

Making Ice Cream In A Bag

Activity Summary

- In this activity, students will:
- ♦ Describe properties of ice cream
 - ♦ Follow Health and Safety Regulations
 - ♦ Convert a recipe from metric into imperial
 - ♦ Scale a recipe from one serving to 150 servings
 - ♦ Prepare a cost analysis for a large scale operation
 - ♦ Role play (Instructor and Ice Cream Maker)
 - ♦ Complete a reflective journal



Prior Knowledge

- **Essential Skills**
- Physical properties, chemical and physical changes
- Health and Safety Regulations
- Converting metric into imperial measurements
- Scaling up recipes
- Cost analysis (i.e. Food items are not taxed)
- Freezing point of water is lowered by the addition of salt



Teaching Planning Notes

- Review assignment including prior learning required and assessment and evaluation tools
- Review Health and Safety Regulations
- Instruct students to bring in winter gloves or a towel.
- Obtain freezer bags. They work the best because they are thicker and less likely to break than sandwich bags. If you are using regular plastic bags make sure you double bag the small bag. (Zip lock work the best)
- Give laboratory instructions only to student A (the trainer)
- Safety Precautions: Teachers must identify students with any milk allergies. These students cannot eat the ice cream or get it near their faces. In the case of severe allergies, students can work on the Analysis portion of the assignment.

Note 1: The application questions are geared towards the TFH 3E course

Note 2: A community connection for this activity could include students serving their homemade ice cream to another class, staff, local day care or retirement home.

Note 3: Students could obtain prices of the materials in a variety of ways such as: taking a field trip to a grocery store, reading weekly grocery flyers, or going to an on-line grocery shopping site

Assessment of Student Achievement

Task	Tool / Type
Making Ice Cream	It's a Chilling Experience! Reflective Learning Skills Rubric (Formative)
Conclusion and Application	It's a Chilling Experience! Worksheet (Summative)
Reflective Journal	It's a Chilling Experience! Essential Skills Reflective Journal Assessment Tool (Formative)

FOCUS ON LEARNING

Essential Skills:

Reading Text

Conducting Lab Activity

Document Use

Conducting Research

Numeracy

Conducting Lab Activity

Writing

Conducting Lab Activity

Reflective Journal

Oral Communication

The Role of the Instructor

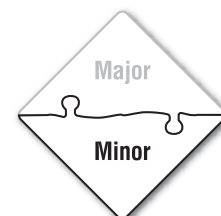
Working with Others

Conducting Lab Activity

Thinking Skills

Conducting Lab Activity

Reflective Journal



Activity and Assessment Materials

- Making Ice Cream Lab Assignment Sheet
- Lab Answer Key
- Reflective Learning Skills Rubric
- **Essential Skills** Reflective Journal
- **Essential Skills** Reflective Journal Assessment Tool

Curriculum Linkages For Ontario Educators

Essential Skills truly are everywhere and as teachers we are always teaching students the **Essential Skills!** As subject teachers and specialists, we know that many of the curriculum expectations we are accountable to teach and assess, also address the **Essential Skills** and while the linkages are not always readily apparent, the linkages exist nonetheless.

While this activity connects to a variety of courses, it is most closely aligned to the following course(s):

- Grade 9 Science Applied, SNC 1P
- Grade 11 Workplace Preparation, Hospitality and Tourism, TFH 3E

To assist you, the teacher, in making more transparent linkages, we have identified the following curriculum linkages for this activity.

Science, Grade 9, Applied, SNC 1P

Coded Overall Expectations	Coded Specific Expectations
CHV.02 - investigate the physical and chemical properties of common elements and compounds, and relate the properties of elements to their location in the periodic table;	CH2.04 - demonstrate the skills required to plan and conduct an inquiry into the properties of substances, using apparatus and materials safely, accurately, and effectively (e.g., investigate the physical properties of common elements and classify them as metals or non-metals);
	CH2.09 - investigate the properties of changes in substances, and classify them as physical or chemical based on experiments (e.g., solubility, combustibility, change of state, changes in colour);

Hospitality and Tourism, Grade 11, Workplace Preparation, TFH 3E

Coded Overall Expectations	Coded Specific Expectations
TFV.03 - describe food product handling, storage, and preparation techniques;	TF3.01 - explain the effect of temperature changes on food;
	TF3.02 - apply National Sanitation Code cleanliness standards during the handling, storage, and preparation of products;
SPV.02 - apply correctly principles related to the preparation, presentation, and service of food products	SP1.05 - apply correctly standards of personal hygiene and grooming;
	SP2.01 - prepare simple recipes using available ingredients;
	SP2.04 - measure quantities correctly in both imperial and metric units;
	SP2.05 - convert recipes correctly to increase or decrease their yield;

It's a Chilling Experience!

Here's the scoop - in this fun and exciting activity you get to make and eat your very own ice cream. You will experience both the roles of an Instructor and an Ice Cream Maker while doing this activity. After sampling your ice cream you will:

- convert the recipe into imperial measurements
- enlarge the recipe
- perform a cost analysis
- identify many of the nine **Essential Skills** used in this activity

Check off that you have all of the following materials at your station:

Materials needed for each student:

- 2 small plastic freezer bags
- 1 large plastic freezer bag
- Approximately 960 mL (approximately 960 g) of crushed ice
- 120 mL of half and half cream (or milk)
- 15 mL of sugar
- 2.5 mL of vanilla
- 90 mL of salt
- hand towel or gloves to keep your hands warm



Lab Instructions

Working in groups of two, student A will be the Instructor and student B will be the Ice Cream Maker.

THE ROLE OF THE INSTRUCTOR:	THE ROLE OF THE ICE CREAM MAKER:
<ul style="list-style-type: none"> • Keep the instructions for yourself. • Quietly read the entire procedure to yourself to get a general overview of the lab. • When you have a complete understanding of the procedure, slowly and clearly read the step-by-step instructions to the experimenter (student B). • Pace yourself so that the experimenter is following your instructions carefully. 	<ul style="list-style-type: none"> • Listen carefully to the trainer's instructions. • Your task is to prepare a delicious sample of ice cream and celebrate your accomplishments by eating it. • After you have finished eating your ice cream, switch roles and become the trainer.

It's A Chilling Experience!

Part One: Procedure

The Instructor reads each step slowly to the Ice Cream Maker.

1. Before you begin making your ice cream, clean your lab bench, tie back your hair, and wash your hands.
2. Fill the large plastic bag with about 960 mL of crushed ice (about 1/2 full).
3. Add 90 mL of salt to the ice. Seal the bag and mix for 5 minutes. The temperature of the mixture drops to about -10°C , so put on winter gloves to keep warm.
4. To one of the small plastic bags add the following ingredients:
 - a) 120 mL of half & half cream (or milk)
 - b) 2.5 mL of vanilla
 - c) 15 mL of sugar
5. Remove as much air as possible and seal the bag. Place this bag inside the other small bag. Again, remove as much air as possible and seal the bag.
6. Wrap the bag in the towel or put your winter gloves on. Carefully shake and massage the bag until the ice cream is solid. Make sure you keep the small bag covered with ice at all times.
7. The mixture will freeze into ice cream in about 5 to 9 minutes.
8. When the ice cream feels frozen, remove the inner bags and rinse the outside of the bag with water to remove any of the salt mixture.
9. Use your spoon and eat your homemade ice cream right out of the bag!
10. Dispose of the plastic bags and spoon in the garbage.
11. Reverse the roles.



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Part Two: Observations and Applying Your Knowledge

On a separate sheet of paper, answer the following questions.

Observations

1. Describe the physical properties of the half and half cream (or milk).
2. Describe the physical properties of the ice cream you made.

Applying Your Knowledge

1. Why do you think salt was added to the ice?
2. Is ice cream a pure substance or a mixture?
3. Did a chemical or physical change take place during the preparation of ice cream? How do you know?
4. The chemical formula for the sugar (sucrose) used in this activity is $C_{12}H_{22}O_{11}$? Is sucrose an element or a compound? Explain your answer.
5. a) What common mineral is found in milk products (like ice cream) that is essential for the growth of strong bones and teeth?
b) Write the chemical symbol of this mineral.
c) Where is this symbol located in the periodic table.
6. Why is it important to wash your hands and have a clean lab bench?
7. You want to e-mail this recipe to a friend in the United States. However, in order for your friend to understand the recipe you must first convert the metric measurements into imperial quantities. Rewrite the ingredients for the ice cream recipe into imperial measurements.
8. You have perfected a technique for making a single serving of vanilla ice cream. Your next step is to increase production size to 150 students. Calculate in metric the quantity of materials required to prepare 150 single servings of ice cream.

It's A Chilling Experience!

9. As a young entrepreneur, you will require financial assistance to prepare ice cream for 150 students. Your task is to:
 - a) From two local grocery stores determine the prices required to purchase enough materials to prepare 150 single servings of ice cream.
Information can be obtained by visiting local grocery stores, reading weekly grocery store flyers or retrieving prices from on-line grocery shopping websites.
 - b) Prepare a table illustrating the price comparison between the two local grocery stores for each item in the materials list.
 - c) Calculate the total amount of money required to purchase the materials from each store.
 - d) In a final statement, include the total amount of money requested for the bank loan and indicate which grocery store you will purchase the ingredients from and why.
10. How much will you charge for a single serving of ice cream so that you can make a profit of \$1.00/serving? (show all your work!)



It's A Chilling Experience!

Lab Answer Key

Note: Answers for Q 9 and 10 are omitted because they depend on the current and local cost for the ingredients.

Applying Your Knowledge

1. Why do you think salt was added to the ice?

Adding salt to the ice lowers the freezing point to approximately -10°C . This creates an environment for the cream (or milk) to freeze and form the ice cream.

2. Is ice cream a pure substance or a mixture?

Ice cream is a mixture because it contains more than one substance. There is vanilla, sugar, milk (fat, calcium, water, etc.).

3. Did a chemical or physical change take place during the preparation of ice cream?
How do you know?

A physical change took place because the ingredients in the bag froze. A change of state represents physical change.

4. The chemical formula for the sugar (sucrose) used in this activity is $\text{C}_{12}\text{H}_{22}\text{O}_{11}$.
Is sucrose an element or a compound? Explain your answer.

Sucrose is a compound because it is composed of 3 kinds of different elements - carbon, hydrogen, and oxygen.

5. a) What common mineral is found in milk products (like ice cream) that is essential for the growth of strong bones and teeth?

Calcium is the common mineral found in milk products that is essential for the growth of strong bones and teeth.

- b) Write the chemical symbol of this mineral.

The chemical symbol for calcium is Ca.

- c) Where is this symbol located in the periodic table?

Calcium is located in group II, the alkaline earth metals.

6. Why is it important to wash your hands and have a clean lab bench?

To create a sterile environment and avoid bacterial contamination of the food.

It's A Chilling Experience!

7. You want to e-mail this recipe to a friend in the United States. However, in order for your friend to understand the recipe you must first convert the metric measurements into imperial quantities.

Rewrite the ingredients for the recipe into imperial measurements.

- *Approximately 4 cups of crushed ice*
 - *1/2 cup of half and half cream (or milk)*
 - *1 tablespoon of sugar*
 - *1/2 teaspoon of vanilla*
 - *6 tablespoons of salt*
8. You have perfected the technique for making a single serving of vanilla ice cream. Your next step is to increase production size to 150 students. Calculate in metric the quantity of materials required to prepare 150 single servings of ice cream.
- *2 x 150 small plastic ziplock freezer bags = 300*
 - *1 x 150 large plastic ziplock freezer bag = 150*
 - *Approximately 960 mL (960 g) x 150 of crushed ice = 144 000 g*
 - *120 mL x 150 of half and half cream (or milk) = 18 000 mL*
 - *15 mL x 150 of sugar = 2 250 mL*
 - *2.5 mL x 150 of vanilla = 375 mL*
 - *90 mL x 150 of salt = 13 500 mL*

It's A Chilling Experience! Reflective Learning Skills Rubric

CATEGORIES/ CRITERIA	LEVEL 1 (50-59%)	LEVEL 2 (60-69%)	LEVEL 3 (70-79%)	LEVEL 4 (80-100%)
<p>Interpersonal Skills in Group Work</p> <p>Interacts positively with all group members, encourages such interaction in others, and is always sensitive to the abilities and feelings of others in contributions.</p>	Limited	Some	Considerable	To a High Degree
<p>Role of the Instructor</p> <p>Understands the procedure and is able to give clear and concise oral instructions.</p> <p>Keeps an excellent pace with the Ice Cream Maker.</p>	Limited	Some	Considerable	To a High Degree
<p>Role of the Ice Cream Maker</p> <p>Understands the instructions and is able to make an excellent ice cream.</p> <p>Keeps an excellent pace with the Instructor.</p>	Limited	Some	Considerable	To a High Degree

Note: A student whose achievement is below Level 1 (50%) has not met the expectations for this assignment or activity.

It's A Chilling Experience! Essential Skills Reflective Journal

Wow and congratulations! You have almost completed this assignment. I hope you warm up to these reflective questions.

1. What parts of this activity did you enjoy? What **Essential Skills** were involved?

2. What parts of this activity did you not enjoy? What **Essential Skills** were involved?

3. Compare the roles you performed using the nine **Essential Skills** as criteria. Provide an example of a task you performed that relates directly to each **Essential Skill**. Write NA (not applicable) if the **Essential Skill** was not used.

Essential Skills	INSTRUCTOR	ICE CREAM MAKER
Reading Text		
Writing		
Numeracy		
Computer Use		
Document Use		
Working With Others		
Oral Communication		
Thinking Skills		
Continuous Learning		

4. a) Did this activity incorporate your favourite **Essential Skill**? _____
 b) If yes, where did it occur?

- c) If no, explain how the activity could be changed to incorporate your favourite **Essential Skill**.

It's A Chilling Experience! Essential Skills Reflective Journal Assessment Tool

COMPONENT	<input checked="" type="checkbox"/>	COMMENTS
Depth and understanding providing examples to support opinion	<input type="checkbox"/>	
Clear, Concise, Comprehensive and Complete	<input type="checkbox"/>	
Correct (spelling, grammar)	<input type="checkbox"/>	



It's A Chilling Experience! Essential Skills Reflective Journal Assessment Tool

COMPONENT	<input checked="" type="checkbox"/>	COMMENTS
Depth and understanding providing examples to support opinion	<input type="checkbox"/>	
Clear, Concise, Comprehensive and Complete	<input type="checkbox"/>	
Correct (spelling, grammar)	<input type="checkbox"/>	

