



YSISTE

ASSESSMENT OF SCIENCE AND TECHNOLOGY ACHIEVEMENT PROJECT (ASAP)

Science and Technology Exemplars

Grade 2: Earth and Space Systems – Air and Water in the Environment

Exemplar Task (2ESPT01/Mar 27, 2001)

Where Did It Go



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Preface

This task is one of a series developed by the Assessment of Science and Technology Achievement Project (ASAP) which is being used for the ASAP Science and Technology Exemplars Project.

This task is organised in three parts:

- A. Task Overview
- B. Student task sheet – designed to be photocopied for the students
- C. Teacher Information – providing essential information relating specifically to this task

For further information, contact the ASAP office at 416-736-5269 or email: asap@edu.yorku.ca

Task Overview



Description of the Task

In this task, students are asked to investigate the evaporation of water and the factors that affect how quickly this happens. The concept is related to an everyday event that they will have experienced by discussing what happens to puddles after a rainstorm. Students will use jars of water placed in different places to investigate the effect of air temperature on the rate of evaporation.



Materials & Equipment Needed

For each student:

3 clear jars or beakers
3 labels
A copy of sheet A

Water
Measuring cup

Ruler
String

Teachers should ensure that there is a selection of different sized jars or beakers but that there are enough for each student to choose three of the same size if they recognise that this is a component of a fair test. Students may need access to a refrigerator or cool place. Each student will require a copy of sheet A found at the end of the teachers' section to enable them to cut and paste the pictures onto the student sheet.



Suggested Timeline

- develop a plan (60 minutes)
- completing the investigation (observations over 5 days)
- writing the report (60 minutes)



Suggested Grouping

- developing a plan and completing the investigation (student pairs)
- writing the report (individual)

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Where did it go?

Student Task Sheets

Scenario: Where Did It Go?

Have you noticed that there are puddles in the street after a rainstorm?

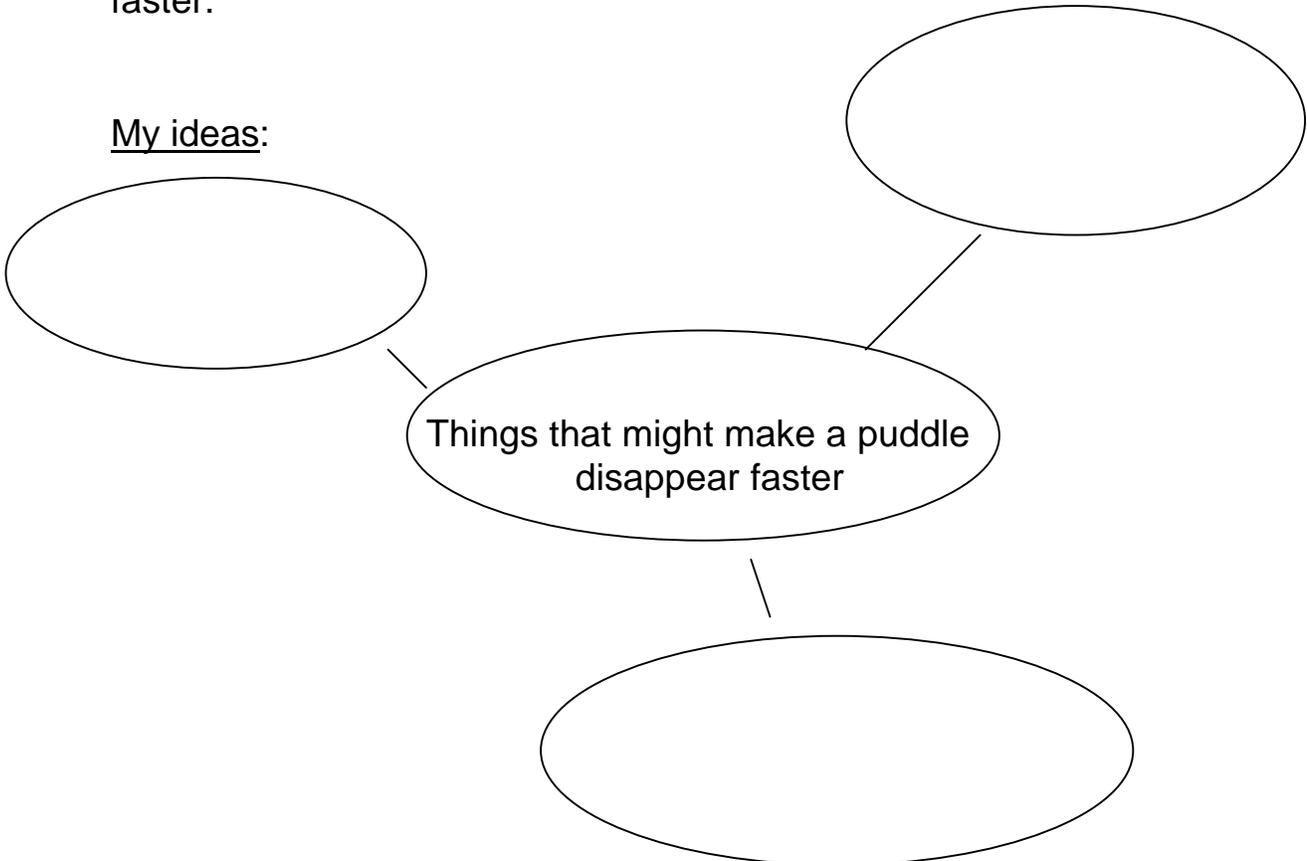
Have you noticed that these seem to disappear after a while?

Why do you think this happens?

What things do you think make a puddle seem to disappear?

Write down what things might make a puddle evaporate (disappear) faster.

My ideas:



You are going to investigate if **warmer weather** would make a puddle evaporate faster.

My Plan:

Cut and paste **four** pictures from Sheet A to show how you will do a **fair test**.

1.

Paste picture here to show what you will do first.

2.

Paste picture here to show what you will do second.

3.

Paste picture here to show what you will do third.

4.

Paste picture here to show what you will do fourth.

Show your plan to your teacher before you start.

My plan:

Where are you going to put your jars?

I will put jar 1 _____

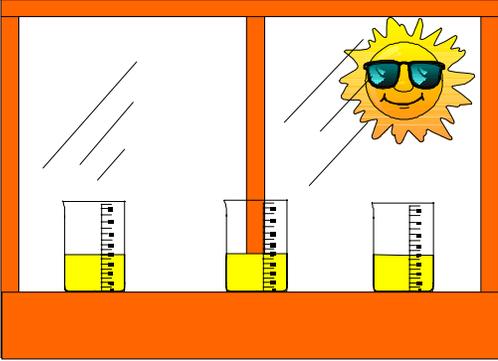
I will put jar 2 _____

I will put jar 3 _____

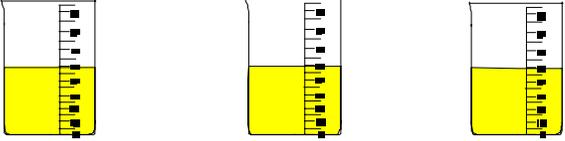
My prediction:

| Fill in this chart | | |
|--|-------------------|--|
| | Where is the jar? | What will happen to the water in the jars? |
|  Cool | | |
|  Warm | | |
|  Hot | | |

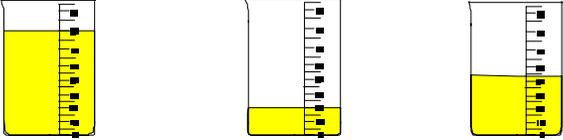
SHEET A: Developing A Plan



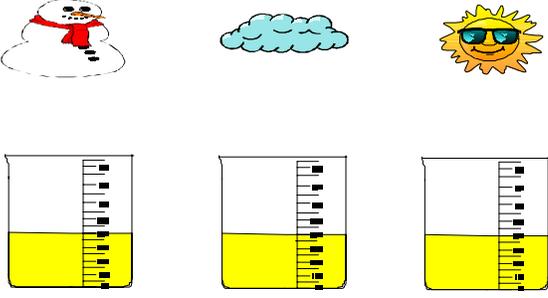
I will put my jars in the same place.



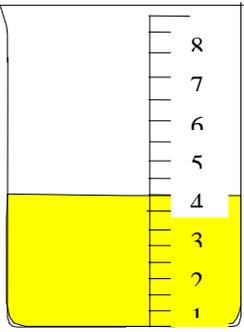
I will put the water into the jars.



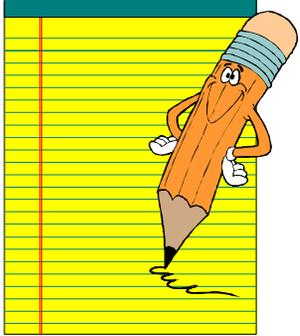
I will put the water in the jars.



I will put my jars in different places.

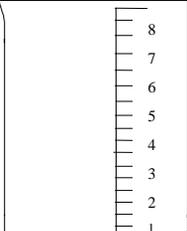
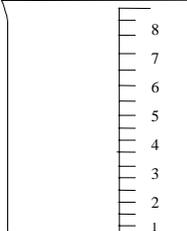
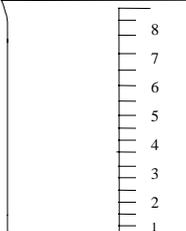
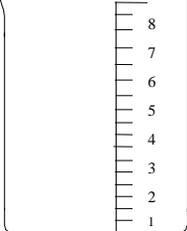
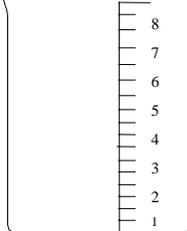
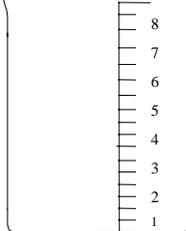
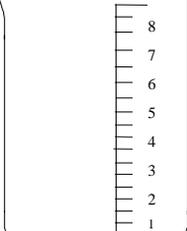
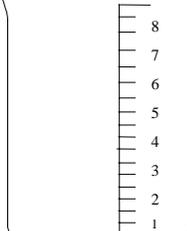
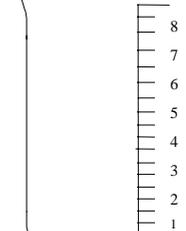
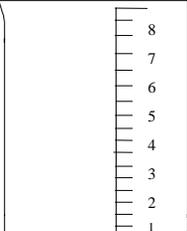
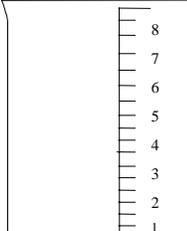
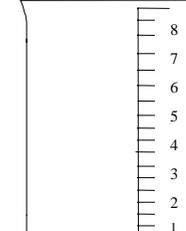
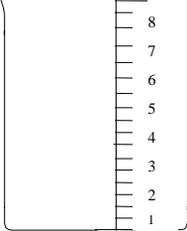
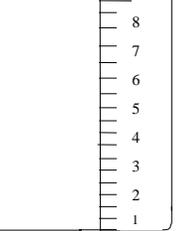
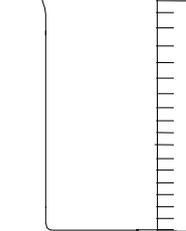


I will measure how much water is left in each jar.



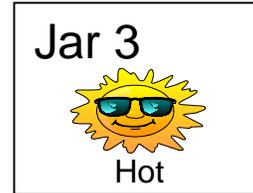
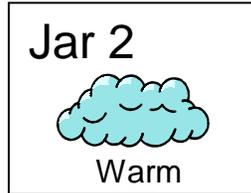
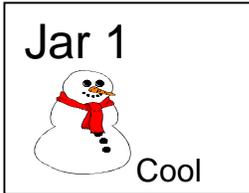
I will write in my chart.

My Observations:

| Day | Jar 1  Cool | Jar 2  Warm | Jar 3  Hot |
|-----|--|--|---|
| 1 |  cm |  cm |  cm |
| 2 |  cm |  cm |  cm |
| 3 |  cm |  cm |  cm |
| 4 |  cm |  cm |  cm |
| 5 |  cm |  cm |  cm |

My Results:

Circle the jar from which the water evaporated fastest.

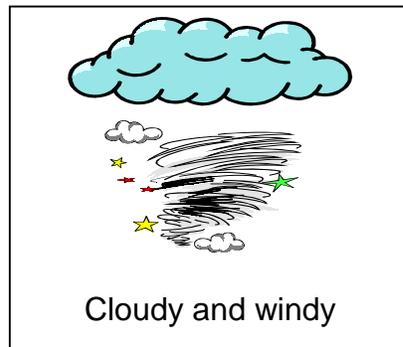
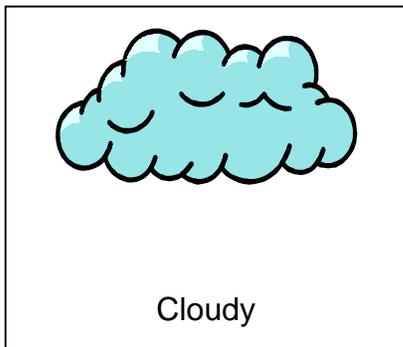
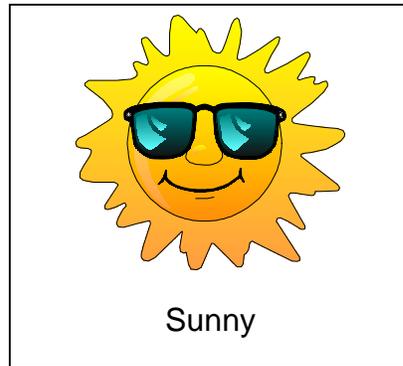
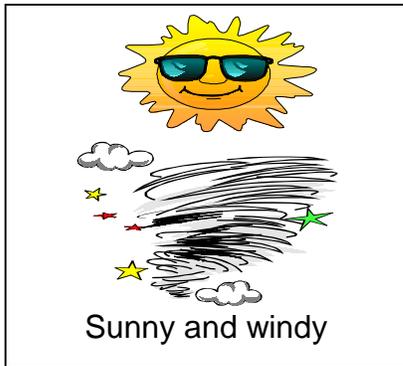


My Conclusion:

Use words and/or pictures to explain why the water in this jar evaporated the fastest:

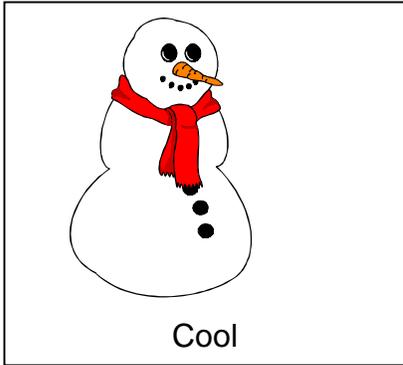
The water in this jar evaporated the fastest because _____

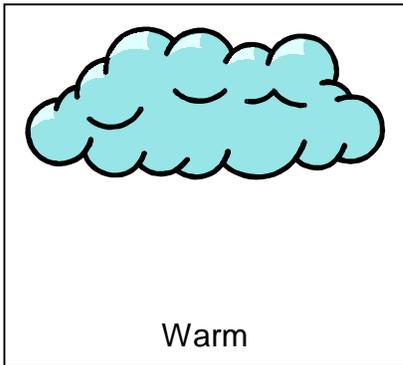
On what type of day would a puddle evaporate (disappear) the fastest?
Circle **one** of the pictures below. Explain your answer.

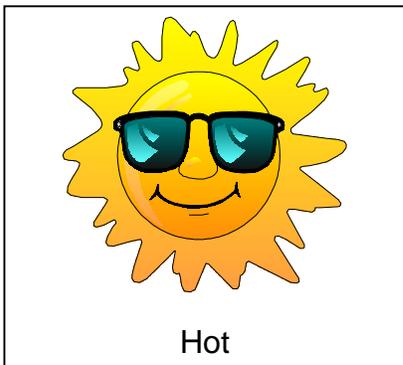


Explain your answer _____

Explain what clothes you would wear and what things you would do when the weather is like this.







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Teacher Information Sheet

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A Fair Test

The second goal of Science and Technology Education encourages students to develop the skills, strategies, and habits of mind for scientific inquiry and technological design. As students investigate solutions to problems through an inquiry approach, it is important that they accommodate the conditions of a fair test as follows:

- One variable at a time is selected for testing
- Only the chosen variable is altered
- As many variables as possible are kept constant in the testing
- All tests are measured in the same way
- Tests are repeated to determine the validity of the test results

Note: A variable is something which can be changed and which may affect results.

This task assesses the following **specific expectations**:



Understanding Basic Concepts

- identify the factors that cause things to dry quickly or slowly
- recognise evidence of the water cycle



Developing Skills of Inquiry, Design and Communication

- ask questions about and identify needs and problems arising from events in the outdoor environment and explore possible answers and solutions
- plan investigations to answer some of these questions or solve some of these problems
- use appropriate vocabulary in describing their investigations, explorations or observations
- record relevant observations, findings and measurements using written language, drawings, charts and concrete materials
- communicate the procedures and results of investigations and explorations for specific purposes using demonstrations, drawings, and oral and written descriptions



Relating Science and Technology to the World Outside the School

- predict and describe how local weather conditions affect living things, including themselves



Prior knowledge and skills

Students should have been taught the background knowledge required for this task (see Appendix 1).



Students should also be familiar with:

- inquiry skills of initiating, predicting, planning, observing, recording and interpreting results
- the need to carry out a fair test
- appropriate and safe use of equipment
- measurement, if students have difficulty using a ruler to measure they could use a piece of string and then hold that against a ruler. They could also count the number of centicubes to record the height of water in their jars



Introductory activities

1. Display the materials and equipment for the students. Discuss the first page of the student sheets with the class. Tell them that they can use these materials to plan and carry out their investigation.
2. Brainstorm with the whole class possible reasons for the evaporation of the water puddles and ideas for setting up the investigation.
3. Review appropriate vocabulary. Cards with words could be displayed around the classroom.
4. Review the water cycle with the students.
5. Read the scenario (“Where did it go”, on page 5) to the whole class, this may have to be repeated with individual students.
6. Review what the icons in task represent (cool, warm, hot).
7. Review and discuss the graphic organiser.

Each student should show a plan to the teacher before starting the investigation.

Discuss the assessment criteria with the students.

Assign the student work sheets.

Clarify how each student will be presenting his/her work (see Collecting the Evidence).



Safety First

Students should be familiar with using the equipment required for the task. Students should be warned to take care with glassware.

Appendix 1



Background knowledge – Where did it go?

Students should have been taught the different factors that cause things to dry quickly or slowly. These are:

- air temperature
- amount of moisture in the air
- amount of wind

Students should have been taught to recognise evidence of the water cycle.

Examples of evidence for the water cycle are:

- comparing evaporation rates of closed and open containers of water
- observing the evaporation of puddles after rainstorms
- observing the evaporation of a shallow dish of salt water to leave salt crystals
- observing the condensation of water on windows and cold drink cans

Task Considerations

1. If clear jars are chosen for this task instead of beakers, make sure that the mouths to the jars are wide enough to allow for noticeable evaporation of water. Also make sure that the jars have wide bottoms so that they do not tip easily.
2. Implementing the task activities in groups of two students will minimize the number of jars or beakers to be placed in a “cool” location (e.g., refrigerator).
3. An appropriate “warm” location in a classroom for this task could be:
 - (a) A sunny window ledge
 - (b) A radiator or heating duct opening in winter
 - (c) On the floor behind a refrigerator



Glossary

Evaporate – change of state from liquid to gas

Fair test – investigation carried out under strictly controlled conditions to ensure accuracy and reliability of results. In a fair test, all variables are controlled except the one under investigation.

RUBRIC FOR GRADE 2: WHERE DID IT GO?

| Knowledge/Skills | Level 1 | Level 2 | Level 3 | Level 4 |
|--|---|--|---|--|
| Understanding basic concepts <ul style="list-style-type: none"> identifies factors recognizes evidence | The student: <ul style="list-style-type: none"> identifies the factors that cause things to evaporate quickly or slowly with many errors | The student: <ul style="list-style-type: none"> identifies the factors that cause things to evaporate quickly or slowly with some errors | The student: <ul style="list-style-type: none"> identifies the factors that cause things to evaporate quickly or slowly with few errors | The student: <ul style="list-style-type: none"> identifies the factors that cause things to evaporate quickly or slowly with no errors |
| Inquiry Skills <ul style="list-style-type: none"> asks questions plans investigations uses vocabulary records observations reports conclusions | The student: <ul style="list-style-type: none"> makes predictions that are unclear develops and follows a limited plan identifies few of the components needed for a fair test records data with many errors reports results and conclusions that are unclear and are not supported by the data | The student: <ul style="list-style-type: none"> makes predictions that are clear develops and follows an adequate plan which may be unclear identifies some of the components needed for a fair test records data with some errors reports results and conclusions that are somewhat clear but are not supported by the data | The student: <ul style="list-style-type: none"> makes predictions that are clear and accurate develops and follows an appropriate and clear plan identifies most of the components needed for a fair test records data with almost no errors reports results and conclusions that are clear and are supported by the data | The student: <ul style="list-style-type: none"> makes predictions that are clear, accurate and well explained develops and follows an appropriate, clear and detailed plan identifies all of the components needed for a fair test records data with no errors reports results and conclusions that are well supported and fully explained |
| Communication of Required Knowledge <ul style="list-style-type: none"> communicates results | The student: <ul style="list-style-type: none"> communicates with limited clarity and precision rarely uses science and technology terminology | The student: <ul style="list-style-type: none"> communicates with some clarity and precision sometimes uses science and technology terminology | The student: <ul style="list-style-type: none"> communicates clearly and precisely through most of the task often uses science and technology terminology | The student: <ul style="list-style-type: none"> communicates clearly and precisely through all of the task always uses science and technology terminology |
| Relating Science and Technology to the world outside the school <ul style="list-style-type: none"> describes effects of weather | The student: <ul style="list-style-type: none"> predicts and describes how weather conditions affect themselves with many errors | The student: <ul style="list-style-type: none"> predicts and describes how weather conditions affect themselves with some errors | The student: <ul style="list-style-type: none"> predicts and describes how weather conditions affect themselves with few errors | The student: <ul style="list-style-type: none"> predicts and describes how weather conditions affect themselves with no errors |

Written using the Ontario Curriculum Unit Planner (March 2001)