Educators Guide - Growing Crystals (STEM To-Go)

Grade(s): Grade 5	Time needed: 7 days
Curriculum Area(s): Matter and Energy	Lesson Topic: Growing Crystals
Learning Goal(s): By the end of the activity, students will be able to: - Identify the states of matter - Describe the physical and chemical changes - Use the scientific research procedure to create a prediction and write or draw observations	

Overall Expectation(s)	Related Specific Expectation(s)
Take this directly from Ontario Ministry of Education documents.	
A1. STEM Investigation and Communication Skills use a scientific research process, a scientific experimentation process, and an engineering design process to conduct investigations, following appropriate health and safety procedures	**A1.1** use a scientific research process and associated skills to conduct investigations **A1.2** use a scientific experimentation process and associated skills to conduct investigations **A1.5** communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes
C2. Exploring and Understanding Concepts demonstrate an understanding of the properties of matter, changes of state, and physical and chemical change	**C2.2** identify the states of matter, and describe characteristics and properties of solids, liquids, and gases **C2.4** describe physical changes in matter as changes of the state, volume, or form of the matter that do not result in the formation of a different substance **C2.5** describe chemical changes in matter as changes that result in the formation of different substances, and identify signs that a chemical change has occurred

Curriculum Connections

Connections with ***Mathematics*** when observing the crystals.

Overall Expectation(s)	Related Specific Expectation(s)
E1. Geometric and Spatial Reasoning describe and represent shape, location, and movement by applying geometric properties and spatial relationships in order to navigate the world around them	E1.3 Geometric Reasoning - draw top, front, and side views of objects, and match drawings with objects

Safety

- Be careful when handling hot water.
- Do not consume salt or crystal.

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Instructions For the Activity

1. Tie the middle of the string to the paper clip. The two ends should hang down.
2. Slide the paper clip onto the middle of the straw.
3. Pour some warm water into the cup until it is about 3⁄4 full.
4. Add 5 spoonfuls of salt to the water and stir until the salt mostly disappears.
5. Bend the ends of the straw and place it on the cup.
6. Stretch the rubber band around the straw and cup.
7. Place the cup in a quiet place for a couple of days. Record what you see each day in your Observation Log. (Appendix B)
8. Repeat the experiment with different amounts of salt.

Tip: As your crystal grows, use the magnifying card to observe what you see.

Keep in Mind While Observing:
What shapes do you see as the crystals form?
Do all crystals have the same shape and structure?

Materials

- Clear Cup
- Elastic Band
- Paper Clip
- String
- Straw
- Salt
- Warm Water
- Spoon
- Magnifying Glass
- Observation Log (Appendix B)

Videos

Play the video to see how your crystals will grow.
https://www.youtube.com/watch?v=tlIqaS6-yKc

Appendix A

STEM To-Go Activity Sheet - Growing Crystals

Appendix B

Observation Log

The Science Behind It All

Use Appendix A as a handout. There are provided illustrations to help further explain the content.

The salt that we add to our food is made up of tiny particles called molecules. Solid salt forms a crystal because the molecules are arranged in a repeating pattern. Other examples of crystals are sugar, snowflakes, and diamonds.

In this activity, the salt is dissolved in water to make a solution. When the water evaporates, salt crystals form.

Extensions

The following extensions can be done using Appendix A: STEM To-Go Activity Sheet - Growing Crystals. The extension sections have a drawing and observation section for students to fill in.

Extension #1
Grade(s): Grade 5
Curriculum Area: Matter and Energy

Overall Expectation(s)	Related Specific Expectation(s)
A1. STEM Investigation and Communication Skills use a scientific research process, a scientific experimentation process, and an engineering design process to conduct investigations, following appropriate health and safety procedures	A1.1 use a scientific research process and associated skills to conduct investigations A1.2 use a scientific experimentation process and associated skills to conduct investigations A1.5 communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes
C2. Exploring and Understanding Concepts demonstrate an understanding of the properties of matter, changes of state, and physical and chemical change	C2.2 identify the states of matter, and describe characteristics and properties of solids, liquids, and gases C2.4 describe physical changes in matter as changes of the state, volume, or form of the matter that do not result in the formation of a different substance

- Use your magnifying card to compare the salt and sugar crystals. Do the crystals look the same? What's different?
- Observe over time what happens and compare the growth of the crystals using an Observation Log. (Appendix B)

Extension #2
Grade(s): Grade 5
Curriculum Area: Matter and Energy

Overall Expectation(s)	**Related Specific Expectation(s)**
C2. Exploring and Understanding Concepts demonstrate an understanding of the properties of matter, changes of state, and physical and chemical change	C2.2 identify the states of matter, and describe characteristics and properties of solids, liquids, and gases C2.3 describe changes of state of matter observed at home, in the community, or in the natural environment C2.4 describe physical changes in matter as changes of the state, volume, or form of the matter that do not result in the formation of a different substance

- Use your magnifying card to examine materials from nature (e.g. rocks, sand).
- Can you find any common shapes or patterns? Write or draw what you see.

Extra Resources

Fun Crystal Activities: https://www.sciencekids.co.nz/lessonplans/chemistry/crystals.html
Growing Crystal Activity: https://layers-of-learning.com/growing-crystals/

Appendix A: STEM To-Go Activity Sheet - Growing Crystals

The activity sheet includes materials, instructions, tips and the science behind this activity.

Growing Crystals Activity - Blog Post: https://www.stemovation.org/post/growing-crystals

Growing Crystals Activity Sheet - Student Copy:

https://www.stemovation.org/_files/ugd/8444cc_677f7ea56ed447c9b000c381248a2a28.pdf

Appendix B: Observation Log

Observation Log is provided for students to observe the process. They are able to write or draw what they see according to the students specific expectations.

Observation Log - Student Copy:

https://8444cc5c-82a2-4fe8-844a-2131bc9088e3.usrfiles.com/ugd/8444cc_cdd36b9f341e4782b6e06b5733efa123.pdf

STEM TO-GO ACTIVITY

GROWING CRYSTALS

MATERIALS

- Clear Cup
- Elastic Band
- Paper Clip
- String
- Straw
- Salt
- Magnifying Glass
- Observation Log

Find at Home

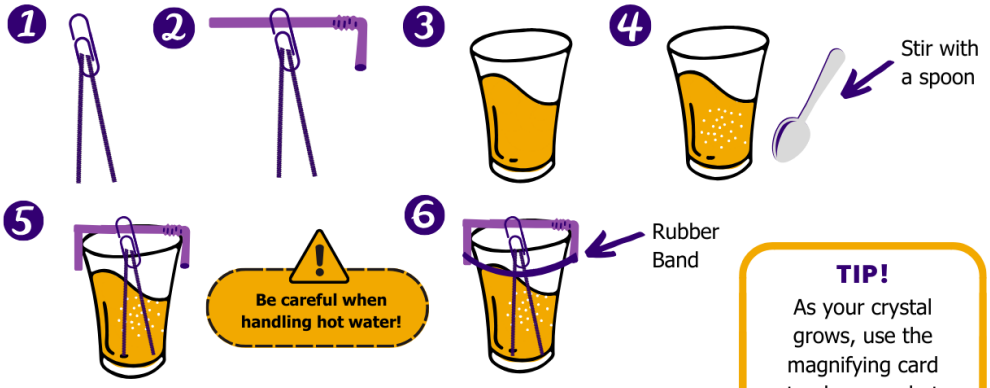
- Warm Water
- Spoon

Be careful when handling hot water!

Watch this video to see how your crystals will grow!
https://www.youtube.com/watch?v=tIIqaS6-yKc

INSTRUCTIONS

1. Tie the middle of the string to the paper clip. The two ends should hang down.
2. Slide the paper clip onto the middle of the straw.
3. Pour some warm water into the cup until it is about ¾ full.
4. Add 5 spoonfuls of salt to the water and stir until the salt mostly disappears.
5. Bend the ends of the straw and place it on the cup.
6. Stretch the rubber band around the straw and cup.
7. Place the cup in a quiet place for a couple of days. Record what you see each day in your Observation Log.
8. Repeat the experiment with different amounts of salt.



TIP!
As your crystal grows, use the magnifying card to observe what you see.

KEEP IN MIND WHILE OBSERVING:

- What shapes do you see as the crystals form?
- Do all crystals have the same shape and structure?

Examples of shapes you might see in your crystals:

STEM TO-GO ACTIVITY

GROWING CRYSTALS

THE SCIENCE BEHIND IT ALL

The salt that we add to our food is made up of tiny particles called molecules.
Solid salt forms a crystal because the molecules are arranged in a repeating pattern.

In this activity, the salt is dissolved in water to make a solution. When the water evaporates, salt crystals form.

EXAMPLES!

Other examples of crystals are sugar, snowflakes, and diamonds.

EXTENSION #1

Use your magnifying card to compare the salt and sugar crystals.

SALT

Drawing:

Observations:

SUGAR

Drawing:

Observations:

EXTENSION #2

Use your magnifying card to examine materials from nature (e.g. rocks, sand).
Can you find any common shapes or patterns? Write or draw what you see.

Material:
Drawing:

Observations:

Natural Resource:
Drawing:

Observations:

STEM TO-GO ACTIVITY

GROWING CRYSTALS

OBSERVATION LOG

SCIENTIST NAME	DATE PREPARED

PREDICTIONS: (What I think the crystal will look like)

Date Observed:
Drawing: **Observations:**

Date Observed:
Drawing: **Observations:**

Date Observed:
Drawing: **Observations:**

Date Observed:
Drawing: **Observations:**

Date Observed:
Drawing: **Observations:**

Date Observed:
Drawing: **Observations:**

Definitions

Predictions: What do you think will happen in the future?
Observations: Record what you notice. (e.g. colour, length, shapes, patterns)