

LESSON PLAN How Does an Oil Spill Impact the Environment?

GRADE 7 (AB, NB, NS, NT, NU, ON, PE, SK)
Cycles 2 and 3 (QC)

SUBJECT Science

TIME NEEDED 110 minutes (total)

- 30 minutes for the Introductory Activity (Schema Activation)
- 40 minutes for the Enhancing Activity (Hook – Oil Spill Investigation)
- 40 minutes for the Culminating Activity (Group Presentations and Recommendations)

VOCABULARY

• Cleaning agent	• Absorbent material
• Contamination	• Biotic
• Crude oil	• Containment
• Ecologist	• Emulsified
• Ecosystem	• Industrial waste
• Environmental disaster	• Investigating
• Oil spill	• Recommending
• Oil-eating bacteria	• Skimmed



Started in 1994, EcoKids is a free Earth Day Canada environmental education program that offers curriculum-linked materials and activities for Canadian elementary schools to engage in environmental action. For more information visit www.ecokids.ca

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LEARNING OBJECTIVES/OUTCOMES

Students will

Science & Technology

- Use scientific inquiry/research skills to investigate occurrences that affect the balance within a local ecosystem
- Use appropriate science and technology vocabulary in oral and written communication
- Demonstrate an understanding of an ecosystem as a system of interactions between living organisms and their environment
- Describe ways in which human activities and technologies alter balances and interactions in the environment

Language

Oral Communications

- Communicate orally in a clear, coherent manner, using a structure and style appropriate to both the topic and the intended audience
- Use appropriate words, phrases, and terminology from the full range of their vocabulary, including inclusive and non-discriminatory language, and a range of stylistic devices, to communicate their meaning accurately and engage the interest of their intended audience
- Identify a range of vocal effects, including tone, pace, pitch, volume, and a variety of sound effects, and use them appropriately and with sensitivity towards cultural differences to communicate their meaning
- Identify a variety of non-verbal cues, including facial expression, gestures, and eye contact, and use them in oral communications, appropriately and with sensitivity towards cultural differences, to help convey their meaning

Mathematics

Measurements

- Describe measurement concepts using appropriate measurement vocabulary

Make increasingly more informed and accurate measurement estimations based on an understanding of formulas and the results of investigations

MATERIALS REQUIRED

Introductory Activity-Analysis of Oil Spill Cleanup Processes

- Chart paper/chalkboard
- Chalk/markers
- Pencils
- **BLM 1.1.l** – Checklist for Oil Spill Cleanup Processes
- **BLM 1.2.a** – Rubric for Science Learning Log/Journal
- **BLM 1.2.c** – Oil Spill Cleanup Processes Task Card
- **BLM 1.2.e** – Photographs of Oil Spill
- **BLM 1.2.f** – Photographs of Oil Spill Cleanup Processes

Oil Spill Investigation Activity

- Glass beaker (1/group - 250 ml)
- Water (200 ml)
- Vegetable or canola oil (50 ml)
- Liquid dish detergent (50 ml)
- Plastic container (1/group - 200 ml)
- Large plastic basins or a sink
- Paper towels (1 roll)
- Scissors
- Measuring tape/ruler (1/group)
- Scotch tape
- White labels
- Pencils
- Wire whisk (1/group)
- Cleaning brush (1/group)
- Ziploc plastic bags (1/group): feathers (2), yarn (20cm), string (20 cm), sponge (5x5 cm), cotton balls (6), tin foil, popsicle sticks (6), pipe cleaners (6), coffee filters (1), paper towel squares (10x10 cm), felt paper (10x10 cm)
- **BLM 1.1.a** – Oil Spill Investigation Task Card
- **BLM 1.1.b** – Oil Spill Investigation Student Worksheet
- **BLM 1.1.c** – Oil Spill Investigation Student Question Sheet
- **BLM 1.1.d** – Peer/Self Assessment
- **BLM 1.1.e** – I.N.S.I.T.E Model on Inquiry Card
- **BLM 1.1.f** – I.N.S.I.T.E. Method Description
- **BLM 1.1.g** – Criteria For Good Presentations
- **BLM 1.1.j** – Rubric for Inquiry and I.N.S.I.T.E
- **BLM 1.1.k** – Rubric for Oil Spill Investigation

Culminating Activity-Group Presentations and Group Discussion

- **BLM 1.1.d** – Peer/Self Assessment
- **BLM 1.1.h** – Group Presentations Checklist
- **BLM 1.2.a** – Rubric for Science Learning Log/Journal
- **BLM 1.2.g** – Rubric for Group Presentations

DESCRIPTION OF ACTIVITY

Students work in small cooperative learning groups as Ecologists to investigate and recommend cleaning agents for an oil spill. The task involves teamwork to investigate absorbent products with the final recommendations done by each individual student.

Introductory Activity (Schema Activation)

Activate Prior Knowledge: Whole class discussion-Introduce the concept of oil spills. Questioning led by teacher:

- What is an oil spill?
- How do oil spills occur?
- What type of oil is involved in them?
- What is the impact of an oil spill on the environment?
- How are they cleaned up?
- Who is responsible for cleaning up oil spills?

1. Students brainstorm their ideas and record responses on white board.
2. Show students photographs of various oil spill cleanup processes and discuss as a whole class what each specific procedure involves.
3. Students work with a partner to decide which cleanup strategy would work best for an oil spill occurring **a)** in an open ocean **b)** on a sandy beach and **c)** along a rocky coastline. Students will spend 15 minutes brainstorming.
4. Encourage students to think about the specific problems that may arise for each of these regions. Suggest that they consider factors such as ocean currents, surface area, weather, and wildlife habitat.
5. Regroup as a whole class and discuss each group's ideas.

Enhancing Activity: Oil Spill Investigation Activity

1. Introduce the oil spill investigation scenario to students. Read- ***As an Ecologist, you have been given the role of investigating and recommending a cleaning agent for oil spills. The task involves investigating the absorbent products provided as a team, with the final recommendations done as an individual.***
2. Ask students what the following terms mean: oil spill, Ecologist, cleaning agent, absorbent material, biotic, contamination, crude oil, ecosystem, investigating, recommending, industrial waste, skimmed, emulsified, oil-eating bacteria, containment, and environmental disaster. Discuss definitions with whole class prior to beginning experiment.
3. Review safety procedures, cooperative learning criteria, and inquiry based criteria, and how to make a proper hypothesis before starting the learning task.
4. Divide students into small cooperative learning groups of 4 – 5 students. Within their groups, students will assign a role of recorder, engineer, scientist, material organizer, accountant, clarifier, encourager, observer etc. Teachers can decide which roles to assign to groups, or students can have the choice of several roles.
5. Each group spends a few minutes brainstorming and discussing which absorbent materials and technique they are going to use to separate the oil from the oil/water mixture.
6. The experimental design should reflect what is possible in a real life scenario. The aim is to contain the oil spill and separate as much oil as possible from the water, with the least amount of money.
7. Each group makes a hypothesis and records it on their individual datasheet. Their hypothesis should include materials and the technique involved in the experiment.
8. Teacher initials hypothesis.
9. Each group is given the required materials (Ziploc Bag) to begin experiment.
10. Students use the selected absorbent materials and technique outlined in the above hypothesis. They measure and record the quantity of oil that is separated from the oil spill.
11. Students also determine how much money was spent on the cleanup process and complete the budget chart outlined on the data sheet.
12. Students complete the questions individually, but can brainstorm ideas with group members.
13. Tidy up group area.
14. Prepare for group presentations and recommendations.

Culminating Activity (Wrap Up Activity): Group Presentations and Group Discussion

1. Have students sitting at individual desks for wrap up discussion. Each group will be given 5 minutes to discuss their results and recommendations.
 2. Compile results in a whole class chart and discuss results.
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ASSESSMENT

See rubrics:

- **BLM 1.1.d** – Peer/Self Assessment
 - **BLM 1.1.j** – Rubric for Inquiry and I.N.S.I.T.E
 - **BLM 1.1.k** – Rubric for Oil Spill Investigation
 - **BLM 1.2.a** – Rubric for Science Learning Log/Journal
 - **BLM 1.2.g** – Rubric for Group Presentations
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EXTENDED ACTIVITIES

Oil and Water Demonstration:

1. Before students begin the Oil Spill Investigation Activity, conduct an oil and water demonstration to show students what happens when the two substances mix.
2. Students observe how the oil forms a layer on top of the water. Ask students why this is occurring.
3. Select a volunteer to stir up the oil and water, using a wire whisk.
4. Students observe how the oil changes its appearance by forming smaller droplets that will eventually disperse in the open ocean and spread out.
5. Explain to students that this is one technique that is used in a cleanup operation.

Oil and Feather Demonstration:

1. Each group should conduct this experiment together.
 2. Put a fake bird feather into a container filled with oily water.
 3. Observe what happens to the bird feather and ask students to attempt to clean the feather using liquid detergent and a brush.
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PRINT AND WEB SITE REFERENCES

- Parks, Peggy J. (2005) *Oil Spills (Our Environment Series)*. Detroit: KidHaven Press
 - Pringle, Laurence P. (1993) *Oil Spills: Damage, Recovery and Prevention (A Save the Earth Book)*. New York: William Morrow & Co
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ADAPTATION

All accommodations must take into account the student's Individual Education Plan. All of the learning tasks and activities are created to accommodate the needs of students at different ability levels. The lesson plan includes pictures and/or examples of a step-by-step process, lists, and graphic organizers to enhance learning. The series of pictures are used to break tasks into easier, more understandable steps. Many of the learning activities provide opportunities for peer or group interactions, encouraging the use of cooperative learning/social skills and risk taking. Adaptations can be made in the following manner:

- Alternatives to written tasks (data sheet and question task), such as drawing, pointing to the correct answers, and fill-in-the blanks could be done as well. The use of keypads, word processors and writing software to support the writing task can be utilized.
- For cooperative learning tasks, students can take on a role that they are comfortable doing rather than that of the recorder or presenter.
- Reduction in the length or number of written responses to the Oil Spill Investigation Question Sheet.

- Students should be given extended timelines for task completion if required.
- All materials, equipment, and manipulative should be labelled with text and visual aids.
- Students can be given exemplars (e.g., sample of a completed hypothesis or budget chart to demonstrate the expectations of the task.).