

## Grade 9 Curriculum Link Ideas

Subject	Unit	Season	Activity	Description
Language Arts	Expository Writing	Any	Nature Writers	Read students a passage from a nature writer e.g. John Muir or David Henry Thoreau. Have them sit in a spot and write about their surroundings in a similar fashion. Share writings to wrap-up.
	Poetry, group communication	Any	Group Poem	Have students work in groups of 8-10. Each group picks a subject (e.g. a tree) in the schoolyard and every person contributes a word/short phrase that is then combined into a group poem, performed to the rest of the class.
	Descriptive Writing	Any	Magic Spot	Have students choose a spot they will visit throughout the year. Have them describe the spot each of those times and note changes. Ask them to describe something differently each time as well – narrow/wide focus, using adjectives etc.
Science	Biodiversity	Early Fall, Late Spring	Artificial Cover Objects	Have students set up a study site by creating an array or patio bricks or wood pieces. Have students visit the site several times and record observations of organisms on a grid sheet. Do the organisms seem to have a preference? Why?
	Biodiversity	Fall, Spring	Quadrat Sampling	Decide on a quadrat size (1-20m <sup>2</sup> depending on the area to be studied). Divide the students into groups and have them randomly or systemically survey an area for flora and fauna. Have students survey more than one quadrat and develop comparison charts/discuss differences and similarities.
	Biodiversity	Fall, Spring	Seed studies	Have students collect as many different kinds of seeds as they can find in the schoolyard. Talk about seed dispersal, consumption, size and pros/cons of the differences.
	Environmental Chemistry	Any	Deadly links	This game shows how chemicals can move up the food chain. See description below.
	Environmental Chemistry	Fall, Spring	Pollution Surveys	Give students map of schoolyard for different types of pollution. Have them determine areas of concern and come up with solutions.
	Environmental Chemistry	Fall, Spring	Tree Colour Chemistry	Cut up green leaves, place in jar with nail polish remover. Let the leaves sit for about 2 days. Drop a small amount of concentrate on a coffee filter which will show rings of colour.
	Environmental Chemistry	Any	Who Dirtied Our Water	This activity shows the effects of polluting water and potential to clean it up. See below for further details

<b>Socials</b>	Governance, rights and economy	Any	Schoolyard Use Decisions	Tell students the schoolyard is going to be sold off to developers. Assign different roles of bidding developers – different industries, conservation groups, people groups, housing developers etc. Groups have to come up with a proposal (including a budget) to support an application and present this application to the class for a vote.
<b>Art</b>	Form and surface qualities	Any	Blind Drawing	Students practice observation of form and surface qualities by drawing natural objects while: a) looking only at the object not the paper and b) feeling only the object and looking at the paper. Students can draw multiple objects of different form and surface quality.
	Changing views	Any	Above and Beside	Students draw a map of the schoolyard from bird's eye view and then from a side view. Discuss how the different views allowed a more thorough understanding of the elements.
<b>Wellness</b>	Physical movement	Any	Schoolyard movements	Students design an obstacle course/ adventure race in the schoolyard that includes different movements including balance, jumps, strength etc.
	Mental/emotional wellness	Any	Nature benefits	Students divide the schoolyard into sections such as bare, few plantings, moderate plantings, many plantings. They then design short tests to determine the effect of spending time in these areas such as measuring heart rate, mental retention, emotional feelings etc.
<b>Math</b>	Patterns	Any	Fibonacci	Explain the Fibonacci numbers and then try to find examples of it in nature – tree branching or cones. What other patterns can we find in nature?
	Measurement, equations, graphing	Winter	Foot Loading	Have students measure foot penetration of one another in undisturbed and packed snow using the following index: $100 - (\text{body mass in grams} / \text{foot area in cm}^2) / 10$ . Graph the results. Look for tracks of other animals and discuss implications of foot size to local animals
	Volumes	Spring	Weighty Water	Put out a container to measure how much water is in a rainfall (or use online data). Have students calculate the amount of water that fell on the schoolyard and compare to volumes the students know. Talk about where the water goes and how much could be captured from a large rain event.

## Deadly Links Game:

- 1) Put out several food tokens (straws, poker chips, painted rocks etc) with 2/3 being white and 1/3 coloured.
- 2) Assign students to roles (give name tag) with the following ratio:  
1 hawk: 3 shrews: 9 grasshoppers
- 3) Grasshoppers start picking up food tokens. 30 seconds later shrews are introduced and can tag grasshoppers and take their tokens (grasshoppers go to sidelines or start again).
- 4) After another 30 s hawks are introduced. They can tag shrews and take their tokens (tagged shrews sit out or start again)
- 5) Stop students after a few minutes. Tell them that coloured food items are a pesticide which accumulates in food chains. Any grasshoppers with coloured tags are dead. If shrew has more than  $\frac{1}{2}$  coloured tokens they are dead. Hawks are not dead but the one with the highest number will not have viable eggs next season.
- 6) Discuss implications of using pesticides to protect crops. Are there ways to satisfy both human and environmental needs?

## Who Dirtied the Water?

*Adapted from the University of Rhode Island's Watershed Education Program*

**OBJECTIVE:** Students will learn about current sources of water pollution, effect on water quality and control

**METHOD:** Visual demonstration and discussion

**MATERIALS:** Labeled film canisters filled with various materials which represent different pollutants (see chart below); a large (1 gallon), clear, wide mouth glass jar; "pollution clean up tools" such as sponges, paper towels, cheesecloth, baking soda, colanders, coffee filters; wooden spoon; pH paper.

### BACKGROUND INFORMATION

1. Water pollution is classified into two main categories:
  - a. Point: from specific spot such as pipe
  - b. non-point: over a widespread area of the landscape
2. Effect of a contaminant depends on its concentration, water volume and flow rate.

### PROCEDURE

1. Explain that this activity focuses on water quality issues or water pollution issues. Ask students why issues arise (differing values).
2. Pass out labeled (with character from below) film canisters.
3. Show students a large clear jar of clean water and tell them it represents a very clean lake. Ask them if they would fish in this lake, boat on it, or even swim in it? If there was a treatment plant, would they drink water from the lake, why or why not?
4. Explain that you will be telling them a story about the lake, and as their character is mentioned, they should come up to the lake and pour the contents of their film canister into the "lake". Tell them the story of the lake, introducing each character from the chart below, one at a time. After each character pollutes the lake, ask the students if they would still fish, boat, swim, or drink water from the lake. Why or why not?
5. Ask the students what happens to the organisms and plants living in the lake? At what point (after which pollutants) do they begin to be affected? How would the pollution effects be different if the lake was a river?
6. Give the students a copy of the chart with only character on it. Discuss what problems each character represents, and are they point or non-point source pollutants? What ways can each source of pollution be reduced or prevented?
7. Ask the students "who is responsible for cleaning up the lake?" Give students "pollution clean up tools" and see if they can make the water clean again. (Baking soda can be used to neutralize vinegar, use the pH paper to test for neutralization.

### Discussion Chart for “Who Dirtied the Water?”

Character	Canister Contents	Pollution	Type	Alternatives for Prevention
Trees	Leaves	Natural Organic	Non-point	No problem except for reservoirs Clear trees/brush from the shore
1 <sup>st</sup> home owner	Liquid Dish soap	Toxic Cleaners	Non-point	Use biodegradable cleaners; if you have to use, bring to special toxic waste disposal sites.
2 <sup>nd</sup> home owner	Sludgy coffee	Leaky septic tank	Non-point	Maintain septic tank properly. Compost toilets
3 <sup>rd</sup> home owner	Sugar	Lawn fertilizers	Non-point	Leave clippings on lawn, use organic fertilizers, plant native gardens.
Beach-goers	Soda tops	Litter	Non-point	Don't litter, pick up after yourself
1 <sup>st</sup> farmer	Soil	Sediment	Non-point	Plant cover crops to hold soil in the winter, contour or strip plow
2 <sup>nd</sup> farmer	Sugar	Pesticides	Non-point	Integrated pest management: monitor fields and spray the minimum amount needed. Farm organically, rotate crops.
Shopping Mall	Pencil Shavings And salt	Stormwater run-off Heavy metals, oils	Non-point	Detention basins, created wetlands, swales, sweep lots No salt in winter or low sodium.
Electric Company	Vinegar	Acid Rain	Non-point	Conserve electricity; smokestack scrubbers, alternative energy sources.
Chemical Plant	Tumeric	Heavy Metals Organic chemicals	Point	Alter industrial processes; improve pre-treatment before Discharge; consumer choice (don't buy from polluting companies)
Sewage Treatment Plant	Sludgy coffee	Organic nutrients Toxic chemicals	Point	Better system design; don't throw toxic materials down drains
Gas Station	Corn Oil	Leaking Underground Storage tank	Non-point	Better tank design and maintenance; drive less, bike