

## Unit Project

### Inquiry Investigation

#### Pedagogical Purpose

Students design and conduct an experiment to determine the effects of different types of compost on plant growth.

Planning	
<b>Materials</b>	500 mL of soil 4 plastic cups 4 plant seeds 4 labels or white tape marker biodegradable household waste <b>BLM 1-29 Inquiry Investigation: Investigating Compost</b> <b>BLM A-33 Controlling Variables Rubric</b>
<b>Time</b>	60 min in class 10 min preparation (collect materials)

#### Skills Focus

- select appropriate instruments and materials
- collect and observe data
- communicate results and conclusions

#### Activity Notes and Troubleshooting

- Discuss composting and green bin programs with students before starting the Investigation. If any students have a compost bin at home, have them explain what goes in it and how it works.
- Distribute **BLM 1-29 Inquiry Investigation: Investigating Compost** to students.
- Have students think about the size and amount of nutrients in each item they consider. Coffee grounds are well documented as useful fertilizer without even having to pass through a compost bin. Other options include tea leaves, ground eggshells, vegetable peelings, and fleshy fruits.
- Use **BLM A-33 Controlling Variables Rubric** to help students develop a plan for monitoring the amount of light, temperature, and water volume for each sample.
- Make sure students grind up household waste before adding it to soil as there will not be as many decomposers to break it down as in a compost bin.
- Students should dry household waste and mix it thoroughly with the soil to avoid mold.
- Have students review the Assessment Checklist before they begin, and again once they complete the project to ensure they have not missed any steps.

#### Additional Support

- Create an alternative design and procedure to compare with students' proposals. Show the design to students having difficulty creating their own so they can copy parts of it or make improvements to their design.
- If students do not have the necessary interpersonal and self management skills for group inquiries, conduct one experiment with the class. Set up a control sample and at least three with different types of household waste that the class can monitor over the course of the Unit.
- Enrichment—Coffee grounds are slightly acidic, so have students investigate how different volumes of coffee grounds in the soil affect the growth of their plants.

- **ELL** Pair English language learners with fluent English writers to prepare the experiment design.
- Ask students what difficulties they encountered in this lab activity and brainstorm how these difficulties could be handled in future activities.

**Rubric**

<b>ACHIEVEMENT CHART CATEGORY</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>
<b>Knowledge &amp; Understanding</b>	Biodegradable household products are described in limited detail.	Biodegradable household products are described in some detail.	Biodegradable household products are described in considerable detail.	Biodegradable household products are described in thorough detail.
<b>Thinking &amp; Investigation</b>	No prediction is made about the effect of the substance on plant growth.	Student made a prediction about the effect of the substance on plant growth.	Student made a clear prediction about the effect of the substance on plant growth.	Student made a clear, detailed prediction about the effect of the substance on plant growth.
	Student designed and executed a procedure controlling appropriate variables and using equipment and materials safely, accurately, with limited effectiveness.	Student designed and executed a procedure controlling appropriate variables and using equipment and materials safely, accurately, with some effectiveness.	Student designed and executed a procedure controlling appropriate variables and using equipment and materials safely, accurately, with considerable effectiveness.	Student designed and executed a procedure controlling appropriate variables and using equipment and materials safely, accurately, with a high degree of effectiveness.
	Analysis and interpretation of qualitative and quantitative data has limited accuracy.	Analysis and interpretation of qualitative and quantitative data has some accuracy.	Analysis and interpretation of qualitative and quantitative data has considerable accuracy.	Analysis and interpretation of qualitative and quantitative data has a high degree of accuracy.
	Student identified sources of error and suggested improvements in limited detail.	Student identified sources of error and suggested improvements in some detail.	Student identified sources of error and suggested improvements in considerable detail.	Student identified sources of error and suggested improvements in thorough detail.
<b>Communication</b>	Written or oral report contains many errors.	Written or oral report contains numerous errors.	Written or oral report summarizes findings.	Written or oral report summarizes findings well.
	Data is recorded and organized with limited effectiveness.	Data is recorded and organized with some effectiveness.	Data is recorded and organized with considerable effectiveness.	Data is recorded and organized with a high degree of effectiveness.
<b>Application</b>	Little connection was made between experimental results and waste reduction.	Some connection was made between experimental results and waste reduction.	Connections were made between experimental results and waste reduction.	Excellent connections were made between experimental results and waste reduction.

Please also see **BLM A-42 Unit 1 Inquiry Investigation Rubric**.

## An Issue to Analyze

### Pedagogical Purpose

Students adopt two lifestyle changes for two weeks to assess how they affect the environment and the students' lifestyles.

Planning	
<b>Materials</b>	journals <b>BLM 1-30 An Issue to Analyze: Going Greener</b> <b>BLM G-40 The 10 Challenges Checklist</b>
<b>Time</b>	40 min in class 5 min preparation (prepare BLM)

### Skills Focus

- think critically
- communicate conclusions

### Activity Notes and Troubleshooting

- Introduce the issue by asking students if they have made changes or decisions in their lives or homes to help the environment. Examples may include walking or bicycling to school when they could get a ride, replacing incandescent light bulbs with compact fluorescent (CFL) bulbs, or installing a nest box.
- Distribute **BLM 1-30 An Issue to Analyze: Going Greener** to students.
- Distribute **BLM G-40 The 10 Challenges Checklist** for students to discuss. For more information on David Suzuki and his proposals for helping the environment, go to [www.scienceontario.ca](http://www.scienceontario.ca).
- Some of the items are intended for adults, such as changes to the family vehicle(s) and meals, but students could discuss the possibility of making the changes with parents and lead the change in their households.
- Use discretion and sensitivity as some of the changes, such as choosing organic, local meat and produce and changing the family vehicle, may be costly or presume particular lifestyles. For example, not every family owns a vehicle.
- Monitor progress by checking in on students during their first and second weeks to remind them about their commitment to these changes.
- Have students review the Assessment Checklist before they begin and again once they complete the project to ensure they have not missed any steps.

### Additional Support

- David Suzuki has also published a list of 10 ways to stop global warming directed at adults. Have students look over these changes to consider ways they can change their lifestyles now, or consider for the future. Some of the items can be considered by students now including sorting garbage and making the most of seasonal foods, which includes canning and preserving.
- Suggest alternative versions of the list items for students who cannot pick any from the list or have students propose their own changes, such as reducing water usage or adjusting the thermostat to decrease the amount of heating or air conditioning used.
- **DI** Have intrapersonal thinkers consider the motivations and discipline involved in continuing with the lifestyle changes throughout their lives.
- Enrichment—Students can design a website, brochure, poster, or PA announcement advocating whatever lifestyle change they found easiest or most effective to convince others to try that change as well.

**Rubric**

<b>ACHIEVEMENT CHART CATEGORY</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>
<b>Knowledge and Understanding</b>	Human factors impacting the ecosystem are described in limited detail.	Human factors impacting the ecosystem are described in some detail.	Human factors impacting the ecosystem are described in considerable detail.	Human factors impacting the ecosystem are described in thorough detail.
<b>Thinking and Investigation</b>	Few resources were used to research environmental impact of lifestyle changes.	Some resources were used to research environmental impact of lifestyle changes.	A variety of resources were used to research environmental impact of lifestyle changes.	Numerous resources were used to research environmental impact of lifestyle changes.
<b>Communication</b>	Few entries were made in a journal.	Some entries were made in a journal.	Daily entries were made in a journal.	Detailed, daily entries were made in a journal.
	Student used an accepted form of academic documentation with limited effectiveness.	Student used an accepted form of academic documentation with some effectiveness.	Student used an accepted form of academic documentation with considerable effectiveness.	Student used an accepted form of academic documentation with a high degree of effectiveness.
	Scientific vocabulary used with limited effectiveness.	Scientific vocabulary used with some effectiveness.	Scientific vocabulary used with considerable effectiveness.	Scientific vocabulary used with a high degree of effectiveness.
	Student communicates for the chosen audience and purpose with limited effectiveness.	Student communicates for the chosen audience and purpose with some effectiveness.	Student communicates for the chosen audience and purpose with considerable effectiveness.	Student communicates for the chosen audience and purpose with a high degree of effectiveness.
<b>Application</b>	Cause-and-effect map not prepared.	Assistance required to prepare cause-and-effect map.	Cause and effect map evaluates effect of changes on environment.	Detailed cause and effect map evaluates effect of changes on environment.
	Student analyzes information for bias and accuracy with limited effectiveness.	Student analyzes information for bias and accuracy with some effectiveness.	Student analyzes information for bias and accuracy with considerable effectiveness.	Student analyzes information for bias and accuracy with a high degree of effectiveness.
	Little assessment of impact of lifestyle changes is provided in a reflection paper.	Some assessment of impact of lifestyle changes is provided in a reflection paper.	Assessment of impact of lifestyle changes is provided in a reflection paper.	Detailed assessment of impact of lifestyle changes is provided in a reflection paper.

Please also see **BLM A-43 Unit 1 An Issue to Analyze Rubric**.