a WOW Lab BLUEPRINT

Bubbles

Quebec - Achievements and Competencies

Learning Outcomes

Cycle 1 (Gr. 1-2)	Cycle 2 (Gr. 3-4)	Cycle 3 (Gr. 5-6)
Properties of matter	Properties of matter	Properties of matter
Mixtures	Solids, liquids, and gases	Solids, liquids, and gases
Solids, liquids, and gases	Changes in matter	Changes in matter

The Quebec Achievements and Competencies are based on the Progression of Learning Outcomes derived from the Quebec Education Plan set by the Ministere de l'Education, du Loisir et du Sport.

Specific Expectations

CYCLE 1 (Gr. 1-2)

MATERIAL WORLD

A. Matter

1. Properties and characteristics of matter

b. Classifies materials (e.g. fabrics, sponges, paper) according to their degree of absorption

Bouncing Bubbles allows students to investigate how the bubbles will interact with different materials and fabrics. They can use various fabrics to see which ones will allow the bubbles to bounce, which ones will allow the bubbles to bounce the highest, and which will cause the bubbles to pop.

d. Distinguishes between translucent substances (transparent or coloured) and opaque substances

In *Coloured Bubble Art*, students are given the opportunity to make coloured bubbles by mixing two or more colours together. They will observe that the bubbles formed are indeed translucent and are still transparent regardless of the coloured bubble mixture. This is because the colour is dispersed throughout the water, not concentrated just on the surface of the bubble, so the bubble does not appear to be coloured. When the bubble pops, the water and colouring are released from the inside of the bubble, resulting in a coloured bubble print on the paper.

2. Mixtures

a. Recognizes mixtures in his/her environment (e.g. air, juice, salad dressing, soup, raisin bread)

Students will explore different bubble mixtures that were used in the various activities. They can discuss the mixtures that were used, whether they were all the same, and possible reasons as to what made them different.

3. Solid, liquid, gaseous state, phase changes
   a. Distinguishes among the three states of matter (solid, liquid, gas)
   b. Recognizes water in its solid (ice, snow), liquid and gaseous (steam) state
   c. Describes the operations involved in changing water from one state to another (heating or cooling)

In *Frozen Bubbles*, students observe the change of state from liquid to solid while being outside in very cold weather. They should be able to describe that the cold weather causes the water (or the bubble) to freeze, changing it from a liquid to a solid.

F. Appropriate Language
   1. Terminology related to an understanding of the material world

Students should use the appropriate terminology throughout the activity (e.g. bounce, pop, fabrics, shapes, cubes, colours, cold, freezing).

CYCLE 2 (Gr. 3-4)

MATERIAL WORLD

A. Matter
   1. Properties and characteristics of matter
      e. Describes the shape, colour and texture of an object or a substance

In each activity, students should describe the shape, colour and texture of the bubbles that were formed. The students can then compare the bubbles that were formed in the different activities. The teacher can ask students why in all of the activities, except *Shape Bubbles*, did the bubbles form a spherical shape. The teacher can also ask why the bubbles did not appear to be coloured in *Colour Bubble Art*.

3. Solid, liquid, gaseous state, phase changes
   a. Distinguishes among the three states of matter (solid, liquid, gas)
   b. Recognizes water in its solid (ice, snow), liquid and gaseous (steam) state
   c. Describes the operations involved in changing water from one state to another (heating or cooling)

In *Frozen Bubbles*, students observe the change of state from liquid to solid while being outside in very cold weather. They should be able to describe that the cold weather causes the water (or the bubble) to freeze, changing it from a liquid to a solid. Through this activity, they will learn that the cold air causes the bubbles to freeze.

5. Changes in matter
   a. Demonstrate that physical changes (e.g. deforming, breaking, grinding, phase changes) do not change the properties of matter

Students will investigate the phase change of water from liquid to solid in *Frozen Bubbles*. Through this activity, students should learn that the properties of water do not change when a physical change (in this case, a phase change) occurs.

F. Appropriate Language
1. Terminology related to an understanding of the material world

Students should use the appropriate terminology throughout the activity (e.g. bounce, pop, fabrics, shapes, cubes, pyramids, cold, freezing, solid, liquid).

CYCLE 3 (Gr. 5-6)

MATERIAL WORLD

A. Matter
1. Properties and characteristics of matter
j. Describes various other physical properties of an object, a substance or a material (e.g. elasticity, hardness, solubility)
k. Recognizes the materials of which an object is made

In each activity, students should describe the shape, colour and texture of the bubbles that are formed. The students can then compare what they notice about the bubbles that are formed in all of the different activities. The teacher can ask students why bubbles form a spherical shape. The students should also describe other physical properties of the bubbles, leading to an explanation that the *Bouncing Bubbles* mixture was different, resulting in bubbles that could bounce.

3. Solid, liquid, gaseous state, phase changes
a. Distinguishes among the three states of matter (solid, liquid, gas)
b. Recognizes water in its solid (ice, snow), liquid and gaseous (steam) state
c. Describes the operations involved in changing water from one state to another (heating or cooling)

In *Frozen Bubbles*, students observe the change of state from liquid to solid while being outside in very cold weather. They should recognize that waving the wand through the air will result in newly formed bubbles that will freeze, but blowing through the wand will not. When the student tries to blow the bubble through the wand, the bubbles remain unfrozen because the heat from their breath will not allow the bubble to freeze. It is the outside air (if cold enough) which causes the bubble to freeze.

5. Changes in matter
c. Explains how certain household products are made (e.g. soap, paper)

Through all of these activities, students discover how bubbles are made and formed. They investigate different characteristics of bubbles in regards to their shape, texture, and formation. Students can apply this knowledge to discuss other household products that may form bubbles, such as dish soap, laundry detergent, and even carbonated drinks. In having these full-group discussions, students are encouraged to apply their understanding and stretch their thinking in a scientific manner.

F. Appropriate Language
1. Terminology related to an understanding of the material world

Students should use the appropriate terminology throughout the activity (e.g. bounce, cubes, pyramid, molecules, freezing, solid, liquid, evaporate, force, glycerin).

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Strategies

EXPLORATION STRATEGIES

- Formulating questions
- Putting forward hypotheses (e.g. individually, as a team, as a class)
- Imagining solutions to a problem
- Taking into account the constraints involved in solving a problem or making an object (e.g. location, specifications, available resources, time allotted)
- Using different types of reasoning (e.g. induction, deduction, inference, comparison, classification)
- Using empirical approaches (e.g. trial and error, analysis, exploration using one's senses)

STRATEGIES FOR RECORDING, USING AND INTERPRETING INFORMATION

- Using a variety of observational techniques and tools
- Using different tools for recording information (e.g. diagrams, graphs, procedures, notebooks, logbook)

COMMUNICATION STRATEGIES

- Using tools to display information in tables and graphs or to draw a diagram
- Exchanging information
- Comparing different possible explanations for or solutions to a problem in order to assess them (e.g. full-group discussion)