

Grade Five Science

Aligned to the Alberta Curriculum

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The lessons and experiments in this book fall under 5 main topics that relate to the Alberta curriculum for Grade 5 Science – Topic A: Electricity and Magnetism, Topic B: Mechanisms Using Electricity, Topic C: Classroom Chemistry, Topic D: Weather Watch and Topic E: Wetland Ecosystems. In each lesson, you will find teacher notes designed to provide you guidance with the learning intentions, the success criteria, materials needed, a lesson outline, as well as provide some insight on what results to expect when the experiments are conducted. Suggestions for differentiation or accommodation are also included so that all students can be successful in the learning environment.

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Some material appearing in this book has been used in other published works, such as lessons from Electricity (OTM2108), Habitats (OTM2104), Earth and Science Grade 5 (OTM2156), Physical Science Grade 5 (OTM2148) and Matter and Materials (OTM2136).

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Printed in Canada

Published in Canada by:
On The Mark Press
Belleville, ON
www.onthemarkpress.com

Funded by the
Government
of Canada

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At Glance

SKILLS – SCIENCE INQUIRY

5-1 Design and carry out an investigation, using procedures that provide a fair test of the question being investigated. *Students will ask questions that lead to exploration and investigation.*

5-2 Recognize the importance of accuracy in observation and measurement; and with guidance, apply suitable methods to record, compile, interpret and evaluate observations and measurements. *Students will identify one or more possible answers to questions by stating a prediction or a hypothesis. Students will plan, with guidance, and carry out procedures that comprise a fair test, identify variables that need to be held constant to ensure a fair test and select appropriate materials and identify how they will be used.*

5-3 Design and carry out an investigation of a practical problem, and develop a possible solution. *Students will identify problems to be solved and the purpose(s) of the problem-solving activity: What problem(s) are we trying to solve? What conditions must be met? What controls are required? How will we know that we have done what we set out to do?*

ATTITUDES

5.4 Demonstrate positive attitudes for the study of science and to the applications of science in responsible ways. *Students will show growth in acquiring and applying curiosity, inventiveness, perseverance, appreciation of the value of experience and observation, a willingness to work with others, a sense of responsibility for actions taken and respect for living things and environments with a commitment for their care.*

TOPIC A: ELECTRICITY AND MAGNETS

5-5 Demonstrate safe methods for the study of magnetism and electricity, identify methods for measurement and control, and apply techniques for evaluating magnetic and electrical properties of materials. *Students will recognize and appreciate the potential dangers involved in using sources of electrical currents (household electrical currents, small and large batteries, heat from electrical circuits, wasting the limited amount of energy in batteries). Students will describe and demonstrate example activities that show that electricity and magnetism are related, demonstrate and interpret evidence of magnetic fields around magnets and around current-carrying wires. Students will demonstrate that a continuous loop of conducting material is needed for an uninterrupted flow of current in a circuit and distinguish electrical conductors-materials that allow electricity to flow through them - from insulators - materials that do not allow electricity to flow through them. Students will recognize and demonstrate that some materials, including resistors, are partial conductors of electricity, predict the effect of placing an electrical resistance in a simple circuit and recognize that the amount of electricity we use in our homes is measured in kilowatt hours. Students will interpret and explain readings on a household electrical metre as well as efficiency labels on electrical appliances. Students will draw and interpret, with guidance, circuit diagrams that include symbols for switches, power sources, resistors, lights and motors.*

TOPIC B – MECHANISMS USING ELECTRICITY

5-6 Construct simple circuits, and apply an understanding of circuits to the construction and control of motorized devices. *Students will identify example applications of electrical devices in the school and home environment, and classify the kinds of uses, design and construct circuits that operate lights and other electrical devices and recognize the importance of switches and other control mechanisms to the design and operation of electrical devices, and identify purposes of switches in particular applications. Students will construct and use a variety of switches, design and construct vehicles or other devices that use a battery-powered electric motor to produce motion and design and construct a burglar alarm. Students will demonstrate different ways of lighting two lights from a single power source, and compare the results, demonstrate different ways of using two batteries to light a bulb, and compare the results and given a design task and appropriate materials, invent and construct an electrical device that meets the task requirements.*

TOPIC C – CLASSROOM CHEMISTRY

5-7 Describe the properties and interactions of various household liquids and solids, and interpret their interactions. *Students will recognize and identify examples of two or more solids, a solid and a liquid and two or more liquids. Students will apply and evaluate a variety of techniques for separating different materials, distinguish substances that will dissolve in a liquid from those that will not, and demonstrate a way of recovering a material from solution and demonstrate a procedure for making a crystal. Students will recognize that the surface of water has distinctive properties, and describe the interaction of water with other liquids and solids, produce carbon dioxide gas through the interaction of solids and liquids, and demonstrate that it is different from air and distinguish reversible from irreversible changes of materials, and give examples of each. Students will recognize and describe evidence of a chemical reaction, explain how the products of a reaction differ from the original substances and use an indicator to identify a solution as being acidic or basic.*

TOPIC D – WEATHER WATCH

5-8 Observe, describe and interpret weather phenomena; and relate weather to the heating and cooling of Earth's surface. *Students will describe and demonstrate methods for measuring wind speed and for finding wind direction, describe evidence that air contains moisture and that dew and other forms of precipitation come from moisture in the air and describe and measure different forms of precipitation, in particular, rain, hail, sleet, snow. Students will measure at least four different kinds of weather phenomena and record weather over a period of time. Students will identify some common types of clouds, and relate them to weather patterns. Students will describe the effects of the Sun's energy on daily and seasonal changes in temperature (24-hour and yearly cycles of change) and recognize that weather systems are generated because different surfaces on the face of Earth retain and release heat at different rates.*

5-9 Investigate relationships between weather phenomena and human activity. *Students will predict where, within a given indoor or outdoor environment, one is likely to find the warmest and coolest temperatures, describe patterns of air movement, in indoor and outdoor environments, that result when one area is warm and another area is cool. Students will understand that climate refers to long term weather trends in a particular region and that climate varies throughout the world, recognize that human actions can affect climate and identify human actions that have been linked to the greenhouse effect. Students will appreciate how important it is to be able to forecast weather and to have suitable clothing or shelter to endure various types of weather. Students will test fabrics and clothing designs to choose those with characteristics that most effectively meet the challenges of particular weather conditions.*

TOPIC E – WETLAND ECOSYSTEMS

5-10 Describe the living and nonliving components of a wetland ecosystem and the interactions within and among them. *Students will recognize and describe one or more examples of wetland ecosystems found in the local area, understand that a wetland ecosystem involves interactions between living and nonliving things, both in and around the water, and identify some plants and animals found at a wetland site, both in and around the water; and describe the life cycles of these plants and animals. Students will identify and describe adaptations that make certain plants and animals suited for life in a wetland and understand and appreciate that all animals and plants, not just the large ones, have an important role in a wetland community. Students will identify the roles of different organisms in the food web of a pond (producers, consumers, decomposers) and draw diagrams of food chains and food webs, and interpret such diagrams. Students will recognize that some aquatic animals use oxygen from air and others from water, identify examples and adaptations of each, identify human actions that can threaten the abundance or survival of living things in wetland ecosystems, identify individual and group actions that can be taken to preserve and enhance wetland habitats and recognize that changes in part of an environment have effects on the whole environment.*

Taken from the Alberta Education Grade 5 Science Curriculum.

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HUMAN BEINGS AND THE WETLANDS ECOSYSTEM

LEARNING INTENTION:

Students will identify human actions that can threaten the abundance or survival of living things in wetland ecosystems. Students identify individual and group actions that can be taken to preserve and enhance wetland habitats. Students will recognize that changes in part of an environment have effects on the whole environment.

SUCCESS CRITERIA:

- describe the effects of human actions on wetland ecosystems, such as adding pollutants will endanger food webs, changing the flow of water will change habitats,
- create, plan and organize events or activities in which individuals and groups can participate in the preservation, appreciation and enhancing of wetland habitats.
- explain how a change in the environment can disrupt an ecosystem

MATERIALS NEEDED:

- a copy of *Human Beings and Wetlands* worksheet 1 and 2 for each student
- a copy of *Wetlands - Get In On The Local Action* worksheet 3 and 4 for each student
- access to internet, local library, local conservation area brochures or similar
- container, sponge, block of concrete or similar, water
- poster art supplies
- scissors, pencils, pens, pencil crayons

PROCEDURE:

***This lesson can be done as one long lesson or divided into shorter lessons.**

1. Present the class with a video on why we need wetlands. Wetlands act as a kind of sponge and trap for flood protection and for water quality. Here is an example video demonstrating how wetlands work – <https://youtu.be/h3dMkhO6jAw>. Ask students what happens if you pour water into a sponge. Demonstrate with a glass container and a sponge. Ask students what happens when you pour water onto concrete (or a rock)? Demonstrate with a container and a block or rock. Give students worksheets 1 and 2. Have students read through the material as a class or independently. Check for understanding. Assign activities and questions and monitor student progress. Review material as needed when work is complete.
2. Lead a discussion with students to identify local wetlands, conservation regions or parklands. Talk about some features or programs that take place there. If possible, ask if one of these places would send a spokesperson to talk to the class about what they do. Give students worksheets 3 and 4. Read through the material and check for understanding. As an option, brainstorm with the class or arrange students into groups for the assignments. Monitor student progress and review material as needed when work is complete.

DIFFERENTIATION:

Slower learners or students with accommodations may benefit from a reading buddy for the worksheets. Due to the number of written questions on the worksheets, consider having students answer some activities with verbal responses.

For enrichment, faster learners could research flooding events in the news or programs designed to clean up pollution. Another option of enrichment would include constructing a model of a wetland. Here is a video of an example – https://youtu.be/QDx9_6IjsaM.

Human Beings and Wetlands

What have wetlands ever done for human beings?

Many people see wetlands as smelly, slimy, bug-infested environments that serve no purpose. But wetlands do many things beneficial to plant life, animal life and even human life. Wetlands are a natural water quality improvement system. They help control shoreline erosion around bodies of water. But just as important, wetlands help with flood protection.



Calgary skyline reflected in a reconstructed urban wetland along the Bow River.

A wetland area is kind of like a big sponge. It traps all kinds of water - surface water, precipitation, groundwater - and then slowly releases the water over time. Trees and wetland vegetation create a kind of root mat, slowing down water while holding onto the dirt and soil.

Human beings use things like concrete and asphalt to construct buildings and roads because they are so solid and strong. They are called impervious surfaces because liquids do not work through them into the soil. Their smooth surfaces are just the opposite of a sponge. They create a lot of run-off with precipitation and water. This is why floods can be so dangerous in urban areas. Where does that water go in heavy storms or spring thaws? Protective wetlands take care of much of the water that might cause damage to homes and communities.

When towns and cities grow larger, they sometimes expand into wetland environments. This creates more concrete and asphalt spaces and less of the protective wetlands.

Influence of Industry and Agriculture

Many industrial plants and factory farms require a lot of water in the cleaning of equipment or processing of products. These added uses of water can reduce the overall water in an area, affecting the water levels in wetlands.

Another problem is pollution. When waste materials such as oil come into a wetlands area, they can suffocate plants, blocking their ability to draw from the environment and receive the sun's energy. Even material like plastic causes problems. Birds sometimes try to eat pieces of plastic only to have it collect in their digestive systems. When the birds die, the loss affects the entire food web.

Even chemicals like fertilizers and pesticides used in farms or gardens can get into the water run-off, collect in wetlands and affect the ecosystem of a wetland.

Changes can be made to prevent these problems. Simple changes in the workplace, like the safe disposal of hazardous material, make a difference and reduce dangerous waste materials in wetlands.

Think About It

1. Name three things a wetlands ecosystem can do for human beings.

2. What is meant by an impervious surface? How is this different from a wetland environment?

3. What are three waste materials that can hurt the ecosystem of a wetland?

4. Choose a plant or animal from the wetlands ecosystem. Find out what would happen if that plant or animal were removed from the ecosystem.

Wetlands - Get In On The Local Action



Footbridge in Astotin Lake, Elk Island National Park.

Do you have a parkland, a conservation region or a wetlands ecosystem in your local area? Places like this often have events or programs for people that want to get involved in the preservation, appreciation or growth of wetland habitats. Some might even have walking trails where you can see all the different features of the ecosystem.

Pick a location. Look at their website or find some of their printed brochures. Select one of their events, programs or special attractions. Answer the following.

1. In your own words, how does this event, program or attraction help with the preservation of the local wetland ecosystem?

2. In your own words, how does this event, program or attraction help with the appreciation of the local wetland ecosystem?

3. In your own words, how does this event, program or attraction help with the growth of the local wetland ecosystem?

Choose one of the following:

1. Interview someone from the parkland or conservation area you selected for the last worksheet. Ask them 5 questions about their work – think of who, what, when, why, where and how. Write up a report on the interview like a journalist for a newspaper.
2. Prepare a poster for the event, program or attraction you selected for the last worksheet. Be sure to highlight the valuable information, how people can get involved and what benefits people might get from the experience.
3. Plan a clean-up event. Find a local wetlands area that needs a “Trash-Bash” clean up. Make a list of the equipment you would need. Organize who is involved, who will do what, and how much time you would need. Think about what you do with the waste afterwards. Write a full report with every detail about your plan.
4. Write a speech with the goal of persuading others to take part in the event, program or attraction you selected for the last worksheet. Make the speech about 1-2 minutes in length.

Notes