Teacher Package

Science and Technology Exemplar Task
Grade 1

Teacher Package

Title: Cleaning Up Spills

Time Requirements: 265 minutes (over several class periods)

Introductory activities
- Pre-task 1: 30 minutes
- Pre-task 2: 30 minutes
- Pre-task 3: 40 minutes

Exemplar task
- Part 1: 60 minutes
- Part 2: 45 minutes
- Part 3: 60 minutes

Description of the Task

Students will select and test three materials to determine which one is best to use when cleaning up a specific kind of spill. They will make recommendations based on their observations and prior experiences.

Students will complete the worksheets provided in this package and submit selected worksheets for assessment. They will also be asked to respond orally to questions posed by the teacher, and these interviews will be videotaped. The videotapes will also be used for purposes of assessment.

Scenario and Instructions for Students

Students should be presented with the following scenario and set of instructions:

In class, students often have to clean up a variety of spills (e.g., of sand, paint, glue, food, or drink). Find out what material works best for cleaning up a particular kind of spill.

Your task is to:
- *describe your spill (dry, wet, sticky, etc.);*
- *choose three different materials (e.g., paper towels, napkins, newspaper) that you think will work well;*
- *tell why you chose them;*

- *decide how you will test the three materials in a fair way;*
- *test each of them;*
- *show which material best cleans up the spill;*
- *tell why you think it is the best;*
- *share what you learned.*

Curriculum Expectations Addressed in the Task

Note that the codes that follow the expectations are from the Ministry of Education's *Curriculum Unit Planner* (CD-ROM).

Students will:

1. distinguish between objects and materials (e.g., scissors are objects, and they can be made of metal and/or plastic), and identify and describe the properties of some materials (e.g., flexibility of plastic, hardness of wood) (1s24);
2. investigate the properties of materials and make appropriate use of materials when designing and making objects (1s25);
3. describe the function of specific materials in manufactured objects that they and others use in daily life (1s26);
4. ask questions about and identify needs and problems related to objects and materials, and explore possible answers and solutions (e.g., test materials to determine which ones insulate more efficiently; test different fabrics to determine which are waterproof) (1s34);
5. plan investigations to answer some of these questions or solve some of these problems (1s35);
6. use appropriate vocabulary in describing their investigations, explorations, and observations (1s36);
7. record relevant observations, findings, and measurements, using written language, drawings, charts, and concrete materials (e.g., make a display board and record the results of their testing of chalk on different materials) (1s37);
8. communicate the procedures and results of investigations for specific purposes, using demonstrations, drawings, and oral and written descriptions (e.g., display examples of materials tested and indicate which ones were best for writing on) (1s38).

"Big Ideas"

Based on the expectations being assessed, the following "big ideas" have been identified for this task:

- Objects are made from materials.
- Materials are distinct because each has specific properties.
- The characteristics and functions of an object depend on the properties of the materials from which it is made.

Teacher Instructions

Prior Knowledge and Skills Required

Before attempting the task, students should have had experience with the following:

- identifying the properties of different materials
- describing materials using their senses
- using a simple inquiry process for Grade 1 (See "Exemplar Task", below.)
- using a simple experimental method and conducting a fair test (e.g., a test in which all other things are kept the same while one thing is changed)
- communicating findings orally and recording their findings using pictures and/or words

The Rubric

The rubric* provided with this exemplar task is to be used to assess students' work. The rubric is based on the achievement levels outlined on page 13 of *The Ontario Curriculum, Grades 1-8: Science and Technology, 1998*.

Introduce the task-specific rubric to students at least one day before administering the task. Copy the rubric for students or make a transparency to use with the class. You may find it useful to rephrase the rubric for students to help them understand it.

Review the elements of the rubric with students to ensure that they understand the criteria and the descriptions for achievement at each level. Allow ample class time for a thorough reading and discussion of the assessment criteria outlined in the rubric.

When using the rubric to assess student work, remember that scientific content and processes should be valued over written language skills, especially with younger students.

Accommodations

Accommodations that are normally provided in the regular classroom for students with special needs should be provided in the administration of the exemplar task.

Classroom Set-up

Set up the classroom as you normally would for a science and technology task that requires space for students to conduct their investigations.

Materials Needed

- a wide variety of materials that may or may not be useful for cleaning up various spills (e.g., sponges, different types of cloth, paper towels, different types of papers, plastic wrap, tinfoil, sandpaper, newspaper, plastic wrap, wood blocks, a brush and dustpan, napkins, card stock or cardboard)
- a wide variety of wet and dry spills (e.g., pencil shavings, sand, glue, paint, pudding, water, juice)
- measuring devices (e.g., measuring spoons, graduated cylinders)
- student packages

Safety Considerations

Ensure that the usual safety considerations are in place for the science and technology activities (e.g., remind students to use caution to avoid slipping on wet spills).

Task Instructions

Introductory Activities

The pre-tasks are intended to ensure that students have the prior knowledge required to complete the exemplar task.

Pre-task 1: Introduction of the Scenario and Instructions for Students

1. Discuss the scenario with the class.
2. Brainstorm the kinds of spills that occur in the classroom. List students' suggestions, with pictures, for future use.
3. Discuss students' prior knowledge about cleaning up spills and what materials worked well. Generate a class list of possible materials for cleaning up the spills.
4. Let students know that each will be responsible for testing three materials and selecting the best one to clean up a specific spill.

Pre-task 2: Review of Properties of Materials

1. Review the senses we use to make observations. Discuss with students the fact that they will use only four senses – sight, hearing, touch, and smell, but not taste – in this activity.
2. Review the definition of the word *material* (the "stuff" you use to make objects).
3. Brainstorm a list of materials and words that you could use to describe them (i.e., their properties, such as *soft, bendable, rough, light, heavy*).

**The rubric is reproduced on pages 14–15 of this document.*

4. Introduce students to a classroom search activity. Have students work in groups and assign each group a property (e.g., flexible, hard, cold) to search for in materials found in the classroom. Provide each group with a large piece of chart paper on which to record a list of materials that share the assigned property. See Appendix 1 for a sample. Students should be encouraged to explain their choices to the group before adding them to the chart. Have each group share its findings with the class.

Pre-task 3: Objects Are Made of Materials With Properties

1. Review the definition of the word *object* (objects are things that are made of one or more materials).
2. Brainstorm with students a list of objects and the materials from which they are made.
3. Introduce students to the activity provided in Appendix 2, using examples such as:
   – A window is made out of glass because you can see through glass.
   – A window is not made out of paper because the rain would come through it.

   Encourage students to come up with several different reasons for each as you work through the examples orally.
4. Have students complete the activity in Appendix 2. Encourage students to think of several different responses and choose one to record. Have students then illustrate each sentence that they have completed.
5. Do a pair-share or have students share responses in small groups.

Exemplar Task

The completed student worksheets "Identify the Problem", "My Choices of Materials", "My Plan", "What Happened", "What I Learned: Part 1", "What I Learned: Part 2", and "I Wonder" (see Appendices 3 to 9) are to be submitted for marking.*

Part 1: Planning

1. Review the scenario with students.
2. Remind students that each will be working independently. Establish the criteria that students will have to meet by reviewing a simplified version of the rubric or by posting a criteria chart.
3. Have each student use the "Identify the Problem" worksheet in the Student Package (see Appendix 3) independently and restate the problem (e.g., "*The problem* is that we have lots of spills in our classroom") and the task (e.g., "*My task is* to find the best material[s] to clean up a glue spill"), using pictures and/or words.
4. Ask each student then to select three different materials for the clean-up from those available for testing. Remind students to think of the properties of the spills as they try to determine the best materials to clean them up. Tell them that they will have to predict which will do the best clean-up job.

5. Have students complete the "My Choices of Materials" worksheet (see Appendix 4).
6. Review with students the process of designing and carrying out a fair test (e.g., all material samples must be the same size and all spills must be the same size; in the case of a student testing paint, the amount of paint spilled stays the same [the constant] and the materials used to clean it up are changed [the variables]).
7. Model for students the fair testing process using a kind of spill not found in the classroom (e.g., flour, baby powder, corn syrup, honey).
8. Model the use of the "I Wonder" worksheet (see Appendix 9). Two possible "I wonders" are: "I wonder if this material would clean up _____?" and "I wonder if a different material would have been better to clean up _____?".
9. Have students record their plans on the "My Plan" worksheet (see Appendix 5), using pictures and words.

Part 2: Experimenting

1. After each student finishes recording his or her plan, have him or her do the experiments with the three clean-up materials chosen.
2. Ask students to record their findings and conclusions on the "What Happened" worksheet (see Appendix 6) and on the "What I Learned" worksheets (see Appendices 7 and 8). Encourage students to record their responses as fully as possible, using pictures, labelled diagrams, and/or words.

Part 3: Concluding and Reflecting

When students complete their experiments, it is important that they share their results in small groups and talk about their successes. Reviewing what went well and what did not go well helps students learn the inquiry process. Encourage students to share ideas about ways in which they can use what they learned. Throughout the sharing, encourage students by using "I wonder" questions (e.g., "I wonder what else this material would have cleaned up?"; "I wonder what would have happened if you had used _____ instead of _____?").

About the Videotaping

For this video exemplar, teachers were asked to set the stage, as described below, for students to be videotaped individually by TVOntario. Teachers were present for the videotaping and provided the questions/prompts listed below to help students articulate their understanding/learning.

– For the taping, have a basket or box of familiar materials and objects from the classroom available for students to select to answer the first prompt.
– A picture prompt is included to be shown to students as you read the scenario (see page 10).
– To create a safe, non-threatening environment for students, it is essential that you, the student's teacher, ask the questions.
– During the videotaping, students should have their completed student booklets available to refer to if they want them.

*The worksheet "I Wonder" is not included in the samples of student work reproduced in this document.

The following video prompts were used during the videotaping of the investigation:

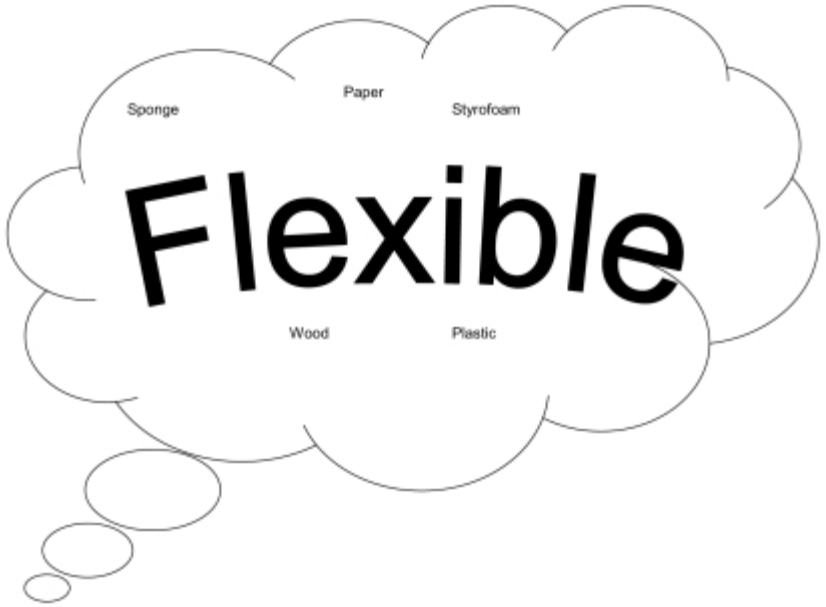
- Use something from the basket/box of classroom items to help explain the difference between objects and materials.
- What problem were you solving?
- What steps did you take to solve the problem?
- What three materials did you choose? Why did you choose them?
- Which material was most successful in cleaning up your spill?
- Why do you think it worked so well?
- If you could have used anything else in the world to clean up your spill, what would you have used? Why?
- A friend has come for lunch at your house and is having a sandwich with a pickle and a glass of juice. As you are carrying your friend's lunch to the table, you bump into a chair. The next thing you know, the juice, sandwich, and pickle are all over the floor. The sandwich, with ketchup on it, has landed upside down in the middle of it all. What a mess! Tell me all the things you could use to clean up the different spills on the floor. Explain why you would choose each of them.
- Tell me one of your "I wonders".

Appendix 1

Pre-task 2: Teacher Sample

Have students create one chart for each property being observed.

Students can draw, cut and paste, or write their examples.



Appendix 2

Pre-task 3: Student Activity

A _____ is made of _____

because _____.

A _____ is NOT made of _____

because _____.

Appendix 3

Identify the Problem

Use pictures and/or words.

The problem is:

My task is:

11

Appendix 4

My Choices of Materials

My first choice is _____ because:

My second choice is _____ because:

My third choice is _____ because:

12

Appendix 5

My Plan

1) What I Need

2) What I Will Do

13

Appendix 6

What Happened

Use pictures and/or words to show what you saw.

14

Appendix 7

What I Learned: Part 1

Which material worked best to clean up the spill?

Why was it the best?

What other kinds of spills could it clean up?

15

Appendix 8

What I Learned: Part 2

If you could use anything else in the world to clean up your spill, what would you use? Tell why.

16

Appendix 9

I Wonder