating Heat & Motion Experiment

Purpose: To determine if hot water or cold water shows more evidence of motion.

What You Need:

- 2 large, clear glasses
- electric kettle
- eyedropper (or something similar)
- thermometer (optional)
- tap water
- food coloring

You will need help from an adult to do this experiment.

What You Do:

1. Fill one glass half-full with hot water from the kettle. Pour an equal amount of cold water into the second glass. Record the temperature of the water in each beaker.

   (You don't actually have to measure the temperature of the water. As long as there is a distinct difference in the temperatures of both glasses of water. Measuring the temperature adds to the "authenticity" of an experiment.)

2. Holding the eyedropper about 1 cm above each liquid, add two drops of food coloring to each glass.

Observations:

1. Observe the glasses for 5 minutes. Record in the following chart what you see in each glass.

2. Record in the following chart, any differences you see between the fluids in each glass after 5 minutes.

Observations:

1. hot water – _____° C _____ _____ _____ _____	cold water – _____° C _____ _____ _____ _____
2. _____ _____ _____ _____	

Conclusions:

1. Using what you have learned about heat and the motion of molecules, describe how hot water must differ from cold water to account for your observations.

_____

_____

_____

_____

_____

_____

2. This is a hard question. Suppose you filled one beaker full with water and the other beaker half-full with water. Both beakers of water are at the same temperature. You then add two drops of food coloring to each beaker. What would you expect the outcome of the experiment to be?

_____
_____
_____
_____
_____
_____
_____
_____

3. Which of these have heat: an ice cube, a cup of steaming water, or a book? How do you know?

_____
_____
_____
_____
_____
_____
_____
_____

4. This is another hard question. Why will a rubber band that is stretched be warmer than a rubber band that is relaxed? How do you know?

_____
_____
_____
_____
_____
_____
_____
_____

Answers:

1. Using what you have learned about heat and the motion of molecules, describe how hot water must differ from cold water to account for your observations.

   Heating the water speeds up the collisions that occur between the water molecules. As a result, the warmer water molecules are going to bump into the food colouring molecules more often causing the food colouring molecules to spread out faster in the glass with the warmer water.

2. This is a hard question. Suppose you filled one beaker full with water and the other beaker half-full with water. Both beakers of water are at the same temperature. You then add two drops of food coloring to each beaker. What will be the outcome of this experiment?

   The food colouring will spread out quicker in the beaker with more water. Because there is more water, more collisions will occur between water molecules, thus spreading out the food colouring quicker.

3. Which of these have heat: an ice cube, a cup of steaming water, or a book. How do you know?

   They all have heat. All things are made up of atoms and molecules that are constantly moving. The motion of these molecules gives them heat. They obviously have different amounts of heat.

4. This is another hard question. Why will a rubber band that is stretched be warmer than a rubber band that is relaxed? How do you know?

   When the rubber band is stretched tighter, its molecules are squeezed together and have more collisions. When the rubber band is relaxed, the molecules have more room and do not collide as often.

©Community Beaver - Adventure 1

Name: _____

What is a Community?

The different kinds of plants and animals that interact with one another in one area form a community. All organisms interact with other organisms in some way. No organism lives completely by itself. Each organism is part of a community. Within a community, there can be several populations of plants or animals. A population is a group of organisms of one species in a particular place at a particular time. A community, can then be defined as group of interacting populations.

1. Describe your involvement in your neighbourhood community. What lessons do you go to, or, what club or church do you belong to?

_____

_____

_____

_____

_____

2. Read the following sentences about beavers (the animal) and answer by writing the word TRUE or FALSE beside each sentence.

- Two or more beaver colonies will live together. _____.
- Beavers share their food with each other. _____.
- Beavers are most active during the day. _____.
- Around age 2, beavers usually leave the colony. _____.
- A beaver always stays close to water. _____.

Answers:

2. Read the following sentences and answer by writing the word TRUE or FALSE beside each sentence.

- *Two or more beaver colonies will live together.* *FALSE*
- *Beavers share their food with each other.* *TRUE*
- *Beavers are most active during the day.* *FALSE*
- *Around age 2, beavers usually leave the colony.* *TRUE*
- *A beaver always stays close to water.* *TRUE*

Animal Adaptations

Name: _____

1. Because each species is important in a community, each living organism finds ways to survive in their environment. When a living thing is well suited for survival, it is adapted to its environment. An adaptation is a characteristic that increases an organism's chance of survival in its environment.

Blending in…. The colour of some animals matches with their surroundings. This is called camouflage.	Name an animal that blends in with its environment. • _____
Deep sleep…. Some animals hibernate to survive winter to avoid the cold temperatures of winter.	Name an animal that hibernates. • _____
Working together…. Some animals can't hunt on their own so they rely on a group effort to catch food.	Name an animal that relies on a group effort to find food. • _____
Change colour…. Some animals change colour when winter comes to blend in with the snow.	Name an animal that changes colour in the winter. • _____

2. Select an animal from the list below and write a story about how it got that adaptation: How the:

duck got webbed feet
rabbit got long ears
beaver got a flat tail
Great Blue Heron got long legs
bullfrog got a sticky tongue
turtle got a shell
rattlesnake got its rattle
leopard frog got its spots
porcupine got quills
elephant got its trunk

Answers:

1. Because each species is important in a community, each living organism finds ways to survive in their environment. When a living thing is well suited for survival, it is adapted to its environment. An adaptation is a characteristic that increases an organism's chance of survival in its environment.

Blending in…. Animals protect themselves in many ways. Many of them are coloured to blend in with their surroundings. This is called camouflage.	Name an animal that blends in with its environment. • *polar bear* • *snowshoe hare* • *Willow Ptarmigan* • *short-tailed weasel* • *Whip-poor-will* • *Screech Owl* • *gray treefrog*
Deep sleep…. Some animals hibernate to survive winter They use lakes, streams, burrows, or dens to avoid the cold temperatures of winter.	Name an animal that hibernates. • *groundhog* • *little brown bat* • *eastern chipmunk* • *black bear (torpor)* • *striped skunk (torpor)*
Working together…. Some animals can't hunt on their own because they are not big enough, so they rely on a group effort to catch food.	Name an animal that relies on a group effort to find food. • *gray wolf* • *African wild dog* • *lion* • *spotted hyena* • *chimpanzee* • *mongoose* • *killer whales*
Change colour…. Some animals change colour when winter comes. They change colour to blend in with the white snow.	Name an animal that changes colour in the winter. • *snowshoe hare* • *Willow Ptarmigan* • *short-tailed weasel* • *Arctic fox* • *Peary caribou*

A Walk Through a Habitat Community

Name: _____

1. Today I went for a walk at a _____.

2. Name three (3) animals or animal signs you saw or found.

- _____
- _____
- _____

3. Name three (3) animals or animal signs you saw or found.

- _____
- _____
- _____

4. Describe how one of the plants or trees you saw is connected to one of the animals you saw?

_____

_____

_____

_____

5. Draw a picture of the best thing you saw today on the back of this page.

Pets and Their Needs

Name: _____

1. List three (3) animals that you would think would make good pets and three (3) animals that you think would NOT make good pets.

Good Pet	Not a Good Pet

2. Choose one (1) of the animals that you think would not make a good pet and explain why.

_____

_____

_____

_____

3. <u>All</u> animals need four (4) things to survive. What are those four things?

i. _____ ii. _____

iii _____ iv. _____

Answers:

1. List three (3) animals that you would think would make good pets and three (3) animals that you think would NOT make good pets.

Top Choices for Pets

- *Dogs: Highly trainable and loyal, with breeds suitable for various lifestyles.*
- *Cats: Ideal for companionship, offering independence with affection.*
- *Small Rodents: Guinea pigs, hamsters, and gerbils are great for smaller homes, with guinea pigs being particularly friendly and sociable.*
- *Rabbits: Social creatures that can be litter-trained, making them good indoor companions.*
- *Birds: Parrots and budgies offer intelligence, color, and affection, though they require specific care.*
- *Reptiles & Fish: Betta fish, leopard geckos, and corn snakes are considered lower-maintenance options.*
- *Exotic Pets: Ferrets and hedgehogs are popular, though they require more specialized care.*

Wild animals, primates, big cats, bears, and venomous creatures make poor pets due to their complex needs, dangerous behaviors, safety risks, and disease transmission potential. They retain wild instincts, grow too large or aggressive, require specialized care, and suffer in captivity, making them unsuitable for home environments.

3. All animals need four (4) things to survive. What are those four things?
    - *food*
    - *water*
    - *shelter*
    - *space*

©Pet Care Beaver - Adventure 2

What is Metamorphosis?

Name: _____

1. Metamorphosis is a process where an animal's life begins with an egg and then goes through a cycle of physical changes in the animal's body structure. The most common animals that go through metamorphosis are certain insects and all amphibians. Name, by putting in order, each stage of the life cycle for each animal.

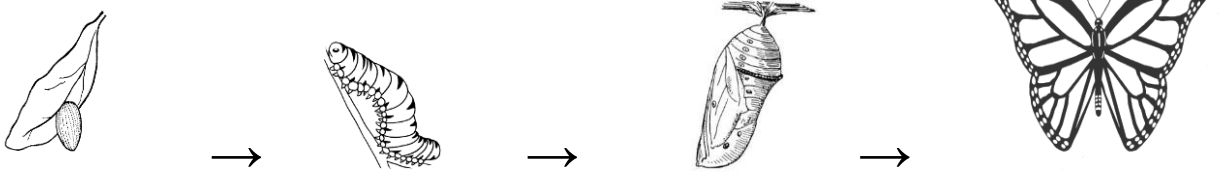
FROG

tadpole **adult** **egg**

_____ _____ _____

MONARCH BUTTERFLY

egg **chrysalis** **caterpillar** **adult**



_____ _____ _____ _____

DRAGONFLY

adult **nymph** **egg**

_____ _____ _____

2. You can break the word "metamorphosis" into two parts:

   "meta" means "middle"
   "morphosis" means "to change form"

   Metamorphosis typically occurs in three stages. So, in the middle of certain insects and all amphibian lives, their body structure changes. Does the first stage of the animal's life cycle look like the third stage?

   Circle the correct answer.

   Yes No

3. Fill in the chart with the correct answers.

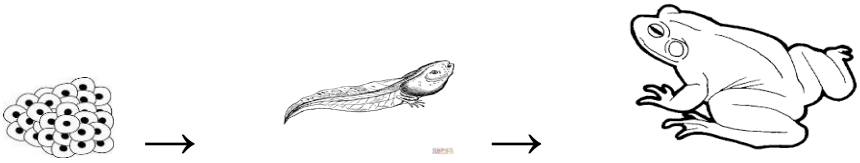
	Frog	Monarch Butterfly	Dragonfly
Where does it lay its eggs?			
How many eggs does it lay?			

4. Draw a picture of either a frog, monarch butterfly, or dragonfly on the back of this page.

Answers:

1.

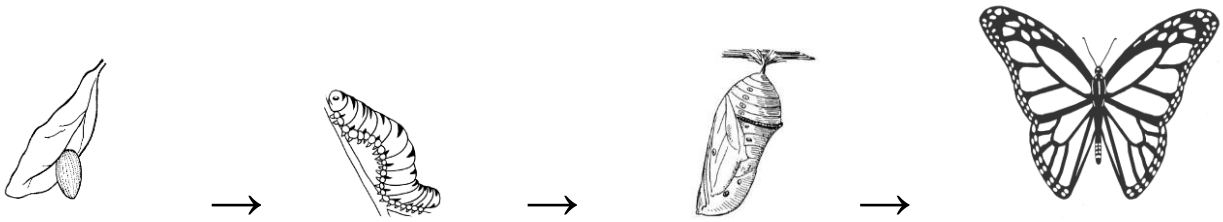
FROG **tadpole** **adult** **egg**



egg *tadpole* *adult*

MONARCH BUTTERFLY

egg **chrysalis** **caterpillar** **adult**



egg *caterpillar* *chrysalis* *adult*

DRAGONFLY **adult** **nymph** **egg**

egg *nymph* *adult*

2. You can break the word "metamorphosis" into two parts:

   "meta" means "middle"
   "morphosis" means "to change form"

   Metamorphosis typically occurs in three stages. So, in the middle of certain insects and all amphibian lives, their body structure changes. Does the first stage of the animal's life cycle look like the third stage?

   No, the first stage does not look anything like the third stage.

3. Fill in the chart with the correct answers.

	Frog	Monarch Butterfly	Dragonfly
Where does it lay its eggs?	*In water, often in still ponds or vernal pools, attached to submerged plants or rocks.*	*On the common milkweed plant. (Asclepias syriaca)*	*Typically in ponds, lakes, marshes, and slow-moving streams, depositing them directly into the water, on aquatic plants, floating vegetation, or damp mud.*
How many eggs does it lay?	*Most frogs lay between 200 and 4,000 eggs at one time. A bullfrog can lay up to 20,000 eggs at a time.*	1	*Eggs can be laid one at a time on plant stems, rotten wood, in mud, on or close to the surface of water, or, as many as 1500 in a jelly-like mass in the water.*

Name: _____

Seasonal Changes in Animal Populations

Winter can be very challenging for animals. Some of the problems that face animals are freezing temperatures, lack of water, and fewer hours of sunlight during the day. In order to remain active, animals need a good food supply throughout the winter. Large herbivores, such as deer, do not get cold very quickly and they can usually find enough food during the winter months. Instead of eating grass and herbs which may be covered in deep snow, they may have to eat the bark of trees and the branches and shoots of bushes.

Animals which are not adapted to cold weather, however, need to find other solutions to the problems of survival. There are three main techniques of survival: migration, hibernation, and the animal's fur changing colour.

Migration

Some birds and mammals move over long distances to survive a difficult season. This is called migration. They do this to avoid the extreme temperatures in which they cannot live or to avoid the temporary lack of food and water.

Hibernation

Hibernation occurs when an animal spends many weeks in a sleeping state in a small, protected area. Many small mammals hibernate over the winter months because they cannot find enough food to give them the energy they need to keep warm.

Animal's Fur Changes Colour

Many animals have developed special adaptations where their fur changes colour as their surroundings change. This occurs with the changing of the seasons. Some birds and mammals deal with this by producing different colors of fur or feathers depending on the time of year (usually winter). In most cases, either changing amounts of daylight or shifts in temperature trigger a hormonal reaction in the animal that causes the animal's fur to change colour.

1. **Winter Survival - Hibernation**

   Place a check mark (√) in the circle of the correct answer.

   a. Hibernation is a way for some animals to survive:

   ○ summer months ○ winter months

   b. During hibernation, an animal:

   ○ eats more ○ eats less

   c. During hibernation, an animal uses:

   ○ more energy ○ less energy

   d. During hibernation, the heartbeat of an animal is:

   ○ slower than normal ○ faster than normal

2. Place a check mark (√) in the box of the correct answer for each animal's winter behaviour.

	Migrate	Hibernate	Change Colour
caribou			
short-tailed weasel			
eastern chipmunk			
Willow Ptarmigan			
monarch butterfly			
groundhog			
snowshoe hare			
little brown bat			

3. Draw a picture on the back of this page of one of the above animals.

Answers:

1. Winter Survival - Hibernation

Place a check mark (√) in the circle of the correct answer.

a. Hibernation is a way for some animals to survive:

○*winter months*

b. During hibernation, an animal:

○*eats less*

c. During hibernation, an animal uses:

○*less energy*

d. During hibernation, the heartbeat of an animal is:

○*slower than normal*

2. Place a check mark (√) in the box of the correct answer for each animal's winter behaviour.

	Migrate	Hibernate	Change Colour
caribou	X		
short-tailed weasel			X
eastern chipmunk		X	
Willow Ptarmigan			X
monarch butterfly	X		
groundhog		X	
snowshoe hare			X
little brown bat		X	

Name: _____

What To Know If You Want a Pet Fish

Fish are vertebrate animals (which means they have a backbone) that are dependent upon water to live and lay eggs. They were the first group of vertebrate animals to evolve. Most fish possess an air bladder that enables them to swim at different depths. Fish that do not possess an air bladder are either continually on the move or remain resting on the bottom. Most fish have protective scales covering their body. The freshwater fish that do not have scales are catfish, lampreys, and eels.

It is important to note that some animals with "fish" in their names are not actually fish. For example, crayfish are crustaceans (like crabs) and jellyfish are cnidarians (like sea anemones). Plus, some sea animals like whales and dolphins that look like fish, are not fish but are actually mammals.

Characteristics of Fish

All fish:

- live in the water;
- are cold-blooded vertebrates with backbones;
- have paired fins which they use for swimming;
- use gills for breathing;
- have a lateral line;
- lay eggs.

Body Shape

The shape of a fish's body helps a fish swim. A smooth, "streamlined" body helps the fish move through water easily and quickly. A fish's body is also covered with a special slime coating. This slime helps the fish glide through the water more easily. The shape of the body helps the fish swim. Fish swim by pushing against the water around them. Most fish do this by wiggling their bodies and tails from side to side. They use strong muscles on each side of their body to create a wave-like motion that travels from their nose to their tail propelling them forward. This movement, combined with a streamlined, tapered body shape allows for efficient, high-speed movement.

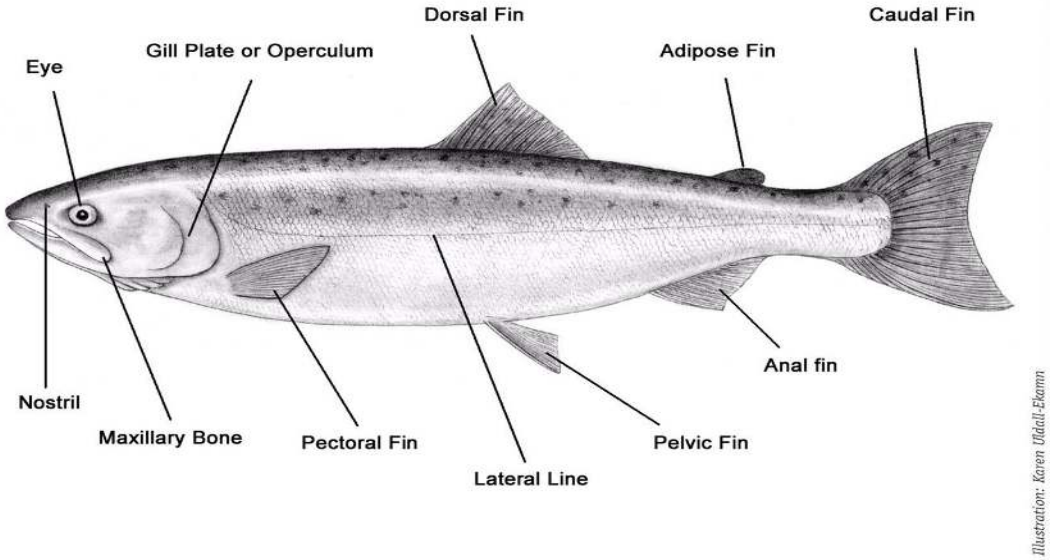
Types of Fins

Fish use their fins for steering, stopping, balance, and speed. Fish have five (5) useful fins that all have a specific function. The number and types of fins on a fish varies, depending on the fish species.

- dorsal & anal fins - keeps the fish upright and balanced in the water;
- pectoral & pelvic fins - **u**sed for steering, stopping, and turning;
- caudal (tail) fin - provides the main thrust to propel the fish forward.

Some fish possess a sixth fin, an adipose fin. The adipose fin is a small, fleshy, boneless fin on the back of certain freshwater fish located between the dorsal and tail fins. It is typically found on salmon, trout, whitefish, char, grayling, catfish, and smelt. The adipose fin was originally considered somewhat "non-functional". New research has now suggested that this fin may be vital in the detection of and response to stimuli such as touch, sound, and changes in water pressure. More recently, it has been discovered that this fin has extensive nervous tissue suggesting that it may act to improve a fish's ability to swim in turbulent waters.

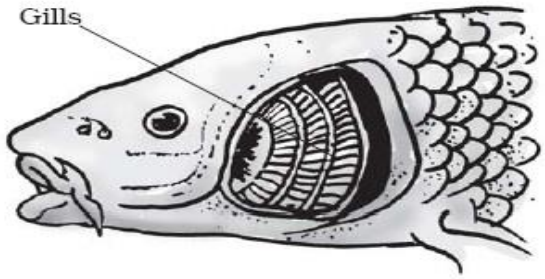
<u>Special Note:</u> All fish obviously swim forwards, but some fish have the ability to swim backwards. These fish tend to rely on their caudal and anal fins to create momentum in the opposite direction.



How Fish Breath

A fish cannot breathe or take in oxygen directly from the air. Most fish breathe oxygen using gills, which are located on the sides of their heads behind each operculum (gill plate). Gills have many tiny, thread-like parts called filaments. These filaments are full of tiny blood vessels, that create a large surface area to absorb oxygen from the water and release carbon dioxide.

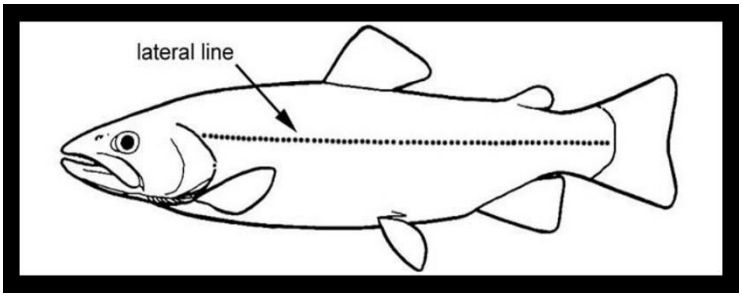
A fish breathes when it takes in water through its mouth, and then pumps it over the gills. The blood in the gills flows in the opposite direction to the water. This helps the fish take in as much oxygen as possible. After the oxygen is absorbed, the fish pushes the oxygen-poor water out through openings near the gills.



The Lateral Line on a Fish

The lateral line is a distinct line down each side of a fish's body, usually visible as faint lines of pits or pores. The lateral line serves three functions:

- it allows for the detection of water pressure changes, movement, and vibrations surrounding the fish;
- it acts like radar, helping the fish to navigate in dark or murky water;
- it helps the fish orient itself upright in the water and relative to other fish (e.g., schooling fish or predators and prey).



Fish as Pets

Many people enjoy keeping fish as pets. The most popular pet fish include hardy and colourful freshwater species like bettas, neon tetras, guppies, goldfish, zebrafish, and mollies. All of these species are relatively peaceful, non-demanding fish that do well in a beginner's fish tank.

Pet fish are the third most popular pet in Canada after cats and dogs. Studies have shown that keeping an aquarium relieves stress. They are aesthetically pleasing. Fish are a great way for children to learn about caring for living things. If you are looking to get started with a freshwater aquarium, it is important to remember that starting and maintaining an aquarium can get expensive, plus, it requires dedicated, regular, on-going care. Luckily, some fish are much easier to take care of than others. It is always important to keep fish that have similar requirements to water temperature, pH, and tank size, so be sure to do your research before heading to the pet store.

Careful Considerations to Getting a Pet Fish

The most important considerations involve the size and placement of the tank or aquarium. Consider the following when getting a pet fish:

- A fishbowl is not a good idea for any pet fish. Fish bowls are generally harmful to fish because their small, spherical design prevents proper filtration, heating, and oxygenation, leading to toxic water conditions (ammonia buildup) A water pump is essential to fish to provide water circulation, aeration, and filtration, ensuring a healthy, oxygen-rich environment for fish and (plants). It prevents stagnant water by creating currents that move waste toward filters, distribute heat evenly, and simulate natural habitats, which helps reduce disease and keeps the tank clean.

- When considering tank size, where is the tank going to stay? Aquariums should not be kept on standard furniture, unless the furniture is extremely sturdy. Aquariums weigh approximately 4.5 kg (10 lb) for every gallon of water, so a ten-gallon tank will weigh around 45 kg (100 lb). This makes moving a tank (once it is set up) very difficult, especially since moving a tank full of water will stress, and possibly break the glass.

- Tanks should not be in direct sunlight, nor should they be near any source of heat or cold (such as your vents). Never put an aquarium in the kitchen.

- If you are getting a rather large aquarium, you are also going to want to ensure that it is placed with its weight resting across several floor supports, rather than across one or two of them. Even worse than the tank ending up on the floor due to weak furniture is the tank ending up on the floor below.

Conclusions:

1. One day you go to feed your pet fish and you notice that the usual fish flakes are all gone. You decide to feed your fish bread crumbs. Is that a good idea?

_____

_____

_____

2. You obtain three pet fish for your aquarium. You go to the pet store to buy some fish food. The pet store has flakes, pellets, frozen, freeze-dried, and live options. You decide to buy the cheapest food. Is that a good idea?

_____

_____

_____

3. You visit a pet store one day and you decide to buy a small, 25-cm shark. Is that a good idea?

_____

_____

_____

Answers:

1. One day you go to feed your pet fish and you notice that the usual fish flakes are all gone. You decide to feed your fish bread crumbs. Is that a good idea?

No, it is not a good idea to feed pet fish bread crumbs. Bread lacks essential nutrients and expands in a fish's stomach potentially, causing digestive blockages. It also decays quickly, decreasing the water quality.

2. You obtain three pet fish for your aquarium. You go to the pet store to buy some fish food. The pet store has flakes, pellets, frozen, freeze-dried, and live options. You decide to buy the cheapest food. Is that a good idea?

No, it is not a good idea. Fish food comes in various forms: flakes, pellets, frozen, freeze-dried, and live. Each type is tailored to the nutritional needs of specific species (tropical, goldfish, koi, herbivores, or carnivores). However, a varied diet is good, as it ensures fish health, with options like algae wafers for bottom feeders and protein-rich frozen food for carnivores.

3. You visit a pet store one day and you decide to buy a small, 25-cm shark. Is that a good idea?

Generally speaking, it is not a good idea. Sharks do not make good pets largely because novice aquarium hobbyists simply do not realize how big these fish get. Freshwater sharks are often sold as juveniles and advertised as community fish. What you may not realize is that they can quickly outgrow the community tank and turn into large, aggressive fish. If you want to avoid having to sell your fish back to the pet store or buy an entirely new aquarium, avoid freshwater sharks.

Name: _____

Make a Toad Abode

Make sure your toad abode has an entrance hole, sits on exposed soil, and add leaves inside for bedding. Keep it near water and avoid chemicals. Here is a step-by-step guide and tips on building the perfect toad abode.

Materials You Can Use

- clay or terracotta pot (best for keeping cool in summer);
- rocks, bricks, or stones (great for natural, sturdy, cave-like structures).

Step-by-Step Instructions

1. Select a location: Find a shady, damp, and quiet spot near your garden, ideally near plants or a shallow water source.
2. Prepare the spot: Clear a small area down to the bare soil, as toads like to burrow.
3. Create the House:
    1. pot method: Turn a clay pot upside down. If it doesn't have a natural notch, carefully break or chip a small archway in the rim for an entrance. Or, you can turn the pot on its side and bury it halfway under the soil.
    2. stone method: Arrange flat stones to create a small, stable cave with front and back exits.
4. Add amenities: Place some damp, rotting leaves, or moss inside for bedding.
5. Secure it. Partially bury the edges of the pot or stones so it is stable and will not rock if bumped.

Key Tips for Success

- Keep it natural: Avoid using toxic paints; if decorating, use non-toxic or water-based options.
- Provide water: Place a shallow dish of water nearby if no natural water source is close.
- Don't force residents: Let the toads find the house on their own; moving them to your yard rarely works.
- Winter care: For winter, make a deeper hole using rocks piled into a dome to allow the toad(s) to burrow below ground level.

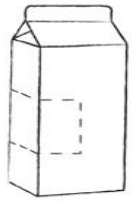
Make a Bird Feeder

Making a bird feeder is a rewarding experience for a Beaver. It instills a positive attitude in the child knowing that they are contributing to the welfare of wildlife. Most important, it helps Beavers develop new skills, and encourages them to recycle items that would normally end up in the waste stream. You can help provide food for birds no matter where you live.

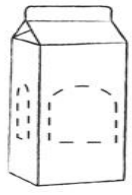
Milk Carton Feeder

Materials:	washed 2-litre waxed milk carton	string
	permanent marker	small nail or tack
	scissors	bird seed

Gather your materials and then spread them out on your work area. This project can be done just about anywhere -- at the kitchen table, on a deck or patio.



Step 1: Using the marker, draw a shape on the milk carton where you want the entrance. Cut out the shape using the scissors. Make sure you leave about 5 cm of space at the bottom to collect the birdseed. Punch out a hole in the top of the carton using the nail or tack and tie the string through, leaving about 20 cm of slack for hanging it up.

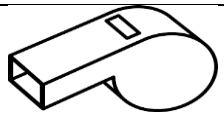
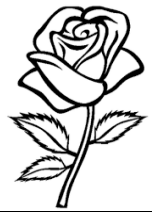


Step 2: Fill the bottom with some birdseed, and hang it up near a tree or somewhere that birds have easy access to.

Name: _____

A Beaver's Five Senses

Put an "X" through the object that does not belong.

Sense of Hearing		
		
Sense of Smell		
		
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	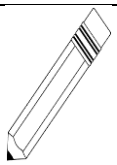	
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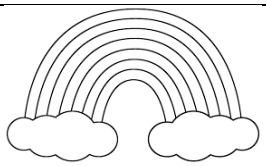		
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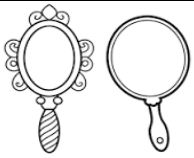
		

Scratch n' Sniff

What You Need: a blindfold, a clear unobstructed path for a small hike

What You Do:

1. Prior to the hike, ask the participating Beaver what their five senses are and discuss the importance of each sense.

2. Ask the child what would happen if one of those senses became impaired or was lost. How does your body compensate?

3. Find a nice unobstructed trail to conduct the hike. Find as many things along the trail that are recognizable through the child's senses.

4. At some point along the hike, blindfold the child. Have them stand still and ask them not to move and to be very quiet. Ask them to listen carefully for the sounds along the path. Remind them that because their eyesight is lost, other senses become sharper.

5. Find something with a strong odour (a cedar leaf, wild leek, cherry twig, decaying leaves). Crush the object putting it under the child's nose. Do not tell them what you are doing or what it is. Their sense of smell will pick it up immediately. Find as many objects you can test their senses with.

6. While blind-folded, proceed along the trail walking slowly. Find a spot along the trail that is uneven, muddy, or rocky. Have the child walk through this. Discuss the results with the child.

The Timber Rattlesnake

Name: _____

The timber rattlesnake is the only native reptile known to be extinct in Ontario.

1. When did the timber rattlesnake become extinct? Where was it found in Ontario?

_____

_____

_____

2. Name two (2) reasons why it became extinct in Ontario.

- _____
- _____

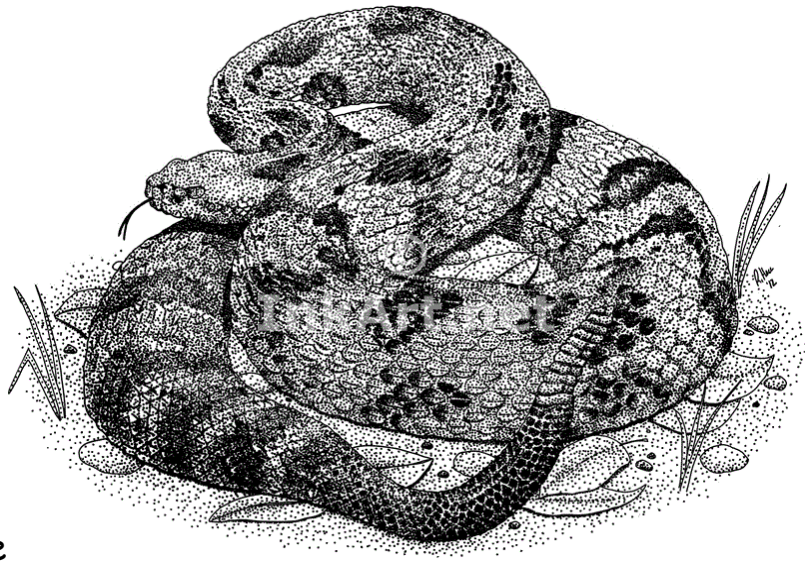
3. Currently, the only remaining rattlesnake species in Ontario is the eastern massasauga rattlesnake. Unfortunately, over the past few years, the population of eastern massasauga rattlesnakes has declined dramatically to the point where it is now endangered.

   Name two (2) things that a Beaver can do to help make sure the eastern massasauga rattlesnake does not become extinct in Ontario.

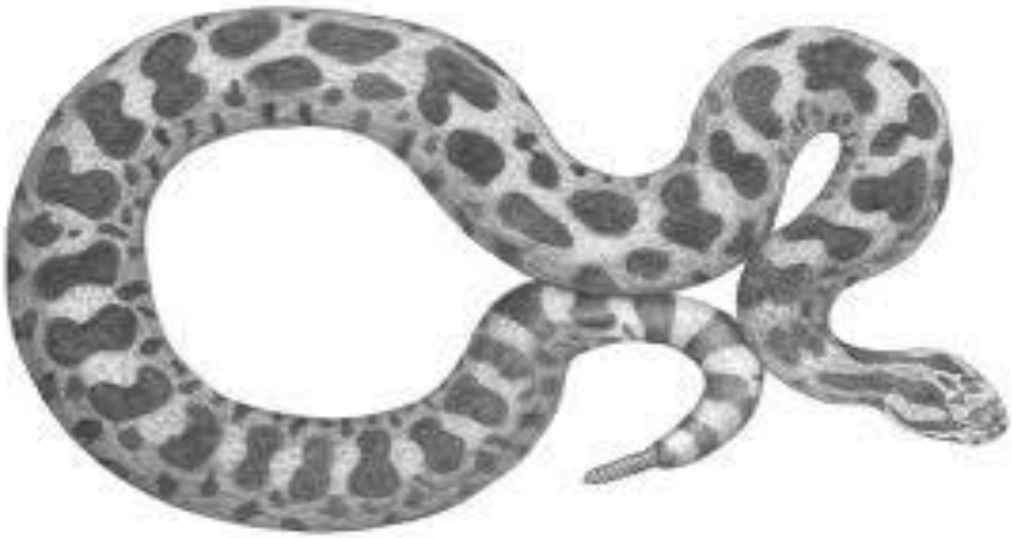
- _____
- _____

4. Name two (2) reasons why rattlesnakes are valuable to a habitat community.

- _____
- _____



timber rattlesnake



eastern massasauga rattlesnake

Answers:

1. When did the timber rattlesnake become extinct? Where was it found in Ontario?

   The last positive identification of a timber rattlesnake was observed at Niagara Glen located deep in the Niagara Gorge in 1941. It could formerly be found from the Niagara gorge region of Welland County northward to the Manitoulin District.

2. Name two (2) reasons why it became extinct in Ontario.

   - *The timber rattlesnake lost much of its habitat. This included rocky, limestone ledges where deep fissures provided winter den sites below the frost line.*

   - *Winter temperatures may also have contributed to its decline. Living at the northern limit of its range in Ontario, it may not have been able to withstand Ontario's cold temperature extremes.*

3. The only remaining rattlesnake species in Ontario is the eastern massasauga rattlesnake. Unfortunately, over the past few years the population of eastern massasauga rattlesnakes has declined dramatically to the point where the it is now endangered.

   Name two (2) things that a Beaver can do to help make sure the eastern massasauga rattlesnake does not become extinct in Ontario?

   - *report a sighting;*
   - *get involved in reptile and amphibian conservation on your property, on the road and in your community;*
   - *donate to support reptile and amphibian conservation;*
   - *watch for reptiles and amphibians on the road;*
   - *don't release pet reptiles and amphibians into the wild.*

4. Name two (2) reasons why rattlesnakes are valuable to a habitat community.

Rattlesnakes are vital components of their habitats, acting as crucial regulators in the food web, natural pest controllers, and indicators of environmental health. Despite the fear surrounding them, they provide several key ecological and human benefits:

- *rattlesnakes primarily feed on small mammals like mice, rats, rabbits, and chipmunks so they control pest populations;*
- *rattlesnakes are a food source for various animals, including eagles, hawks, owls, badgers, foxes, and coyotes;*
- *rattlesnakes are an indicator species; they are sensitive to environmental changes, pollution, and habitat destruction so the presence or absence of rattlesnakes helps scientists gauge the overall health of an ecosystem;*
- *rattlesnake venom is a complex substance used in research and the development of life-saving drugs, including treatments for high blood pressure, heart attacks, blood clotting disorders, and potentially cancer.*

In summary, rattlesnakes are considered an "integral component" of their systems, contributing to biodiversity and natural health.

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Name: _____

Canada's Rainforests

What is a Rainforest?

A rainforest is a dense, warm, and wet ecosystem having tall, mostly old-growth coniferous (evergreen) trees that form a dense canopy. A rainforest receives a lot of rainfall each year, typically over 200 cm (80 inches). The climate in a rainforest is typically warm and humid with temperatures frequently staying between 24-33°C (75-90°F).

A rainforest is considered a carbon sink, acting like the "lungs of the Earth". A carbon sink is any natural or artificial system that absorbs and stores more carbon dioxide (CO_2) from the atmosphere than it releases. Because it absorbs massive amounts of carbon dioxide and releases oxygen, is plays a crucial role in regulating the global climate by reducing greenhouse gases.

There are two main types of rainforests:

- tropical rainforest, found near the equator
- temperate rainforest, found along coastal, cooler areas

Canada has two significant temperate rainforests, located primarily along the Pacific coast of British Columbia. These include the Great Bear Rainforest and the rare inland temperate rainforest. Both these areas cover roughly 74,000 km^2, representing nearly 25% of the world's temperate rainforests.

Canada's unique, coastal temperate rainforests are characterized by their proximity to both ocean and mountains. Both forests are known for their massive, old-growth western red cedar, Sitka spruce, and hemlock trees, which make up 1.8% of Canada's total forested area.

The Great Bear Rainforest

The 6.4-million-hectare Great Bear Rainforest is the largest intact coastal temperate rainforest on Earth. It features high biodiversity, including 1,000-year-old trees (Sitka spruce, western red cedar) and is home to animals such as cougars, wolves, salmon, grizzly bears, and the Kermode ("Spirit") bear, a unique subspecies of the black bear, which has white-coloured fur.

Inland Temperate Rainforest

Located in southeastern British Columbia, roughly 500 km from the ocean near Revelstoke, this unique inland rainforest is the world's only inland temperate rainforest. It stretches over 1,100 km and is considered a "forgotten" ecosystem. It also features high biodiversity and is home to animals such as the mountain caribou (an endangered species in Canada), grizzly bears, wolverines, fishers, mountain goats, and Sitka black-tailed deer.

Threats to Canada's Rainforests

- Deforestation: There is an extensive history of forestry in the region, however the high rate of logging trees seems to be increasing. Driven by human development and resource demand, deforestation is rapidly destroying these ecosystems.

- Climate Change: By 2100, the projected increase in Canada's average temperature ranges from 4 to 8 degrees Celsius, or up to four times higher than the global average. This will increase the frequency of intense wildfires, insect outbreaks, and severe droughts throughout Canada's rainforests.

Losing Canada's rainforests would cause a massive loss in biodiversity, disrupt water cycles, increase flood risks, and erase thousands of years of ecosystem development. Because these rainforests act as a significant carbon sink, their destruction would then turn them into carbon sources. As these forests die and decompose, or burn, they would release massive amounts of carbon dioxide into the atmosphere contributing immensely to climate change.

Conclusions:

1. Why is the word "rainforest" a good name for this ecosystem?

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_____

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2. What is the natural process called when plants remove carbon dioxide from the atmosphere to make oxygen?

_____

3. What does the word "biodiversity" mean?

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4. Why is the Great Bear rainforest so important to First Nations people?

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Answers:

1. Why is the word “rainforest” a good name for this ecosystem?

"Rainforest" is an excellent name because it precisely describes the ecosystem's defining characteristics: extremely high annual rainfall (often over 80–100 inches) and dense, towering forest coverage. This name highlights the crucial, constant moisture that drives the habitat's intense biodiversity, lush growth, and vital role in the water cycle.

2. What is the natural process called when plants remove carbon dioxide from the atmosphere to make oxygen?

Photosynthesis: carbon dioxide + water → glucose (food) + oxygen)

3. What does the word “biodiversity” mean?

Biodiversity, short for biological diversity, refers to the immense variety of all the living things you will find in one area—the variety of animals, plants, fungi, and even microorganisms like bacteria that make up our natural world. Each of these species and organisms work together in ecosystems, like an intricate web, to maintain balance and support life.

4. Why is the Great Bear rainforest so important to First Nations people?

The Great Bear Rainforest is vital to First Nations people because they are ancestral, unceded territories that provide sustenance, medicines, and materials for cultural practices. These ecosystems are deeply spiritual, seen as the "lifeblood" of communities.

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Name: _____

Coyotes

Since 1900, as a result of land clearing, the coyote (*Canis latrans*) is now becoming more common in southern Ontario. Although it can be found in varying habitats, it prefers open, hilly country with some continuous wooded areas with high, stable populations now in open agricultural landscapes and urban, green spaces like Toronto. Coyotes are generally very timid and suspicious of humans but over time, have become bolder. They will frequent city parks, and in some cases, are becoming more use to humans thereby making them more visible. Most often though, they are usually wary of humans and avoid people whenever possible.

Physical Appearance

A coyote is relatively easy to identify. They are typically smaller than a German shepherd. Their fur is grayish-brown with reddish tones, white-throated, and lighter-colored bellies. Their face is long with a slender snout and a black nose pad less than 2.54 cm (1-inch) across and large, upright, pointed ears. They have excellent hearing and smell. Their eyes tend to be yellow or amber, rather than the brown often seen in dogs. The most readily identifiable feature is their tail. It is bushy, often with a black tip, and <u>always held down when moving</u>. The tail is never held high or curled. Coyotes are fast runners that travel with a purposeful, <u>straight-line gait</u> rather than zig-zagging like a dog.

Coyote Behaviour

The coyote is a highly intelligent predator that has adapted well to both rural and urban environments. Coyotes remain active throughout fall and into the winter. They are typically most active around sunrise and sunset, but in the winter, they become very active throughout the day. Most of their activity involves looking for food. Coyotes are opportunistic feeders and will consume a variety of foods. For most of the year, their diet consists mainly of small mammals (fox, rodents, rabbits, mice and voles), birds, amphibians, grasshoppers, deer fawns, fruits, and vegetables.

Encounters with Coyotes

It is unusual for coyotes to show no fear of humans. Coyotes displaying no fear of humans, or exhibiting aggressive behaviours, have likely been habituated to people through direct or indirect feeding. Coyote sightings often increase as a result of humans intentionally or unintentionally providing a food source and people conclude they are seeing multiple coyotes when, in fact, the same coyote is making numerous visits to the same area where it has found a consistent food source. People should never feed coyotes. The best approach for safe and harmonious coexistence is to avoid conditioning coyotes with human contact and food. The few documented cases of coyote-inflicted wounds on humans occurred as a result of humans encouraging close contact by feeding a coyote. Offering food encourages the coyote to increase their proximity and tolerance to people.

In a small number of cases coyotes lose their fear of people and start preying on livestock. These problem coyotes require more serious measures. There are tools for farmers and rural landowners that will help them deal with coyote conflicts and predation.

Preying on humans is not normal behavior for a coyote. They are naturally extremely fearful, shy animals. But coyotes that appear unnaturally aggressive and fearless are potentially dangerous. Rabies often (but not always) makes animals behave this way as the virus rages through the animal's central nervous system. Surprisingly though, rabies is rare in coyotes, and accounts for only 1% of all diagnosed cases.

If a Coyote is Near

If you happen to cross paths with a coyote on a walk, remain calm and give it space. Coyotes typically prefer to avoid people and chances are, when it sees you, it will quickly head in the opposite direction. Coyotes are naturally curious creatures and may pause to look you over, but will have no intention to approach or attack. If you do feel threatened by a coyote, make yourself big, make loud noises, and sudden movements to scare it away.

In most cases, coyotes and humans can coexist with little issue as long as coyotes are provided physical space, access to habitat and natural food sources, and maintain a healthy apprehension to humans.

Conclusions:

1. List three (3) tips a Beaver could offer someone to minimize an encounter with a coyote in their yard.

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- _____
- _____

2. Why should you never turn your back on or run from a coyote?

_____

_____

_____

3. Why are coyotes a danger to pet cats and small dogs?

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4. How do humans cause challenges for the coyote?

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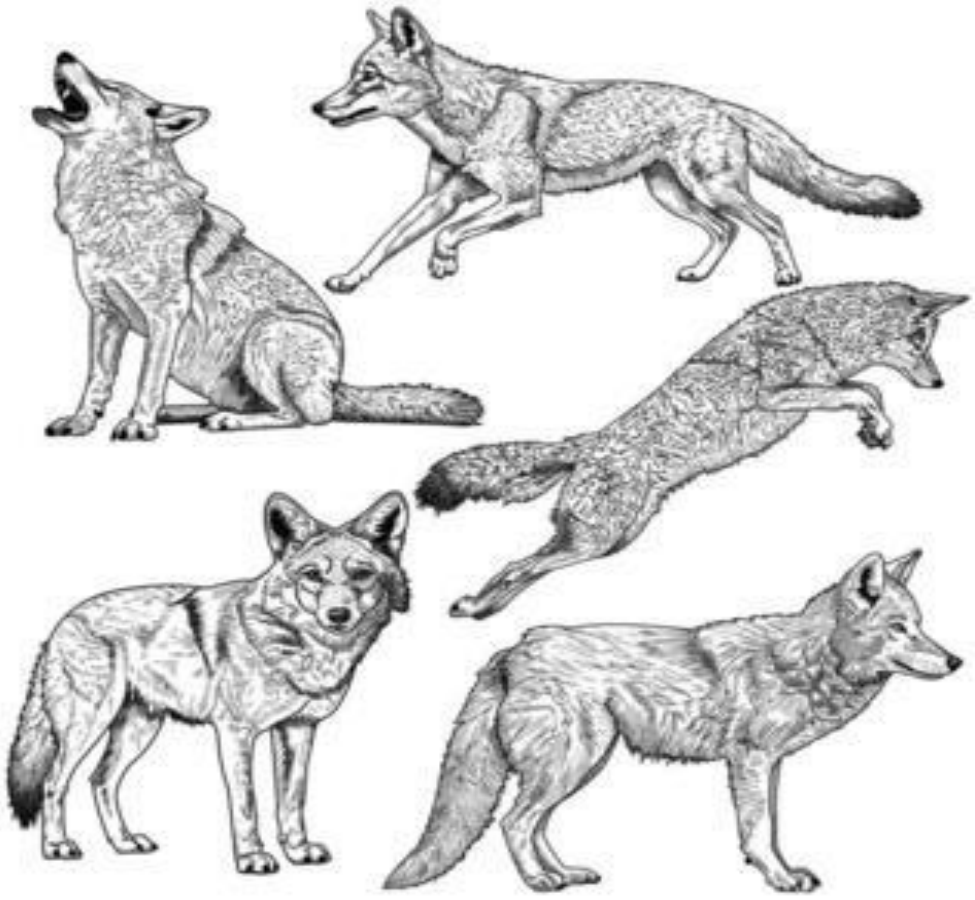

Answers:

1. List three (3) tips a Beaver could offer someone to minimize an encounter with a coyote in their yard.

   - *Do not allow a large amount of wild bird seed to remain on your lawn. Birdseed attracts birds, rabbits, squirrels, and rodents, which are prey for coyotes.*
   - *Keep trash cans covered and use wildlife-proof lids.*
   - *Pick ripened fruit, and clean all rotted fallen fruit from the ground.*
   - *Supervise pets and keep them under strict control.*
   - *Keep compost bins safely stored and secure.*

2. Why should you never turn your back on or run from a coyote?

You should never turn your back on or run from a coyote because it can trigger their natural, high-speed chase instinct, leading them to view you as prey. Running away or showing fear can encourage a coyote to chase and potentially attack, as they are capable of reaching speeds up to 65 km/h (40 mph).

3. Why are coyotes a danger to pet cats and small dogs?

If given the opportunity, pet cats are considered ideal prey for coyotes, which naturally hunt small mammals such as mice, voles and rabbits. Coyotes can run up to 65 km/h (40 mph), making it nearly impossible for a cat to outrun them.

Dogs and coyotes are close cousins; the scent of a dog may cause coyotes to become territorial and aggressive thereby potentially injuring or killing the dog.

4. How do humans cause challenges for the coyote?

Coyotes must adjust to their ever-changing human world. Due to habitat loss or habitat fragmentation, coyotes are forced to establish new territories to hunt and forage for food. Defending their territory can lead to fights with other coyotes (especially solitary or transient ones) and potentially fatal. Coyote dens are destroyed through development activities. Human-related activities, specifically vehicle collisions (40-70% of fatalities) and illegal shootings, particularly in urban and suburban areas, are the primary causes of mortality for coyotes. However, the resilient coyote continues to respond successfully to these environmental impacts.