WE STAND TOGETHER

THE POWER OF COLOURS

RECOMMENDED GRADE LEVEL: Grades 4 to 6

SUBJECT: Science and Technology

Suggested time: 120 minutes over three days

Essential Question: What is the purpose of colour in the natural environment?

LEARNING GOALS

Students will:

- Create a scientific experience to extract natural colours
- Explore how members of the Sumas First Nation and Musqueam First Nation use their natural surrounding for different purposes.

WORD BANK

Hypothesis— idea or explanation that you then test through study and experimentation. A guess.

MATERIALS AND RESOURCES

- Blueberries
- Onionskins
- Boiled water
- A large vessel (preferably clear glass) for mixing the boiled water with the blueberries or onionskins
- Bowls or cups (enough for each student or small group)
- Strips of white cloth OR 100% recycled white paper (enough for each student to complete the experiment twice)
- A Journey Into Time Immemorial: virtual museum www.sfu.museum/time/en/flash/
- An elder discussing the dyeing process www.sfu.museum/time/en/videos/12/
- Blackline Master 1: Dye Making Experiment

EDUCATOR'S NOTE: This lesson is designed to be implemented in three phases. Ensure that all materials and resources are ready for day one to allow the experiment to run effectively.

Day 1

1. **RECOMMENDED ASSESSMENT FOR LEARNING:** In small groups, ask students to select two items in the classroom. Have a preselected collection available for students. Examine the item in your group. Ask students to think about the following questions:
   a. What is the item made of?
   b. Was it always this colour?
   c. How did it become this colour?

2. Inform students that dyes are used all the time to colour things that people make. Encourage students to make "good" guesses.
   a. What is the item made of?
   b. Was it always this colour?
   c. How did it become this colour?

3. Inform students: One of the many ways that the people of the Sumas in British Colombia use bark, onionskins and berries, is to create dyes. The process of dyeing in these communities was passed down through generations by oral narratives. The communities used materials and resources that they found around their home and community. Using the colours extracted or taken from these materials was a traditional way to dye fibres, such as wool collected from mountain goats. While this method is still practiced, it is no longer the only method of dyeing materials. As a class, we will be experimenting with natural materials to create natural dyes.

4. Distribute **Blackline Master 1: Dye Making Experiment, Recording Sheet**.

5. As a class, create hypothesis that answers the question: If the dye is made from either onionskins or blueberries, what colour will the dye make the material or paper that it is applied to? Remind students that a hypothesis is a smart guess to answer a question that an experiment will aim to answer.

6. Model the process of creating the dye:
   a. Place the berries into a cup and fill it with 2 parts boiling water to 1 part natural material. Make enough dye solution to allow each student to perform the experiment twice. Tell students that traditionally the water would be boiled over heat with the natural material to extract the dye but modifications were made for a classroom.
   b. Stir everything until it is incorporated.
   c. Wait five minutes then tell students to observe the changes that have taken place, if any, over the last five minutes. Ask students: What colour is the solution turning?

7. As a class, list the materials used so far in the "Materials" section of the **Blackline Master 1: Dye Making Experiment**, Recording Sheet. Then fill in the "Process" section with the steps that were taken so far.

8. Inform students that the mixture needs to set overnight and they will work on the experiment tomorrow.

Day 2

9. In pairs, ask students to share how dyes can be used in their everyday life? Ask students to recall the materials and process of the scientific experiment from the previous day.

10. Distribute either a small piece of cloth to dye OR a sheet of paper and a paintbrush along with a cup or bowl filled with dye solution to each student. Reserve half of the total dye solution for the next experiment.

11. Model the activity for students. In groups, instruct them to follow your lead.
    a. Material method: Place the piece of material into the cup or bowl with dye solution. Ensure the material is fully covered with the dye
    b. Paper method: Use a paintbrush to paint the dye solution onto the piece of paper.

12. **RECOMMENDED ASSESSMENT AS LEARNING:** Allow the material to dry for a few minutes before making initial observations. Ask students to record their observations on the **Blackline Master 1: Dye Making Experiment**, Recording Sheet. Students have the option of writing their observations or drawing a labelled diagram. Students should answer the following questions:
    a. What colour is the dye solution?
    b. What colour does it dye the material or paper?
    c. Is this the colour you were expecting? If it is different than you expected, describe how it is different.
    d. Was your hypothesis correct?

13. Instruct students to set their material aside until the next day.

Day 3

14. In pairs, ask student to reflect on the previous day's experiment. Were you able to correctly guess the colour of the dye? Why were you right?

15. Distribute cups or bowls with the dye solution that has been steeping for two days.

16. In the same groups as the previous day, instruct students to go through the experiment again with new material or paper. Lead by example again, if necessary.

17. Allow the material to dry for a few minutes before making final observations of the two pieces.

18. Explain the scientific method to students: The scientific method is a way for scientists to test their ideas. It starts with a question then an answer is formulated with a hypothesis (or guess). This answer is then tested through experimentation. Once the experiment outcomes (or results) are documented (or written down) the gathered information needs to be studied and analysed and a conclusion made. This is the process you have been going through over the last few days and will complete today.

19. Using their recording sheet, ask students to individually identify the components of a scientific experiment. Model the process of recording the experiment for students who require additional assistance.

20. As a class make observations, comparing the two pieces of material. Ask students to record their observations on the blackline master. Students should answer the following questions:
    a. What colour is the dye solution now that it has steeped for two days?
    b. Describe how it is or isn't different from yesterday.
    c. What colour does it dye the material or paper?
    d. Is this colour different in any way than yesterday's colour? If it is different, describe how it is different.
    e. Explain the differences between the two pieces of material and the two days of experimenting.
    f. Is your hypothesis now correct?

21. **RECOMMENDED ASSESSMENT OF LEARNING:** Ask students to reflect on the question, what did you learn about naturally coloured dyes? How are these dyes created? What are the dyes used for in First Nation, Métis and Inuit cultures?

    Provide students with white paper. Using the Internet, have students find a black and white picture of a First Nations traditional piece of clothing. Ask students to trace their picture of a First Nations traditional clothing piece using the natural coloured dyes they produced. Students may also use their dyed piece of cloth to trace their picture.

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Blackline Master 1:
Dye Making Experiment

RECORDING SHEET
Name:
Question: What colour is your dye going to be when it is applied to material or paper?
Hypothesis (Guess): What colour do you think your dye will be? Will it be exactly the same colour as your natural material? Why or why not?
Materials: ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪
Process: These are the steps you take to test the hypothesis.
1. **Day 1:** Break the berries into small pieces. Place the berries into a cup and fill it with 2 parts boiling water to 1 part natural material. Stir and wait 5 minutes . (This step is performed by the educator.)
2. **Day 2:** Dye the fabric or paper with dye solution. a. **Material method:** Place the piece of material into the cup or bowl with dye solution. Ensure the material is fully covered with the dye; OR b. **Paper method:** Use a paintbrush to paint the dye solution onto the piece of paper.
3. **Day 3:** Repeat Day 2.

Blackline Master 2:
Dye Making Experiment

DYE MAKING EXPERIMENT
Observations Day 1: Describe what you see. a. What colour is the dye solution? b. What colour does it dye the material or paper? c. Is this the colour you were expecting? If it is different than you expected, describe how it is different. d. Was your hypothesis correct?
Observations Day 2: Describe what you see. a. What colour is the dye solution now that it has steeped for two days? b. Describe how it is or isn't different from yesterday. c. What colour does it dye the material or paper? d. Is this colour different in any way than yesterday's colour? If it is different, describe how it is different. e. Explain the differences between the two pieces of matrial and the two days of experimenting. f. Is your hypothesis now correct?
Conclusion: