Collection of Alternative Assessment Tasks for Grade 8

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Introduction

This collection of tasks was produced as part of the New York State Alternative Assessment project (NSF Grant ESI 9154506). Separate collections were assembled for use at grade 4, grade 8, Earth science, and biology. Some of the tasks are in a manipulative skills format (where students manipulate objects, and/or equipment), and some are in a paper and pencil format (often including diagrams, graphs and/or data tables).

Another product of this assessment grant was the Alternative Assessment in Science: A Teacher's Guide (Reynolds, Doran, Allers, & Agruso, 1996). This guide was designed to provide teachers and supervisors with background information, procedures, and examples in developing alternative assessment tasks in science.

These resources were produced by the staff of the project and hundreds of New York State teachers who wrote, trial tested, and revised the tasks included in the Task Collections and the Teacher's Guide. The Teacher's Guide was intended to provide the general background and skills appropriate for elementary, middle, and high school teachers of science, while the Task Collections provide a set of examples for teachers to try and to modify as best fit their teaching situations.

Recommended Use

These two documents can be used in professional development workshops at the school building, district, regional, and/or state levels. The Teacher's Guide and the Task Collections were designed to be used together. The former provides general background and procedures for developing and trial testing tasks; while the latter provides a sample of tasks, designed for a particular grade or subject, that have been developed and trial tested with students.

We have found that everything takes longer than one initially thinks. This is especially true when teachers are expected to try some tasks with their students between separate sessions of the professional development activity. Be sure to allow enough time for each stage of the planned workshop and enough time between the stages.

While the Guide and the Collections were designed to be read and used by individual teachers, some sections could be presented via overheads of key visuals or sections of text and guided practice on applying some small set of skills (e.g. writing rubrics).

Structure of Task Packets

On the following pages you will find the tasks that have been developed for Grade 8. Each task includes several parts that may be used by teachers, students, or scorers.

The structure of each task collection is as follows:

A. Task Information Sheet (blue - for teachers)
B. Student Task Sheets (white - directions, questions, and space for student's written responses)
C. Scoring Rubric and Scoring Form (yellow)
D. Samples of scored student booklets (white)

Each part will be described briefly in the following section.

Task Information Sheet

The Task Information sheet includes descriptions of the task in terms of **grade level/subject** of recommended use, **content** reference from the relevant syllabus or learning standards, **format** and **purpose** of the task, as well as **skills** assessed in the task. To help a teacher plan and prepare to use a task, this sheet also includes **time** for administration, **materials** needed to perform and prepare the task for administration, as well as detailed directions for the **preparation** of the task materials. If there are any potential **safety** issues they are noted, as well as possible **extensions** or **modifications** of a task. Lastly, when appropriate the **credit / source** of the assessment task is listed.

A more detailed description of each of the parts of the task information is presented in the following section. It is presented in the same format as it will appear in each of the task packets.

Task Title
Task Information

Grade/Subject: The **grade level** or **subject** for which the task was designed to be used.

Content: The **Content** listing specifies the subject matter or the particular knowledge area that is covered by the task., with detailed references to the related section of the relevant state syllabus.

Format: The **Format** of the task describes the general method of assessment. The task may be paper and pencil, or it may be a manipulative task in which students work with objects or equipment.

Purpose: The statement of **Purpose** indicates the detailed outcome the author(s) intends to be assessed by the task.

Skills: Identifies the **skills** students need to use in order to complete the task. These skills have been taken from lists included in the related syllabus.

- **Primary:** The skills which are the predominant ones used by the students.
- **Secondary:** Other skills required for successful performance in the task

Time: The approximate **Time** required for student completion of the task

Materials: **Materials** needed for **per student** to complete the task. In addition are a list of materials used by the **teacher** in preparing for the task.

Preparation: Some of the tasks have detailed teacher directions which give information on assembly and set up of materials and further **Preparation** instructions.

Safety: Any potential **Safety** issues which may arise about the task or the use of the equipment and materials are noted here.

Extensions/Modifications: Suggestions for minor changes to directions and/or materials that shift the focus of the task or provide a different amount of help or support for the student completing the task are included here.

Credit/Source: Some tasks may have been modified from different **sources**. In this section appropriate **credit** is given.

Student Task Sheet

The student instructions and answer sheet provide detailed directions on what the student is to do in order to perform the task and respond appropriately Some task sheets are quite open ended and require much insight, interpretation, and creativity on the part of the student. Others are more structured and clearly describe the procedures which the student is expected to follow. By looking at the statement of purpose from the task information sheet, and knowing one's students, a teacher can decide which style would be most appropriate. The student answer sheet is part of the task sheet. The structure of the answer sheet is determined by the style of student directions. Some of the tasks have integrated directions and answer sheets, (all in one package), while other tasks have separate student directions and answer sheets (and are so labeled). Considerable space is provided for student's written responses. This is what is rated or scored by the teacher.

Scoring Rubric and Scoring Form

The next section of the task collection includes the Scoring Rubric and Scoring Form. The development of these is described in detail in Chapter 4 of the Teacher's Guide. The scoring rubric provides detailed information on how to rate each student's responses. The rubric includes the performance standards, criteria for awarding points, and sample acceptable answers. For each task a sample scoring form is provided to facilitate the rating of individual student's performance. This scoring form briefly identifies each question and provides numbers to circle (corresponding to the points possible for that question) and space to indicate the total score earned by that student.

Scored Student Responses

For most tasks we have selected three student's work as part of the task packet. We selected tasks that illustrate excellent, adequate, and minimal levels of performance. Each student response sheet has an accompanying scoring form, with the points earned. One can see which responses earned the low, medium, and high scores.

Task Collections

Listed below are the titles and a brief description of each task included in this task collection. The tasks are assembled in two sections; manipulative tasks, and paper and pencil tasks. More information about each task is included on the Task Information Sheet (blue pages) at the beginning of each collection.

Grade 8
Manipulative Tasks:

Acid and Base Testing:
Students plan and carry out an experiment to determine which of three (3) solutions is acidic, basic or neutral.

Acid Precipitation:
Students determine the level of acidity of five (5) solutions representing water collected in March 1993 from sources around N.Y. State and infer causes.

Changing Ramp Heights:
Students measure and compare the distance a rolling ball moves a plastic cup when the ball is released from different heights.

Chemical Changes:
Students experiment to determine what evidence indicates that a chemical change is occurring.

Density of a sinker:
Students determine the density of a sinker by measuring its mass and volume.

Height of Bounce:
Students measure the height that a ping pong ball bounces when dropped from several different heights and predict for other heights.

Probing Under the Surface:
Students use a measuring stick to infer the shape of the inside bottom of a box.

Rate of Solution:
Students determine factors which affect the rate of solution.

Sand in Bottles:
Students measure the speeds that bottles containing different amounts of sand will roll down a ramp and predict for other bottles.

Sugar & Starch Testing:
Students plan and carry out an experiment to determine if solutions contain starch and/or sugar.

Unknown Liquids:
Students plan and conduct an experiment to determine which of two solutions in vials has the greater density.

Paper and Pencil Tasks:

Dichotomous Key:

Students use a dichotomous key to identify and name three (3) species of Triangulum (hypothetical species).

Phases of Matter:

Students apply content knowledge about phases of matter to observations and problems from everyday life.

Sun and Temperatures:

Students infer the temperature of four (4) thermometers and justify the inferences.

Acid and Base Testing 1
Task Information

Grade: 8th Grade

Content:

- Block H (The Chemistry of Matter). Section VI, 1 and 2. page 29-30

Format: Manipulative

Purpose: The student will use indicators to identify an acid and a base

Skills:

Primary: Interpreting data, recording data
Secondary: Observing

Time: 8 - 10 minutes

Materials:

- solution A - Water
- solution B - acid - (Citric or Ascorbic acid)
- solution C - base (Limewater)
- Red and blue litmus paper
- Plastic reaction plate or transparency paper
- phenolphthalein
- permanent fine line black marker
- dropper bottles
- small plastic cup
- water for cleaning
- paper towels
- goggles
- waste container

Teacher Preparation:

1. **Stock Solution Preparation:** for thirty (30) students (60 ml.) dropper bottles which can be used for 5 classes
   a. Solution A - water in dropper bottles labeled "A"
   b. Solution B - acid solution - dilute citric or ascorbic acid.
      If using purchased citric acid, follow manufacturer's directions for making a dilute solution.
      If using "Fruit Fresh", dissolve 3 teaspoons in 1500 ml of water.
      Test with litmus paper. Place in dropper bottles labeled "B"
   c. Solution C - base solution - dilute limewater ($Ca(OH)_2$.
      For best results purchase just prior to the activity as limewater has a short shelf life.
      Place in dropper bottles labeled "C".
2. **Materials Preparation:**
   a. Label dropper bottles "A", "B", "C", and "Phenolphthalein".
   b. For best results. fill phenolphthalein bottles just prior to the activity.
   c. Keep litmus paper in closed containers.
   d. Use the permanent marker or a copy machine to transfer the template onto transparency paper. Cut into strips. Discard strips after using.
   e. Alternative: purchase reaction Plates (24 wells) . Use flat sides of both tops and bottoms of reaction plates. **Wash well between uses.**

Safety:

- Students should wear safety goggles
- Check MSDS (Materials Safety Data Sheets) for further laboratory precautions.
- Laboratory safety procedures required.

Extensions/Modifications:

- Variations of this task include Acid and Base Testing 2, and 3 with different degrees of structure.
- Acid and Base Testing 1, 2, and, 3 - Micro, with different materials.

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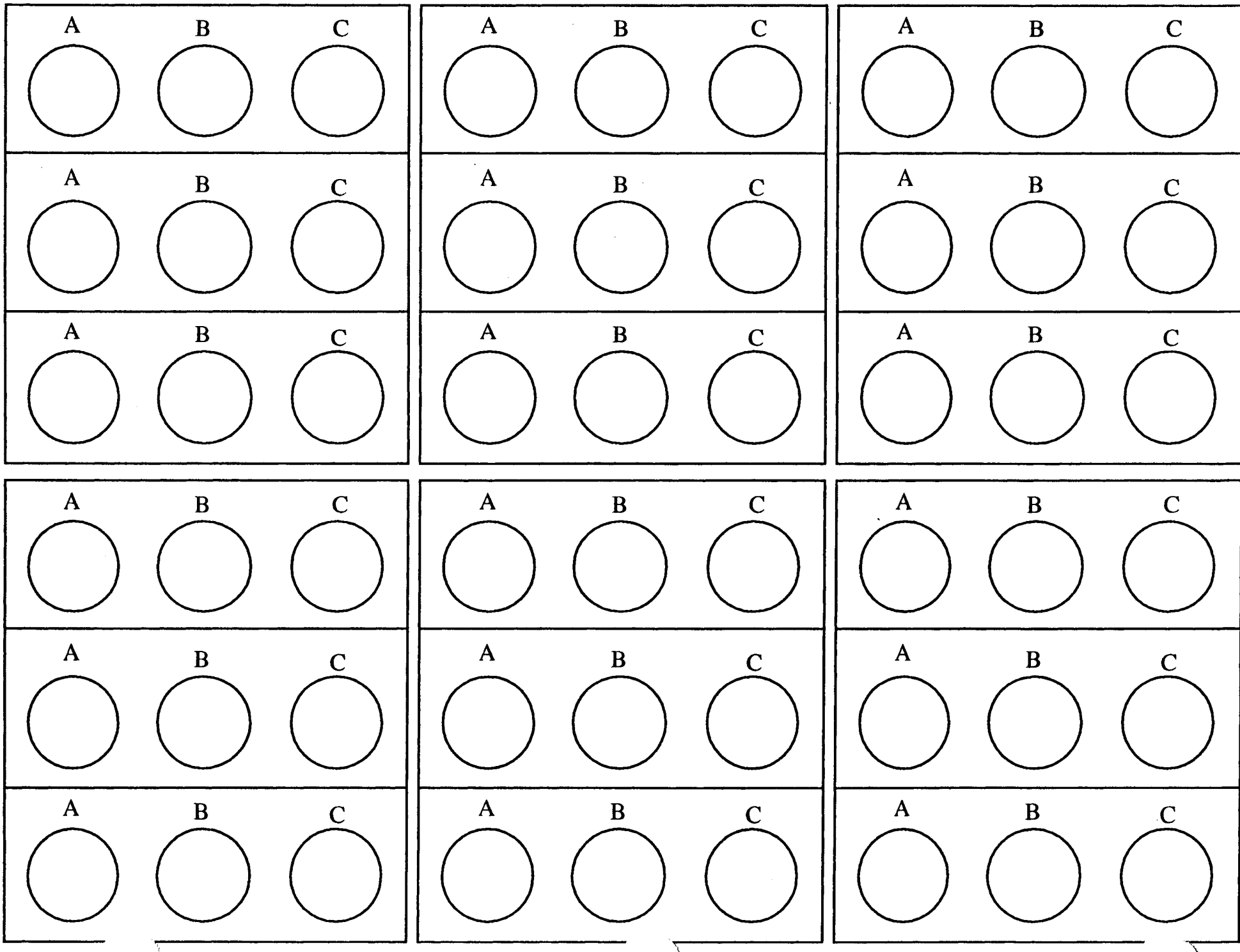
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Acid and Base Testing 1

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

Materials:

- solution filled dropper bottles A, B, & C
- dropper bottle with phenolphthalein
- reaction transparency or plate
- blue litmus paper
- red litmus paper
- safety goggles
- waste cup
- paper towels
- water

Background:

Phenolphthalein turns pink in a basic solution.
Blue litmus paper turns red (pink) when dipped in an acidic solution.
Red litmus paper turns blue (purple) when dipped in a basic solution.

Directions:

1. **Put your safety goggles on.** Do **not** taste or touch any solution. Clean up all spills with a paper towel.
2. Place one drop of each solution, A, B, & C, on the circle with the same letter in each of the three rows.
3. Dip the end of a different piece of blue litmus paper into each of the three solutions in **the top row** and lay them on the plate.
4. Immediately record the **COLOR** of the litmus paper on the data table.
5. Repeat steps 3 and 4 using the red litmus paper in **the middle row** and lay them on the table.

Table 1: **COLOR** results of litmus paper

	Indicator	Solution A	Solution B	Solution C
Row 1	Blue Litmus			
Row 2	Red Litmus			

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

6 Add one drop of phenolphthalein to each of the three solutions in **the bottom row.**

7. Record the **COLOR** of the phenolphthalein on the data table below.

Table 2: **COLOR** results of phenolphthalein

	Indicator	Solution A	Solution B	Solution C
Row 3	Phenolphthalein			

8. Wash the reaction plate or transparency with water and dry with a paper towel. Throw any garbage into the waste cup.

9. Using the data you have collected in Tables 1 & 2 and the background information, which solution is acidic? _____

In the space below, explain the reason for your answer.

_____

_____

_____

10. Using the data you have collected in Tables 1 & 2 and the background information, which solution is basic? _____

In the space below, explain the reason for your answer.

_____

_____

_____

Acid and Base Testing 1 - Scoring Rubric

Maximum Score - 12 points

Questions 5. Litmus paper data table 1 **4 points total**

	Indicator	Solution A	Solution B	Solution C
Row 1	**Blue Litmus**	*blue or same or no change*	*red or pink*	*blue or same or no change*
Row 2	**Red Litmus**	*red or same or no change*	*red or same or no change*	*blue or purple*

Point Criteria:

- Blue Litmus
  - Allow 1 point if both Solutions A and C are correct.
  - Allow 1 point if Solution B is correct.
- Red Litmus
  - Allow 1 point if both Solutions A and B are correct.
  - Allow 1 point if Solution C is correct.

Question 7. Phenolphthalein data table. **2 points total**

	Indicator	Solution A	Solution B	Solution C
Row 3	Phenolphthalein	*clear or same or no change*	*clear or same or no change*	*pink*

Point Criteria:

- Phenolphthalein
  - Allow 1 point if both Solutions A and B are correct.
  - Allow 1 point if Solution C is correct.

Question 9. Identify acidic solution and explain your answer. **3 points total**

Point Criteria:

- Allow 1 point for identifying the acidic solution as solution B
  - Accept any student's response correctly **based on his/her data**
  - Multiple answers receive no credit
- Allow 2 points for an explanation relating student data to background information.
  - Solution B turned blue litmus red which indicates an acid.
  - Allow only 1 point if the student states the background information without relating it to his/her data.

Question 10. Identify basic solution and explain your answer. **3 points total**

Point Criteria:

- Allow 1 point for identifying the basic solution as solution C.
  - Accept any student's response correctly **based on his/her data**
  - Multiple answers receive no credit
- Allow 2 points for an explanation relating student data to background information.
  - Solution C turned red litmus blue and/or phenolphthalein pink which indicates a base.
  - Allow only 1 point if the student states the background information without relating it to his/her data.

Highest possible Score - 12 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Scoring Form - Acid & Base Testing 1**
Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	0 1	
Solution B	0 1	
Red Litmus		
Solutions A & B	0 1	
Solution C	0 1	_____
7. Phenolphthalein Data Table 2		
Solutions A & B	0 1	
Solution C	0 1	_____
9. Acidic Solution		
Solution Named	0 1	
Reason for choice	0 1 2	_____
10. Basic Solution		
Solution Named	0 1	
Reason for choice	0 1 2	_____

Total Score _____

Highest Possible Score - 12 points

Student ID 8-TS2-28 **Scoring Form - Acid & Base Testing 1** #1

Male or **Female** (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	0 (1)	
Solution B	0 (1)	
Red Litmus		
Solutions A & B	(0) 1	3
Solution C	0 (1)	
7. Phenolphthalein Data Table 2		
Solutions A & B	0 (1)	2
Solution C	0 (1)	
9. Acidic Solution		
Solution Named	(0) 1	
Reason for choice	(0) 1 2	0
10. Basic Solution		
Solution Named	(0) 1	
Reason for choice	(0) 1 2	0

Total Score 5

Highest Possible Score - 12 points

May 4, 1994

Acid and Base Testing

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

- dropper bottle marked **A**
- dropper bottle marked **B**
- dropper bottle marked **C**
- test card
- wax paper sheet
- dropper bottle with phenolphthalein
- blue litmus paper
- red litmus paper
- waste container
- paper towels

BACKGROUND:

- **Phenolphthalein is a colorless indicator. When phenolphthalein is added to a basic solution, the solution turns pink.**
- **Litmus paper is another indicator. Blue litmus paper turns red (pink) when dipped in an acidic solution, while red litmus paper turns blue when dipped in a basic solution.**

DIRECTIONS:

1. Place a wax paper sheet over the test card.
2. Place one drop of each solution on the wax paper over the appropriate circle on the test card.
3. Add one drop of phenolphthalein to one drop of each solution.
4. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
PHENOL	no changes	white stuff in drop	turned colored

5. Discard the wax paper and wipe off the test card.
6. Place a new sheet of wax paper over the test card.
7. Place three drops of each solution on the wax paper over the appropriate circle on the test card.
8. Dip one piece of blue litmus and one piece red litmus in each solution.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

9. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
BLUE LITMUS	Stayed Same Color	turned pink	turned a little more pink
RED LITMUS	stayed same color	Stayed same color	Stayed same color

10. Discard the wax paper and wipe off the test card.

11. Based on your observations, which solution is acidic? B

Explain the reason for your conclusion in the space below.

Because litmus paper is soppost to turn red when in acid And It did in Solution B

12. Based on your observations, which solution is basic? C

Explain the reason for your conclusion in the space below.

I turned red with an indecator

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID 8-T52-100 **Scoring Form - Acid & Base Testing 1** #2

Male or **Female** (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	0 (1)	
Solution B	0 (1)	
Red Litmus		
Solutions A & B	0 (1)	
Solution C	(0) 1	3
7. Phenolphthalein Data Table 2		
Solutions A & B	0 (1)	
Solution C	0 (1)	2
9. Acidic Solution		
Solution Named	0 (1)	
Reason for choice	0 1 (2)	3
10. Basic Solution		
Solution Named	0 (1)	
Reason for choice	(0) 1 2	1

Total Score 9

Highest Possible Score - 12 points

2

Acid and Base Testing

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

- dropper bottle marked **A**
- dropper bottle marked **B**
- dropper bottle marked **C**
- test card
- wax paper sheet
- dropper bottle with phenolphthalein
- blue litmus paper
- red litmus paper
- waste container
- paper towels

BACKGROUND:

- **Phenolphthalein is a colorless indicator. When phenolphthalein is added to a basic solution, the solution turns pink.**
- **Litmus paper is another indicator. Blue litmus paper turns red (pink) when dipped in an acidic solution, while red litmus paper turns blue when dipped in a basic solution.**

DIRECTIONS:

1. Place a wax paper sheet over the test card.
2. Place one drop of each solution on the wax paper over the appropriate circle on the test card.
3. Add one drop of phenolphthalein to one drop of each solution.
4. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
PHENOL	nothing	nothing	turned Pink

5. Discard the wax paper and wipe off the test card.
6. Place a new sheet of wax paper over the test card.
7. Place three drops of each solution on the wax paper over the appropriate circle on the test card.
8. Dip one piece of blue litmus and one piece red litmus in each solution.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

9. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
BLUE LITMUS	Purple	Pink	blue
RED LITMUS	light purple	light purple	purple

10. Discard the wax paper and wipe off the test card.

11. Based on your observations, which solution is acidic? Solution C

Explain the reason for your conclusion in the space below.

Because when I put the Phenol Red into Solution C it turned pink

12. Based on your observations, which solution is basic? Solution A

Explain the reason for your conclusion in the space below.

Also when I put the Phenol Red into Solution A nothing happened.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID 8-TS2-24 **Scoring Form - Acid & Base Testing 1** #3

Male or (Female) (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	0 (1)	
Solution B	0 (1)	
Red Litmus		
Solutions A & B	0 (1)	
Solution C	0 (1)	4
7. Phenolphthalein Data Table 2		
Solutions A & B	0 (1)	
Solution C	0 (1)	2
9. Acidic Solution		
Solution Named	0 (1)	
Reason for choice	0 1 (2)	3
10. Basic Solution		
Solution Named	0 (1)	
Reason for choice	0 1 (2)	3

Total Score 12

Highest Possible Score - 12 points

8-TS2-24

May 4, 1994

3

Acid and Base Testing

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

- dropper bottle marked **A**
- dropper bottle marked **B**
- dropper bottle marked **C**
- test card
- wax paper sheet
- dropper bottle with phenolphthalein
- blue litmus paper
- red litmus paper
- waste container
- paper towels

BACKGROUND:

- **Phenolphthalein is a colorless indicator. When phenolphthalein is added to a basic solution, the solution turns pink.**
- **Litmus paper is another indicator. Blue litmus paper turns red (pink) when dipped in an acidic solution, while red litmus paper turns blue when dipped in a basic solution.**

DIRECTIONS:

1. Place a wax paper sheet over the test card.
2. Place one drop of each solution on the wax paper over the appropriate circle on the test card.
3. Add one drop of phenolphthalein to one drop of each solution.
4. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
PHENOL	clear/ same	clear/ same	Pink

5. Discard the wax paper and wipe off the test card.
6. Place a new sheet of wax paper over the test card.
7. Place three drops of each solution on the wax paper over the appropriate circle on the test card.
8. Dip one piece of blue litmus and one piece red litmus in each solution.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

9. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
BLUE LITMUS	Blue	Pink	Blue
RED LITMUS	Pink	Pink	Blue

10. Discard the wax paper and wipe off the test card.

11. Based on your observations, which solution is acidic? B

Explain the reason for your conclusion in the space below.

The Blue litmus paper turned Pink in the solution

12. Based on your observations, which solution is basic? C

Explain the reason for your conclusion in the space below.

The red litmus paper turned blue in the solution

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Acid and Base Testing 2
Task Information

Grade: 8th Grade

Content:

- Block H (The Chemistry of Matter). Section VI, 1 and 2. page 29 - 30

Format: Manipulative

Purpose: The student will use indicators to identify an acid and a base.

Skills:

Primary; Interpreting data, Recording data
Secondary; Observing

Time: 10 - 15 minutes

Materials:

- solution A : Water
- solution B: citric or ascorbic acid
- solution C: Lime water, $Ca(OH)_2$
- Red litmus paper
- Blue litmus paper
- goggles
- paper towels
- water for cleaning
- plastic reaction plates
  or
  transparency paper
- waste container
- phenolphthalein
- dropper bottles
- permanent fine line black marker

Preparation:

1. **Stock Solution Preparation:**
   a. Solution A - water in dropper bottles labeled "A"
   b. Solution B - acid solution - dilute citric or ascorbic acid.
   If using purchased citric acid, follow manufacturer's directions for making a dilute solution.
   If using "Fruit Fresh", dissolve 3 teaspoons in 1500 ml of water.
   Test with litmus paper. Place in dropper bottles labeled "B"
   c. Solution C - base solution - dilute lime water, $Ca(OH)_2$. in dropper bottles labeled "C". For best results purchase just prior to the activity as limewater has a short shelf life.
   d. phenolphthalein in dropper bottles labeled "phenolphthalein"
   Dilute solutions are appropriate. Check the solutions with litmus paper before using

2. **Materials Preparation:**
   a. Label dropper bottles "A", "B", "C", and "Phenolphthalein".
   b. For best results. fill phenolphthalein bottles just prior to the activity.
   c. Keep litmus paper in closed containers.
   d. Use the permanent marker or a copy machine to transfer the template onto transparency paper. Cut into strips. Discard strips after using.
   e. Alternative: purchase reaction Plates (24 wells). Use flat sides of both tops and bottoms of reaction plates. **Wash well between uses.**

Safety:

Students must wear safety goggles.
Check MSDS (Materials Safety Data Sheet) for further laboratory precautions
Laboratory safety procedures required.

Extensions/Modifications:

Variations of this task include; Acid and Base Testing 1, and 3, with different degrees of structure.
Acid and Base Testing 1, 2, and 3 - Micro, with different materials

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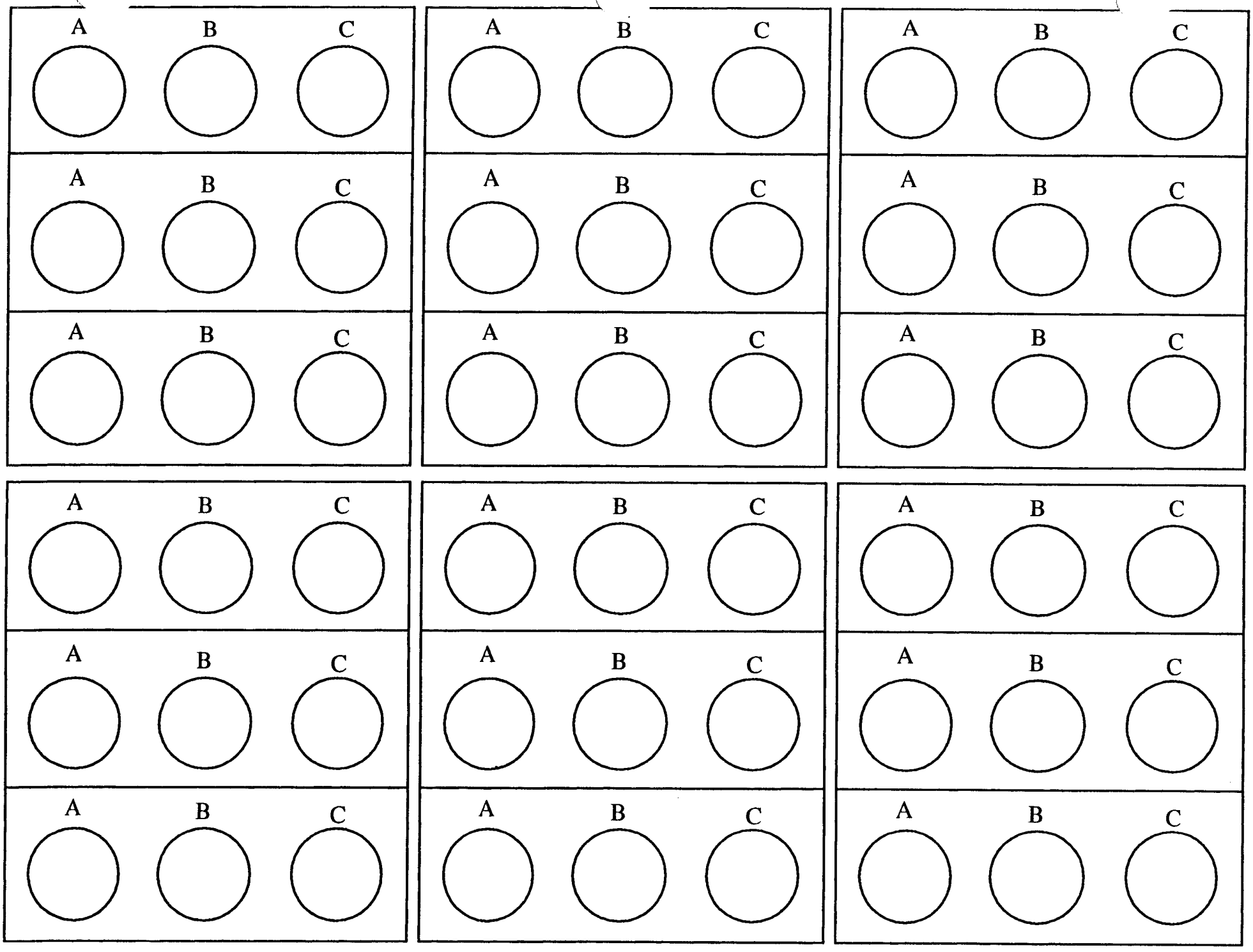
NSF Grant #MDR-9154506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Acid and Base Testing 2

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

Materials:

- dropper bottles **A, B, & C**
- dropper bottle with phenolphthalein
- reaction transparency or reaction plate
- blue litmus paper
- red litmus paper
- safety goggles
- paper towels
- waste cup
- water

Background:

Phenolphthalein turns pink in a basic solution.
Blue litmus paper turns red (pink) when dipped in an acidic solution.
Red litmus paper turns blue (purple) when dipped in a basic solution.

Directions:

1. Put your safety goggles on.
2. Think carefully about an experiment you could do to determine which of the three solutions are acidic and which are basic.
3. In the space below, describe the procedures you followed in conducting your experiment.

4. **CARRY OUT YOUR EXPERIMENT.**

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

5. Record your observations in the data table below.

Indicator	Solution A	Solution B	Solution C
Blue Litmus			
Red Litmus			
Phenolphthalein			

6. Wash the reaction plate with water. Throw the transparency strip into the waste container.

7. Using the data you have collected and the background information, which solution is acidic?

_____

In the space below, explain the reason for your answer.

_____

_____

_____

8. Using the data you have collected and the background information, which solution is basic?

_____

In the space below, explain the reason for your answer.

_____

_____

_____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Acid and Base Testing 2 - Scoring Rubric

Maximum Score - 11 points

Question 3 Experimental procedures. **2 points total**

Point Criteria:

- Allow 1 point for a correct testing method for an acid
- Allow 1 point for correct testing method for a base.

Acceptable responses include:

- Use phenolphthalein in all three solutions. (1 point)
- Use litmus in all three solutions. (1 point)
- Record and compare which are acid and base.

or

- Use blue litmus to test for acids. (1 point)
- Use red litmus to test for bases. (1 point)

or

- Use litmus paper to test for acids and bases. (2 points)

Question 5 Litmus and phenolphthalein data table. **3 points total**

Indicator	Solution A	Solution B	Solution C
Blue Litmus	*blue, same, or no change*	*red or pink*	*blue, same, or no change*
Red Litmus	*red, same, or no change*	*red, same, or no change*	*blue or purple*
Phenolphthalein	*clear, same, or no change*	*clear, same, or no change*	*pink*

Point Criteria:

- Allow 1 point for correct data for solution A based on student plan in question #3.
- Allow 1 point for correct data for solution B based on student plan in question #3.
- Allow 1 point for correct data for solution C based on student plan in question #3.

Question 7. Identify acidic solution and explain your answer. **3 points total**

Point Criteria:

- Allow 1 point for identifying the acidic solution as B.
  - Accept any student's response correctly based on his/her data.
  - Multiple answers receive no credit.
- Allow 2 points for an explanation relating student data to background information.
  - Solution B turned blue litmus red which indicates an acid.
  - Allow 1 point if the student states the background information without relating it to his/her data.

Question 8. Identify basic solution and explain your answer. **3 points total**

Point Criteria:

- Allow 1 point for identifying the basic solution as C.
  - Accept any student's response correctly based on his/her data.
  - Multiple answers receive no credit.
- Allow 2 points for an explanation relating student data to background information.
  - Solution C turned red litmus blue and/or phenolphthalein pink which indicates a base.
  - Allow 1 point if the student states the background information without relating it to his/her data.

Highest Possible Score - 11 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Acid and Base Testing 2**

Male or Female (circle one) **Scoring Form**

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
3. Experimental procedures		
Base Testing Method	0 1	_____
Acid Testing Method	0 1	
5. Litmus and Phenolphthalein Data Table		
Solution A	0 1	
Solution B	0 1	_____
Solution C	0 1	
7. Acidic Solution		
Solution Named	0 1	
Reason for choice	0 1 2	_____
8. Basic Solution		
Solution Named	0 1	
Reason for choice	0 1 2	_____

Total Score _____

Highest Possible Score - 11 points

#1

Student ID 8-TS3-11

Male or Female (circle one)

Acid and Base Testing 2
Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
3. Experimental procedures		2
Base Testing Method	0 (1)	
Acid Testing Method	0 (1)	
5. Litmus and Phenolphthalein Data Table		0
Solution A	(0) 1	
Solution B	(0) 1	
Solution C	(0) 1	
7. Acidic Solution		0
Solution Named	(0) 1	
Reason for choice	(0) 1 2	
8. Basic Solution		0
Solution Named	(0) 1	
Reason for choice	(0) 1 2	

Total Score 2

Highest Possible Score - 11 points

May 16, 1994

8-T53-11

Acid and Base Testing

Task: At this station, you will design and carry out an experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

dropper bottle marked **A**
dropper bottle marked **B**
dropper bottle marked **C**
dropper bottle with phenolphthalein
blue litmus paper
red litmus paper
test card
wax paper sheets
waste container
paper towels

BACKGROUND:

- **Phenolphthalein is a colorless indicator. When phenolphthalein is added to a basic solution, the solution turns pink.**
- **Litmus paper is another indicator. Blue litmus paper turns red (pink) when dipped in an acidic solution, while red litmus paper turns blue when dipped in a basic solution.**

DIRECTIONS:

1. Using the information above, what will you do to determine which solution(s) are acidic and which are basic? Using only the materials listed above, outline the plan for your experiment in the space below.

Test Solution A with Phenolpulphthalein Record then do the Same with B and C Solution Then Clean up and test all with Blue litmus Paper then clean up and Test all with Red litmus Paper Record all information

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

2. CARRY OUT YOUR PLAN.

When carrying out your experiment, place a wax paper sheet over the test card to protect it.

3. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
Phenolph-thalein	acidic	acitic	basic
blue litmus Paper	base	acitic	base
Red litmus Paper	acidic	acidic	acidic

4. Based on your observations, which solution is acidic? all

Explain the reason for your conclusion in the space below.

Because each had one test were the turned To acider that indicated that they were acidic

5. Based on your observations, which solution is basic? none

Explain the reason for your conclusion in the space below.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#2

Student ID 8-T53-10

Male or Female (circle one)

Acid and Base Testing 2
Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
3. Experimental procedures Base Testing Method Acid Testing Method	0 (1) 0 (1)	2
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	(0) 1 (0) 1 (0) 1	0
7. Acidic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	3
8. Basic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	3

Total Score 8

Highest Possible Score - 11 points

8-T53-10 May 16, 1994

Acid and Base Testing

Task: At this station, you will design and carry out an experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

dropper bottle marked **A**
dropper bottle marked **B**
dropper bottle marked **C**
dropper bottle with phenolphthalein
blue litmus paper
red litmus paper
test card
wax paper sheets
waste container
paper towels

BACKGROUND:

- **Phenolphthalein is a colorless indicator. When phenolphthalein is added to a basic solution, the solution turns pink.**
- **Litmus paper is another indicator. Blue litmus paper turns red (pink) when dipped in an acidic solution, while red litmus paper turns blue when dipped in a basic solution.**

DIRECTIONS:

1. Using the information above, what will you do to determine which solution(s) are acidic and which are basic? Using only the materials listed above, outline the plan for your experiment in the space below.

Test Solution A with Blue Litmus paper, Pheno., Red Litmus
Test Solution B with Phenolphthalein, Blue + Red Litmus
Test Solution C with red litmus paper, Pheno, Blue Litmus

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

2. CARRY OUT YOUR PLAN.

When carrying out your experiment, place a wax paper sheet over the test card to protect it.

3. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
Red Litmus	Acid	Acid	Base
Blue Litmus	~~Red~~ Base	Acid	Base
Phenolphthalein	~~Base~~ Acid	Acid	Acid

4. Based on your observations, which solution is acidic? Solution B

Explain the reason for your conclusion in the space below.

Solution B is the only one that came out all Acid

5. Based on your observations, which solution is basic? Solution C

Explain the reason for your conclusion in the space below.

Solution C is the one that 2/3 Indicators said was a Base

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#3

Student ID 8-TS3-96
Male or Female (circle one)

Acid and Base Testing 2
Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
3. Experimental procedures		2
Base Testing Method	0 (1)	
Acid Testing Method	0 (1)	
5. Litmus and Phenolphthalein Data Table		3
Solution A	0 (1)	
Solution B	0 (1)	
Solution C	0 (1)	
7. Acidic Solution		3
Solution Named	0 (1)	
Reason for choice	0 1 (2)	
8. Basic Solution		3
Solution Named	0 (1)	
Reason for choice	0 1 (2)	

Total Score 11

Highest Possible Score - 11 points

May 16, 1994

8- TS3 - 96

Acid and Base Testing

Task: At this station, you will design and carry out an experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

dropper bottle marked **A**
dropper bottle marked **B**
dropper bottle marked **C**
dropper bottle with phenolphthalein
blue litmus paper
red litmus paper
test card
wax paper sheets
waste container
paper towels

BACKGROUND:

- **Phenolphthalein is a colorless indicator. When phenolphthalein is added to a basic solution, the solution turns pink.**
- **Litmus paper is another indicator. Blue litmus paper turns red (pink) when dipped in an acidic solution, while red litmus paper turns blue when dipped in a basic solution.**

DIRECTIONS:

1. Using the information above, what will you do to determine which solution(s) are acidic and which are basic? Using only the materials listed above, outline the plan for your experiment in the space below.

I will put small amounts of solutions A, B, + C on their spots on the test card. I will add a drop of phenolphthalein to each to see if it turns pink. If it doesn't then I will test it with blue litmus paper to see if it is an acid

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

May 16, 1994

2. **CARRY OUT YOUR PLAN.**
When carrying out your experiment, place a wax paper sheet over the test card to protect it.

3. Record your observations in the data table below.

INDICATOR	SOLUTION A	SOLUTION B	SOLUTION C
phenolph-thalein	no change	no change	pink
blue litmus	no change	red	X
X			

4. Based on your observations, which solution is acidic? B

Explain the reason for your conclusion in the space below.
Solution B turned red when tested with blue litmus paper

5. Based on your observations, which solution is basic? C

Explain the reason for your conclusion in the space below.
Solution C turned pink when phenolphthalein was added.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Acid and Base Testing 1 - Micro
Task Information

Grade: 8th Grade

Content: Block H (The Chemistry of Matter). Section VI, 1 and 2. page 29 - 30

Format: Manipulative

Purpose: The student will use indicators to identify an acid and a base.

Skills:

Primary; Interpreting data, recording data
Secondary; observing

Time: 10 - 15 minutes

Materials:

- solution A : water
- solution B: citric Acid (Fruit Fresh)
- solution C: Lime water, $Ca(OH)_2$
- Red litmus paper
- Blue litmus paper
- phenolphthalein
- goggles
- paper towels
- disposable pipettes
- plastic reaction plates
  or
  transparency paper
- cassette case
- waste container
- small plastic cup
- permanent fine line black marker
- water for cleaning

Teacher Preparation:

1. **Stock Solution Preparation;**
   a. Solution A - water
   b. Solution B - acid solution - dilute citric acid (ex.: Fruit Fresh™ dissolved in water)
   c. Solution C - base solution - dilute lime water, $Ca(OH)_2$
2. **Materials Preparation:**
   a. Label disposable pipettes "A", "B", "C", and "Phenolphthalein".
   b. Pour individual stock solutions in small plastic cups. To fill pipettes, place a handful of pipettes into the solutions (tips down), and squeeze bulbs simultaneously. Capillarity will keep solutions in the pipettes without sealing.
   c. For best results, fill phenolphthalein pipettes just prior to the activity.
   d. Pipettes will fit inside of the cassette case with tips up for easy storage and handling. Styrofoam can be used as spacers between pipettes
   e. Pipette Source; Specialty Transfer Pipettes (1 ml, 43 drops/ml)
   f. For best results, keep litmus paper in closed containers.
   g. Use the permanent marker or a copy machine to transfer the attached template onto the transparency. Use the smooth side of the transparency to avoid contamination. Discard after use.
   h. Alternative: purchase reaction plates (24 wells). Use flat sides of both lids and bottoms of reaction plates. Wash between uses.

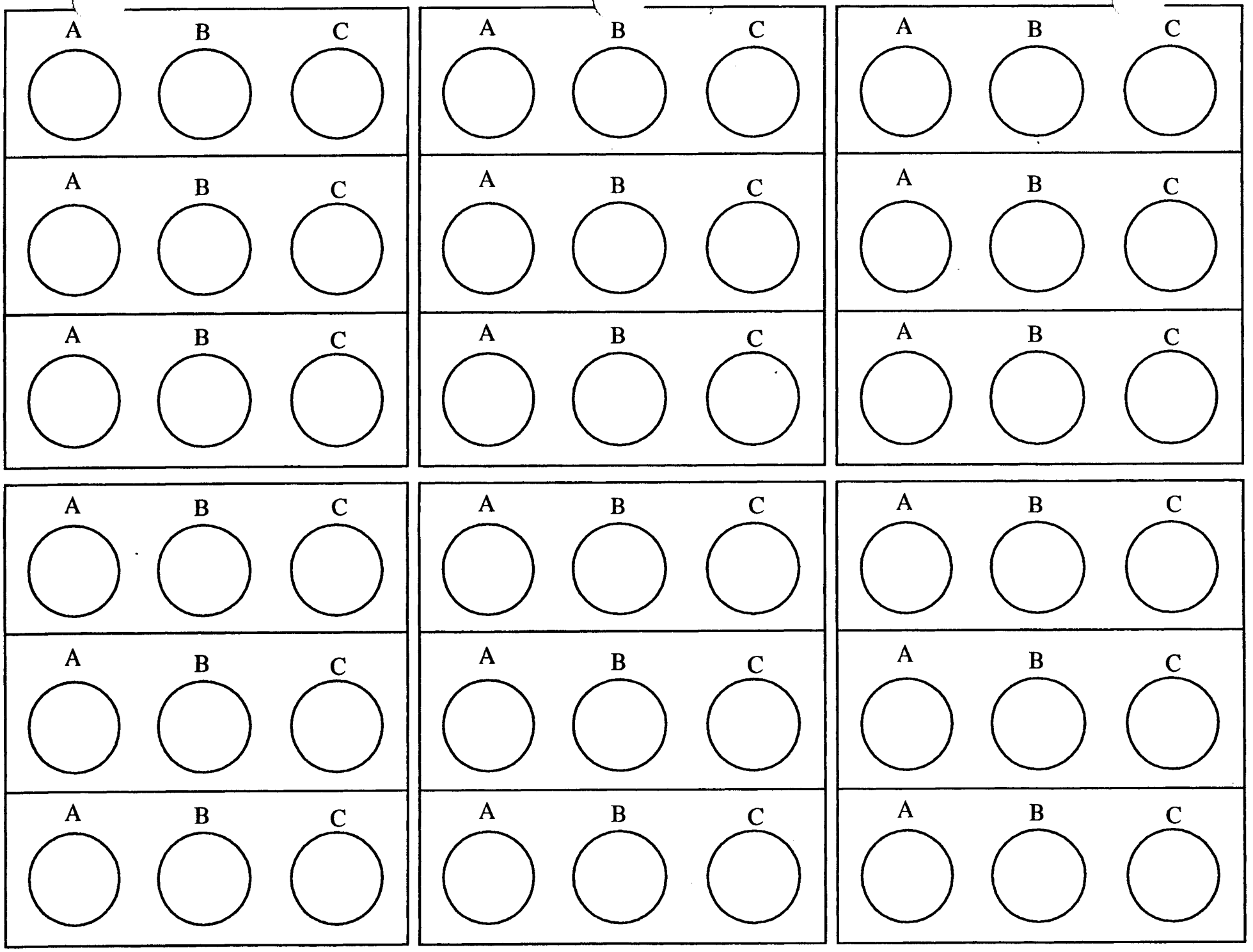
Safety:

Students must wear safety goggles.
Check MSDS (Materials Safety Data Sheet) for further laboratory precautions.
Laboratory safety procedures required.

Extensions/Modifications:

- Variations of this task include Acid and Base Testing 2, and 3 with different degrees of structure.
- Acid and Base Testing 1, 2, and, 3 - Micro, with different materials.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506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Acid and Base Testing 1 - Micro

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

Materials:

- solution filled disposable pipettes **A, B, & C**
- disposable pipette with phenolphthalein
- reaction transparency or plate
- blue litmus paper
- red litmus paper
- safety goggles
- waste cup
- paper towels
- cassette case
- water

Background:

Phenolphthalein turns pink in a basic solution.
Blue litmus paper turns red (pink) when dipped in an acidic solution.
Red litmus paper turns blue (purple) when dipped in a basic solution.

Directions:

1. **Put your safety goggles on.** Do **not** taste or touch any solution. Clean up all spills with a paper towel.
2. Place one drop of each solution, A, B, & C, on the circle with the same letter in each of the three rows.
3. Dip the end of a different piece of blue litmus paper into each of the three solutions in **the top row** and lay them on the plate.
4. Immediately record the **COLOR** of the litmus paper on the data table.
5. Repeat steps 3-4 using the red litmus paper in **the middle row** and lay them on the table.

Table 1: **COLOR** results of litmus paper

Indicator	Solution A	Solution B	Solution C
Blue Litmus			
Red Litmus			

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

6 Add one drop of phenolphthalein to each of the three solutions in **row 3**.

7. Record the **COLOR** of the phenolphthalein on the data table below.

Table 2: **COLOR** results of phenolphthalein

Indicator	Solution A	Solution B	Solution C
Phenolphthalein			

8. Wash the plate or reaction transparency with water and dry with a paper towel. Throw any garbage into the waste cup.

9. Using the data you have collected and the background information, which solution is acidic? _____

In the space below, explain the reason for your answer. Refer to Tables 1 & 2.

_____

_____

_____

10. Using the data you have collected and the background information, which solution is basic? _____

In the space below, explain the reason for your answer. Refer to Tables 1 & 2.

_____

_____

_____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Acid and Base Testing 1 - Micro - Scoring Rubric

Maximum Score - 12 points

Questions 5. Litmus paper data table 1 **4 points total**

Indicator	Solution A	Solution B	Solution C
Blue Litmus	*blue or same or no change*	*red or pink*	*blue or same or no change*
Red Litmus	*red or same or no change*	*red or same or no change*	*blue or purple*

Point Criteria:

- Blue Litmus
  - Allow 1 point if both Solutions A and C are correct.
  - Allow 1 point if Solution B is correct.
- Red Litmus
  - Allow 1 point if both Solutions A and B are correct.
  - Allow 1 point if Solution C is correct.

Question 7. Phenolphthalein data table. **2 points total**

Indicator	Solution A	Solution B	Solution C
Phenolphthalein	*clear or same or no change*	*clear or same or no change*	*pink*

Point Criteria:

- Phenolphthalein
  - Allow 1 point if both Solutions A and B are correct.
  - Allow 1 point if Solution C is correct.

Question 9. Identify acidic solution and explain your answer. **3 points total**

Point Criteria:

- Allow 1 point for identifying the acidic solution as solution B
  - Accept any student's response correctly **based on his/her data**
  - Multiple answers receive no credit
- Allow 2 points for an explanation relating student data to background information.
  - Solution B turned blue litmus red which indicates an acid.
  - Allow only 1 point if the student states the background information without relating it to his/her data.

Question 10. Identify basic solution and explain your answer. **3 points total**

Point Criteria:

- Allow 1 point for identifying the basic solution as solution C.
  - Accept any student's response correctly **based on his/her data**
  - Multiple answers receive no credit
- Allow 2 points for an explanation relating student data to background information.
  - Solution C turned red litmus blue and/or phenolphthalein pink which indicates a base.
  - Allow only 1 point if the student states the background information without relating it to his/her data.

Highest possible Score - 12 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Acid & Base Testing 1 - Micro**

Male or Female (circle one) **Scoring Form**

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	0 1	
Solution B	0 1	
Red Litmus		
Solutions A & B	0 1	
Solution C	0 1	_____
7. Phenolphthalein Data Table 2		
Solutions A & B	0 1	
Solution C	0 1	_____
9. Acidic Solution		
Solution Named	0 1	
Reason for choice	0 1 2	_____
10. Basic Solution		
Solution Named	0 1	
Reason for choice	0 1 2	_____

Total Score _____

Highest Possible Score - 12 points

#1

Student ID GS 24

Male or Female (circle one)

Acid & Base Testing 1 - Micro
Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	(0) 1	
Solution B	(0) 1	
Red Litmus		
Solutions A & B	(0) 1	(0)
Solution C	(0) 1	
7. Phenolphthalein Data Table 2		
Solutions A & B	(0) 1	(0)
Solution C	(0) 1	
9. Acidic Solution		
Solution Named	(0) 1	(0)
Reason for choice	(0) 1 2	
10. Basic Solution		
Solution Named	(0) 1	(0)
Reason for choice	(0) 1 2	

Total Score (0)

Highest Possible Score - 12 points

Acid and Base Testing 1 - Micro

#1

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

GS-24

MATERIALS:

disposable pipettes **A - C**
chem plate marked **A - C** (3 rows)
disposable pipette with phenolphthalein
blue litmus paper
red litmus paper
safety goggles
waste cup
paper towels
cassette case

BACKGROUND:

Phenolphthalein turns pink in a basic solution.
Blue litmus paper turns red (pink) when dipped in an acidic solution.
Red litmus paper turns blue (purple) when dipped in a basic solution.

DIRECTIONS:

1. Put your safety goggles on.
2. Place one drop of each solution on the circle with the same letter in each of the three rows.
3. Dip the end of a blue litmus paper into each of the three solutions in **row 1** and lay them on the plate.
4. Immediately record the **COLOR** of the litmus paper on the data table.
5. Repeat steps 2-4 using the red litmus paper in **row 2** and lay them on the table.

Indicator	Solution A	Solution B	Solution C
Blue Litmus	BASE	Acid	Acid
Red Litmus	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] BASE	ACID	ACID

[illegible]

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

6. Add one drop of phenolphthalein to each of the three solutions. in row 3.
7. Record the **COLOR** of the phenolphthalein on the data table below.

Indicator	Solution A	Solution B	Solution C
Phenolphthalein	cloudy	Acid	cloudy

8. Blot the chem plate with a paper towel. Throw any garbage into the waste cup.
9. Using the data you have collected and the background information, which solution is acidic?

A, B, & C

In the space below, explain the reason for your answer.

when I put the litmus paper in these solutions they turned to Acid colors.

10. Using the data you have collected and the background information, which solution is basic?

A

In the space below, explain the reason for your answer.

when I put the litmus paper in that solution they turned base colors

#2

Student ID GS-19

Male or Female (circle one)

Acid & Base Testing 1 - Micro
Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Litmus Paper Data Table 1		
Blue Litmus		
Solutions A & C	(0) 1	
Solution B	0 (1)	
Red Litmus		
Solutions A & B	0 (1)	2
Solution C	(0) 1	
7. Phenolphthalein Data Table 2		
Solutions A & B	0 (1)	1
Solution C	(0) 1	
9. Acidic Solution		
Solution Named	(0) 1	
Reason for choice	0 1 (2)	2
10. Basic Solution		
Solution Named	0 (1)	
Reason for choice	0 1 (2)	3

Total Score 8

Highest Possible Score - 12 points

Acid and Base Testing 1 - Micro

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

GS-19

MATERIALS:

disposable pipettes **A - C**
chem plate marked **A - C** (3 rows)
disposable pipette with phenolphthalein
blue litmus paper
red litmus paper
safety goggles
waste cup
paper towels
cassette case

BACKGROUND:

Phenolphthalein turns pink in a basic solution.
Blue litmus paper turns red (pink) when dipped in an acidic solution.
Red litmus paper turns blue (purple) when dipped in a basic solution.

DIRECTIONS:

1. Put your safety goggles on.
2. Place one drop of each solution on the circle with the same letter in each of the three rows.
3. Dip the end of a blue litmus paper into each of the three solutions in **row 1** and lay them on the plate.
4. Immediately record the **COLOR** of the litmus paper on the data table.
5. Repeat steps 2-4 using the red litmus paper in **row 2** and lay them on the table.

Indicator	Solution A	Solution B	Solution C
Blue Litmus	same	pink	pink
Red Litmus	pink	pink	pink

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

2

6. Add one drop of phenolphthalein to each of the three solutions. in row 3.
7. Record the **COLOR** of the phenolphthalein on the data table below.

Indicator	Solution A	Solution B	Solution C
Phenolphthalein	Cloudy	light cloudiness	cloudy

8. Blot the chem plate with a paper towel. Throw any garbage into the waste cup.
9. Using the data you have collected and the background information, which solution is acidic?

Solution B and C

In the space below, explain the reason for your answer.

Because Solution B when dipped with Blue litmus paper and red litmus paper it turned pink. but when mixed with Phenolphthalein it was lightly clouded. and didn't get no results of acid or basic.

10. Using the data you have collected and the background information, which solution is basic?

none

In the space below, explain the reason for your answer.

Because none of the solutions turned ~~red~~ purple with both pink and blue litmus papers.

Student ID GS-17 **Acid & Base Testing I - Micro**
Scoring Form

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Litmus Paper Data Table 1 Blue Litmus Solutions A & C Solution B Red Litmus Solutions A & B Solution C	0 (1) 0 (1) 0 (1) (0) 1	3
7. Phenolphthalein Data Table 2 Solutions A & B Solution C	0 (1) (0) 1	1
9. Acidic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	3
10. Basic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	3

Total Score 10

Highest Possible Score - 12 points

Acid and Base Testing 1 - Micro

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

8

GS-17

MATERIALS:

disposable pipettes **A - C**
chem plate marked **A - C** (3 rows)
disposable pipette with phenolphthalein
blue litmus paper
red litmus paper
safety goggles
waste cup
paper towels
cassette case

BACKGROUND:

Phenolphthalein turns pink in a basic solution.
Blue litmus paper turns red (pink) when dipped in an acidic solution.
Red litmus paper turns blue (purple) when dipped in a basic solution.

DIRECTIONS:

1. Put your safety goggles on.
2. Place one drop of each solution on the circle with the same letter in each of the three rows.
3. Dip the end of a blue litmus paper into each of the three solutions in **row 1** and lay them on the plate.
4. Immediately record the **COLOR** of the litmus paper on the data table.
5. Repeat steps 2-4 using the red litmus paper in **row 2** and lay them on the table.

Indicator	Solution A	Solution B	Solution C
Blue Litmus	blue	red	blue
Red Litmus	red	red	red

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

3

6 Add one drop of phenolphthalein to each of the three solutions. in row 3.

7. Record the **COLOR** of the phenolphthalein on the data table below.

Indicator	Solution A	Solution B	Solution C
Phenolphthalein	white	white	white

8. Blot the chem plate with a paper towel. Throw any garbage into the waste cup.
9. Using the data you have collected and the background information, which solution is acidic?

Solution B

In the space below, explain the reason for your answer.

The solution changed the litmus (blue) paper.

10. Using the data you have collected and the background information, which solution is basic?

I didn't get any results to show the answer.

In the space below, explain the reason for your answer.

The red litmus paper didn't change blue.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Acid and Base Testing 2 - Micro
Task Information

Grade: 8th Grade

Content:
- Block H (The Chemistry of Matter). Section VI, 1 and 2. page 29 - 30

Format: Manipulative

Purpose: The student will use indicators to identify an acid and a base.

Skills:

Primary: Interpreting data, Recording data
Secondary: Observing

Time: 10 - 15 minutes

Materials:
- solution A - water
- solution B - citric acid (Fruit Fresh)
- solution C - Lime water, $Ca(OH)_2$
- Red litmus paper
- Blue litmus paper
- phenolphthalein
- goggles
- paper towels
- disposable pipettes
- plastic reaction plates
  or
  transparency paper
- cassette case
- waste container
- small plastic cup
- permanent fine line black marker
- water for cleaning

Preparation:

1. **Stock Solution Preparation:**
   a. Solution A - water
   b. Solution B - acid solution - dilute citric acid (ex.: Fruit Fresh™) or vinegar dissolved in water).
   c. Solution C - base solution - dilute lime water, $Ca(OH)_2$ or baking soda.
2. **Materials Preparation:**
   a. Label disposable pipettes "A", "B", "C", and "Phenolphthalein".
   b. Pour individual stock solutions in small plastic cups. To fill pipettes, place a handful of pipettes into the solutions (tips down), and squeeze bulbs simultaneously. Capillarity will keep solutions in the pipettes without sealing.
   c. For best results, fill phenolphthalein pipettes just prior to the activity.
   d. Pipettes will fit inside of the cassette case with tips up for easy storage and handling. Styrofoam can be used as spacers between pipettes
   e. Pipettes - 2" Specialty Transfer Pipettes (1 ml, 43 drops/ml)
   f. For best results, keep litmus paper in closed containers.
   g. Use the permanent marker or a copy machine to transfer the template onto the transparency. Use the smooth side of the transparency to avoid contamination. Discard after each use.
   h. Alternative: purchase reaction plates (24 wells). Use Flat sides of both lids and bottoms of reaction plates. Wash between uses.

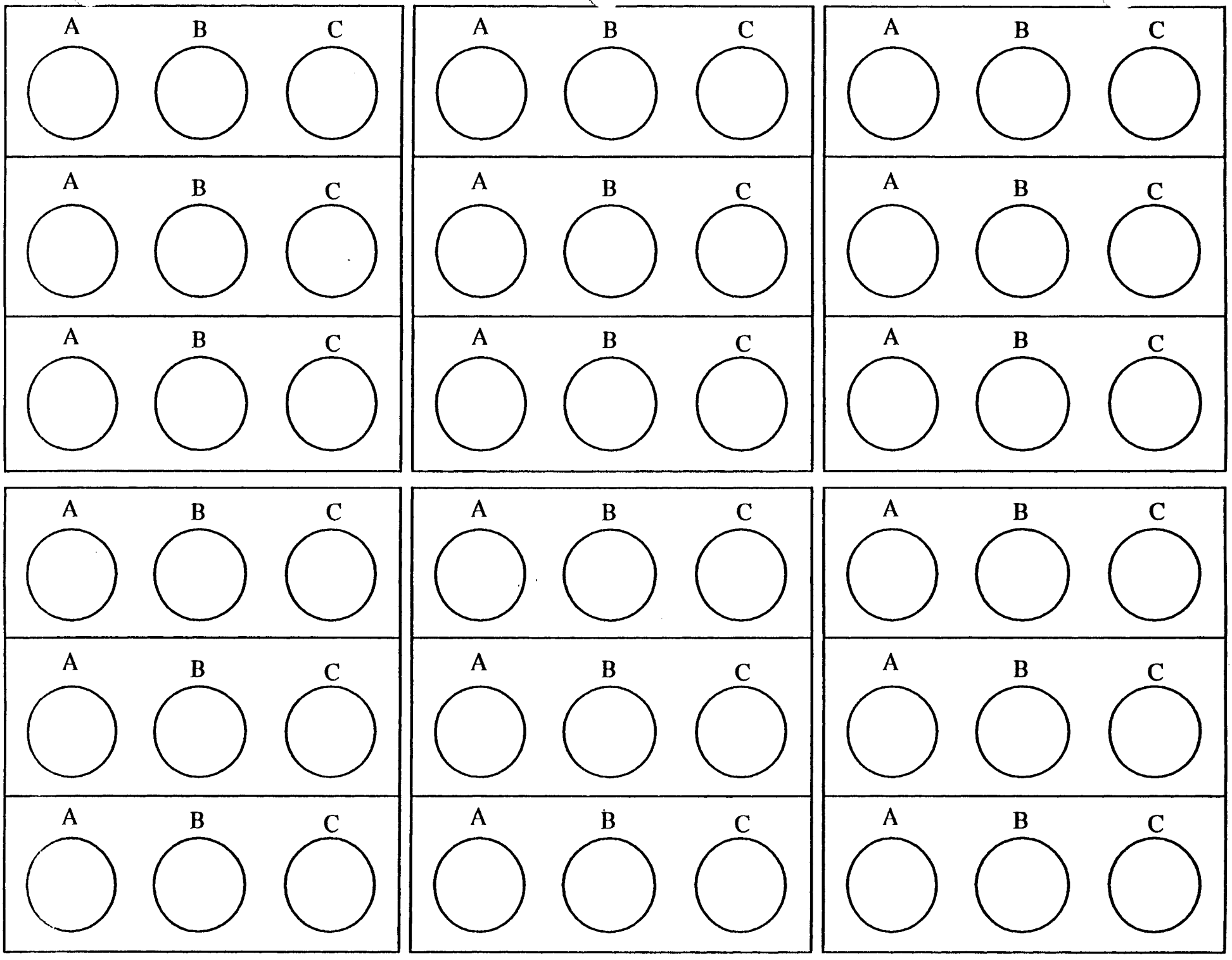
Safety:

Students must wear safety goggles.
Check MSDS (Materials Safety Data Sheet) for further laboratory precautions.
Laboratory safety procedures required.

Extensions/Modifications:

Variations of this task include; Acid and Base Testing 1, and 3, with different degrees of structure.
Acid and Base Testing 1, 2, and 3 - Micro, with different materials

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506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Acid and Base Testing 2 - Micro

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

Materials:

- solution filled disposable pipettes **A**, **B**, & **C**
- disposable pipette with phenolphthalein
- reaction plate or transparency strip
- blue litmus paper
- red litmus paper
- safety goggles
- waste cup
- paper towels
- cassette case
- water

Background on Indicators:

Phenolphthalein turns pink in a basic solution.

Blue litmus paper turns red (pink) when dipped in an acidic solution.

Red litmus paper turns blue (purple) when dipped in a basic solution.

Directions:

1. **Put your safety goggles on. Do not taste or touch any solution.** Clean up all spills with a paper towel.
2. Before you are 3 unknown solutions A, B, and C. Think carefully about an experiment you could do to determine which of the three solutions is acidic and which is basic. You may use any or all of the three indicators given to you.
3. In the space below, describe the procedures you will follow in conducting your experiment.

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

4. **CARRY OUT YOUR EXPERIMENT.**
5. Record your color observations in the data table below.

Indicator	Solution A	Solution B	Solution C
Blue Litmus			
Red Litmus			
Phenolphthalein			

6. Wash the reaction plate or transparency with water. Throw any garbage into the waste cup.
7. Using the data you have collected and the background information, which solution is acidic?

_____

In the space below, use your observations to explain your answer.

_____

_____

_____

8. Using the data you have collected and the background information, which solution is basic?

_____

In the space below, use your observations to explain your answer.

_____

_____

_____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Acid and Base Testing 2 - Micro - Scoring Rubric

Maximum Score - 11 points

Question 3. Experimental procedures. **2 points total**

Point Criteria:

- Allow 1 point for a correct testing method with phenolphthalein
- Allow 1 point for correct testing method with litmus
- Acceptable responses include:
  - Use phenolphthalein in all three solutions. (1 point)
  - Use litmus in all three solutions. (1 point)
  - Record and compare which are acid and base.

  or
  - Use blue litmus to test for acids. (1 point)
  - Use red litmus to test for bases. (1 point)

  or
  - Use litmus paper to test for acids and bases. (2 points)

Question 5. Litmus and phenolphthalein data table. **3 points total**

Indicator	Solution A	Solution B	Solution C
Blue Litmus	*blue or same or no change*	*red or pink*	*blue or same or no change*
Red Litmus	*red or same or no change*	*red or same or no change*	*blue or purple*
Phenolphthalein	*clear, same, or no change*	*clear, same, or no change*	*pink*

Point Criteria:

- Allow 1 point for correct data for solution A based on student plan in question #3.
- Allow 1 point for correct data for solution B based on student plan in question #3.
- Allow 1 point for correct data for solution C based on student plan in question #3.

Question 7. Identify acidic solution and explain your answer. **3 points total**

Point Criteria:

- Allow 1 point for identifying the acidic solution as B.
  - Accept any student's response correctly based on his/her data.
- Allow 2 points for an explanation relating student data to background information.
  - Solution B turned blue litmus red which indicates an acid.
  - Allow 1 point if the student states the background information without relating it to his/her data.

Question 8. Identify basic solution and explain your answer. **3 points total**

Point Criteria:

- Allow 1 point for identifying the basic solution as C.
  - Accept any student's response correctly based on his/her data.
- Allow 2 points for an explanation relating student data to background information.
  - Solution C turned red litmus blue and/or phenolphthalein pink which indicates a base.
  - Allow 1 point if the student states the background information without relating it to his/her data.

Highest possible score - 11 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____

Male or Female (circle one)

Acid and Base Testing 2 - Micro
Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
3. Experimental procedures Phenolphthalein Method Litmus Method	0 1 0 1	_____
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	0 1 0 1 0 1	_____
7. Acidic Solution Solution Named Reason for choice	0 1 0 1 2	_____
8. Basic Solution Solution Named Reason for choice	0 1 0 1 2	_____

Total Score _____

Highest Possible Score - 11 points

Student ID 1H-8 **Acid and Base Testing 2 - Micro Scoring Form** #1

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
3. Experimental procedures Phenolphthalein Method Litmus Method	0 (1) 0 (1)	2
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	0 (1) 0 (1) (0) 1	2
7. Acidic Solution Solution Named Reason for choice	(0) 1 (0) 1 2	0
8. Basic Solution Solution Named Reason for choice	(0) 1 (0) 1 2	0

Total Score 4

Highest Possible Score - 11 points

Acid and Base Testing 2 - Micro

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

disposable pipettes **A - C**
chem plate marked **A - C** (3 rows)
disposable pipette with phenolphthalein
blue litmus paper
red litmus paper
safety goggles
waste cup
paper towels
cassette case

BACKGROUND:

Phenolphthalein turns pink in a basic solution.
Blue litmus paper turns red (pink) when dipped in an acidic solution.
Red litmus paper turns blue (purple) when dipped in a basic solution.

DIRECTIONS:

1. Put your safety goggles on.
2. Think carefully about an experiment you could do to determine which of the three solutions are acidic and which are basic.
3. **CARRY OUT YOUR EXPERIMENT.**
4. Record your observations in the data table below.

Indicator	Solution A	Solution B	Solution C
Blue Litmus	Stayed the same	turned pink	Stayed the same
Red Litmus	stayed the same	got ~~Red~~ light	stayed the same
Phenolphthalein	turned clear	got cloudy then clear. then cloudy	got cloudy then clear

5. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

6. In the space below, describe the procedures you followed in conducting your experiment.

I put three drops of each solution in the containers marked A, B, C (Solution A in slot A etc.) then I tested each solution first with the blue litmus paper then the red then I put 4 drops of phenolphthalein in each slot.

7. Using the data you have collected and the background information, which solution is acidic?

Solution C

In the space below, explain the reason for your answer.

Because it was the only one which did not turn cloudy when the base was added.

8. Using the data you have collected and the background information, which solution is basic?

Solutions A & B

In the space below, explain the reason for your answer.

Because they turned cloudy when the base was added

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID 1H-15

(Male) or Female (circle one)

Acid and Base Testing 2 - Micro Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
3. Experimental procedures Phenolphthalein Method Litmus Method	0 (1) 0 (1)	2
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	(0) 1 0 (1) (0) 1	1
7. Acidic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	3
8. Basic Solution Solution Named Reason for choice	(0) 1 (0) 1 2	0

Total Score 6

Highest Possible Score - 11 points

Acid and Base Testing 2 - Micro

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

disposable pipettes **A - C**
chem plate marked **A - C** (3 rows)
disposable pipette with phenolphthalein
blue litmus paper
red litmus paper
safety goggles
waste cup
paper towels
cassette case

BACKGROUND:

Phenolphthalein turns pink in a basic solution.
Blue litmus paper turns red (pink) when dipped in an acidic solution.
Red litmus paper turns blue (purple) when dipped in a basic solution.

DIRECTIONS:

1. Put your safety goggles on.
2. Think carefully about an experiment you could do to determine which of the three solutions are acidic and which are basic.
3. **CARRY OUT YOUR EXPERIMENT.**
4. Record your observations in the data table below.

Indicator	Solution A	Solution B	Solution C
Blue Litmus	Blue	Pink	Blue
Red Litmus	~~Blue~~ Purple	Red	Purple
Phenolphthalein	Clear	Clear	Clear

5. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

6. In the space below, describe the procedures you followed in conducting your experiment.

In the The chem plate, I put the 3 different Solution in 1 I put solution A in a solution B + in 3 I put solution C I then tested each one with litmus - paper ant phenolphthalein.

7. Using the data you have collected and the background information, which solution is acidic?

B

In the space below, explain the reason for your answer.

The blue litmus turned pink

8. Using the data you have collected and the background information, which solution is basic?

A + B

In the space below, explain the reason for your answer.

The red litmus paper stayed red

#3

Student ID 1H-20 **Acid and Base Testing 2 - Micro**
Male or Female (circle one) **Scoring Form**

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
3. Experimental procedures Phenolphthalein Method Litmus Method	0 (1) 0 (1)	2
5. Litmus and Phenolphthalein Data Table Solution A Solution B Solution C	0 (1) 0 (1) (0) 1	2
7. Acidic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	3
8. Basic Solution Solution Named Reason for choice	0 (1) 0 1 (2)	3

Total Score 10

Highest Possible Score - 11 points

3

Acid and Base Testing 2 - Micro

Task: At this station, you will experiment to determine which of three solutions is acidic and which is basic.

MATERIALS:

disposable pipettes **A - C**
chem plate marked **A - C** (3 rows)
disposable pipette with phenolphthalein
blue litmus paper
red litmus paper
safety goggles
waste cup
paper towels
cassette case

BACKGROUND:

Phenolphthalein turns pink in a basic solution.
Blue litmus paper turns red (pink) when dipped in an acidic solution.
Red litmus paper turns blue (purple) when dipped in a basic solution.

DIRECTIONS:

1. Put your safety goggles on.
2. Think carefully about an experiment you could do to determine which of the three solutions are acidic and which are basic.
3. **CARRY OUT YOUR EXPERIMENT.**
4. Record your observations in the data table below.

Indicator	Solution A	Solution B	Solution C
Blue Litmus	Stayed Blue	Turned Pink	Stayed Blue
Red Litmus	Stayed Red	Stayed Red	Stayed Red
Phenolphthalein	Cloudy	Cloudy	Cloudy

5. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

6. In the space below, describe the procedures you followed in conducting your experiment.

I put a Drop of A in each circle for A and Did the same thing to B & C. I first tested with the phenothalene in the first row. R. Litmus paper in the second an Red litmus paper in the third.

7. Using the data you have collected and the background information, which solution is acidic?

Solution B

In the space below, explain the reason for your answer.

It turned Blue litmus paper pink & Red stayed Red

8. Using the data you have collected and the background information, which solution is basic?

None

In the space below, explain the reason for your answer.

Because None of the solutions turned red litmus paper purple.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Acid Precipitation
Task Information

Grade: 8th grade

Content:
- Block H (The Chemistry of Matter). Section VI, 1 and 2. page 29 - 30; Appendix H - 60

Format: Manipulative

Purpose: The student will use an indicator to determine and evaluate the level of acidity in simulated water sources from New York State.

Skills:
Primary: Interpreting data, Observing
Secondary: Predicting

Time: 8 - 15 minutes

Materials:

Teacher
- citric acid (Fruit Fresh™)
- stock bottles
- permanent fine line black marker
- water

per Student
- dropper bottles labeled A - D
- pH paper (range 2 - 8) in vial with color key
- transparency test card
- paper towels
- water (550 ml)
- waste container
- safety goggles
- water for cleaning

Preparation:

1. **Stock Solution Preparation;**
   a. The solutions can be purchased as buffer solutions from a science supply company.
   - If you are making your own solutions use citric acid crystals (Fruit Fresh™) which are less toxic than other acids

   b. You might use the following chart to make enough stock solutions to fill 30 student dropper bottles with 50 ml each.

Bottle	Desired pH	Grams of Citric acid	ml of Distilled Water
A	4.0		1500 ml
B	6.0		1500 ml
C	7.0	0	1500 ml
D	6.0		1500 ml

For best results:
- Test each solution with pH paper strips prior to use.
- It is difficult to maintain a pH of 7 in a stock solution. Atmospheric CO_2 will lower the pH upon exposure. Keep bottle tightly covered and adjust pH as needed by adding drops of a weak base such as lime water or baking soda solution. (Add cautiously and test often with pH paper.)
- Transfer attached template for testing card with a permanent marker or a copy machine. Use shiny side of transparency to avoid contamination between tests.

Safety:
- Students **must** wear safety goggles.
- Check MSDS (Materials Safety Data Sheet) for further laboratory precautions.
- Laboratory safety procedures required.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Acid Precipitation
Test Card

A B C D

Acid Precipitation
Test Card

A B C D

Acid Precipitation
Test Card

A B C D

Acid Precipitation
Test Card

A B C D

Acid Precipitation

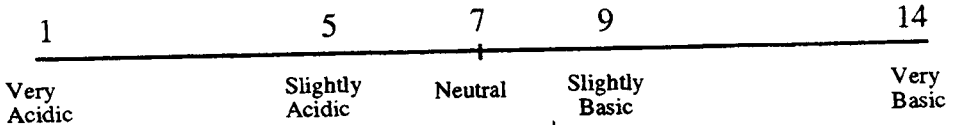
Task: At this station, you will experiment with 4 solutions representing water collected in March 1995 from sources around New York State to determine their level of acidity.

Materials:

- pH color chart
- pH paper
- water for cleaning
- transparency test card
- solution filled dropper bottles labeled **A - D**
- waste cup
- paper towels
- safety goggles

Background:

pH paper is an indicator used to determine how acidic or basic a solution is.
Distilled water with a pH of 7 is not an acid or base; it is called neutral.



The dropper bottles A through d contain samples that represent water collected in March 1995 from the following sources:

- Bottle A - Adirondack Lake water
- Bottle B - Finger Lake water
- Bottle C - Drinking (tap) water
- Bottle D - Great Lake water

Directions:

1. Put your safety goggles on. DO NOT taste or touch any solution. Clean up any spills immediately.
2. Place one drop of each solution on the transparency circle on the test card with the same letter as the solution.
3. Dip the end of a pH paper into solution A.
4 Compare the color of the pH paper with the chart on the pH color chart.
5 Record the pH of the solution on the data table on the answer sheet.
6. Repeat steps 3 through 5 for solutions B, C, and D using separate unused strips of pH paper for each solution..
7. Place used strips of pH paper in the waste cup.
8. Clean the transparency test cards with water. Throw any garbage into the waste cup.
9. Answer questions 1 through 4 on the answer sheet.

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Answer Sheet
Acid Precipitation

1. Record the pH of each sample on the data table below.

Sample	Source of Water	pH Levels	
		March 1993	March 1995
A	Adirondack Lake	5.0	
B	Finger Lake	6.0	
C	Drinking (tap)	7.0	
D	Great Lake	5.5	

2. Using the data you have collected and the background information, determine the following:
   a. Which 1995 sample is most acidic? (If there is a tie, list them)

   _____

   b. Which 1995 sample is least acidic? (If there is a tie, list them)

   _____

The pH of rain water in all of these areas was measured at 4.5 in 1993 and 3.0 in 1995.

3. Compare your results on the data table from 1995 with the results from 1993. Which sample(s) was/were most affected by acid rain?

   _____

   In the space below, explain the reason for your answer.

   _____

   _____

   _____

   _____

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

4. To survive, many organisms need the water pH to be between a pH of 5 and 9. The list below shows the lowest pH of water at which certain organisms can live.

Bass	**pH 5.0**	**Perch**	**pH 4.5**	**Snail**	**pH 6.0**
Minnow	**pH 6.5**			**Salamander**	**pH 5.5**

Predict the order in which the organisms in a lake will die as a lake becomes more acidic.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Acid Precipitation - Scoring Rubric
Maximum Score - 9 points

Question 1. pH data table. **3 points total**

Sample	Source of Water	pH Levels	
		March 1993	March 1995
A	Adirondack Lake	5.0	4.0 (3-5)
B	Finger Lake	6.0	6.0 (5-7)
C	Drinking (tap)	7.0	7.0 (6-8)
D	Great Lake	5.5	6.0 (5-7)

Point Criteria:

- Students receive points for the number of recorded pH's within the acceptable range of answers given in the data table.
  - Allow 3 points for 3 - 5 correct data entries
  - Allow 2 points for 2 correct data entries
  - Allow 1 point for 1 correct data entries

Question 2. Most and least acidic solutions **2 points total**

Point Criteria:

- Allow 1 point for identifying the most acidic solution as sample A
  - Accept any student's response correctly **based on his/her data.**
- Allow 1 point for identifying the least acidic solution as sample C
  - Accept any student's response correctly **based on his/her data.**

Question 3. Sample most affected by acid rain and explanation **2 points to**

Point Criteria:

- Allow 1 point for identifying sample A as the most affected
  - Accept any student's response correctly **based on his/her data**
- Allow 1 point for stating that the pH of A dropped or became more acidic than the others.

Question 4. Order organisms will die **2 points total**

Point Criteria:

- Correct order is minnow, snail, salamander, bass, and perch
  - Allow partial credit (1 point) for 1 misplaced organism
  - Allow no credit for more than 1 misplaced organism

Highest possible score - 9 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Acid Precipitation - Scoring Form**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. pH Data Table 3 - 4 correct 2 correct 1 correct 0 correct	 3 2 1 0	_____
2. Most/Least Acidic Samples Most - Sample A Least - Sample C	 0 1 0 1	_____
3. Comparing Results Named Sample Reason for Choice	 0 1 0 1	_____
4. Order Organisms Will Die (minnow, snail, salamander, bass, perch)	0 1 2	_____

Total Score _____

Total possible score - 9 points

#1

Student ID HM8-1-2 **Acid Precipitation - Scoring Form**

Male or (Female) (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. pH Data Table 3 - 4 correct 2 correct 1 correct 0 correct	(3) 2 1 0	3
2. Most/Least Acidic Samples Most - Sample A Least - Sample C	(0) 1 (0) 1	0
3. Comparing Results Named Sample Reason for Choice	(0) 1 (0) 1	0
4. Order Organisms Will Die (minnow, snail, salamander, bass, perch)	(0) 1 2	0

Total Score 3

Total possible score - 9 points

HM8-1-2

Answer Sheet

1. Record the pH of each sample on the table below.

Sample	Source of Water	pH levels	
		March 1990	March 1993
A	Acid rain	4.5	3
B	Adirondack Lake	5.0	4.5
C	Finger Lake	6.0	6
D	Household Tap	7.0	7.5
E	Great Lake	5.5	6.5

2. Using the data you have collected and the background information, determine the following:
   a. Which 1993 sample(s) is/are most acidic? Household Tap
   b. Which 1993 sample(s) is/are least acidic? Acid Rain

3. Compare your results from 1993 with the results from 1990. Which sample(s) was/were most affected by acid rain? The Great Lake Sample

   In the space below, explain the reason for your answer.

   The Great Lake Sample went up the most (it went to one number) so it was the most affected by acid rain.

4. To survive, many organisms need the water pH to be between a pH of 5 and 9. The list below shows the lowest pH of water at which certain organisms can live.

Bass	**pH 5.0**	**Perch**	**pH 4.5**	**Snail**	**pH 6.0**
Minnow	**pH 6.5**	**Salamander**	**pH 5.5**		

   Predict the order in which the organisms in a lake will die as a lake becomes more acidic.

   Perch, Bass, Salamander, Snail, Minnow

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#2

Student ID HM8-1-7 **Acid Precipitation - Scoring Form**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. pH Data Table 3 - 4 correct 2 correct 1 correct 0 correct	3 (2) 1 0	2
2. Most/Least Acidic Samples Most - Sample A Least - Sample C	0 (1) 0 (1)	2
3. Comparing Results Named Sample Reason for Choice	0 (1) 0 (1)	2
4. Order Organisms Will Die (minnow, snail, salamander, bass, perch)	(0) 1 2	0

Total Score 6

Total possible score - 9 points

HM8-1-7

Answer Sheet

1. Record the pH of each sample on the table below.

Sample	Source of Water	pH levels	
		March 1990	March 1993
A	Acid rain	4.5	2.2
B	Adirondack Lake	5.0	2.0
C	Finger Lake	6.0	6.0
D	Household Tap	7.0	7.5
E	Great Lake	5.5	5.7

2. Using the data you have collected and the background information, determine the following:
   a. Which 1993 sample(s) is/are most acidic? Samples A-E
   b. Which 1993 sample(s) is/are least acidic? Soree D

3. Compare your results from 1993 with the results from 1990. Which sample(s) was/were most affected by acid rain? Sameas A-B

   In the space below, explain the reason for your answer.
   The pH levels of Sample A and Sample B changed roughly 2-3 levels, and they are now more acidic than the Samples that were taken in March 1990. These two have the greatest difference between the 2 periods in which samples were taken

4. To survive, many organisms need the water pH to be between a pH of 5 and 9. The list below shows the lowest pH of water at which certain organisms can live.

Bass	**pH 5.0**	**Perch**	**pH 4.5**	**Snail**	**pH 6.0**
Minnow	**pH 6.5**	**Salamander**	**pH 5.5**		

   Predict the order in which the organisms in a lake will die as a lake becomes more acidic.
   Perch, Bass, Salamander Snail minnow

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#3

Student ID HM-8-1-4 **Acid Precipitation - Scoring Form**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. pH Data Table 3 - 4 correct 2 correct 1 correct 0 correct	(3) 2 1 0	3
2. Most/Least Acidic Samples Most - Sample A Least - Sample C	0 (1) 0 (1)	2
3. Comparing Results Named Sample Reason for Choice	0 (1) 0 (1)	2
4. Order Organisms Will Die (minnow, snail, salamander, bass, perch)	0 1 (2)	2

Total Score 9

Total possible score - 9 points

Answer Sheet

1. Record the pH of each sample on the table below.

Sample	Source of Water	pH levels	
		March 1990	March 1993
A	Acid rain	4.5	2.0
B	Adirondack Lake	5.0	3.5
C	Finger Lake	6.0	7.0
D	Household Tap	7.0	7.5
E	Great Lake	5.5	6.5

2. Using the data you have collected and the background information, determine the following:
   a. Which 1993 sample(s) is/are most acidic? Sample A
   b. Which 1993 sample(s) is/are least acidic? Sample D

3. Compare your results from 1993 with the results from 1990. Which sample(s) was/were most affected by acid rain? Sample A

   In the space below, explain the reason for your answer.
   The Ph level of Sample A changed by 2.5, a greater change than in any of the other samples.

4. To survive, many organisms need the water pH to be between a pH of 5 and 9. The list below shows the lowest pH of water at which certain organisms can live.

Bass	**pH 5.0**	**Perch**	**pH 4.5**	**Snail**	**pH 6.0**
Minnow	**pH 6.5**	**Salamander**	**pH 5.5**		

   Predict the order in which the organisms in a lake will die as a lake becomes more acidic.
   Minnow, Snail, Salamander, Bass, Perch.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Acid Precipitation - Micro
Task Information

Grade: 8th grade

Content:

- Block H (The Chemistry of Matter). Section VI, 1 and 2. page 29 - 30; Appendix H - 60

Format: Manipulative

Purpose: The student will use an indicator to determine and evaluate the level of acidity in simulated water sources from New York State.

Skills:

Primary: Interpreting data, Observing
Secondary: Predicting

Time: 8 - 15 minutes

Materials:

- disposable pipettes labeled **A - D**
- pH paper (range 2 - 8) with pH color chart
- small plastic cups - 4
- dropper bottles for stock solutions
- safety goggles
- fine line permanent black marker
- water for clean up
- paper towels
- waste container

Preparation:

1. **Stock Solution Preparation**
   a. The solutions can be purchased as buffer solutions from a science supply company.
   - If you are making your own solutions use citric acid crystals (Fruit Fresh™) which are less toxic than other acids

   b. You might use the following chart to make enough stock solutions to fill 30 student pipettes with 1 ml each.

Bottle	Desired pH	Grams of Citric acid	ml of Distilled Water
A	4.0		
B	6.0		
C	7.0		
D	6.0		

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

2. Materials Preparation

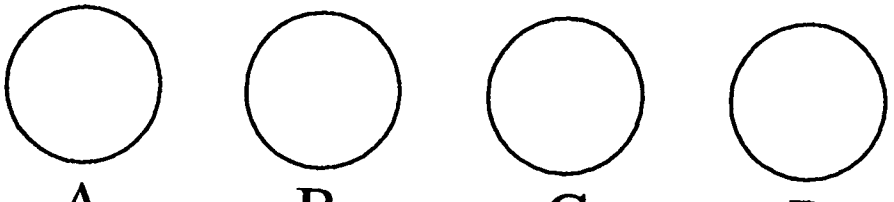
a. Label disposable pipettes "A", "B", "C", and "D".
b. Pour individual stock solutions in small plastic cups. To fill pipettes, place a handful of pipettes into the solutions (tips down), and squeeze bulbs simultaneously. Capillarity will keep solutions in the pipettes without sealing.
c. For best results, test each solution with pH paper strips prior to use.
d. Pipettes will fit inside of the cassette case with tips up for easy storage and handling. Styrofoam can be used as spacers.
e. Pipettes - 2" Specialty Transfer Pipettes (1 ml, 43 drops/ml)
f. Use the permanent marker or a copy machine to transfer the template onto the transparency. Use the smooth side of the transparency to avoid contamination. Discard after each use.
g. Alternative: purchase Reaction Plates (24 wells). Use Flat sides of both lids and bottoms of reaction plates. **Wash** Between uses.

Safety:

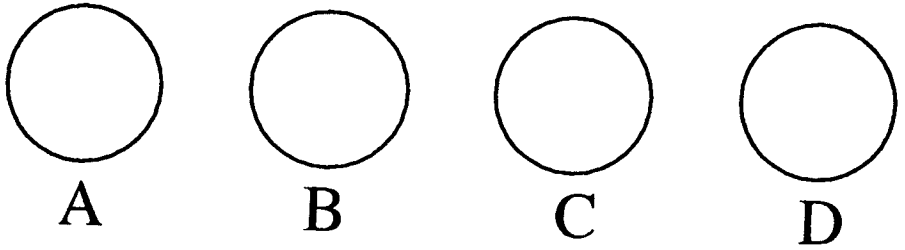
- Students **must** wear safety goggles.
- Check MSDS (Materials Safety Data Sheet) for further laboratory precautions.
- Laboratory safety procedures required.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

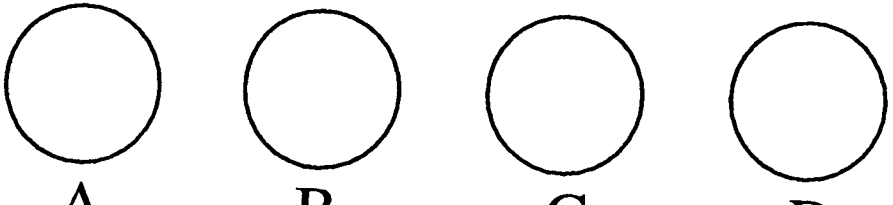
Acid Precipitation
Test Card



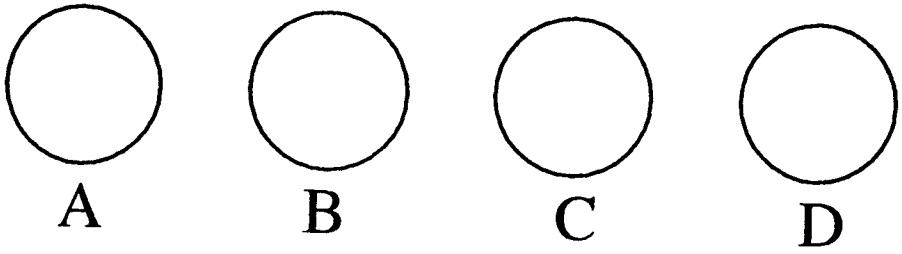
Acid Precipitation
Test Card



Acid Precipitation
Test Card



Acid Precipitation
Test Card



Acid Precipitation - Micro

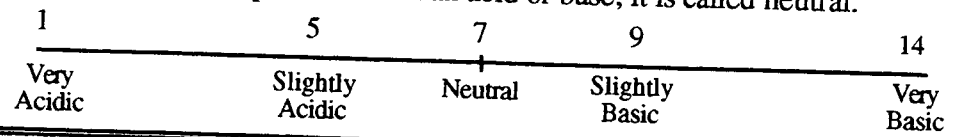
Task: At this station, you will experiment with 5 solutions representing water collected in March 1995 from sources around New York State to determine their level of acidity.

Materials:

- solution filled disposable pipettes **A** through **D**
- pH paper (range 2 - 8)
- pH color chart
- transparency test card
- waste cup
- paper towels
- safety goggles
- cassette case
- water for cleaning

Background:

pH paper is an indicator used to determine how acidic or basic a solution is. Distilled water with a pH of 7 is not an acid or base; it is called neutral.



The disposable pipettes A - D contain samples that represent water collected in March 1995 from the following sources:

- Pipette A - Adirondack Lake water
- Pipette B - Finger Lake water
- Pipette C - Drinking (tap) water
- Pipette D - Great Lake water

You will test the water samples collected in March 1995. Results from these samples will be compared with water collected in March 1993 from these same locations.

Directions:

1. **Put your safety goggles on. Do not taste or touch any solution. Clean up any spills immediately.**
2. Place one drop of each solution on the transparency circle with the same letters as the solution.
3. Dip the end of a pH paper into solution **A**.
4. Compare the color of the pH paper with the pH color chart.
5. Record the pH of the solution on the data table on the answer sheet.
6. Repeat steps 3 -5 for solutions **B** through **D** using separate strips of pH paper for each solution.
7. Place used strips of pH paper in the waste cup.
8. Clean the transparency test card with water. Throw any garbage into the waste cup.
9. Answer questions 1 - 4 on the answer sheet.

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Answer Sheet
Acid Precipitation - Micro

1. Record the pH of each sample on the table below.

Sample	Source of Water	pH Levels	
		March 1993	March 1995
A	Adirondack Lake	5.0	
B	Finger Lake	6.0	
C	Drinking (tap)	7.0	
D	Great Lake	5.5	

2. Using the data you have collected and the background information, determine the following:
   a. Which 1995 sample is **most** acidic? _____
      (If there is a tie, list them.)
   b. Which 1995 sample is **least** acidic? _____
      (If there is a tie, list them.)

   The pH of rain water in **all** of these areas measured 4.5 in 1993 and 3.0 in 1995.

3. Compare your results from 1995 with the results from 1993. Which sample(s) was/were most affected by acid rain?

   _____

   In the space below, explain the reason for your answer.

   _____

   _____

   _____

   _____

4. To survive, many organisms need the water pH to be between a pH of 5 and 9. The list below shows the lowest pH of water at which certain organisms can live.

Bass	**pH 5.0**	**Perch**	**pH 4.5**	**Snail**	**pH 6.0**
Minnow	**pH 6.5**			**Salamander**	**pH 5.5**

   Predict the order in which the organisms in a lake will die as a lake becomes more acidic.

   _____

   _____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Acid Precipitation - Micro - Scoring Rubric

Maximum Score - 9 points

1. pH Data Table

3 points total

Sample	Source of Water	pH Levels	
		March 1993	March 1995
A	Adirondack Lake	5.0	*4.0 (3 - 5)*
B	Finger Lake	6.0	*6.0 (5 - 7)*
C	Drinking (tap)	7.0	*7.0 (6 - 8)*
D	Great Lake	5.5	*6.0 (5 - 7)*

** *The theoretical pH value of each solution is given first.*
The acceptable range of student answers is given in parenthesis.

Point Criteria:

- Students receive points for the number of recorded pH's within the acceptable range of answers given in the data table.
  - Allow 3 points for 3 - 4 correct data entries
  - Allow 2 points for 2 correct data entries
  - Allow 1 point for 1 correct data entries

2. Most and least acidic solutions

2 points total

Point Criteria:

- Allow 1 point for identifying the most acidic solution as sample A
  - Accept any student's response correctly **based on his/her data.**
- Allow 1 point for identifying the least acidic solution as sample C
  - Accept any student's response correctly based on his/her data.

3. Sample most affected by acid rain and explanation

2 points total

Point Criteria:

- Allow 1 point for identifying sample A as the most affected
  - Accept any student's response correctly **based on his/her data**
- Allow 1 point for stating that the pH of A dropped or became more acidic than the others.

4. Order organisms will die

2 points total

Point Criteria:

- Correct order is minnow, snail, salamander, bass, and perch
  - Allow partial credit (1 point) for 1 misplaced organism
  - Allow no credit for more than 1 misplaced organism

Highest possible score - 9 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____

Male or Female (circle one)

Acid Precipitation - Micro Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. pH Data Table 3 - 4 correct 2 correct 1 correct 0 correct	 3 2 1 0	_____
2. Most/Least Acidic Samples Most - Sample A Least - Sample C	 0 1 0 1	_____
3. Comparing Results Named Sample Reason for Choice	 0 1 0 1	_____
4. Order Organisms Will Die (minnow, snail, salamander, bass, perch)	0 1 2	_____

Total Score _____

Highest Possible score - 9 points

#1

Student ID 2H - 1

Male or Female (circle one)

Acid Precipitation - Micro Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. pH Data Table 3 - 4 correct 2 correct 1 correct 0 correct	(3) 2 1 0	3
2. Most/Least Acidic Samples Most - Sample A Least - Sample C	0 (1) (0) 1	1
3. Comparing Results Named Sample Reason for Choice	0 (1) (0) 1	1
4. Order Organisms Will Die (minnow, snail, salamander, bass, perch)	(0) 1 2	0

Total Score 5

Highest Possible score - 9 points

#1

2H-1

Answer Sheet
Acid Precipitation - Micro

1. Record the pH of each sample on the table below.

Sample	Source of Water	pH levels	
		March 1993	March 1995
A	Acid rain	4.5	4.5
B	Adirondack Lake	5.0	4.5
C	Finger Lake	6.0	5.5
D	Household Tap	7.0	7.0
E	Great Lake	5.5	5.5

2. Using the data you have collected and the background information, determine the following:
   a. Which 1995 sample(s) is/are **most** acidic? Acid rain + Adirondack Lake
   b. Which 1995 sample(s) is/are **least** acidic? finger lake + GREAT LAKE
3. Compare your results from 1995 with the results from 1993. Which sample(s) was/were most affected by acid rain?
   Adirondack lake

   In the space below, explain the reason for your answer.

4. To survive, many organisms need the water pH to be between a pH of 5 and 9. The list below shows the lowest pH of water at which certain organisms can live.

Bass	**pH 5.0**	**Perch**	**pH 4.5**	**Snail**	**pH 6.0**
Minnow	**pH 6.5**	**Salamander**	**pH 5.5**		

   Predict the order in which the organisms in a lake will die as a lake becomes more acidic.

   Perch, Bass, Salamander, Snail + Minnow

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#2

Student ID 2H-3

Male or Female (circle one)

Acid Precipitation - Micro Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. pH Data Table 3 - 4 correct 2 correct 1 correct 0 correct	(3) 2 1 0	3
2. Most/Least Acidic Samples Most - Sample A Least - Sample C	0 (1) 0 (1)	2
3. Comparing Results Named Sample Reason for Choice	0 (1) 0 (1)	2
4. Order Organisms Will Die (minnow, snail, salamander, bass, perch)	(0) 1 2	0

Total Score 7

Highest Possible score - 9 points

#2

2H-3

Answer Sheet
Acid Precipitation - Micro

1. Record the pH of each sample on the table below.

Sample	Source of Water	pH levels	
		March 1993	March 1995
A	Acid rain	4.5	4.5
B	Adirondack Lake	5.0	4.5
C	Finger Lake	6.0	5.5
D	Household Tap	7.0	7.0
E	Great Lake	5.5	5.5

2. Using the data you have collected and the background information, determine the following:
   a. Which 1995 sample(s) is/are **most** acidic? Acid rain
   b. Which 1995 sample(s) is/are **least** acidic? House hold tap

3. Compare your results from 1995 with the results from 1993. Which sample(s) was/were most affected by acid rain? adirondack lake

   In the space below, explain the reason for your answer.

   There were more hydrogen ions in the lake which made it acidic

4. To survive, many organisms need the water pH to be between a pH of 5 and 9. The list below shows the lowest pH of water at which certain organisms can live.

Bass	**pH 5.0**	**Perch**	**pH 4.5**	**Snail**	**pH 6.0**
Minnow	**pH 6.5**	**Salamander**	**pH 5.5**		

   Predict the order in which the organisms in a lake will die as a lake becomes more acidic.

   perch, Bass, salamander, snail, minnow

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#3

Student ID 2H-5

Male or Female (circle one)

Acid Precipitation - Micro Scoring Form

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. pH Data Table 3 - 4 correct 2 correct 1 correct 0 correct	(3) 2 1 0	3
2. Most/Least Acidic Samples Most - Sample A Least - Sample C	0 (1) 0 (1)	2
3. Comparing Results Named Sample Reason for Choice	0 (1) 0 (1)	2
4. Order Organisms Will Die (minnow, snail, salamander, bass, perch)	0 1 (2)	2

Total Score 9

Highest Possible score - 9 points

3

Answer Sheet
Acid Precipitation - Micro

2H-5

1. Record the pH of each sample on the table below.

Sample	Source of Water	pH levels	
		March 1993	March 1995
A	Acid rain	4.5	4.5
B	Adirondack Lake	5.0	4.5
C	Finger Lake	6.0	5.5
D	Household Tap	7.0	7.0 (7.3)
E	Great Lake	5.5	5.5

2. Using the data you have collected and the background information, determine the following:
   a. Which 1995 sample(s) is/are **most** acidic? A & B
   b. Which 1995 sample(s) is/are **least** acidic? D

3. Compare your results from 1995 with the results from 1993. Which sample(s) was/were most affected by acid rain?

LETTER	C	B
X more Aside	5	5

In the space below, explain the reason for your answer.

SAMPLES B & C GOT MORE ASIDIC BECAUS MORE FOSSIL FULES WERE BURNED AND MORE NOx AND SO_2 WERE REUSED into the AIR.

4. To survive, many organisms need the water pH to be between a pH of 5 and 9. The list below shows the lowest pH of water at which certain organisms can live.

~~**Bass pH 5.0**~~ **Perch pH 4.5** ~~**Snail pH 6.0**~~
~~**Minnow pH 6.5**~~ ~~**Salamander pH 5.5**~~

Predict the order in which the organisms in a lake will die as a lake becomes more acidic.

THE FIRST TO DIE will be the MINNOW, THEN THE SNAIL, THEN SALAMDER, THEN BASS THEN THE PERCH

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Changing Ramp Heights
Task Information

Grade: 8th grade

Content:

Block I (Energy Sources and Issues) Section I;B.1, B.2, B.3. page 7.

Format: Manipulative

Purpose: The students will determine the relationship between the height of a ramp and the energy of the ball rolling down the ramp.

Skills:

Primary: Measuring, interpreting data, calculating
Secondary: Recording data, observing

Time: 10 - 15 minutes

Materials:

Teacher:

- scissors or craft knife
- black or blue marker

Per student or station:

- three(3) books of the same size
- plastic cup or bowl
- 30 cm ruler w/ center groove
- golf ball
- metric measuring tape
- masking tape
- calculator

Preparation:

- Cut a hole in the side of the plastic cup or container large enough to allow the golf ball to roll through it freely.
- Designate the part of the cup that the students will be measuring from (back or front)
- You must have a large flat surface to do this task; laboratory tables, cafeteria tables, or the floor work well. A single student desk is **not** large enough.
- A ball release point should be marked on the ramp or ruler with permanent marker.

Extension/Modifications:

- Uniform wood blocks may be used in place of the books for the ramp.
- A rubber ball may be substituted for the golf ball.
- A piece of wooden molding may be used in place of the ruler for the ramp.

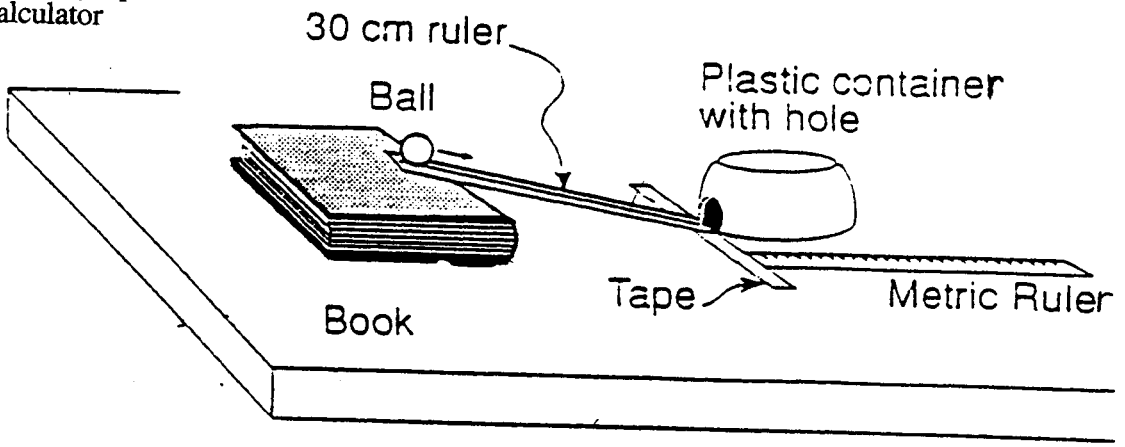
NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Changing Ramp Heights

Task: At this station you will be measuring the effect the height of a ramp has on the distances a ball is able to move a stationary cup.

Materials

- 3 books of the same size
- plastic cup or bowl
- ruler with a center groove
- golf ball
- metric measuring tape
- masking tape
- calculator



Directions

1. Be sure your equipment is set up exactly as it appears in the diagram above. Make sure the cup is placed with the hole facing the ruler. Rest the ruler on the books at about 5 cm from the end.

   *** **The ball must roll into the cup** ***

2. Release the golf ball about 2 cm from the top of the wood.
3. Measure, in centimeters, how far the ball moved the cup. Be sure to measure from the front of the cup.
4. Record your measurement in the data table on the answer sheet.
5. Conduct two (2) more trials for this height. Find the average of **all** three (3) trials to the nearest whole number and record it in the data table on the answer sheet.
6. Add one book to the ramp and repeat steps 2 - 5.
7. Add a third book to the ramp and repeat step 2 - 5.
8. Answer questions 2 - 5 on your answer sheet.

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Changing Ramp Heights
Answer Sheet

1. Record your measurements on the data table below.

Distance cup moved - (in centimeters)

Number of Books	Trial 1	Trial 2	Trial 3	Average
1				
2				
3				

2. Write a sentence comparing the effect of ramp height on the average distance the cup moved.

3. In terms of kinetic and potential energy, explain why changing the height of the ramp produced different results.

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

4. Was your data the same for all three trials when three books were used? _____

   Explain what might have caused this.

   _____

   _____

   _____

   _____

5. Why does a scientist use more than one trial when conducting an experiment?

   _____

   _____

   _____

   _____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Changing Ramp Heights - Scoring Rubric

Maximum Score - 10 points

1. Data Table - Distance the Cup Moved

3 points total

Point Criteria:

- Allow 1 point for data collection taken three times (3 trials)
- Allow 1 point for correctly averaging and rounding at least two (2) of the three(3) distances.
- Allow 1 point for data showing an increase in the average distance as the number of books is increased.

2. Effect of Ramp Heights on Distance

2 points total

Point Criteria:

- Allow 1 point for identifying height of the ramp as the variable.
- Allow 1 point for an explanation that states that the distance the cup moved is directly related to the height of the ramp.

Sample of acceptable responses:

- As the ramp was moved higher, the cup moved further.
- When the ramp was low, the cup did not roll as far as when it was higher.

3. Explanation of Results

2 points total

Point Criteria:

- Allow 1 point if the student states that increased energy of the ball leads to increase movement of the cup.
- Allow 1 point if the student states that the increased ramp height is the cause of the increase in the ball's energy.

Allow 2 points for both cause and effect

Sample of acceptable answers:

- When there were more books, the ball had more energy and moved the cup further.
- When the ramp height was increased the potential energy was increased and led to more kinetic energy to move the cup.

4. Variation in Data

2 points total

Point Criteria:

- Allow 1 point if the student's response matches his/her data.
- Allow 1 point if the student relates the change in distance to the human factor involved in the experiment.

Sample of acceptable responses:

- The starting position of the cup may have varied.
- The ball may have been placed at different starting positions.
- Human element
- Environmental factors

5. Multiple Trials

1 point total

Point Criteria:

- Allow 1 point if the student's response states that several trials validate the data and allow for human error.

Highest possible score - 10 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Scoring Form - Changing Ramp Heights**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Data Table - distance the ball moved		
Three trials completed	0 1	_____
Average	0 1	_____
Direct relationship shown	0 1	_____
2. Effect of ramp heights on distance cup moves		
Correct identification of variable	0 1	_____
Correct explanation	0 1	_____
3. Explanation of results	0 1 2	_____
4. Variation in data		
Response matches data	0 1	_____
Correct explanation	0 1	_____
5. Multiple trials	0 1	_____

Total Score _____

Maximum Score - 10 points

Student ID 01 (Male) or **Female** (circle one)

Changing Ramp Heights

Scoring Form (Maximum Score = 9 points)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Data Table - Distance the ball moved		
Data Entry	0 (1)	1
Data Collection	0 (1)	1
2. Effect of Ramp Heights on Distance cup moves		
Correct identification of variable	0 (1)	1
Correct explanation	(0) 1	0
3. Explanation of Results	0 1 (2)	2
4. Explanation of Scientific Method		
Response matches data	0 (1)	1
Correct Explanation	(0) 1	0
5. Data Collecting	(0) 1	0

Total Score 6

Changing Ramp Heights
Answer Sheet

1. Record your measurements on the data table below.

Distance Cup Moved (in centimeters)

Number of Books	Trial 1	Trial 2	Trial 3
1	6 cm	7cm	7cm
2	20.5cm	23.5cm	20.5cm
3	36cm	37cm	37cm

2. Write a sentence comparing the effects of ramp height on the distance the cup moved.

With three blocks it ~~was~~ went the farthest. With one blocks it went the least.

3. Write a sentence explaining why changing the height of the ramp produced different results.

More of an angle caused the ball to go faster.

Please continue this task on the next page

4. Was your data the same for all three trials at each height? no

Explain what might have caused this.

The weight of the ball and the bigger Angle caused the ball to go faster And move the cup farther.

5. Why does a scientist use more than one trial when conducting an experiment?

For different results.

#12

Student ID 02 **Male or Female** (circle one)

Changing Ramp Heights

Scoring Form (Maximum Score = 9 points)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Data Table - Distance the ball moved		
Data Entry	0 (1)	1
Data Collection	0 (1)	1
2. Effect of Ramp Heights on Distance cup moves		
Correct identification of variable	0 (1)	1
Correct explanation	0 (1)	1
3. Explanation of Results	0 1 (2)	2
4. Explanation of Scientific Method		
Response matches data	0 (1)	1
Correct Explanation	(0) 1	0
5. Data Collecting	(0) 1	0

Total Score 7

Changing Ramp Heights
Answer Sheet

1. Record your measurements on the data table below.

Distance Cup Moved (in centimeters)

Number of Books	Trial 1	Trial 2	Trial 3
1	18 cm	20 cm	17½ cm
2	35 cm	40 cm	30 1/2 cm
3	57 cm	58 cm	50 cm

2. Write a sentence comparing the effects of ramp height on the distance the cup moved.

every time the ramp was moved up the cup went further.

3. Write a sentence explaining why changing the height of the ramp produced different results.

The different results were caused from the speed every time the ramp was changed it moved faster.

Please continue this task on the next page

4. Was your data the same for all three trials at each height? No

Explain what might have caused this.

Because of force of speed.

5. Why does a scientist use more than one trial when conducting an experiment?

Notes, Motion and effort

Student ID 03 Male or Female (circle one)

Changing Ramp Heights

Scoring Form (Maximum Score = 9 points)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Data Table - Distance the ball moved		
Data Entry	0 (1)	1
Data Collection	0 (1)	1
2. Effect of Ramp Heights on Distance cup moves		
Correct identification of variable	0 (1)	1
Correct explanation	0 (1)	1
3. Explanation of Results	0 1 (2)	2
4. Explanation of Scientific Method		
Response matches data	0 (1)	1
Correct Explanation	0 (1)	1
5. Data Collecting	0 (1)	1

Total Score 9

Changing Ramp Heights
Answer Sheet

1. Record your measurements on the data table below.

Distance Cup Moved (in centimeters)

Number of Books	Trial 1	Trial 2	Trial 3
1	12.5	17	15.7
2	42.3	40	38.5
3	off the table	off the table	51

2. Write a sentence comparing the effects of ramp height on the distance the cup moved.

The Higher the ramp is the farther the cup moves

3. Write a sentence explaining why changing the height of the ramp produced different results.

The ball can go down faster from a different height.

Please continue this task on the next page

4. Was your data the same for all three trials at each height? no

Explain what might have caused this.

The ball might have started at a different starting point. The ramp is smooth and the structure of the ball might have been different.

5. Why does a scientist use more than one trial when conducting an experiment?

to see if it works

Chemical Changes
Task Information

Grade: 8th grade

Content:

- Block H (the chemistry of matter). Section II, 5.D. page 14 -15.

Format:

Manipulative

Purpose:

The student will determine what evidence indicates that a chemical change is occurring.

Skills:

Primary: Observing, generalizing and inferring
Secondary: Predicting and measuring

Time: 10 - 15 minutes

Materials:

Teacher:

- 1 lb box of baking soda
- 1 quart of white vinegar
- small cups or containers

Per Student or station:

- 2 resealable bags labeled A and B
- 2 twist ties
- 1 plastic teaspoon
- 50 ml graduated cylinder
- baking soda
- white vinegar
- water
- paper towels
- safety goggles

Preparation:

- A 1 pound box of baking soda and one (1) quart of vinegar is sufficient for a class of approximately thirty (30) students.
- a supply of baking soda and vinegar in small labeled containers must be placed at each student station.
- The resealable bags may be washed and reused.
- Use a 'good' brand of vinegar. Not all vinegars have the same acid content.

Safety:

- Check MSDS (Materials Safety Data Chart) for further laboratory precautions.
- Laboratory safety procedure is required.
- Safety goggles must be worn during this experiment
- Be aware that the baking soda and vinegar bag will expand greatly due to the carbon dioxide production.

Extension/Modification: None

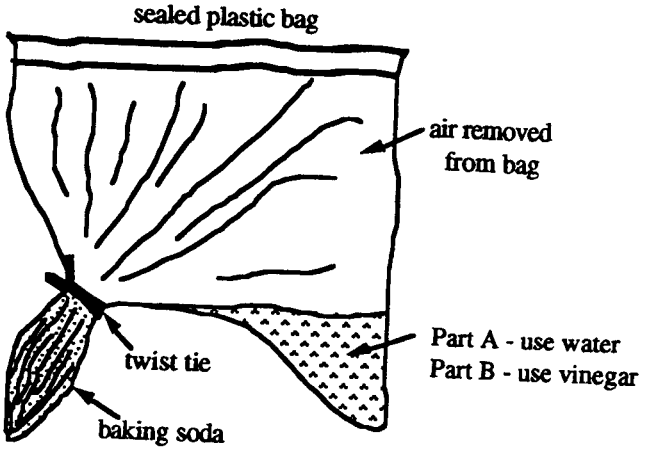
NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Chemical Changes

Task: At this station, you will observe two types of interactions, and then be asked to answer some questions about the interactions.

Materials

- 2 resealable plastic bags
- 2 twist ties
- 1 half teaspoon measure
- 1 - 50 ml graduated cylinder
- baking soda
- vinegar
- water
- paper towels
- safety goggles



Background

In nature many types of matter (chemicals) interact as they come in contact with one another. With some chemical interactions no change occurs, but with other chemical interactions, change can occur.

Directions:

Part A

Put on your safety goggles. Do not touch or taste any chemical. Clean up spills immediately.

1. In one of the bags, put 1/2 teaspoon of baking soda into one corner.
2. Tie off the corner of the bag with a twist tie as shown in the diagram.
3. Measure 30 mL of **WATER** and pour it into the empty corner.
4. Remove as much air as possible and seal the bag tightly.
5. Remove the twist tie from the bag and gently mix the baking soda with the water.
6. Describe what you observed after you mixed the contents of this bag. List **2** observations.

_____

_____

_____

7. Set the bag aside, and continue with Part B.

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Part B

1. In the **other bag**, put 1/2 teaspoon of baking soda into one corner.
2. Tie off the corner of the bag with a twist tie as shown in the diagram.
3. Measure 30 mL of **VINEGAR** and pour it into the empty corner.
4. Remove as much air as possible and seal the bag tightly.
5. Remove the twist tie from the bag and gently mix the baking soda with the vinegar.
6. Describe what you observed after you mixed the contents of this bag. List 2 observations.

_____

_____

_____

Questions:

1. In which of the bags did a chemical change occur? (Circle) your answer.

   The baking soda & water bag | The baking soda & vinegar bag | Both bags | Neither bag

2. Based on your knowledge of science and your observations, explain why you think a chemical change occurred. Give 2 reasons to support your answer.

_____

_____

_____

_____

3. If you could pour the solution from the baking soda and water bag into an open, shallow dish, and let it sit out in the sun, what would you find in the dish at the end of one week? Explain the reason for your answer.

_____

_____

_____

_____

Chemical Changes - Scoring Rubric

Maximum Score - 9 points

Part A6. Baking soda and water observations — 2 points total

Point Criteria:

- Allow 1 point for each valid observation up to a maximum of 2 points. If more than 2 observations are listed, correct the first 2 only.

  Sample of acceptable responses:

  - A solution of baking soda is made.
  - A white paste is made.
  - The powder dissolves/disappears in the water or liquid.
  - It feels cool. (Tap water temperature can effect bag temperature.)

  Sample of unacceptable responses:

  - Nothing happens.
  - Any incorrect observations.

- No credit is awarded if the student did not follow directions.

Part B6. Baking soda and vinegar observations — 2 points total

Point Criteria:

- Allow 1 point for each valid observation up to a maximum of 2 points. If more than 2 observations are listed, correct the first 2 only.

  Sample of acceptable responses:

  - The baking soda and vinegar fizzed or bubbled.
  - The bag felt cold.
  - The solution turned white or milky.
  - The bag blew up.

  Sample of unacceptable responses:

  - Nothing happens.
  - Any incorrect observations.

- No credit is awarded if the student did not follow directions.

1. Where did a chemical change occur? — 1 point total

- Identifying the baking soda and vinegar bag
  - Accept any student's response correctly based on his/her data

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NSF Grant #MDR-9154506

2. Explain why a chemical change occurred **2 points total**

Point Criteria:

- Allow 1 point for each valid reason up to a maximum of 2 points. If more than 2 reasons are listed, correct the first 2 only.

Sample of acceptable responses:

- The solution bubbled or fizzed.
- The temperature changed.
- A gas or new substance was produced.
- The bag blew up.
- When baking soda and vinegar are mixed, a gas (CO_2) is produced.

(Credit is awarded even if the gas is incorrectly identified.)

- When an acid combines with a base, there is a chemical change.

Sample of unacceptable responses:

- There was a color change.

---

3. Substance left if the solution sat out in the sun **2 points total**

Point Criteria:

- Allow 1 point for identifying the remaining substance as a dry powder (baking soda) or white substance.
- Allow 1 point for identifying the reason as evaporation.

Highest possible score - 9 points

Student ID _____ **Scoring Form - Chemical Changes**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
Part A 6. Baking soda and water bag First observation Second observation	 0 1 0 1	_____
Part B 6. Baking soda and vinegar bag First observation Second observation	 0 1 0 1	_____
1. Location of chemical change	0 1	_____
2. Reasons for change	0 1 2	_____
3. What remains? Description of substance Reason for answer	 0 1 0 1	_____

Total Score _____

Total possible score - 9 points

#1

Student ID 8-TS2-55 **Scoring Form - Chemical Changes**

(Male) or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
Part A 6. Baking soda and water bag First observation Second observation	0 (1) (0) 1	1
Part B 6. Baking soda and vinegar bag First observation Second observation	(0) 1 (0) 1	0
1. Location of chemical change	0 (1)	1
2. Reasons for change	(0) 1 2	0
3. What remains? Description of substance Reason for answer	(0) 1 (0) 1	0

Total Score 2

Total possible score - 9 points

8-TS2-55 1

May 4, 1994

ANSWER SHEET

1. Describe what you observed after you mixed the contents of Bag A.

Baking settled below water

2. Describe what you observed after you mixed the contents of Bag B.

it exploded

3. In which of the bags did a chemical change occur? Circle your answer.

IN NEITHER BAG | ONLY IN BAG A | (ONLY IN BAG B) | IN BOTH BAGS

4. Explain why you think a chemical change occurred.

because I put to much baking Soda and vinegar in.

5. If you could pour the solution from Bag A into an open, shallow dish, and let it sit out, what would you find in the dish at the end of one week?

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#2

Student ID 8-TS2-26 **Scoring Form - Chemical Changes**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
Part A 6. Baking soda and water bag First observation Second observation	0 (1) 0 (1)	2
Part B 6. Baking soda and vinegar bag First observation Second observation	0 (1) 0 (1)	2
1. Location of chemical change	(0) 1	0
2. Reasons for change	(0) 1 2	0
3. What remains? Description of substance Reason for answer	0 (1) (0) 1	1

Total Score 5

Total possible score - 9 points

May 4, 1994

8-TS2-26

ANSWER SHEET

1. Describe what you observed after you mixed the contents of Bag A.

The dissolved totally on the side that was not fizzed at. And dissolved into a thick substance on the fizzed at side

2. Describe what you observed after you mixed the contents of Bag B.

They both dissolved together and fizzed up.

3. In which of the bags did a chemical change occur? Circle your answer.

IN NEITHER BAG	ONLY IN BAG A	ONLY IN BAG B	IN BOTH BAGS

4. Explain why you think a chemical change occurred.

Because the forms of Both materials were altered.

5. If you could pour the solution from Bag A into an open, shallow dish, and let it sit out, what would you find in the dish at the end of one week?

It would harden into a doughy substance

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#3

Student ID 8-TS2-20
Male or (Female) (circle one)

Scoring Form - Chemical Changes

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
Part A 6. Baking soda and water bag First observation Second observation	0 (1) 0 (1)	2
Part B 6. Baking soda and vinegar bag First observation Second observation	0 (1) 0 (1)	2
1. Location of chemical change	0 (1)	1
2. Reasons for change	0 (1) 2	1
3. What remains? Description of substance Reason for answer	(0) 1 0 (1)	1

Total Score 7
Total possible score - 9 points

8-TS2-20 #3

May 4, 1994

ANSWER SHEET

1. Describe what you observed after you mixed the contents of Bag A.

the baking soda mixed in w/the water then went back down to the bottom of the bag

2. Describe what you observed after you mixed the contents of Bag B.

everything bubbled and fizzed a lot. gradually died down Air filled the bag

3. In which of the bags did a chemical change occur? Circle your answer.

IN NEITHER BAG | ONLY IN BAG A | (ONLY IN BAG B) | IN BOTH BAGS

4. Explain why you think a chemical change occurred.

Because vinegar is an acid + when it mixed w/the ~~vinegar~~ b.soda it fizzed + bubbled because they reacted as a chemical change Air filled the bag from the gases released

5. If you could pour the solution from Bag A into an open, shallow dish, and let it sit out, what would you find in the dish at the end of one week?

the b soda would still be on the bottom in a clump + it wouldn't mix in with the water.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Density Of A Sinker
Task Information

April 26, 1996

Grade: 8th Grade

Format: Manipulative

Purpose: The student will find the density of a metal sinker

Content: Physical Science

Skills:

Primary: Measuring, Observing, Applying Math
Secondary: Recording Data

Time: 10 - 15 minutes

Materials:

- spring scale or balance
- 100 mL beaker with water
- modeling clay
- calculator
- graduated cylinder (at least 50 mL)
- 1 oz or 3/4 oz lead sinker
- string

Preparation:

- Put a small piece of modeling clay in the bottom of the graduated cylinder. This will pad the graduate in case the student drops the sinker into the graduate.
- Tie a string to the lead sinker so that the students can gently lower the sinker into the graduated cylinder. This will also help them to get the sinker out of the graduate.

Safety:

- Caution the students against dropping the sinker into the graduated cylinder.
- If any glassware should break, instruct the students **not** to attempt to clean it up themselves but to inform the instructor immediately.

Extension/Modifications:

- Grade 8 Task Collection - Unknown Liquids
- Earth Science Task Collection - Density of a mineral

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Density of a Sinker

Task: At this station, you will be determining the density of a sinker.

Materials

- spring scale or balance
- graduated cylinder
- beaker with water
- sinker
- calculator

Directions

1. Find the mass of the sinker. Include units in your answer. _____
2. In the space below, describe the procedures you will use to find the **VOLUME** of the sinker.

_____

_____

_____

_____

3. Find the volume of the sinker. Include units in your answer. _____
4. What is the density of the sinker? Round to the nearest tenth. Include units in your answer.

_____

Show your work in the space below using the formula:

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

5. Suppose you cut the bottom half off the sinker. What would be the density of the upper half of the sinker? Explain your answer.

_____

_____

_____

_____

_____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Density of a Sinker - Scoring Rubric

Maximum Score - 10 points

Question 1. Mass of the Sinker

2 points total

Point Criteria:

- Teacher determined mass: _____ grams
- Allow 1 point for mass within the acceptable ranges.
  - triple beam or double pan balance = accuracy of +/- 1.0 grams
  - spring scale = accuracy of +/- 2.0 grams
- Allow 1 point for labeling the units as grams.

Question 2. Procedure for Volume

2 points total

Point Criteria:

- Response should include:
  - Put sinker into graduated cylinder.
  - Measure initial and final volumes.
  - Difference is the volume of the sinker.
- Allow 2 points if all three elements are included.
- Allow 1 point if two elements are included **or** if student writes "water displacement method."

*** Points should be based on the procedure not the actual value for the volume of the sinker. ***

Question 3. Volume of the Sinker

2 points total

Point Criteria:

- Teacher determined volume: _____ milliliters
- Allow 1 point for volume within the acceptable range.
  - accurate to +/- 1.0 milliliters
- Allow 1 point for labeling the units as milliliters.

Question 4. Density of the Sinker.

3 points total

Point Criteria:

- Density calculation should be based upon the **student's** values of mass and volume.
- Allow 1 point for density within the acceptable range.
  - accurate to +/- 0.5 g/mL
- Allow 1 point for labeling units as g/mL.
- Allow 1 point for correct substitution of the student's values into the density formula.

Question 5 Density of 1/2 the sinker.

1 point total

Point Criteria:

- Allow 1 point for a statement indicating that the density of 1/2 the sinker will be the same as the whole sinker because density is not directly related to volume.

Highest possible score - 10 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Scoring Form - Density of a Sinker**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle point breakdown	Points earned
1. Mass of sinker	0 1 2	_____
2. Procedure followed	0 1 2	_____
3. Volume of Sinker	0 1 2	_____
4. Density of Sinker Calculations Work Shown	0 1 2 0 1	_____
5. Density of 1/2 the sinker	0 1	_____

Total Score _____

Total possible score - 10 points

Student ID GMS 32 **Scoring Form - Density of a Sinker** #1

Male or (Female) (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle point breakdown	Points earned
1. Mass of sinker	0 (1) 2	1
2. Procedure followed	0 (1) 2	1
3. Volume of Sinker	0 (1) 2	1
4. Density of Sinker Calculations Work Shown	(0) 1 2 (0) 1	0
5. Density of 1/2 the sinker	(0) 1	0

Total Score 3

Total possible score - 10 points

GMS-32 #1

October 13, 1994

Density of a Sinker

Task: At this station, you will be determining the density of a sinker.

MATERIALS:

spring scale or balance
graduated cylinder
beaker with water
sinker
calculator

DIRECTIONS:

1. Find the mass of the sinker. Include units in your answer. 30.1

2. In the space below, describe the procedures you will use to find the **VOLUME** of the sinker.
I will put in 30ml grams of water then put the sinker in the water

3. Find the volume of the sinker. Include units in your answer. 4

4. What is the density of the sinker? Round to the nearest tenth. Include units in your answer. 60

Show your work in the space below using the formula: Density = $\frac{\text{mass}}{\text{volume}}$

30.1
34.0

5. Suppose you cut the bottom half off the sinker.
What would be the density of the upper half of the sinker?
If I cut off the bottom half I will get 20.1.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID GMS-36 **Scoring Form - Density of a Sinker** #2

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle point breakdown	Points earned
1. Mass of sinker	0 1 (2)	2
2. Procedure followed	0 1 (2)	2
3. Volume of Sinker	0 (1) 2	1
4. Density of Sinker Calculations Work Shown	(0) 1 2 0 (1)	1
5. Density of 1/2 the sinker	(0) 1	0

Total Score 6

Total possible score - 10 points

October 13, 1994

GMS-36

Density of a Sinker

Task: At this station, you will be determining the density of a sinker.

MATERIALS:

spring scale or balance
graduated cylinder
beaker with water
sinker
calculator

DIRECTIONS:

1. Find the mass of the sinker. Include units in your answer. 32g

2. In the space below, describe the procedures you will use to find the **VOLUME** of the sinker.

I will fill the graduated cylinder half way with water and then stick the sinker in it and see how much the water raises

3. Find the volume of the sinker. Include units in your answer. 7

4. What is the density of the sinker? Round to the nearest tenth. Include units in your answer. 4.4

Show your work in the space below using the formula: Density = $\frac{\text{mass}}{\text{volume}}$

$$7\overline{)32} \quad 4.4$$
$$28$$
$$4$$

5. Suppose you cut the bottom half off the sinker. What would be the density of the upper half of the sinker?

2.2

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID GMS-35 **Scoring Form - Density of a Sinker** #3

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle point breakdown	Points earned
1. Mass of sinker	0 1 (2)	2
2. Procedure followed	0 1 (2)	2
3. Volume of Sinker	0 1 (2)	2
4. Density of Sinker Calculations Work Shown	0 1 (2) 0 (1)	3
5. Density of 1/2 the sinker	(0) 1	0

Total Score 9

Total possible score - 10 points

#3

October 13, 1994

GMS-35

Density of a Sinker

Task: At this station, you will be determining the density of a sinker.

MATERIALS:

spring scale or balance
graduated cylinder
beaker with water
sinker
calculator

(2)

DIRECTIONS:

1. Find the mass of the sinker. Include units in your answer. 28g

2. In the space below, describe the procedures you will use to find the **VOLUME** of the sinker.
I placed water in volume tube put sinker in watched where in was and were it ended up at.

3. Find the volume of the sinker. Include units in your answer. 3ml^3

4. What is the density of the sinker? Round to the nearest tenth. Include units in your answer. 9.3 g/ml^3

   Show your work in the space below using the formula: $\text{Density} = \frac{\text{mass}}{\text{volume}}$

5. Suppose you cut the bottom half off the sinker.
   What would be the density of the upper half of the sinker?
Dont Know

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Dichotomous Key
Task Information

Grade: 8th Grade

Content:

- 8 Block A IC

Format: Paper/pencil

Purpose: To use a dichotomous key to identify unknown organisms.

Skills:

Primary: Classifying
Secondary: Hypothesizing, interpreting data

Time: 15 - 25 minutes

Materials: None

Preparation: None

Safety: N/A

Extensions/Modifications:

Biology task - Dichotomous Key 2

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

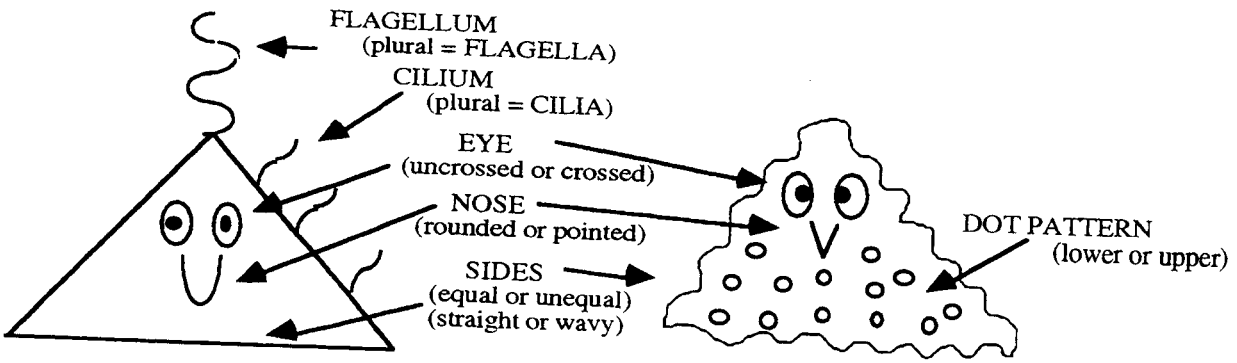
Dichotomous Key

Task: With the millions of living organisms in the world, scientists need a method of identifying an unknown organism. To do this, scientists use a dichotomous key. At this station, you will be using a dichotomous key to identify unknown organisms.

Directions

Use the dichotomous key below to identify any three (3) of the species of Triangulum in the accompanying Species Sheet. Record the choices made, and the resulting scientific name, on the answer sheet provided.

Dichotomous Key

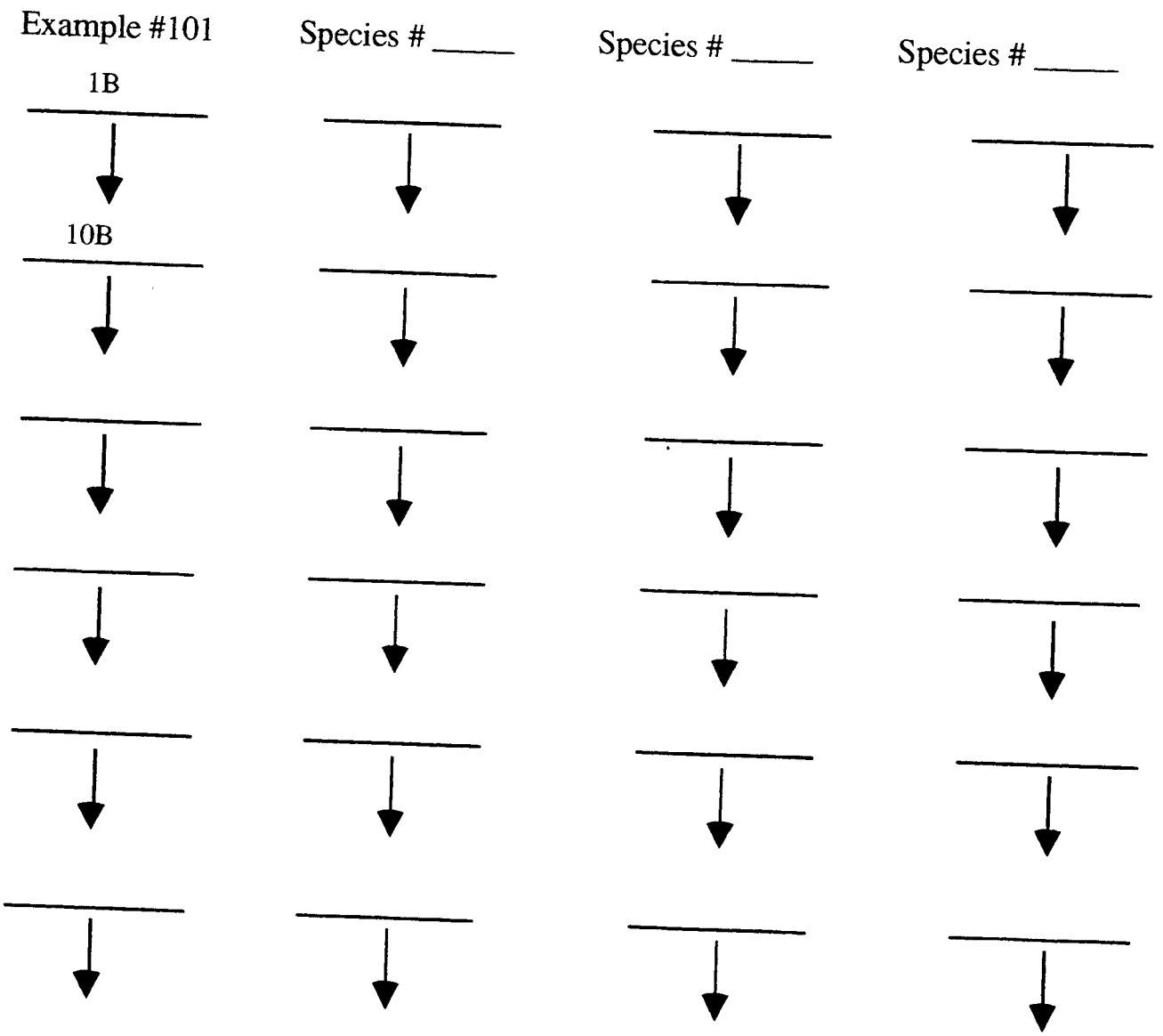


1. A. Sides are straight lines ..... Go to 2
   B. Sides are wavy lines ..... Go to 10
2. A. Has no eyes ..... Go to 3
   B. Has eyes ..... Go to 5
3. A. Has flagella for movement ..... Go to 4
   B. Has cilia for movement ..... Go to 7
4. A. The three sides are of equal length ..... triangulum equalius
   B. The three sides are not of equal length ..... Go to 12
5. A. Has crossed-eyes ..... Go to 6
   B. Eyes not crossed ..... Go to 9
6. A. Has a single flagellum for movement ..... triangulum monoflagelleum
   B. Has two or more flagella for movement ..... triangulum polyflagelleum
7. A. Total number of cilia for movement are odd ..... triangulum oddcilius
   B. Total number of cilia for movement are even ..... Go to 8
8. A. Has a pointed nose ..... triangulum pointiatus
   B. Has a rounded nose ..... triangulum roundiatus
9. A. Has two cilia on each side for movement ..... triangulum biciliatus
   B. Has more than two cilia on each side ..... triangulum polycilius
10. A. Has crossed-eyes ..... Go to 11
    B. Eyes not crossed ..... triangulum waveus (samplest correctus)
11. A. Lower half of the body has a dot pattern ..... triangulum ventridotteus
    B. Upper half of the body has a dot pattern ..... triangulum dorsalidotteus
12. A. Has a pointed nose ..... triangulum pointiflagelleum
    B. Has a rounded nose ..... triangulum roundiflagelleum

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Answer Sheet

Choose any three of the species of **triangulum** from the Species Sheet and key them to their scientific names. Be sure to write in the numbers of the species that you are trying to identify. In the proper spaces below write in the number and letter (example #101) for each of the choices you made as you identified the species. When you are sure of the species identification, write in the scientific name in the space provided.



Scientific name of Example #101 = samplest correctus

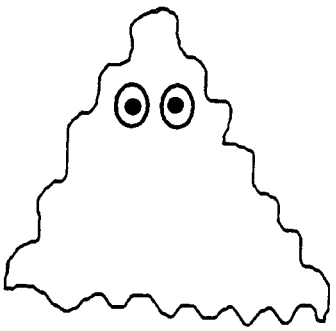
Scientific name of Species # _____ = _____

Scientific name for Species # _____ = _____

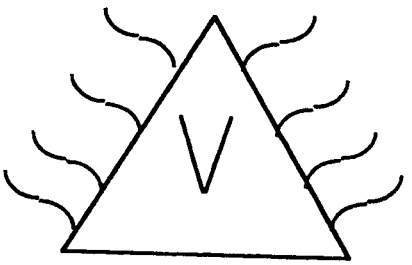
Scientific Name for Species # _____ = _____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

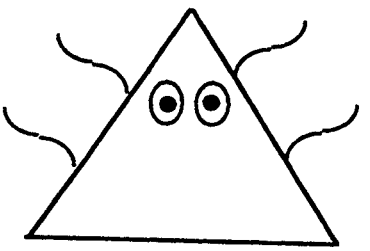
Species Sheet



#101



#105



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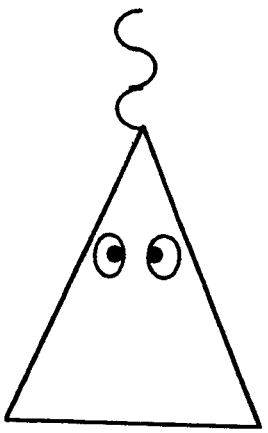

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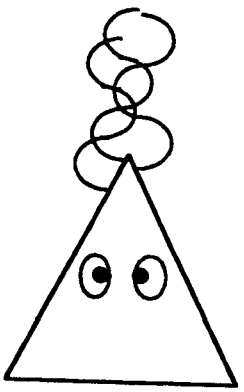

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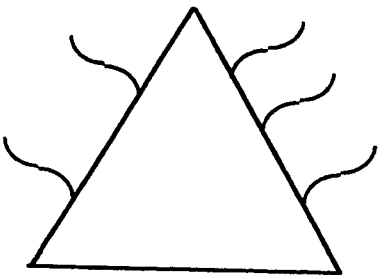

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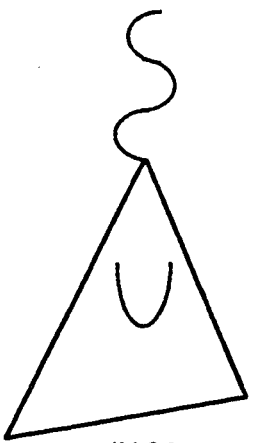

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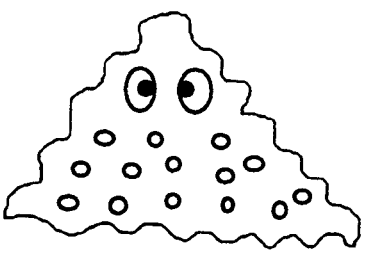

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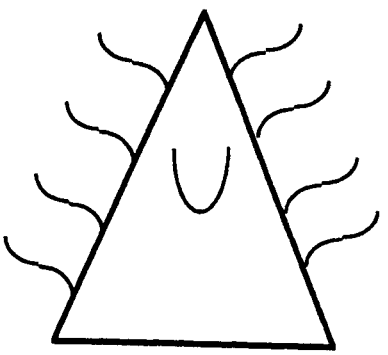

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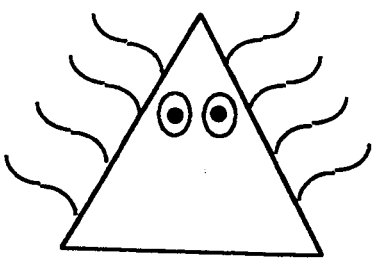

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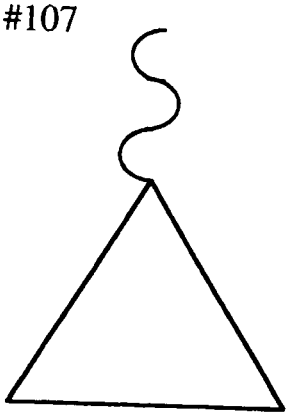

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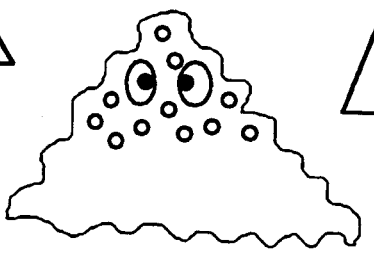

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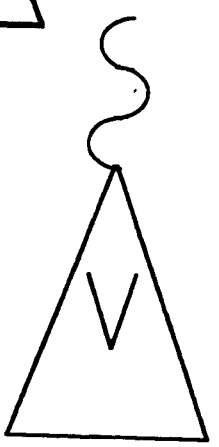


#112

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Dichotomous Key - Scoring Rubric

This activity is to be used as an assessment after the students have already been exposed to the use of a dichotomous key, and therefore know what the term dichotomous refers to, and how it is used. There are 13 species of Triangulum pictured; it is suggested that each student identifies any three of the species.

- 1 point is awarded for each correct choice made in the identification of each species.
- 1 point is awarded for each correct choice or step along the way.

The scoring of each species should continue until the last correct choice or step.

The Example given on the Student Answer Sheet (#101) would be awarded 3 points for a perfect answer. But if the student had only been able to reach choice 1B before making a mistake, only 1 point would be awarded.

Since a different number of choices is necessary to identify the different species, the students may end up with different total points. Therefore a percent grade should be given.

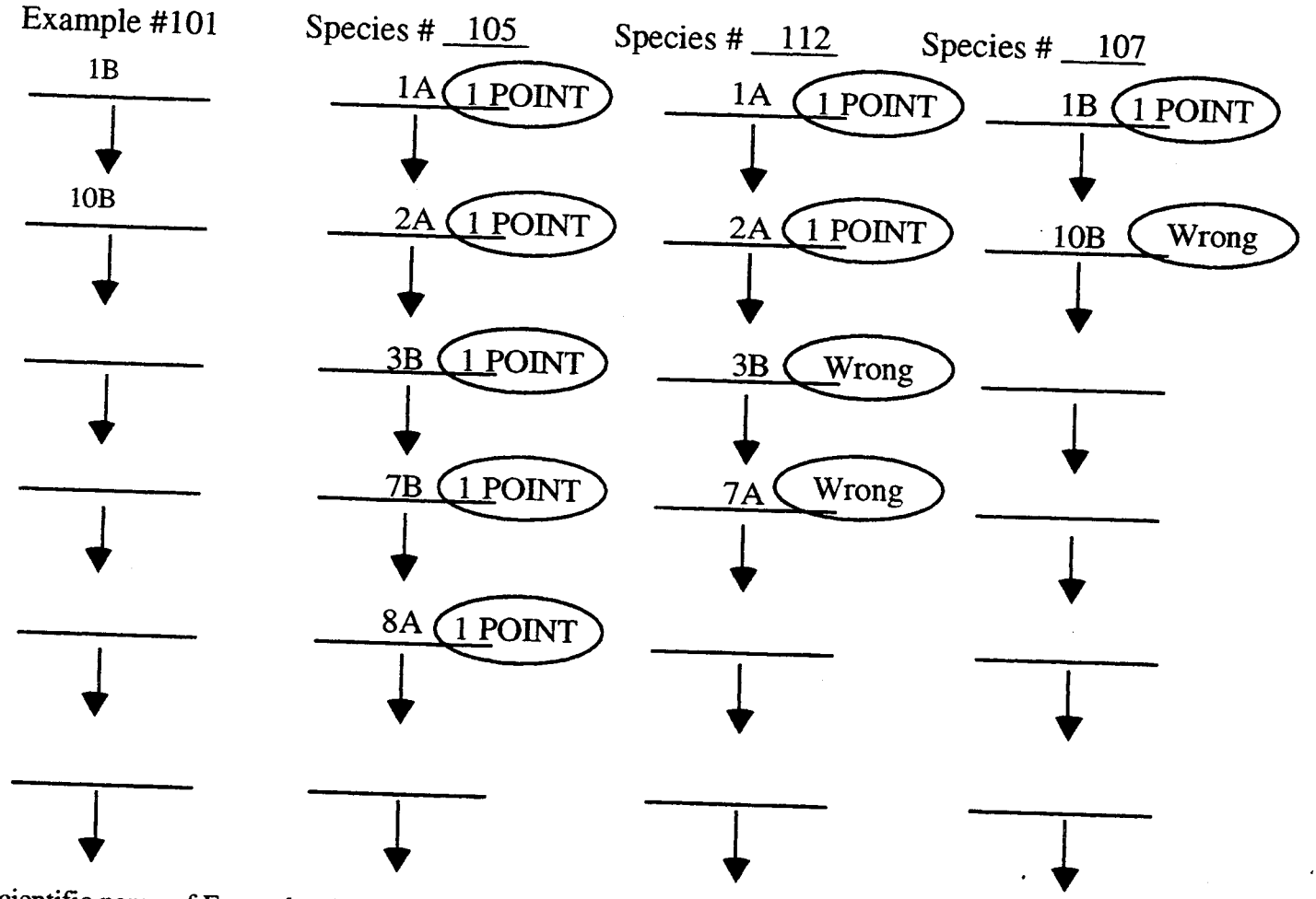
Total number of points for each species are given below, including the correct choice for each of the steps.

Species # 101	T. waveus (10B)	(1B - 10B)	3 points
Species # 102	T. monoflagelleum (6A)	(1A - 2B - 5B - 6A)	5 points
Species # 103	T. roundflagelleum (12B)	(1A - 2A - 3A - 4B - 12B)	6 points
Species # 104	T. polycilius (9B)	(1A - 2B - 5B - 9B)	5 points
Species # 105	T. pointiatus (8A)	(1A - 2A - 3B - 7B - 8A)	6 points
Species # 106	T. polyflagelleum (6B)	(1A - 2B - 5A - 6B)	5 points
Species # 107	T. ventridotteus (11A)	1B - 10A - 11A)	4 points
Species # 108	T. equalius (4A)	(1A - 2A - 3A - 4A)	5 points
Species # 109	T. biciliatus (9A)	(1A - 2B - 5B - 9A)	5 points
Species # 110	T. oddcilius (7A)	(1A - 2A - 3B - 7A)	5 points
Species # 111	T. roundiatus (8B)	(1A - 2A - 3B - 7B - 8B)	6 points
Species # 112	T. pointiflagelleum (12A)	(1A - 2A - 3A - 4B - 12A)	6 points
Species # 113	T. dorsalidotteus (11B)	1B - 10A - 11B)	4 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Sample Answer Sheet

Choose any three of the species of **Triangulum** from the Species Sheet and key them to their scientific names. Be sure to write in the numbers of the species that you are trying to identify. In the proper spaces below write in the number and letter (example #101) for each of the choices you made as you identified the species. When you are sure of the species identification, write in the scientific name in the space provided.



Scientific name of Example #101 = Samplest Correctus

1. Scientific name of Species #105 = Triangulum Pointiatus (1 POINT)
   Actual points = 6 Possible Points = 6
2. Scientific name for Species #112 = Triangulum oddcilius (Wrong)
   Actual Points 2 Possible points = 6
3. Scientific Name for Species #107 = Triangulum Waveus (Wrong)
   Actual Points 1 Possible Points = 4

Total actual points 9 Total possible points 16

$\frac{\text{Total actual points}}{\text{Total possible points}} \times 100 =$ 56 percent grade

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _#_____ Scoring Form - Dichotomous Key
Female / Male (Circle one)

Species #	Actual Points	Possible Points
Totals		

$$\frac{\text{Total Actual Points}}{\text{Total Possible Points}} \times 100 = \_\_\_\_\_$$ Percent Grade

---

Student ID _#_____ Scoring Form - Dichotomous Key
Female / Male (Circle one)

Species #	Actual Points	Possible Points
Totals		

$$\frac{\text{Total Actual Points}}{\text{Total Possible Points}} \times 100 = \_\_\_\_\_$$ Percent Grade

Student ID _# GS-10 #1 Scoring Form - Dichotomous Key
Female / (Male) (Circle one)

Species #	Actual Points	Possible Points
103	1	6
108	5	5
107	1	4
Totals	7	15

$\frac{7}{15}$ Total Actual Points X 100 = 47 Percent Grade
Total Possible Points

Student ID _# GS-17 #2 Scoring Form - Dichotomous Key
(Female) / Male (Circle one)

Species #	Actual Points	Possible Points
103	3	6
104	4	5
110	5	5
Totals	12	16

$\frac{12}{16}$ Total Actual Points X 100 = 75 Percent Grade
Total Possible Points

Student ID _# GS-02 #3 Scoring Form - Dichotomous Key
Female / Male (Circle one)

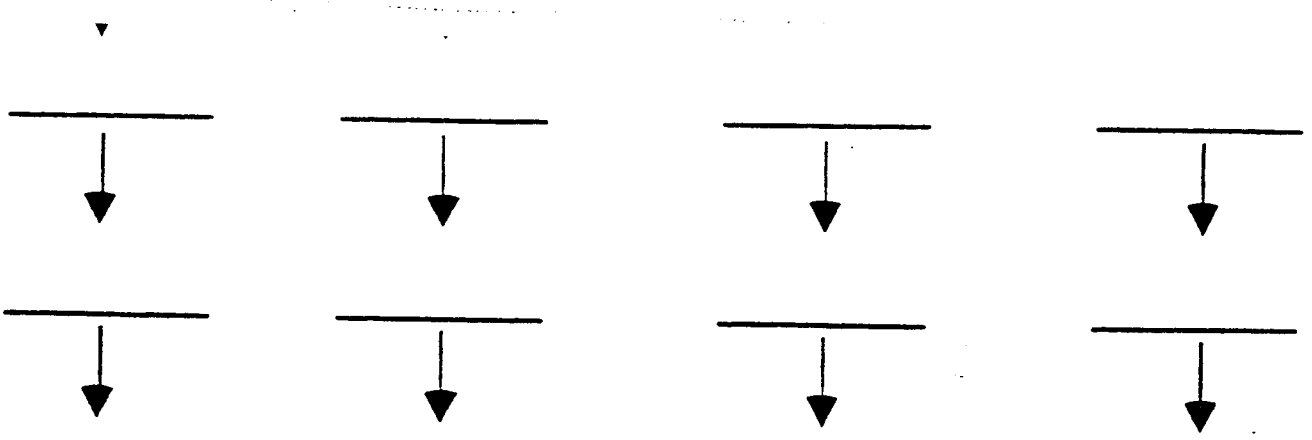
Species #	Actual Points	Possible Points
102	5	5
107	4	4
108	5	5
Totals	14	14

$\frac{14 \text{ Total Actual Points}}{14 \text{ Total Possible Points}} \times 100 = 100$ Percent Grade

Student ID _#_____ Scoring Form - Dichotomous Key
Female / Male (Circle one)

Species #	Actual Points	Possible Points
Totals		

$\frac{\text{Total Actual Points}}{\text{Total Possible Points}} \times 100 =$ _____ Percent Grade



Scientific name of Example #101 = Samplest Correctus

Scientific name of Species # 108 = Triangulum Equalius

Scientific name for Species # 1003 = Triangulum Roundiflagelleum

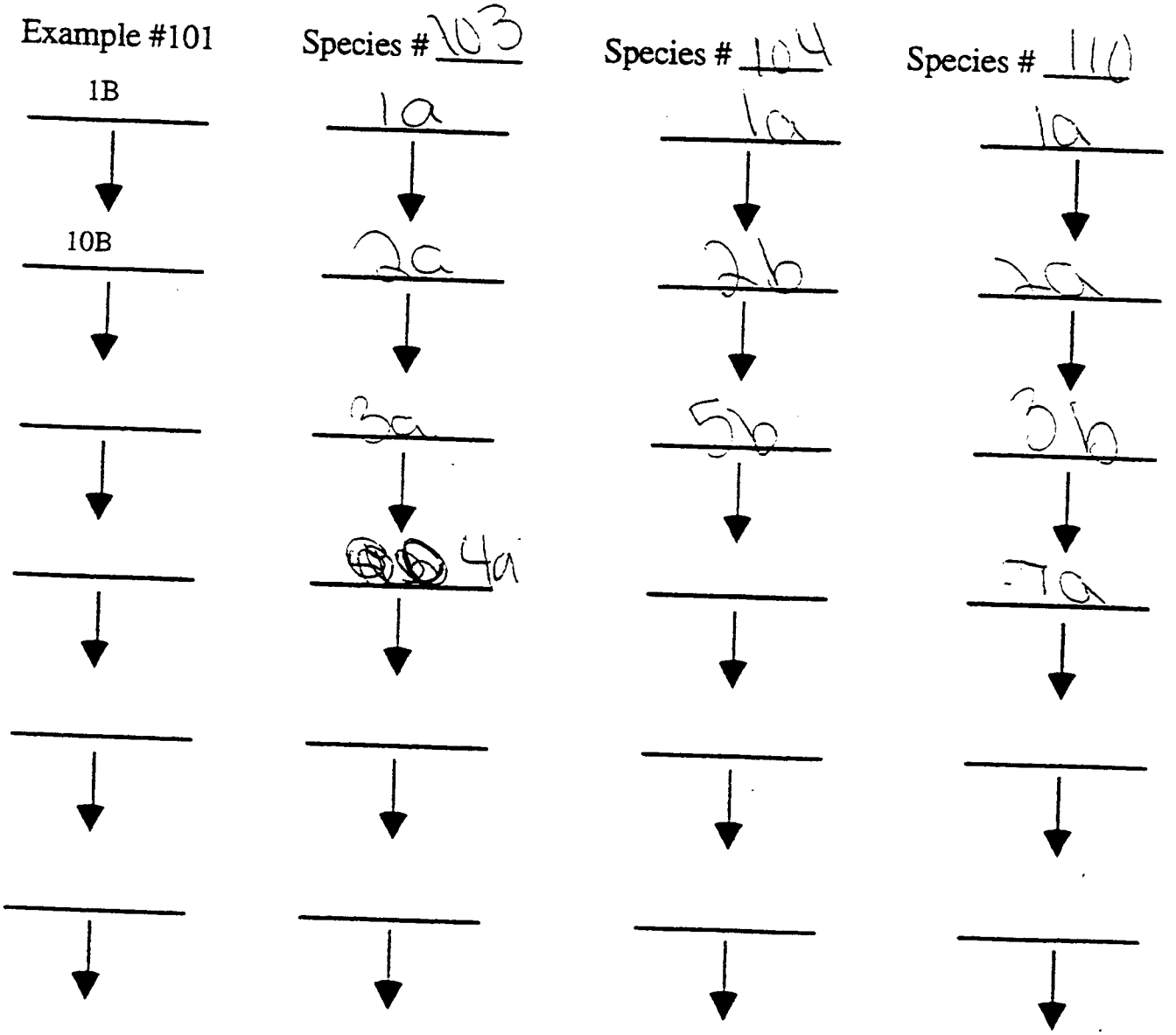
Scientific Name for Species # 107 = Triangulum Ventridotteus

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Answer Sheet

GS-17 #2

Choose any three of the species of **Triangulum** from the Species Sheet and key them to their scientific names. Be sure to write in the numbers of the species that you are trying to identify. In the proper spaces below write in the number and letter (example #101) for each of the choices you made as you identified the species. When you are sure of the species identification, write in the scientific name in the space provided.



Scientific name of Example #101 = Samplest Correctus

Scientific name of Species # 103 = Triangulum Equilitus

Scientific name for Species # 104 = Triangulum Poly Cilius

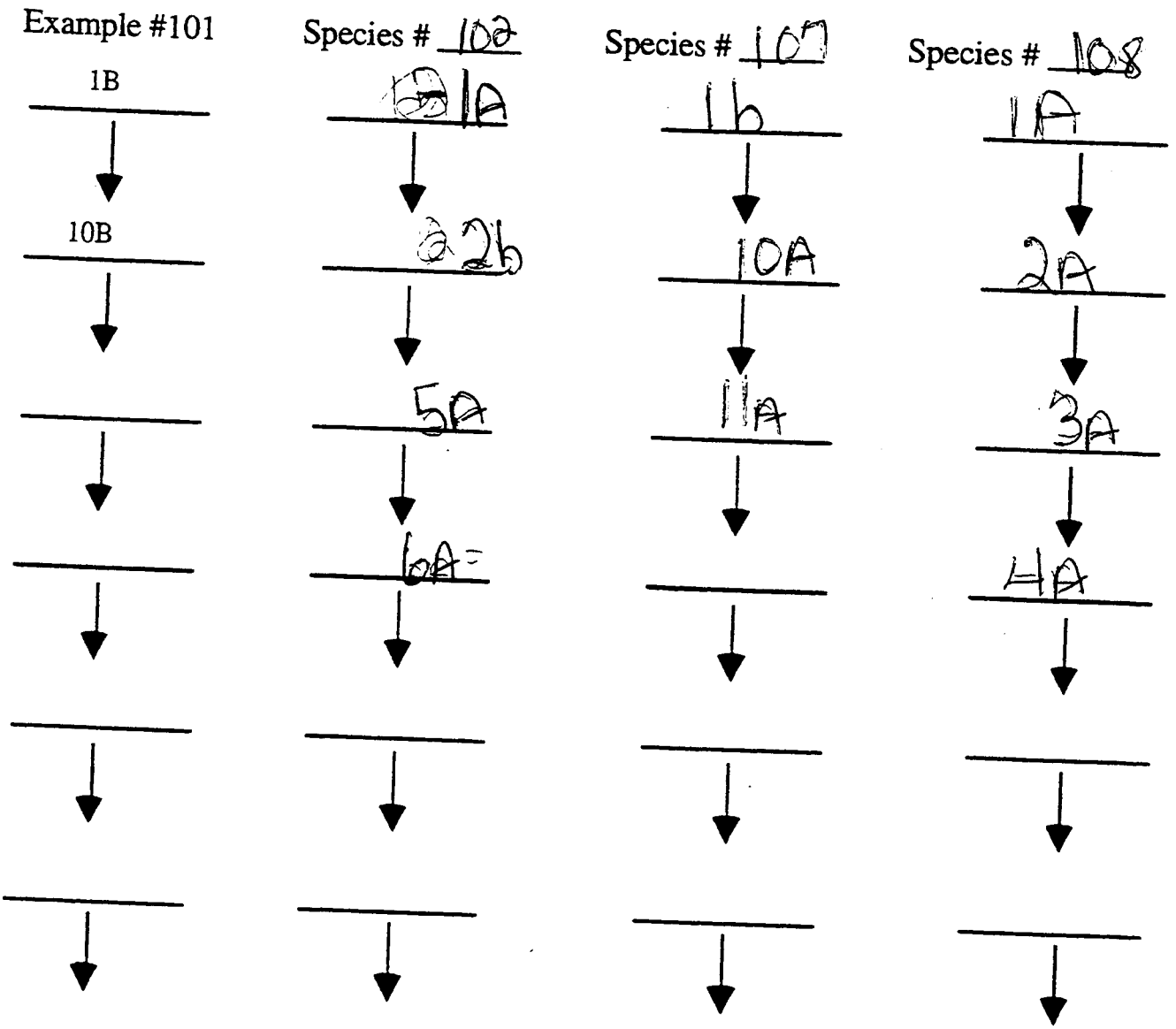
Scientific Name for Species # 110 = Triangulum odd cilius

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Answer Sheet

GS-02 #3

Choose any three of the species of **Triangulum** from the Species Sheet and key them to their scientific names. Be sure to write in the numbers of the species that you are trying to identify. In the proper spaces below write in the number and letter (example #101) for each of the choices you made as you identified the species. When you are sure of the species identification, write in the scientific name in the space provided.



Scientific name of Example #101 = Samplest Correctus

Scientific name of Species # 102 = Terngulum Mondflaggelum

Scientific name for Species # 107 = Triangulum Ventedotteus

Scientific Name for Species # 108 = Triangulum Equalius

rS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Height of Bounce
Task Information

Grade: 8th grade

Content: Physical Science G 1B1 Nature of Motion

Format: Manipulative

Purpose: Students will determine the relationship between the height of bounce of a ping-pong ball and the height from which it was dropped.

Skills:

Primary: Recording and Interpreting data
Secondary: Predicting

Time: 15 - 20 minutes

Materials:

Per student

- 1 ping-pong ball
- 1 box top fitted with a metric scale (0-45 cm)
- 3 books
- masking tape or duct tape

Preparation:

- The metric scale is attached to the outside of a large box top. A copy paper box works very well.
- Use adhesive metric tape or a tape measure for the scale
- The box top must be anchored to the workspace with books or tape before the students begin the task
- An acceptable range of answers for height of bounce needs to be established by the teacher before student testing. To establish ranges for the scoring rubric, testing should be done on the same surface and with the same equipment that the students will be using.
- See the scoring rubric for further clarification.

Safety:

- The ping pong balls will occasionally roll off of the work space. Instruct the students to retrieve them, but **not** to run or disturb others around them.
- Remind students **not** to throw ping-pong balls.

Extensions/Modifications:

- Instead of the box set up, a metric ruler may be taped to a vertical surface.

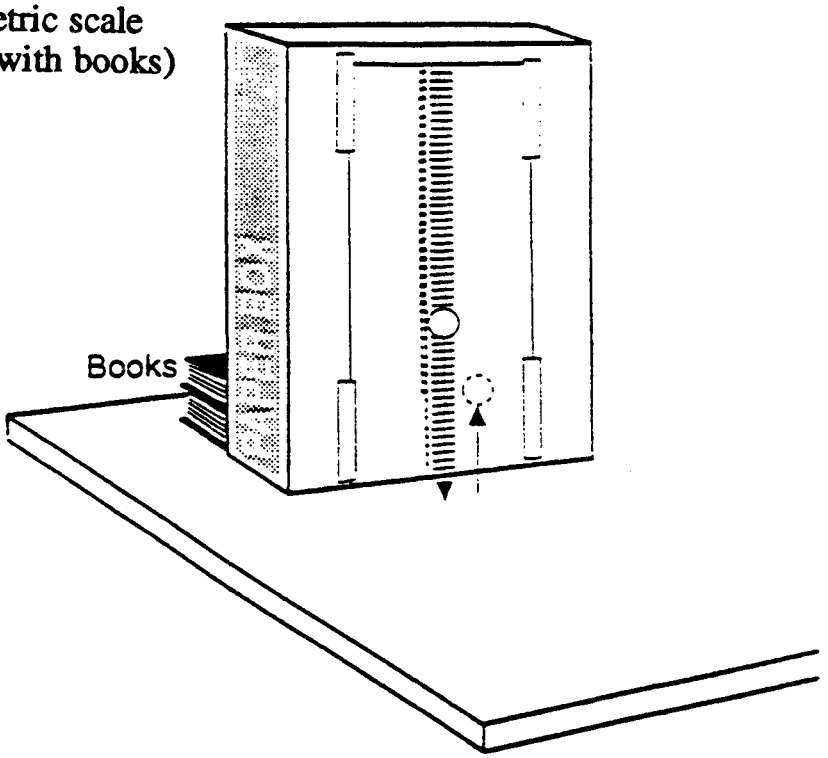
NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Height of Bounce

Task: At this station, you will be measuring the effect of height on the bounce of a ping pong ball.

Materials

- ping pong ball
- 1 box top fitted with a metric scale (taped down or balanced with books)
- calculator



Directions

1. Check to see that your materials are set up as shown in the diagram above.
2. Before you begin your task, follow the directions inside the box:

> For practice, release the ball from any point on the scale and determine the height to which it bounces. The "height of bounce" is the distance from the table top to the **bottom** of the ball on the first bounce. (Practice a few times to make an accurate observation.

3. **Your task:** Hold the ball near the scale on the box so that the bottom of the ball is level with the 10 centimeter mark. Release the ball and observe how high it bounces.
4. Record the height that the ball bounced in trial 1 on the data table. Round your answer to the nearest whole number of centimeters.
5. Repeat steps 3 and 4 for release heights of 20 cm, 30 cm, and 40 cm.

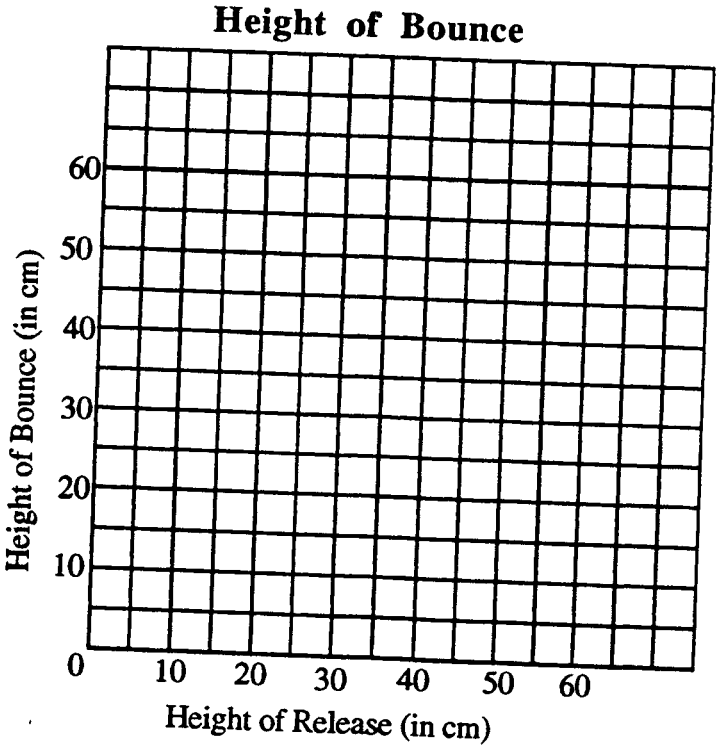
Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Data Table: Height of Bounce (in cm)

Height of Release	Trial 1	Trial 2	Trial 3	Average
10 cm				
20 cm				
30 cm				
40 cm				

6. Use the average data from your data table to construct a graph on the grid below. Connect the points to make a line graph.



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NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

7. Based on your observations, write a generalized statement describing the relationship between the height of release and the height of bounce of a ping-pong ball.

8. If you were able to bounce this ball from a height of 60 cm, how high (in centimeters) would you predict that the ball would bounce?

In the space below, explain how you used your data to make this prediction.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Height of Bounce - Scoring Rubric

Maximum score - 13 points

Questions 4. and 5. Height of bounce data table. **3 points total**

Height of Release	Height of Bounce (in centimeters)
10 cm	*3 - 6 cm*
20 cm	*10 - 18 cm*
30 cm	*15 -25 cm*
40 cm	*20 - 30 cm*

*** The ranges for height of bounce in the table are examples only.

Point Criteria:

- Allow 1 point for correctly averaging and rounding at least 3 of the 4 distances.
- Allow 1 point for data collection taken three times (3 trials).
- Allow 1 point for data showing height of bounce within the acceptable range in at least 3 of 4 releases.

*** The ranges in the table above are examples. Teachers should determine their own acceptable range for height of bounce before students do their testing.
To establish ranges, testing should be done on the same surface and with the same equipment that the students will be using.

Question 6. Graph of data. **5 points total**

Point Criteria:

- Allow 1 point for each data point plotted to an accuracy of +/- 0 cm "height of release," and +/- 2 cm "height of bounce" based on student's data.
- Allow 1 point for plotted points connected properly

Question 7. Relationship between bounce and release heights. **2 points total**

Point Criteria:

- Allow two points if the student states a directly proportional relationship between the height of bounce and the height of release.
  Possible answers:
  - As the height of release increases, the height of bounce increases.
  - The higher I release the ball, the higher the height of bounce.
  - The lower the height of release, the lower the height of bounce.
  - The height of bounce is approximately $1/2$ to $3/4$ that of the height of release.
  - The height of the release was higher than the height of bounce.
  - The height of the release is larger than the bounce.
  - The higher you drop the ball the further away the bounce was from the height you dropped it from.
- Allow one point (partial credit) if the student states the relationship only in terms of his/her own data.
  Possible answers:
  - A ball dropped from 40 cm bounces higher than a ball dropped from 10 cm.
  - A ball dropped from 40 cm bounces up to 30 cm high (or student's own data)

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Question 8. Predict the bounce height for release of 60 cm **3 points total**

Point Criteria:

- Allow 1 point if the student successfully predicts a bounce height between 30 - 45 cm**
  ** This range is an example. The teacher should establish an acceptable range for this height of bounce also.
  - Accept a student's prediction if supported by his/her graph.
- Allow 2 points if the student explains his/her prediction using the data collected.
  - I extended the line on my graph and observed where it crossed over the 60 cm release point.
  - Since the heights of bounce were approximately $1/2$ to $3/4$ the height of release, a ball dropped from 60 cm would bounce 30 - 40 cm.
- Allow 1 point if the student implies or states that he/she tested a ball drop from 60 cm.

Highest possible score - 13 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Scoring Form - Height of Bounce**

Male or Female (circle one

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
4. & 5 Bounce Data Table		
3 trials completed	0 1	
Average	0 1	_____
Data within range	0 1	
6. Graph		
10 cm plot	0 1	
20 cm plot	0 1	
30 cm plot	0 1	
40 cm plot	0 1	_____
overall (connected) plot	0 1	
7 Stated Relationship	0 1 2	_____
8. Extrapolation to 60 cm		
Predicted height	0 1	
Explanation	0 1 2	_____

Total Score _____

Total possible score - 13 points

Student ID GMS27 (Male) or Female (circle one)

Height of Bounce

Scoring Form (Maximum Score = 14 points)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
4. and 5. Bounce Data Table		
10 cm release	0 (1)	
20 cm release	0 (1)	4
30 cm release	0 (1)	
40 cm release	0 (1)	
6. Graph		
10 cm plot	(0) 1	
20 cm plot	(0) 1	
30 cm plot	(0) 1	0
40 cm plot	(0) 1	
Overall (connected) plot	(0) 1	
7. Stated Relationship	0 (1) 2	1
8. Extrapolation to 60 cm		
Predicted height	(0) 1	0
Explanation	(0) 1 2	

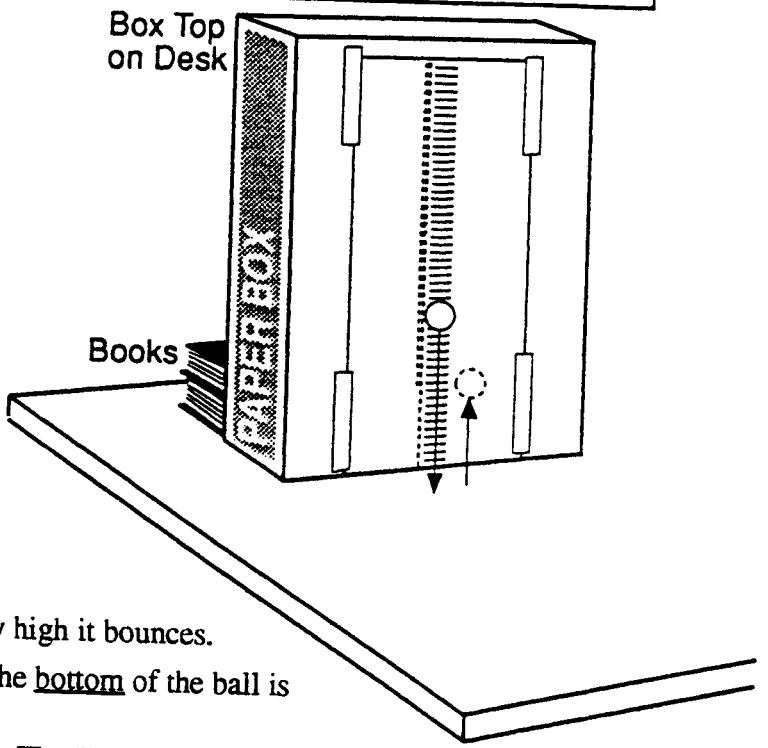
Total Score 5

Height of Bounce

Task: At this station, you will be measuring the height that a ping pong ball bounces when dropped from several different heights.

MATERIALS:

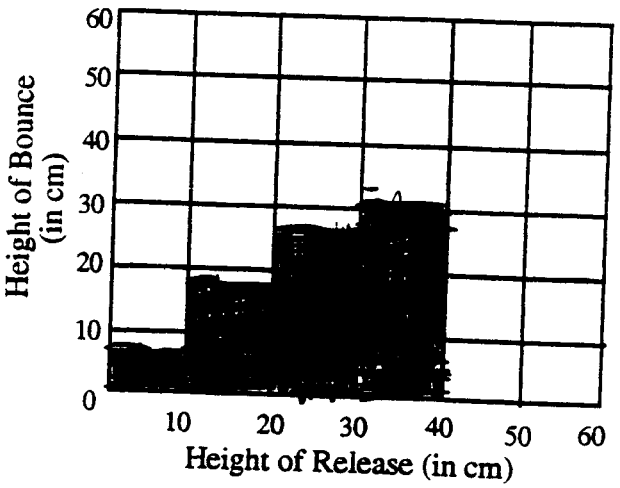
1 ping pong ball
1 box top with metric measurements,
(taped down or balanced with books)
calculator



DIRECTIONS:

1. Drop the ball from any height and observe how high it bounces.
2. Hold the ball near the scale on the box so that the bottom of the ball is level with the 10 centimeter mark.
3. Drop the ball and observe how high it bounces. The "height of bounce" is the distance from the table top to the bottom of the ball on the first bounce. (Practice a few times to make an accurate observation.
4. Record the height that the ball bounced on the data table. Round your answer to the nearest whole number.
5. Repeat steps 2 - 4 for release heights of 20 cm, 30 cm, and 40 cm.
6. Plot your results. Connect the points.

Height of Release	Height of Bounce (in centimeters)
10 cm	9.5
20 cm	18.3
30 cm	27
40 cm	30.1



NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

7. Based on your observations, write a generalized statement describing the relationship between the height of release and the height of bounce of a ping-pong ball.

I held the ball at the right number and I let it go' it didn't go as high

8. If you were able to bounce this ball from a height of 60 cm, how high (in centimeters) would you predict that the ball would bounce?

about 49 cm

In the space below, explain how you used your data to make this prediction.

I watched each and every time I droped The ball and there it went less and less So I hypothesized 49 cm

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID GMS 30 Male or Female (circle one)

Height of Bounce

Scoring Form (Maximum Score = 14 points)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
4. and 5. Bounce Data Table		
10 cm release	0 (1)	
20 cm release	0 (1)	4
30 cm release	0 (1)	
40 cm release	0 (1)	
6. Graph		
10 cm plot	(0) 1	
20 cm plot	(0) 1	
30 cm plot	(0) 1	1
40 cm plot	(0) 1	
Overall (connected) plot	0 (1)	
7. Stated Relationship	(0) 1 2	0
8. Extrapolation to 60 cm		
Predicted height	(0) 1	1
Explanation	0 (1) 2	

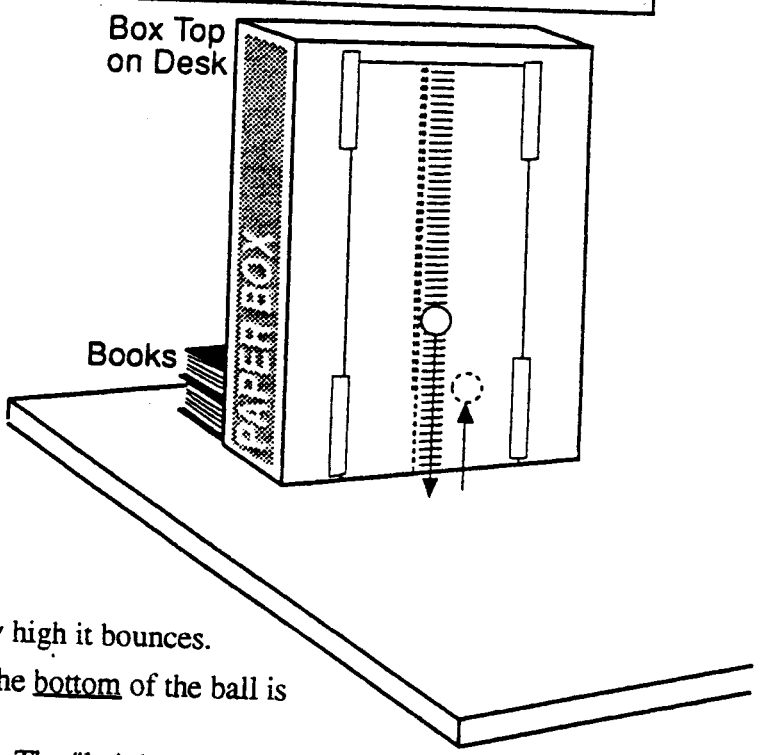
Total Score 6

Height of Bounce

Task: At this station, you will be measuring the height that a ping pong ball bounces when dropped from several different heights.

MATERIALS:

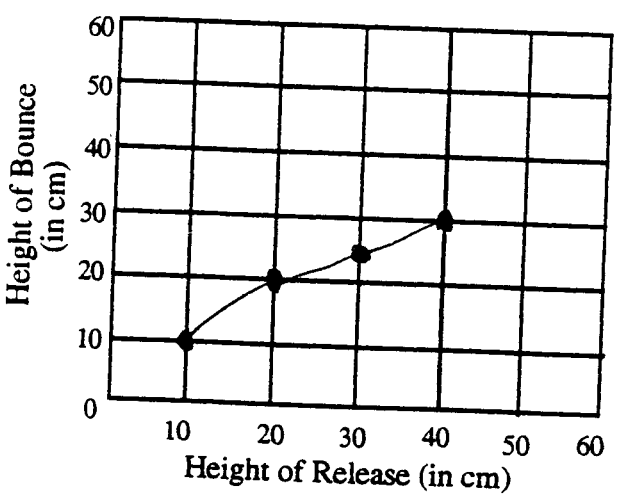
1 ping pong ball
1 box top with metric measurements,
(taped down or balanced with books)
calculator



DIRECTIONS:

1. Drop the ball from any height and observe how high it bounces.
2. Hold the ball near the scale on the box so that the bottom of the ball is level with the 10 centimeter mark.
3. Drop the ball and observe how high it bounces. The "height of bounce" is the distance from the table top to the bottom of the ball on the first bounce. (Practice a few times to make an accurate observation.
4. Record the height that the ball bounced on the data table. Round your answer to the nearest whole number.
5. Repeat steps 2 - 4 for release heights of 20 cm, 30 cm, and 40 cm.
6. Plot your results. Connect the points.

Height of Release	Height of Bounce (in centimeters)
10 cm	8cm=10
20 cm	19cm=20
30 cm	26cm=30
40 cm	30cm



NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

7. Based on your observations, write a generalized statement describing the relationship between the height of release and the height of bounce of a ping-pong ball.

The lower you bounced the ball from the higher it would bounce. When you bounce the ball from 40cm it will not bounce as high

8. If you were able to bounce this ball from a height of 60 cm, how high (in centimeters) would you predict that the ball would bounce?

50 cm

In the space below, explain how you used your data to make this prediction.

I figured that if the height was 30cm when droped from 40cm, then 50 would be 40cm, and 60cm would be 50cm.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID GMS 22 (Male) or Female (circle one)

Height of Bounce

Scoring Form (Maximum Score = 14 points)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
4. and 5. Bounce Data Table		
10 cm release	0 (1)	
20 cm release	0 (1)	4
30 cm release	0 (1)	
40 cm release	0 (1)	
6. Graph		
10 cm plot	0 (1)	
20 cm plot	0 (1)	
30 cm plot	0 (1)	5
40 cm plot	0 (1)	
Overall (connected) plot	0 (1)	
7. Stated Relationship	0 (1) 2	1
8. Extrapolation to 60 cm		
Predicted height	0 (1)	3
Explanation	0 1 (2)	

Total Score 13

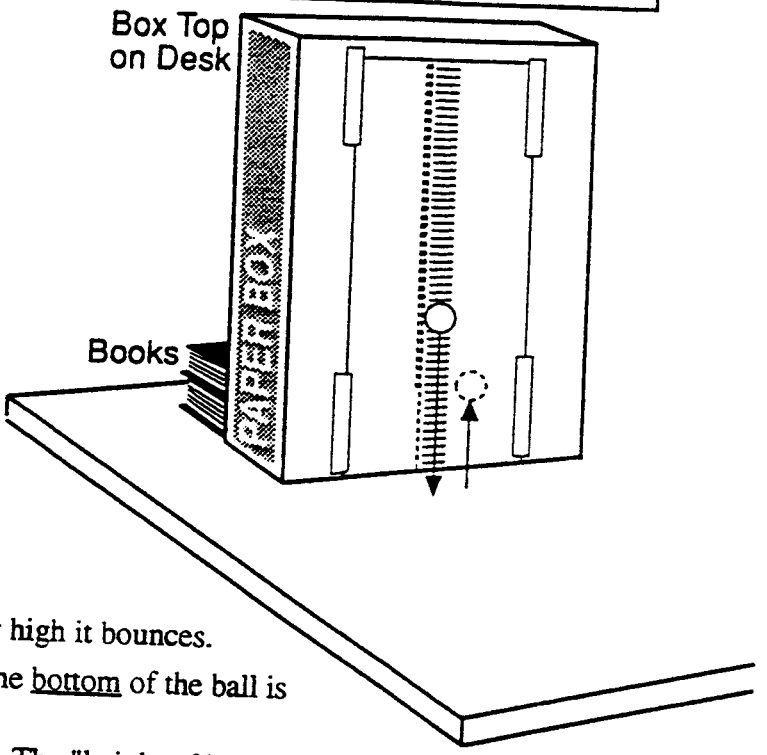
Height of Bounce

Task: At this station, you will be measuring the height that a ping pong ball bounces when dropped from several different heights.

3

MATERIALS:

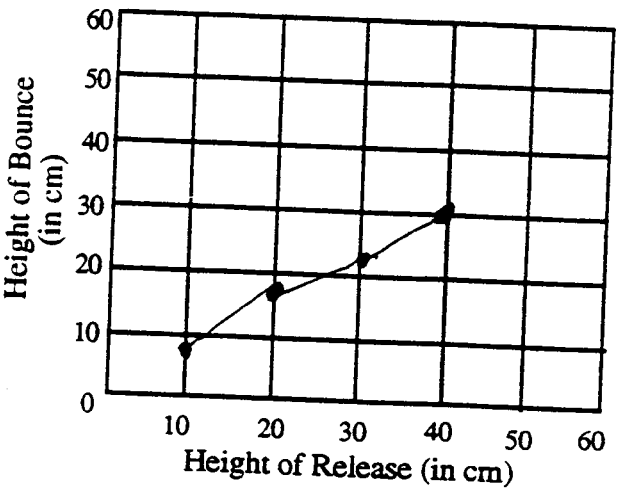
1 ping pong ball
1 box top with metric measurements,
(taped down or balanced with books)
calculator



DIRECTIONS:

1. Drop the ball from any height and observe how high it bounces.
2. Hold the ball near the scale on the box so that the bottom of the ball is level with the 10 centimeter mark.
3. Drop the ball and observe how high it bounces. The "height of bounce" is the distance from the table top to the bottom of the ball on the first bounce. (Practice a few times to make an accurate observation.
4. Record the height that the ball bounced on the data table. Round your answer to the nearest whole number.
5. Repeat steps 2 - 4 for release heights of 20 cm, 30 cm, and 40 cm.
6. Plot your results. Connect the points.

Height of Release	Height of Bounce (in centimeters)
10 cm	8 cm
20 cm	16 cm
30 cm	22 cm
40 cm	30 cm



NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

7. Based on your observations, write a generalized statement describing the relationship between the height of release and the height of bounce of a ping-pong ball.

for each 10 cm greater the ball Respond with 8 more cm to eac one. E 10-8, 20-16, 30-22 70-30

8. If you were able to bounce this ball from a height of 60 cm, how high (in centimeters) would you predict that the ball would bounce?

46 cm

In the space below, explain how you used your data to make this prediction.

Same As question No. 7

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Probing Under the Surface
Task Information

Grade: 8th grade

Content:

- Middle Level Block D - IF3 Topographic Maps
- MST Framework Standard 2 Systems Modeling (Descriptive Modeling)

Format: Manipulative

Purpose:

- To use a simple instrument to measure, record, and draw inferences about a hidden surface.

Skills:

Primary: Observing, measuring, generalizing/inferring
Secondary: Interpreting data, predicting

Time: 20 minutes

Materials:

per Student:

- measuring stick
- mystery box

Preparation:

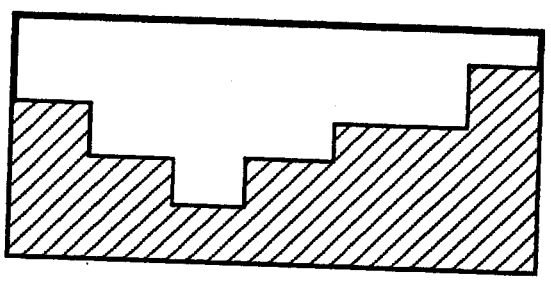
- **Measuring Stick:**
  - use a small wooden dowel 1/8" - 1/4" in diameter and at least 5 cm longer than the box height.
  - marked off in centimeters and label 0 - 15.
  - mark the dowel with a fine line permanent marker
- **Mystery Box:**
  - use a regular size shoe box.
  - cut and/or shape Styrofoam blocks to different levels. A handy knife or coarse file will do this. See diagrams below.
  - boxes must be all the same **or** labeled to match student papers with an answer key.
  - glue Styrofoam blocks at 3 or 4 different levels inside the bottom of the box
  - cover the tops of the Styrofoam blocks with tag board (duct tape). This keeps the measuring stick from poking into the Styrofoam.
  - the depth between hole three (3) and hole five (5) should show significant changes.
  - on the top of the box, place a row of 10 (ten) equally distant dots.
  - number the dots 1 - 10

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

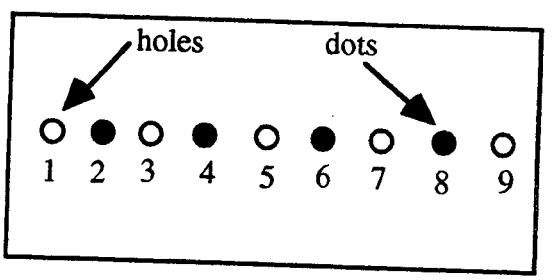
- use a drill or sharp pair of scissors to poke holes through the top of the box on the **odd numbered dots.**
- Be sure that the holes are large enough for the measuring stick to fit through. but not so large that you can see into the box.
- Seal the edges of the box top on the box with clear packing tape.
- The students should not be able to see inside the box at all during the experiment.
- measure and record the actual depth reading of each box to serve as the answer key.

Sample Mystery Box Diagram:

(side view - inside of shoe box)



(top view)



Extensions/Modifications:

- Students may wish to design their own hidden surfaces.

Safety:

- Watch that the students don't push the probe down too hard, causing the base to puncture or split.

Credit/Source: Project Aims Activities in integrating math and science

Probing Under the Surface

Task: At this station, you will be using a measuring stick to determine the shape of the inside bottom of a box.

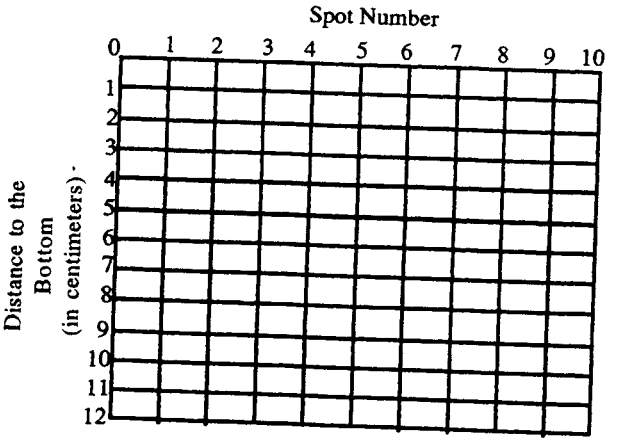
Materials:

- 1 measuring stick
- 1 mystery box

Directions:

1. Slide the measuring stick straight down into each spot marked on the box lid.
2. Measure the distance to the inside bottom of the box from each spot.
3. Record your measurements on the data table.
4. Place points on the graph representing the distance to the inside bottom of the box.
5. Connect the dots to make a line graph.

Spot Number	Distance to the Bottom of the Box (in centimeters)
1	
3	
5	
7	
9	



6. What does the graph indicate about the shape of the inside bottom of the box?

_____

_____

7. Based on your graph, predict what the depth is to the inside bottom of the box at spot 4.

_____

In the space below, explain the reason for your answer.

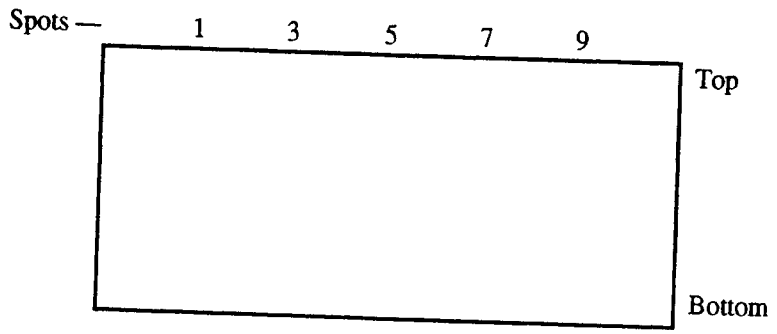
_____

_____

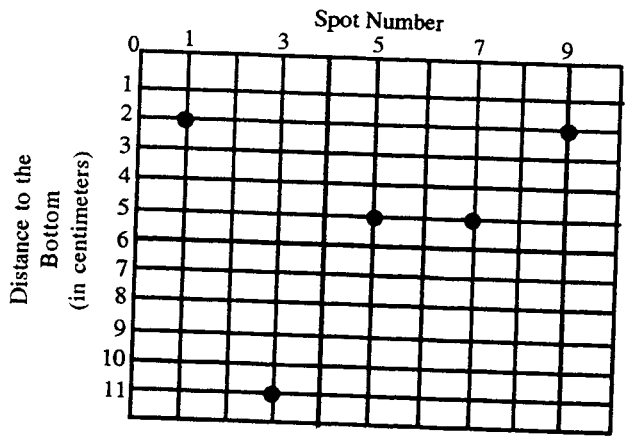
Please Continue on the Next Page

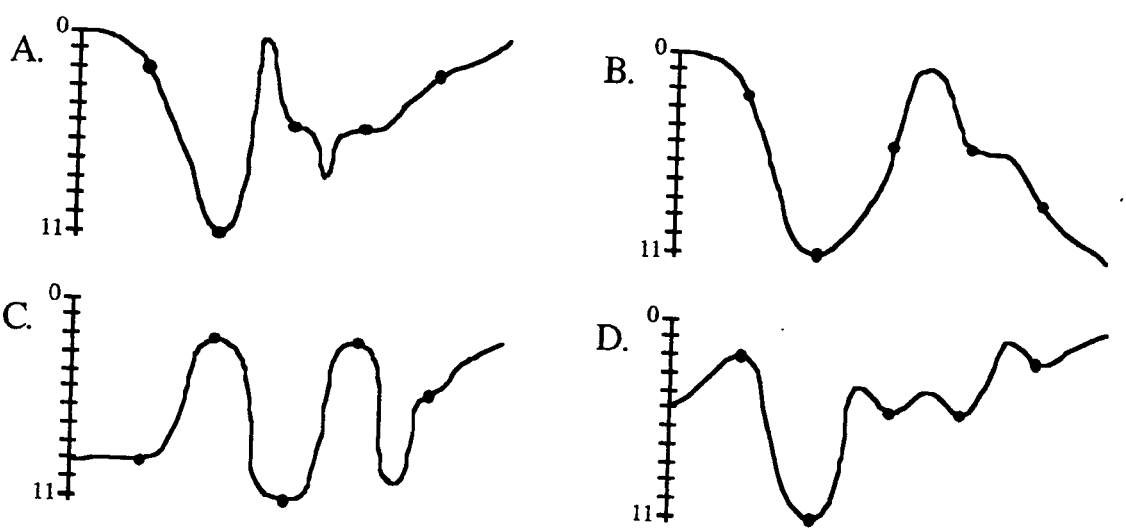
NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

8. In the space below, make a drawing of what you think the inside bottom of the box looks like.



9. Below is a set of observations made on **another box**. Which of the drawings could represent the shape of the inside bottom of the box? (Circle the letters of as many choices that could be possible.)





Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

10. Two students performed a similar activity with the same mystery box that you used. Roberto used a probe that was 4 cm long and Susan used a probe that was 8 cm long. Compare the results that Susan and Roberto would have obtained about the shape of the inside bottom of the box.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Probing Under The Surface - Scoring Rubric

Maximum Score 24 points

Tasks 1 & 2 - Directions

No credit

Task 3. Data Table

7 points total

Standard: The student will measure the distance to the bottom of the box and record these data accurately and precisely in a data table.

Criteria

A. 1 point for **each** of the five correct measurements (+/- 1.0 cm. of teacher's value)

B. 1 point if **all** measurements are rounded to the nearest tenth of a centimeter.

C. 1 point if **all** of the measurements are labeled with the correct units.

4 & 5 Graph

6 points total

Standard: The student will use the data from his/her table to draw a graph representing a profile of the surface of the bottom of the box.

Criteria

A. Allow 1 point for **each** of the five correctly plotted points

B. 1 point if the line is correctly drawn.
Dot to dot **or** best fit curve may be acceptable.

Question 6 Shape description

2 points total

Standard: The student will describe the shape of the bottom of the box using his/her data to draw inferences about the profile of an unobservable surface.

Criteria

- 2 points if the statement is descriptive and is generally consistent with the table and graph.
- 1 point if the statement is partially correct.

Question 7 Estimation

4 points total

Standard: The student will predict the elevation of an unknown value between two known values, and justify that prediction. The prediction should be based on the student's graph

Criteria

A. 2 points for correctly estimating the value and unit at spot four (4), based on their line graph - +/- 0.1 cm
1 point for correct value +/- 0.2 cm.

B. 2 points for a reasonable explanation for their prediction.
1 point for a partial explanation of prediction.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Question 8 Model drawing

1 point total

Standard: The student will draw a two dimensional representation of the bottom of the box based on their data.

Criteria

- 1 point for a drawing which matches the graph in #3.

Question 9 Select drawing

2 points total

Standard: The student will interpret the data from the graph to make an accurate inference.

Criteria

- 2 points if both and only graphs A & D are selected.
- 1 point if only graph A or D is selected, with no incorrect selections.
- 1 point if both graphs A or D are selected, and one additional incorrect selection is made.
- 0 points if 2 incorrect graphs are selected.

Question 10 Explanation of limited stick

2 points total

Standard: The student will explain the results of the limits of measurement

Criteria

- 2 points if a logical explanation is given that the graph would reflect the lack of data below the limits of the measuring stick.
- 1 point for a partial explanation.

Highest possible score - 24 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ Scoring Form - Probing Under the Surface
Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. & 2. No credit

3. Data table

A. Recorded each correct measurement	0	1	2	3	4	5
B. Record all measurements to the nearest tenth of a centimeter	0	1				
C. Labeled all measurements with correct units	0	1				

4. & 5. Graph

A. Points correctly plotted	0	1	2	3	4	5
B. Line correctly drawn	0	1				

6. Shape Description	0	1	2
7. Estimation			
A. Value of depth and units	0	1	2
B. Reasonable explanation	0	1	2
8. Model Drawing	0	1	
9. Select Drawing	0	1	2
10. Explanation of Limited Stick	0	1	2

Total Score _____
Total possible score - 24

Student ID 8-TS3-35 **Scoring Form - Probing Under the Surface** #1
Male or (Female) (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. & 2. No credit

3. Data table

A. Recorded each correct measurement	0	1	2	(3)	4	5
B. Record all measurements to the nearest tenth of a centimeter	(0)	1				
C. Labeled all measurements with correct units	0	(1)				

4. & 5. Graph

A. Points correctly plotted	0	1	2	3	4	(5)
B. Line correctly drawn	0	(1)				

6. Shape Description 0 1 (2)

7. Estimation

A. Value of depth and units	0	1	(2)
B. Reasonable explanation	0	(1)	2

8. Model Drawing (0) 1

9. Select Drawing 0 (1) 2

10. Explanation of Limited Stick (0) 1 2

Total Score 16
Total possible score - 24

8-+S3-35 #1

Probing Under the Surface

Task: At this station, you will be using a measuring stick to determine the shape of the inside bottom of a box.

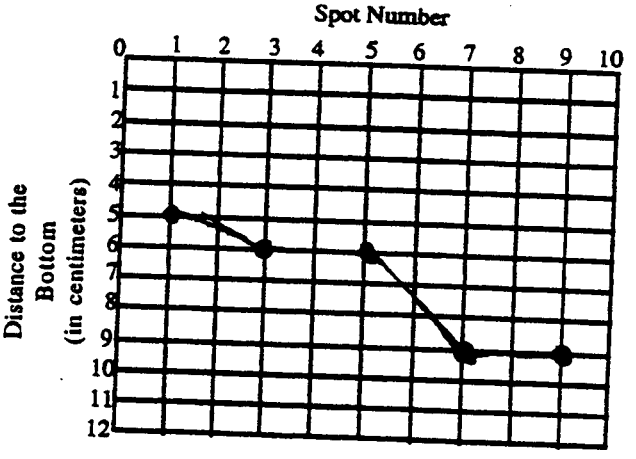
MATERIALS

1 measuring stick
1 mystery box

DIRECTIONS

1. Slide the measuring stick straight down into each spot marked on the box lid.
2. Measure the distance to the inside bottom of the box from each spot.
3. Record your measurements on the data table.
4. Place points on the graph representing the distance to the inside bottom of the box.
5. Connect the dots to make a line graph.

Spot Number	Distance to the Bottom of the Box (in centimeters)
1	5cm
3	6 cm
5	6 cm
7	9 cm
9	9 cm



6. What does the graph indicate about the shape of the inside bottom of the box?

It indicates that as you move down the box it gets deeper Or it stays the same.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

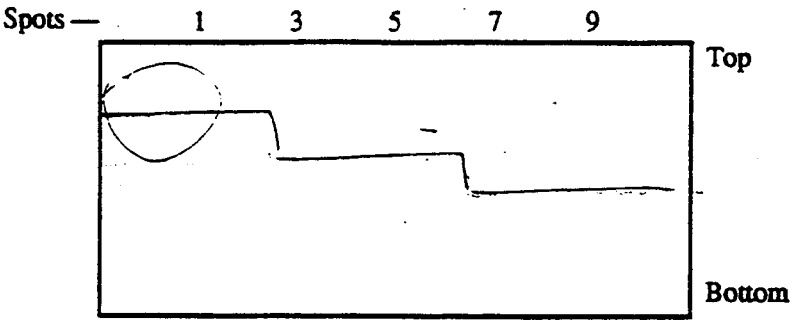
#1

7. Based on your graph, predict what the depth is to the inside bottom of the box at spot 4.

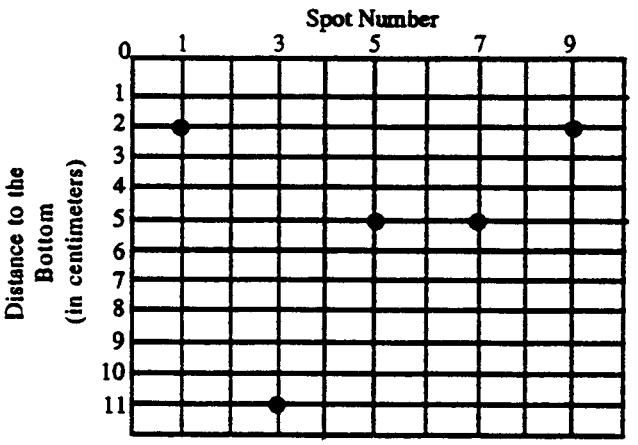
6 cm Explain how you got your answer in the space below.

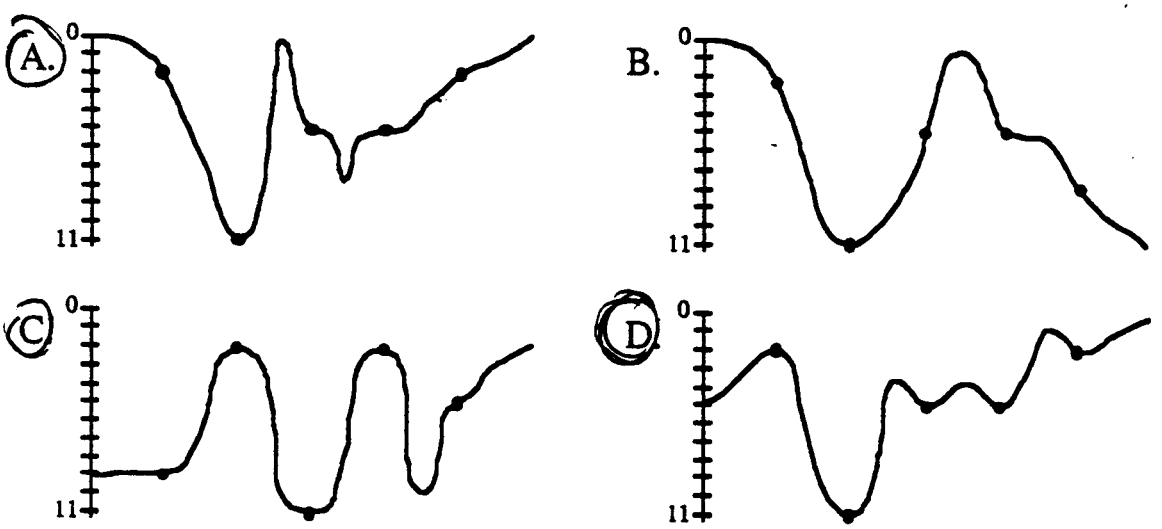
I got this answer because the graph shows that the box gets deeper or stays the same so I think it would stay the or the depth of the box would be lower

8. In the space below, make a drawing of what you think the bottom of the box looks like.



9. Below is a set of observations made on another box. Which of the drawings could represent the shape of the inside bottom of the box? (Circle the letters of as many choices that could be possible.)





NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#1

10. Two students performed a similar activity with the same mystery box that you used. Roberto used a probe that was 4 cm long and Susan used a probe that was 8 cm long. Compare the results that Susan and Roberto would have obtained about the shape of the inside bottom of the box.

Susan's box was deeper and Roberto's was swallower

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID 8+53-67 **Scoring Form - Probing Under the Surface** 412

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. & 2. No credit

3. Data table

A. Recorded each correct measurement	0	1	2	3	4	(5)
B. Record all measurements to the nearest tenth of a centimeter	0	(1)				
C. Labeled all measurements with correct units	0	(1)				

4. & 5. Graph

A. Points correctly plotted	0	1	2	3	4	(5)
B. Line correctly drawn	0	(1)				

6. Shape Description	0	1	(2)	
7. Estimation				
A. Value of depth and units	0	1	(2)	
B. Reasonable explanation	0	1	(2)	
8. Model Drawing	0	(1)		
9. Select Drawing	0	(1)	2	
10. Explanation of Limited Stick	(0)	1	2	→ didn't see or do

Total Score 21

Total possible score - 24

8th 53-67 #2

Probing Under the Surface

Task: At this station, you will be using a measuring stick to determine the shape of the inside bottom of a box.

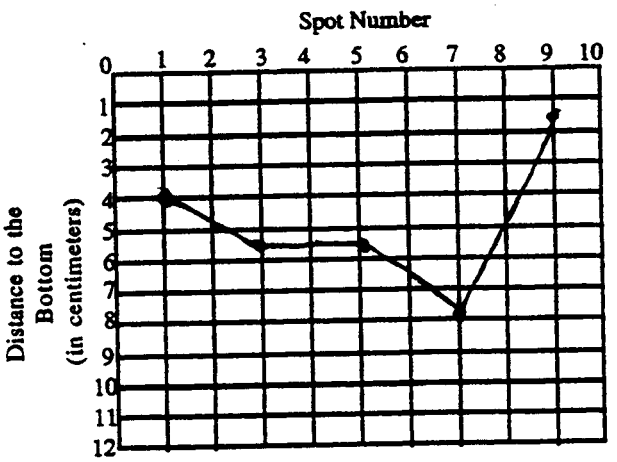
MATERIALS

1 measuring stick
1 mystery box

DIRECTIONS

1. Slide the measuring stick straight down into each spot marked on the box lid.
2. Measure the distance to the inside bottom of the box from each spot.
3. Record your measurements on the data table.
4. Place points on the graph representing the distance to the inside bottom of the box.
5. Connect the dots to make a line graph.

Spot Number	Distance to the Bottom of the Box (in centimeters)
1	4 cm
3	5½ cm
5	5½ cm
7	8 cm
9	11 cm.



6. What does the graph indicate about the shape of the inside bottom of the box?

The graph indicates that the shape of the box inside is no all even the front is higher than the middle the end is very high.

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NSF Grant #MDR-9154506

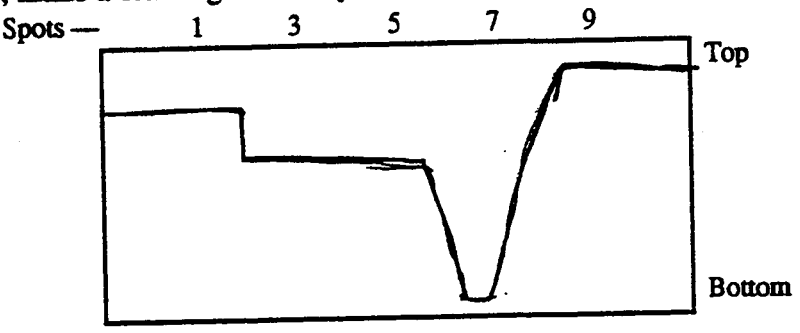
#2

7. Based on your graph, predict what the depth is to the inside bottom of the box at spot 4.

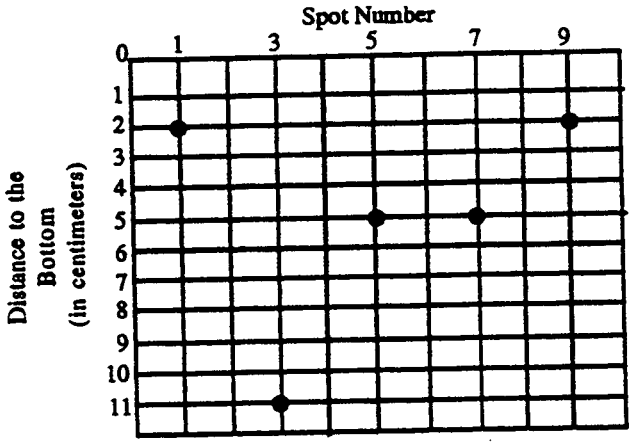
5½ cm Explain how you got your answer in the space below.

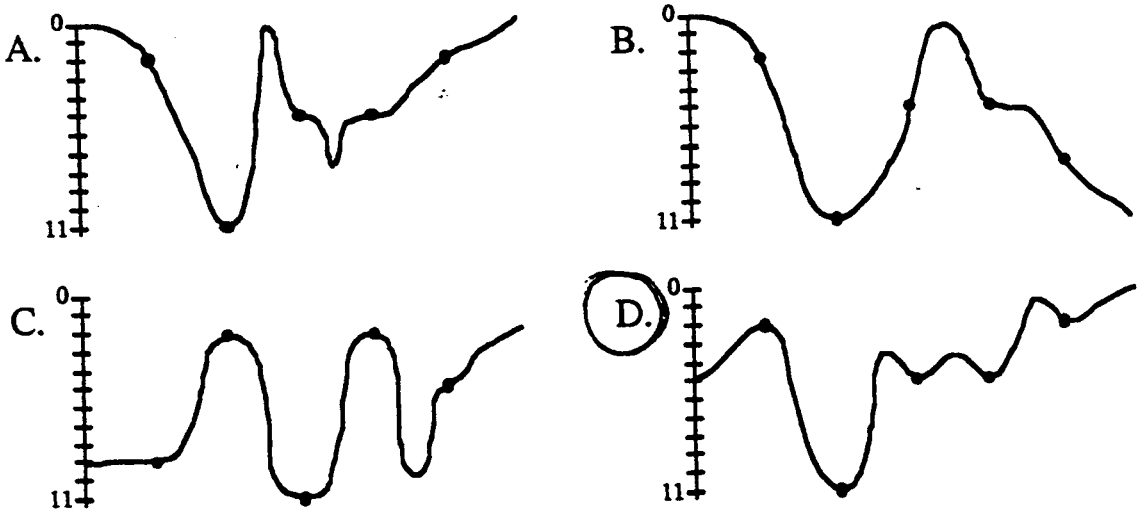
I got 5½ cm because the #3 spot is 5½ so is the #5 spot.

8. In the space below, make a drawing of what you think the bottom of the box looks like.



9. Below is a set of observations made on another box. Which of the drawings could represent the shape of the inside bottom of the box? (Circle the letters of as many choices that could be possible.)





NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

10. Two students performed a similar activity with the same mystery box that you used. Roberto used a probe that was 4 cm long and Susan used a probe that was 8 cm long. Compare the results that Susan and Roberto would have obtained about the shape of the inside bottom of the box.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID 8+53-23 **Scoring Form - Probing Under the Surface** #3

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. & 2. No credit

3. Data table

A. Recorded each correct measurement	0	1	2	3	4	(5)
B. Record all measurements to the nearest tenth of a centimeter	0	(1)				
C. Labeled all measurements with correct units	0	(1)				

4. & 5. Graph

A. Points correctly plotted	0	1	2	3	4	(5)
B. Line correctly drawn	0	(1)				

6. Shape Description	0	1	(2)
7. Estimation			
A. Value of depth and units	0	1	(2)
B. Reasonable explanation	0	1	(2)
8. Model Drawing	0	(1)	
9. Select Drawing	0	1	(2)
10. Explanation of Limited Stick	0	1	(2)

Total Score 24

Total possible score - 24

10. Two students performed a similar activity with the same mystery box that you used. Roberto used a probe that was 4 cm long and Susan used a probe that was 8 cm long. Compare the results that Susan and Roberto would have obtained about the shape of the inside bottom of the box.

Roberto wouldn't have had much info. Using a 4 cm stick would have left a few hole unexplored. Susan, would have gotten a much better reading. using an 8 cm stick allows you to reach every hole

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

5. During the winter, snow often sits on a roof of a house. Houses that are poorly insulated will often have icicles hanging from the ends of the roof. If the water starts out as a solid phase in snow on the roof, explain how icicles form that are hanging over the edge.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Phases of Matter - Scoring Rubric

Maximum score - 8 points

Question 1. Explain how popcorn pops. **2 points total**

- Allow 2 points for discussing a phase change of liquid water changing to a gas and that increased pressure causes the popcorn kernel to expand..
- Allow 1 point for writing that heat causes things to expand.
- Allow 1 point for writing that heat causes the water to evaporate.

Question 2. Why a hot shower "fogs" up a mirror. **1 point total**

- Allow 1 point for writing that small water droplets condense on a cold mirror.

Question 3. Why you can "see your breath" **2 points total**

- Allow 2 points for writing that the warm water vapor exhaled condenses on the dust particles in the cold air.
- Allow 1 point for writing that the warm water vapor condenses when meeting the cold air.

Question 4. Explain how dryers use heat to dry. **1 point total**

- Allow 1 point for writing that the heat adds energy to the liquid water causing the water to evaporate into a gas.

Question 5. How icicles form on a roof. **2 points total**

- Allow 2 points for writing that the heat from the house rises through the roof, melting the solid snow into liquid water. The water drips off the roof, freezing back into the solid phase or icicles when it hits the cold air.
- Allow 1 point for writing that the water melts and refreezes into icicles.

Highest possible score - 8 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Scoring Form - Phases of Matter**

Male / Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Explain how popcorn pops	0	1	2
2. Why a hot shower fogs up a mirror?	0	1	
3. Why you can "see your breath"	0	1	2
4. Explain hoe dryers use heat to dry	0	1	
5. How icicles form on a roof	0	1	2

Total Score _____

Total Possible score - 8 points

Student ID _____ **Scoring Form - Phases of Matter**

Male / Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Explain how popcorn pops	0	1	2
2. Why a hot shower fogs up a mirror?	0	1	
3. Why you can "see your breath"	0	1	2
4. Explain hoe dryers use heat to dry	0	1	
5. How icicles form on a roof	0	1	2

Total Score _____

Total Possible score - 8 points

#1

Student ID HM POM - 6 **Scoring Form - Phases of Matter**

Male / (Female) (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Explain how popcorn pops	(0)	1	2
2. Why a hot shower fogs up a mirror?	(0)	1	
3. Why you can "see your breath"	(0)	1	2
4. Explain hoe dryers use heat to dry	(0)	1	
5. How icicles form on a roof	0	(1)	2

Total Score 1

Total Possible score - 8 points

Hm Pom 6

March 21, 1996 1

Phases of Matter

Task: To determine if students can apply content knowledge to observations and problems from everyday life.

Directions:
Answer the following questions using your knowledge of the phases of matter. Be sure to use the correct vocabulary such as solid, liquid, gas, condense, evaporate, freeze, or melt. Explain each response in detail.

1. A kernel of popcorn contains a small amount of water and when heated the popcorn pops.
How can you explain this to someone?
Sure, there is water in the popcorn kernel and when it gets hot it pops

2. Explain why a hot shower "fogs" up a bathroom mirror.
Cause the heat goes to the mirror

3. You inhale and exhale a lot of air and moisture. Explain why you can "see your breath" when you are outside on a cold day.
Cause when its cold out you can see hot air coming from your mouth

4. Dryers are used to dry your hands or clothes. Explain how they use heat to dry
heat takes the water away

Please Continue on the Next Page

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York
Department

#2

Student ID #MPOM7 **Scoring Form - Phases of Matter**

Male / (Female) (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Explain how popcorn pops	0	(1)	2
2. Why a hot shower fogs up a mirror?	0	(1)	
3. Why you can "see your breath"	(0)	1	2
4. Explain hoe dryers use heat to dry	0	(1)	
5. How icicles form on a roof	0	1	(2)

Total Score 5

Total Possible score - 8 points

HM POM 7

March 21, 1996 1

#2

Phases of Matter

Task: To determine if students can apply content knowledge to observations and problems from everyday life.

Directions:
Answer the following questions using your knowledge of the phases of matter. Be sure to use the correct vocabulary such as solid, liquid, gas, condense, evaporate, freeze, or melt. Explain each response in detail.

1. A kernel of popcorn contains a small amount of water and when heated the popcorn pops.
How can you explain this to someone?

a popcorn kernel has water in the center. When heat is added the water evaporates causing the kernel to pop

2. Explain why a hot shower "fogs" up a bathroom mirror.

A hot shower fogs up a mirror because as some water is released it evaporates and condenses

3. You inhale and exhale a lot of air and moisture. Explain why you can "see your breath" when you are outside on a cold day.

you can see because the temp. in your mouth is 98.7° and then this hits the cold air water vapors are formed

4. Dryers are used to dry your hands or clothes. Explain how they use heat to dry.

Heat makes water evaporate. When you dry your hands the water on them evaporate off by the heat

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506
York
Department

#2

5. During the winter, snow often sits on a roof of a house. Houses that are poorly insulated will often have icicles hanging from the ends of the roof. If the water starts out as a solid phase in snow on the roof, explain how icicles form that are hanging over the edge.

Heat from the house or outside causes the snow to melt. When the water starts to run-off the temp might change refreezing the water

#3

Student ID #MPOM 8 **Scoring Form - Phases of Matter**

Male / (Female) (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Explain how popcorn pops	0	1	(2)
2. Why a hot shower fogs up a mirror?	0	(1)	
3. Why you can "see your breath"	0	(1)	2
4. Explain hoe dryers use heat to dry	0	(1)	
5. How icicles form on a roof	0	1	(2)

Total Score 7

Total Possible score - 8 points

HM POM 8

March 21, 1996 1

#3

Phases of Matter

Task: To determine if students can apply content knowledge to observations and problems from everyday life.

Directions:
Answer the following questions using your knowledge of the phases of matter. Be sure to use the correct vocabulary such as solid, liquid, gas, condense, evaporate, freeze, or melt. Explain each response in detail.

1. A kernel of popcorn contains a small amount of water and when heated the popcorn pops.
How can you explain this to someone?
When water is heated it evaporates, when The water evaporates in the kernel there is no were for the water to go so it Pops.

2. Explain why a hot shower "fogs" up a bathroom mirror.
Whe water is heated it evaporats, when the evaporation hits ~~the~~ the cold surface of the mirror it turns-in to condensetion

3. You inhale and exhale a lot of air and moisture. Explain why you can "see your breath" when you are outside on a cold day.
When you exhale the warm air is relesed and then when it hits the cold air It turns in to condensation but then it has no were to land so it turns into moisture in the air

4. Dryers are used to dry your hands or clothes. Explain how they use heat to dry.
When the warm air of the Dryer hits your hands it has the water evaporate ~~so~~ off your hands. so they dry.

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506
York
Department

#3

5. During the winter, snow often sits on a roof of a house. Houses that are poorly insulated will often have icicles hanging from the ends of the roof. If the water starts out as a solid phase in snow on the roof, explain how icicles form that are hanging over the edge.

The warm air from the house is let out to the air, that warm air melts the snow + when the water falles over the side it freezes again

Rate of Solution
Task Information

Grade: 8th Grade

Content:

Block H (The Chemistry of Matter). Section VI.B.2. Appendix H-68
Block J (STS) Section IV Process 15

Format: Manipulative

Purpose: To determine the amount of agitation necessary to dissolve various sized sugar particles.

Skills:

Primary - graph interpolation, generalizing
Secondary - measuring, observing

Time: 15 minutes

Materials:

- 1 sugar cube
- granulated sugar in a sealed container
- waste container (cups or small buckets)
- teaspoon
- graduated cylinder
- 2 bottles with screw on caps, labeled A and B
- super fine sugar sample
- water (500 ml)
- safety goggles
- hand lens

Preparation:

Mark the sealed container of granulated sugar;
"granulated sugar - Do Not Open"
Bottle size and water temperature **must** be consistent at every student station.

Safety:

- Safety goggles **must** be worn for this activity
- See MSDS - materials etc. for further safety precautions.
- proper laboratory safety procedures are required.

Extensions/ Modifications:

- Different types of sugar may be substituted in the shaking process;
  granulated and super fine - extrapolate cube
  granulated and cub - extrapolate super fine
- correlate particle size with surface area

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Rate of Solution

Task: At this station, you will determine the number of shakes necessary to dissolve various sized sugar particles.

Materials

- 1 sugar cube
- water (500 ml)
- granulated sugar in a sealed container
- 2 bottles with caps, labeled A and B
- waste cup
- safety goggles
- teaspoon
- super fine sugar sample
- graduated cylinder

Directions

Procedure

1. **Put on safety goggles. Do not taste any substance in this activity. Clean up any spills immediately.**
2. Use your hand lens to carefully observe the sugar cube and the super fine sugar. Which form of sugar has the smaller size particles?

   _____
3. Add 50 ml of water to the two (2) bottles.
4. Drop one **sugar cube** into bottle A and close the bottle tightly.
5. Count how many shakes it takes to totally dissolve the sugar cube.
6. Record you data in the data table below.
7. Place one **level** teaspoon of **Super fine sugar** into Bottle B and repeat steps 5 and 6.
8. Dump the contents of the two (2) bottles into the waste cup and rinse the bottles. Leave one bottle on the desk and let it stand without movement.

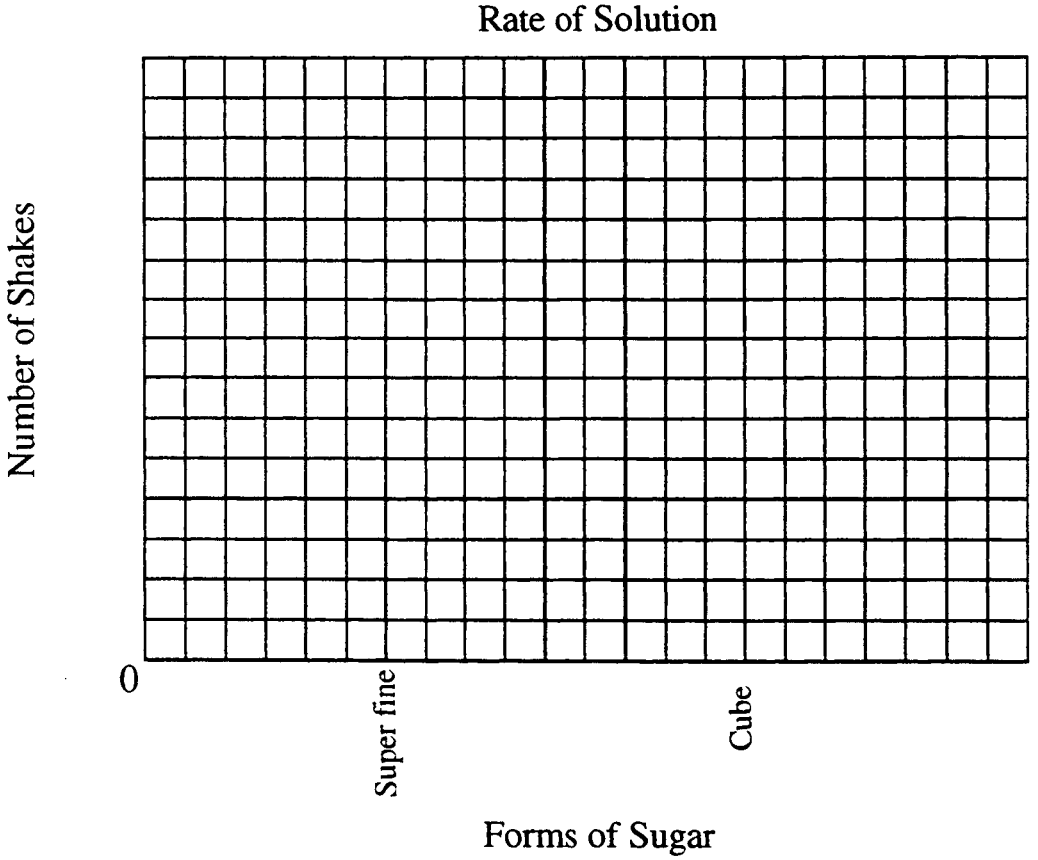
Data Table: Number of Shakes

Types of Sugar	Super fine Sugar	Sugar Cube
Number of Shakes		

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

9. draw a **line graph** showing the number of shakes needed to dissolve the two forms of sugar. Use the grid below. Make sure you include the appropriate range and interval of numbers on the y- axis.



10. Use your hand lens to carefully observe the particle size of the granulated table sugar. Use the information from the line graph. Predict the number of shakes it would take to completely dissolve one level teaspoon of the granulated table sugar in the same amount of water.

_____

11. Write a generalized statement which explains the relationship between the particle size of the sugar and the number of shakes needed to dissolve the sugar.

_____

_____

_____

_____

_____

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NSF Grant #MDR-9154506

Rate of Solution - Scoring Rubric

Maximum Score - 8 points

---

2. Identifying the smallest sized particle of sugar **1 point total**

- Allow 1 point for identifying the super fine sugar as having the smallest particles.

Data Table **1 point total**

- Allow 1 point for appropriate numbers showing a greater number of shakes for the sugar cube.

---

9. Graph **3 points total**

- Allow 1 point for appropriate number range and interval on the Y - axis based on the student's data.
- Allow 1 point for correctly plotting **both** points (+/- 5)
- Allow 1 point for correctly connecting **only** the two (2) plotted points.

---

10. Predicting **1 point total**

- Allow 1 point for any number between the student derived data for super fine and sugar cube shakes.

---

11. Relationship between particle size and # of shakes **2 points total**

- Allow 2 points for the correct relation of both variables.
  Sample of acceptable answers
  ~ As the particle size increases, shakes increase
  ~ As the sugar sizes get bigger it takes longer to dissolve
- Allow 1 point for a restatement of data
  Sample of acceptable answers
  ~ It took the cube longer to dissolve
  ~ It took less time to dissolve the super fine sugar

Highest possible score - 8 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Scoring Form - Rate of Solution**

Male or Female (Circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
2. Identify smallest particle	0 1	_____
Data Table Appropriate number of shakes	0 1	_____
9. Graph • Y - axis • plotting points • Drawing Line	 0 1 0 1 0 1	_____
10. Prediction	0 1	_____
11. Relationship Statement	0 1 2	_____

Total Score _____

Highest possible score - 8 points

Student ID HM-11 **Scoring Form - Rate of Solution** #1

Male or Female (Circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
2. Identify smallest particle	0 (1)	1
Data Table Appropriate number of shakes	0 (1)	1
9. Graph • Y - axis • plotting points • Drawing Line	0 (1) (0) 1 (0) 1	1
10. Prediction	(0) 1	0
11. Relationship Statement	(0) 1 2	0

Total Score 3

Highest possible score - 8 points

Rate of Solution

Task: At this station, you will determine the number of shakes necessary to dissolve various sized sugar particles.

Materials

- 1 sugar cube
- water (500 ml)
- granulated sugar in a sealed container
- 2 bottles with caps, labeled A and B
- waste cup
- safety goggles
- teaspoon
- powdered sugar sample
- graduated cylinder

Directions

Procedure

1. **Put on safety goggles. Do not taste any substance in this activity. Clean up any spills immediately.**
2. Use your hand lens to carefully observe the sugar cube and the powdered sugar. Which form of sugar has the smaller size particles?
   powdered
3. Add 50 ml of water to the two (2) bottles.
4. Drop one **sugar cube** into bottle A and close the bottle tightly.
5. Count how many shakes it takes to totally dissolve the sugar cube.
6. Record you data in the data table below.
7. Place one **level** teaspoon of **powdered sugar** into Bottle B and repeat steps 5 and 6.
8. Dump the contents of the two (2) bottles into the waste cup and rinse the bottles. ~~Leave one bottle on the desk and let it stand without movement.~~

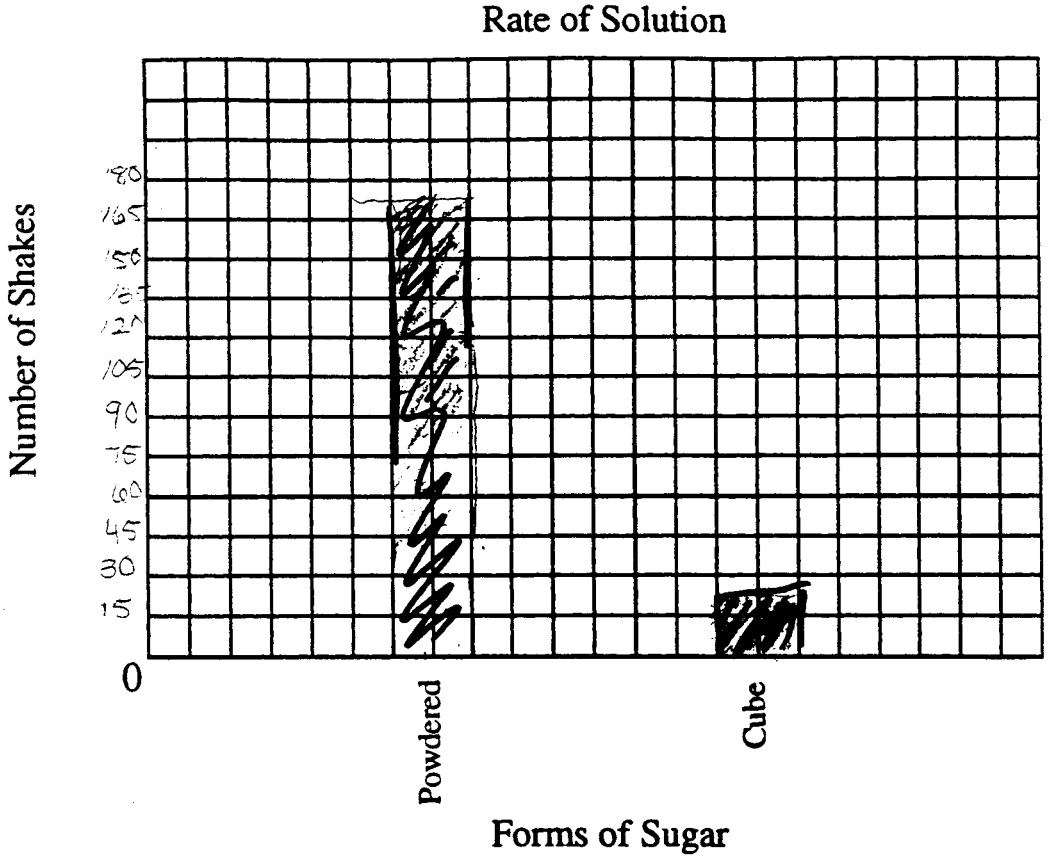
Data Table: Number of Shakes

Types of Sugar	Powdered Sugar = Super Fine	Sugar Cube
Number of Shakes	20	170

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#1

9. draw a **line graph** showing the number of shakes needed to dissolve the two forms of sugar. Use the grid below. Make sure you include the appropriate range and interval of numbers on the y- axis.



10. Use your hand lens to carefully observe the particle size of the granulated table sugar. Use the information from the line graph. Predict the number of shakes it would take to completely dissolve one level teaspoon of the granulated table sugar in the same amount of water.

10 ✓ -1

11. Write a generalized statement which explains the relationship between the particle size of the sugar and the number of shakes needed to dissolve the sugar.

They both have the same kind of crystals /2

Student ID HM-10 **Scoring Form - Rate of Solution** #2

Male or Female (Circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
2. Identify smallest particle	0 (1)	1
Data Table Appropriate number of shakes	0 (1)	1
9. Graph • Y - axis • plotting points • Drawing Line	0 (1) (0) 1 (0) 1	1
10. Prediction	0 (1)	1
11. Relationship Statement	0 1 (2)	2

Total Score 6

Highest possible score - 8 points

Rate of Solution

Task: At this station, you will determine the number of shakes necessary to dissolve various sized sugar particles.

Materials

- 1 sugar cube
- water (500 ml)
- granulated sugar in a sealed container
- 2 bottles with caps, labeled A and B
- waste cup
- safety goggles
- teaspoon
- ~~powdered sugar~~ Super fine sample
- graduated cylinder

17/19

Directions

Procedure

1. **Put on safety goggles. Do not taste any substance in this activity. Clean up any spills immediately.**
2. Use your hand lens to carefully observe the sugar cube and the ~~powdered~~ Super fine sugar. Which form of sugar has the smaller size particles?

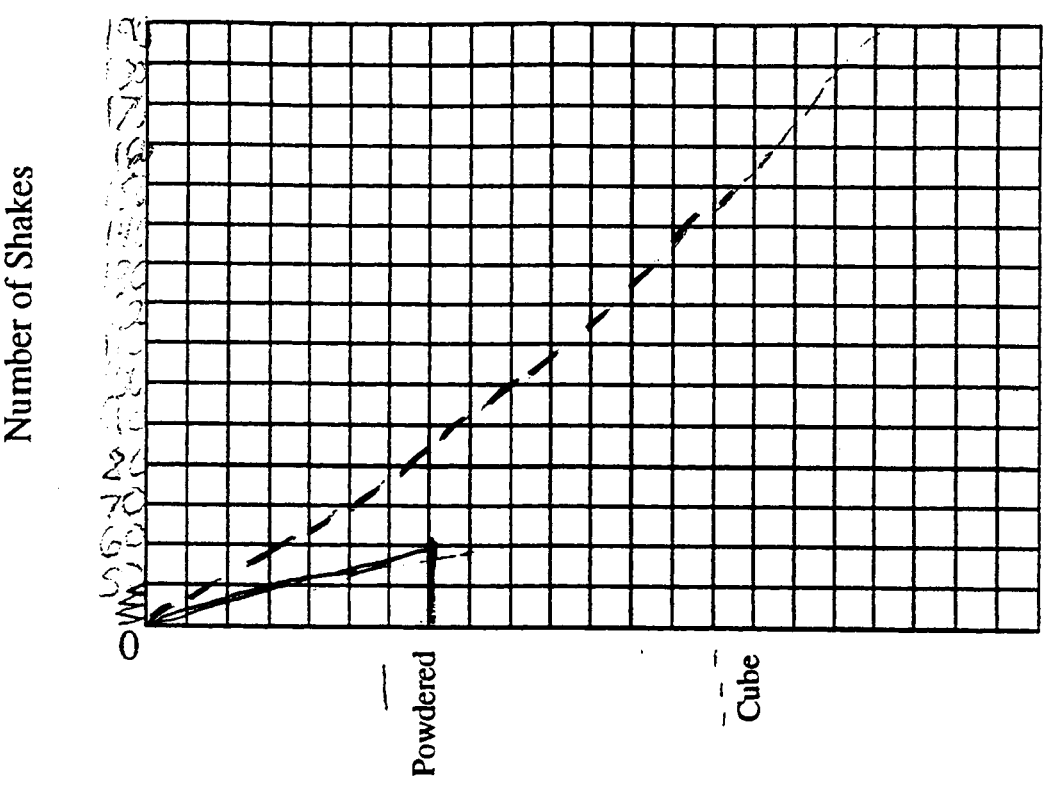
   Super fine
3. Add 50 ml of water to the two (2) bottles.
4. Drop one **sugar cube** into bottle A and close the bottle tightly.
5. Count how many shakes it takes to totally dissolve the sugar cube.
6. Record you data in the data table below.
7. Place one **level** teaspoon of ~~**powdered**~~ Super fine **sugar** into Bottle B and repeat steps 5 and 6.
8. Dump the contents of the two (2) bottles into the waste cup and rinse the bottles. ~~Leave one bottle on the desk and let it stand without movement.~~

Data Table: Number of Shakes

Types of Sugar	Powdered Sugar	Sugar Cube
Number of Shakes	60	183

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

9. draw a **line graph** showing the number of shakes needed to dissolve forms of sugar. Use the grid below. Make sure you include the appropriate range and interval of numbers on the y- axis.



line graph? points plotted?

10. Use your hand lens to carefully observe the particle size of the granulated table sugar. Use the information from the line graph. Predict the number of shakes it would take to completely dissolve one level teaspoon of the granulated table sugar in the same amount of water.

120 shacks

11. Write a generalized statement which explains the relationship between the particle size of the sugar and the number of shakes needed to dissolve the sugar.

the larger the particle size & the more shaks it will take. the smaller the particle size the less shaks it will take to dissolve.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID HM-4 **Scoring Form - Rate of Solution** #3

Male or Female (Circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
2. Identify smallest particle	0 (1)	1
Data Table Appropriate number of shakes	0 (1)	1
9. Graph • Y - axis • plotting points • Drawing Line	0 (1) 0 (1) 0 (1)	3
10. Prediction	0 (1)	1
11. Relationship Statement	0 1 (2)	2

Total Score 8

Highest possible score - 8 points

[redacted] Mods 4-6 12/14/95 HM 4 SB #3

6/8

Rate of Solution

Task: At this station, you will determine the number of shakes necessary to dissolve various sized sugar particles.

Materials

- 1 sugar cube
- water (500 ml)
- granulated sugar in a sealed container
- 2 bottles with caps, labeled A and B
- waste cup
- safety goggles
- teaspoon
- powdered sugar sample
- graduated cylinder

Directions

Procedure

1. **Put on safety goggles. Do not taste any substance in this activity. Clean up any spills immediately.**
2. Use your hand lens to carefully observe the sugar cube and the powdered sugar. Which form of sugar has the smaller size particles?
   Powder sugar
3. Add 50 ml of water to the two (2) bottles.
4. Drop one **sugar cube** into bottle A and close the bottle tightly.
5. Count how many shakes it takes to totally dissolve the sugar cube. 150 shakes
6. Record you data in the data table below.
7. Place one **level** teaspoon of **powdered sugar** into Bottle B and repeat steps 5 and 6.
8. Dump the contents of the two (2) bottles into the waste cup and rinse the bottles. ~~Leave one bottle on the desk and let it stand without movement.~~

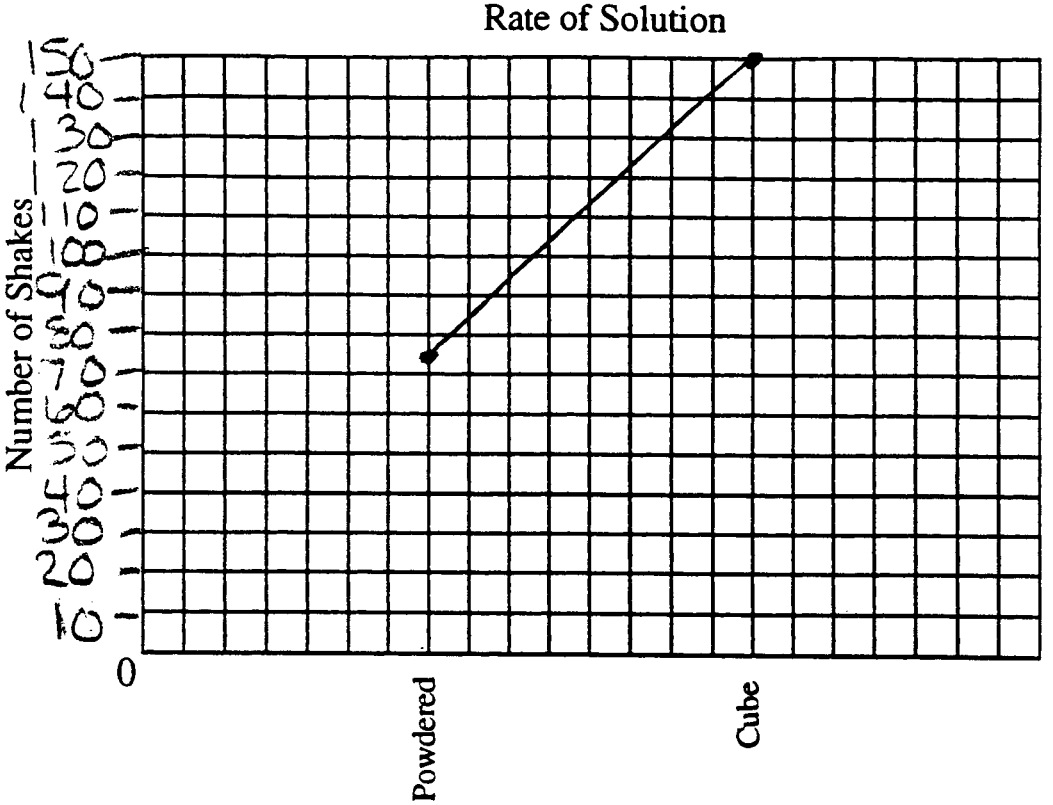
Data Table: Number of Shakes

Types of Sugar	Powdered Sugar	Sugar Cube
Number of Shakes	75	150

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

 #3

9. draw a **line graph** showing the number of shakes needed to dissolve the two forms of sugar. Use the grid below. Make sure you include the appropriate range and interval of numbers on the y- axis.



10. Use your hand lens to carefully observe the particle size of the granulated table sugar. Use the information from the line graph. Predict the number of shakes it would take to completely dissolve one level teaspoon of the granulated table sugar in the same amount of water.

55 shakes

11. Write a generalized statement which explains the relationship between the particle size of the sugar and the number of shakes needed to dissolve the sugar.

The powdered sugar is dissolved faster because chunks are faster then particals.

ok!

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Sand In Bottles
Task Information

Grade: 8th Grade

Content:

Physical Science

- G.1.B. - The acceleration of objects depends upon many factors.

Format: Manipulative

Purpose:

To determine the effect that material inside a bottle has on the rolling characteristics.

Skills:

Primary: Predicting
Secondary: Generalizing / Inferring

Time: 10 -15 minutes

Materials:

Teacher:

- white or construction sand
- plastic bottles with caps at both ends. - size 148 ml
- hot glue

Per Student or Station:

- 5 bottles labeled A, B, C, D & X
- 2 books approximately 1 inch thick
- clipboard

Preparation:

- Fill enough bottles for each student or station accordingly
  - ≈ Bottle A - full of sand
  - ≈ Bottle B - 1\2 full of sand
  - ≈ Bottle C - 1\4 full of sand
  - ≈ Bottle D - empty
  - ≈ Bottle X - full of sand
- Bottles must be smooth so that they will roll down the clipboard easily.
- Slide a dark piece of paper inside bottle X so that the students cannot see inside.
  - Seal the tops with glue to avoid spills.
  - To make the bottles roll evenly glue a cap on the bottom of the bottles as well.
  - Film containers will work if they have tops that push inside to seal.
  - Place **only** bottles labeled A, B, C, and X at the student stations. Distribute bottle D **after** the student has competed question #10.

Safety:

- Caution the students if glass bottles are used

Extensions & Modifications:

- Medicine vials or film containers can also be used.
- Any hard flat surface such as, fiberboard, smooth wood, or cardboard may be used to create the incline.

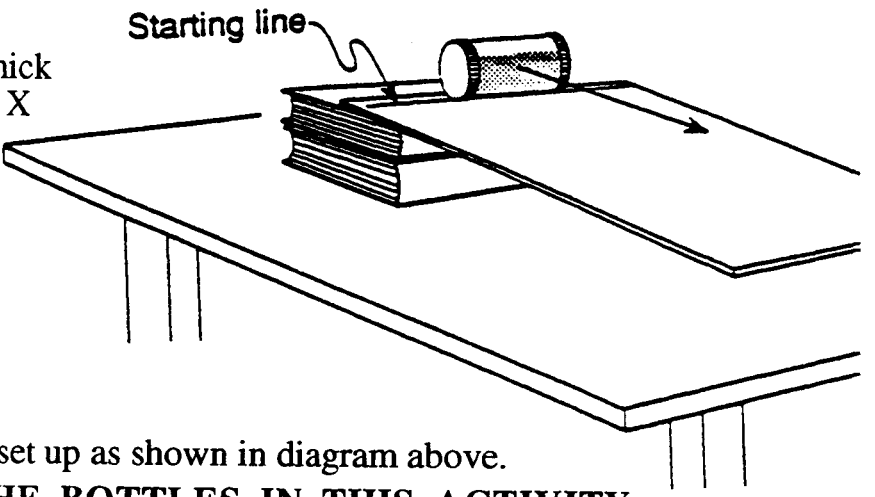
NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Sand in Bottles

Task: At this station, you will be determining the different speeds that bottles will roll with different amounts of sand inside.

Materials:

- clipboard
- 2 books, approx. 2 - 5 cm thick
- 5 bottles labeled A, B, C, & X



Directions:

1. Make sure that your equipment is set up as shown in diagram above.
2. **DO NOT OPEN ANY OF THE BOTTLES IN THIS ACTIVITY.**
3. Examine bottles A, B, and C.
4. Starting at the line on the ramp, allow each bottle to roll down the ramp once or twice and observe how fast each bottle rolls down the ramp. Do **not** push the bottle.
5. Record the relative speeds of the bottles in the data table below. Use the following terms: slow, medium, and fast.

Data Table: Speed of Bottles

Letter	Amount of Sand	Speed of Bottle
A	Full Bottle	
B	1/2 Full Bottle	
C	1/4 Full Bottle	

6. Based on your observations, write a general statement describing the relationship between the amount of sand in the bottles and the speed of the bottles.

_____

_____

_____

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

7. Roll bottle **X** down the ramp and observe how fast it rolls.

8. Use this observation and the information from the data table to determine how much of bottle X is filled with sand.

   _____

   In the space below, explain the reason for your answer.

   _____

   _____

   _____

9. **Use the information from the data table** to predict the speed of a bottle 1/8 full of sand compared to bottles A, B, and C.

   _____

   Explain the reason for your prediction.

   _____

   _____

   _____

10. **Use the information from the data table** to predict the speed of an empty bottle as compared to the other bottles rolling down the ramp.

    _____

11. Now raise your hand and quietly ask your teacher for bottle D, and empty bottle. Roll Bottle D down the ramp. Did it match your prediction?

    _____

    What is a possible explanation for why this happened?

    _____

    _____

    _____

    _____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Sand in Bottles - Scoring Rubric
Maximum Score - 13 points

5. Relative speed data table — Total 2 points

Letter	Amount of Sand	Speed of Bottle
A	Full Bottle	*fast*
B	1\2 Full Bottle	*medium*
C	1\4 Full Bottle	*slow*

Point Criteria:

- Allow 2 points if at least two (2) out of the three (3) entries in the data table are correct.
- Allow 1 point if only (1) out of the three (3) entries in the data table is correct.

6. Statement relating amount of sand to speed of bottles — 2 points total

Point Criteria:

- Allow 2 points if the student makes a general statement about a directly proportional relationship between speed and the amount of sand in a bottle.
  - The more sand in the bottle, the faster it rolls.
  - The less sand in a bottle, the slower its speed.
  - A bottle will roll faster with more sand inside than a bottle with less sand.
- Allow 1 point if the student restates a specific observation.
  - A bottle half full of sand rolls slower than a full bottle of sand.

8. Prediction of speed of bottle X and explanation — 3 points total

Point Criteria:

- Prediction
  - Allow 1 point for predicting that bottle X is > $1/2$ to full.
  - Allow 0 points if student implies that he/she looked into bottle X.
- Explanation
  - Allow 2 points for an answer comparing bottle X to bottle A or B.

  Sample of acceptable answers;
  - Bottle X rolls at a similar speed as bottle A or B and bottle A is full and Bottle B is 1/2 full.
  - It feels like the same weight as bottle A or B.
  - It rolls a similar distance from the ramp as bottle A or B..
  - Allow 1 point (partial credit) for an incomplete explanation with no comparison to their data.
    - Bottle X rolled fast.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

9. Prediction of speed of a bottle $^1/_8$ full and explanation 3 points total

Point Criteria:

- Prediction
  - Allow 1 point for predicting that the bottle will roll the slowest of all the bottles.
- Explanation
  - Allow 2 points for an answer applying the data from bottles A, B, and C to the bottle $^1/_8$ full.

  Sample of acceptable answers:
  - When there is less sand in a bottle, it rolls slower down an incline.
  - The trend in the data show that bottles with more sand roll faster than bottles with less sand, so a bottle $^1/_8$ full will roll slowest.
  - Allow 1 point (partial credit) for an incomplete explanation with no comparison to their data.

---

10. & 11. Prediction of the speed of bottle D and explanation 3 points total

Point Criteria:

- Prediction
  - Allow 1 point for an answer that is consistent with their data.
- Explanation
  - Allow 2 points for an answer applying the data from bottles A, B to & C to the empty bottle.

  Sample of acceptable answers:
  - The data shows that bottles with more sand roll faster than bottles with less sand. So a bottle with no sand will roll slower than the rest.
  - Allow 1 point (partial credit) for an incomplete explanation with no comparison to their data.
    - The bottle rolled very slowly.
  - 0 points for an answer that states that the bottle will **not** roll.
  - 0 points for an answer that only verifies the prediction.

Highest possible score - 13 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Scoring Form - Sand in Bottles**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Speed data table	0 1 2	_____
6. Speed/Amount of sand relationship	0 1 2	_____
8. Bottle X Predicted amount Explanation	 0 1 0 1 2	_____
9. Bottle 1/8 full of sand Predicted amount Explanation	 0 1 0 1 2	_____
Bottle D 10. Predicted speed 11. Explanation	 0 1 0 1 2	_____

Total Score _____

Highest possible score - 13 points

Student ID TS4804 #1 **Male or Female** (circle one)

Sand in Bottles

Scoring Form (Maximum Score = 11 points)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
4. Speed Data Table		
Bottle A	0 (1)	3
Bottle B	0 (1)	
Bottle C	0 (1)	
5. Speed/Amount of Sand Relationship	0 1 (2)	2
7. Bottle X		
Predicted Amount	0 (1)	2
Explanation	0 (1) 2	
8. Bottle 1/8 Full of Sand		
Predicted Speed	0 (1)	1
Explanation	(0) 1 2	

Total Score 8

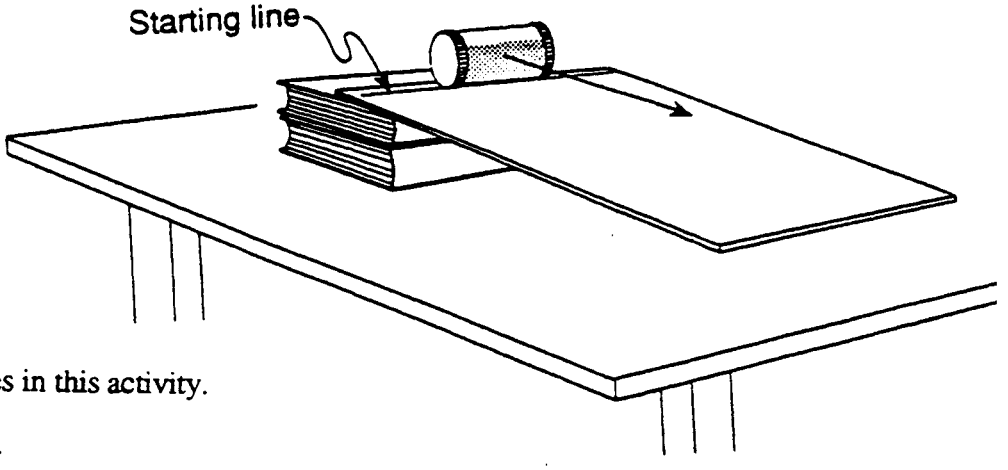
Sand in Bottles

#1

Task: At this station, you will be determining the speeds that bottles with different amounts of sand inside will roll.

MATERIALS:

- clipboard
- books
- 4 bottles, **A** - **C**, and **X**



DIRECTIONS:

1. Do not open any of the bottles in this activity.
2. Examine bottles A, B, and C.
3. Starting at the line on the ramp, roll each bottle down the ramp once or twice and observe how fast each bottle rolls down the ramp.
4. Record the relative speeds of the bottles using the terms slow, medium, and fast.

Letter	Amount of Sand	Speed of Bottle
A	Full bottle	fast
B	1/2 full bottle	medium
C	1/4 full bottle	slow

5. Based on your observations, write a general statement describing the relationship between the amount of sand in the bottles and the speed of the bottles.

the more the sand there is the more mass pulling down

PLEASE CONTINUE THIS TASK ON THE NEXT PAGE

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#1

6. Roll bottle **X** down the ramp and observe how fast it rolls.

7. What portion of bottle X is filled with sand? more than half

   In the space below, explain the reason for your answer.

   the speed and the sound

8. Predict the speed for a bottle 1/8 full of sand compared to bottles A, B, and C. Explain the reason for your prediction.

   faster than bottle b and C more mass

9. Predict the speed of an empty bottle as compared to the other bottles rolling down the ramp.

   medium slow

10. Roll Bottle D down the ramp. Did it match your prediction? no

    What is a possible explanation for why it happened?

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID TS4-8-19 #2 **Male or Female** (circle one)

Sand in Bottles

Scoring Form (Maximum Score = 11 points)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
4. Speed Data Table		
Bottle A	0 (1)	3
Bottle B	0 (1)	
Bottle C	0 (1)	
5. Speed/Amount of Sand Relationship	0 1 (2)	2
7. Bottle X		
Predicted Amount	0 (1)	3
Explanation	0 1 (2)	
8. Bottle 1/8 Full of Sand		
Predicted Speed	0 (1)	2
Explanation	0 (1) 2	

Total Score 10

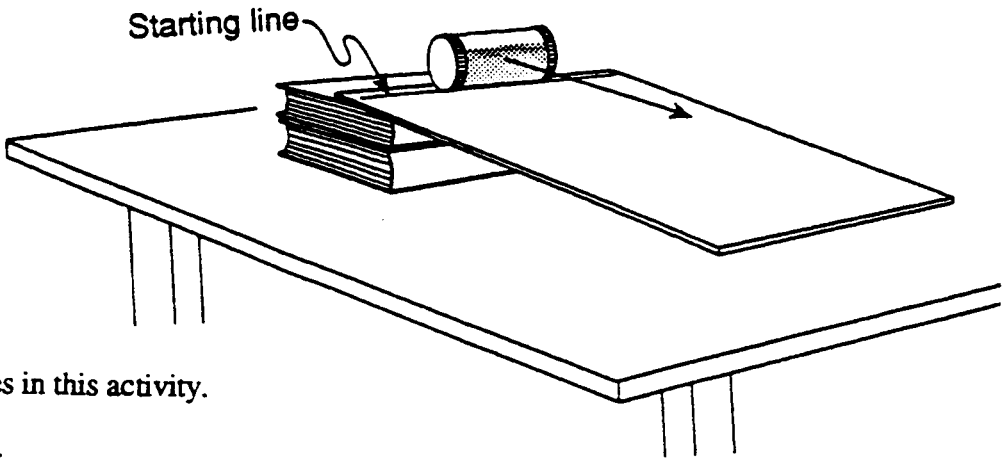
Sand in Bottles

#2

Task: At this station, you will be determining the speeds that bottles with different amounts of sand inside will roll.

MATERIALS:

clipboard
books
4 bottles, **A** - **C**, and **X**



DIRECTIONS:

1. Do not open any of the bottles in this activity.
2. Examine bottles A, B, and C.
3. Starting at the line on the ramp, roll each bottle down the ramp once or twice and observe how fast each bottle rolls down the ramp.
4. Record the relative speeds of the bottles using the terms slow, medium, and fast.

Letter	Amount of Sand	Speed of Bottle
A	Full bottle	fast
B	1/2 full bottle	medium
C	1/4 full bottle	slow

5. Based on your observations, write a general statement describing the relationship between the amount of sand in the bottles and the speed of the bottles.

The more the sand in the bottles the faster they go. The less the sand in the bottle the slower it goes.

PLEASE CONTINUE THIS TASK ON THE NEXT PAGE

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#2

6. Roll bottle X down the ramp and observe how fast it rolls.

7. What portion of bottle X is filled with sand? Full bottle

In the space below, explain the reason for your answer.

I think that because it rolls pretty much the same speed as the Full bottle

8. Predict the speed for a bottle 1/8 full of sand compared to bottles A, B, and C. Explain the reason for your prediction.

It will probably roll slow because there is not alot of sand in it make go fast.

9. Predict the speed of an empty bottle as compared to the other bottles rolling down the ramp.

I think the speed of the empty bottle will be fast

10. Roll Bottle D down the ramp. Did it match your prediction? Yes

What is a possible explanation for why it happened?

I think it happened because there was no toose sand to slow it down. In A the sand was pretty much packed. In B it wasn't as packed so it went a medium speed. In C it very loose so the sand just flopped all over and causes it to go slow.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID T54802 #3 **Male or Female** (circle one)

Sand in Bottles

Scoring Form (Maximum Score = 11 points)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
4. Speed Data Table		
Bottle A	0 (1)	3
Bottle B	0 (1)	
Bottle C	0 (1)	
5. Speed/Amount of Sand Relationship	0 1 (2)	2
7. Bottle X		
Predicted Amount	0 (1)	3
Explanation	0 1 (2)	
8. Bottle 1/8 Full of Sand		
Predicted Speed	0 (1)	3
Explanation	0 1 (2)	

Total Score 11

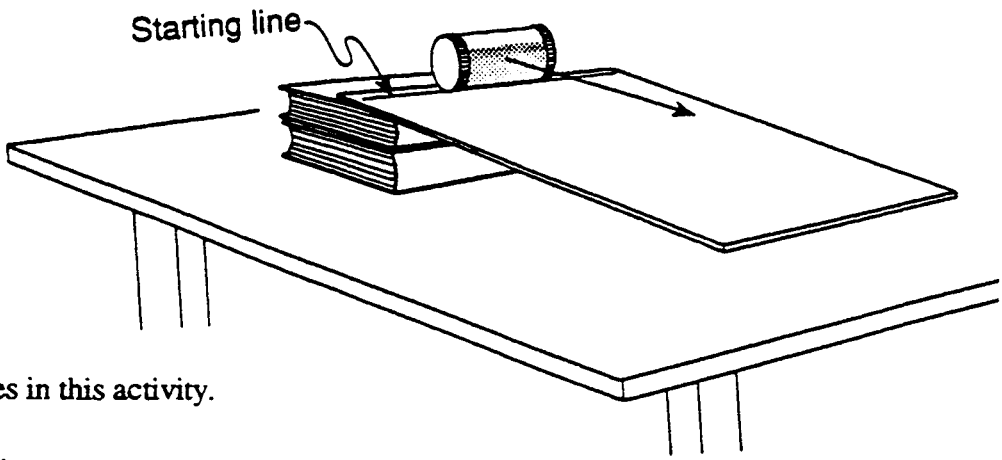
Sand in Bottles

#3

Task: At this station, you will be determining the speeds that bottles with different amounts of sand inside will roll.

MATERIALS:

clipboard
books
4 bottles, A - C, and X



DIRECTIONS:

1. Do not open any of the bottles in this activity.
2. Examine bottles A, B, and C.
3. Starting at the line on the ramp, roll each bottle down the ramp once or twice and observe how fast each bottle rolls down the ramp.
4. Record the relative speeds of the bottles using the terms slow, medium, and fast.

Letter	Amount of Sand	Speed of Bottle
A	Full bottle	fast
B	1/2 full bottle	medium
C	1/4 full bottle	slow

5. Based on your observations, write a general statement describing the relationship between the amount of sand in the bottles and the speed of the bottles.

when you put more sand in a bottle, you make it heavier making it roll faster

PLEASE CONTINUE THIS TASK ON THE NEXT PAGE

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#3

6. Roll bottle **X** down the ramp and observe how fast it rolls.

7. What portion of bottle X is filled with sand? all

In the space below, explain the reason for your answer.

because even though I cant see the amout I compare the speed of A & X & they were the same

8. Predict the speed for a bottle 1/8 full of sand compared to bottles A, B, and C. Explain the reason for your prediction.

I think it will roll very slow because C had a litle sand so a 1/8 Filled bottle would go very slow

9. Predict the speed of an empty bottle as compared to the other bottles rolling down the ramp.

I think it will go fast

10. Roll Bottle D down the ramp. Did it match your prediction? yes

What is a possible explanation for why it happened?

Because It dant have any wieght from the sand slowing it down.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Starch and Sugar Testing 1
Task Information

Grade: 8th Grade

Format: Manipulative

Purpose: The students will determine the presence of starch and sugar in unknown solutions

Content: Physical Science - Block H - VIA, VIIIA

Skills:

Primary: Observing, Recording Data, Interpreting data.
Secondary: Classifying, Generalizing/Inferring

Time: 10 -15 minutes

Materials:

- dropper bottles labeled A, B, and C
- dropper bottle with iodine
- glucose test strip/stick
- laminated test card or transparency test card
- waste container (cup or small pail)
- wax paper
- paper towels
- safety goggles

Preparation:

- Glucose and starch solutions can be obtained from a science supply company
- Put glucose solutions in bottles A and B
- Put starch solutions in bottle C
- Glucose test strips/stick can be obtained from a science supply company or a drugstore
- Keep the glucose strips away from the iodine solution. The fumes will turn the strips black or green
- Be sure to test glucose and starch solutions before using them with the students
- The glucose and starch solutions can be diluted two or three times. They will be more effective than full strength.
- Wax paper should be cut to fit over the test card. This will keep the test card from becoming contaminated. If using transparency test card be sure to discard when each student is finished.

Modifications and Extensions:

- Glucose test tape is no longer manufactured. You may use glucose test strips/sticks found at a drugstore. These are quite expensive so a teacher demo may be more appropriate.
- To do a Teacher Demo you might use an overhead projector with a transparency sheet marked with three circles marked "A", "B", and "C". The students could then check the color on the glucose strips as well as see the iodine change when the materials were added.
- There is also Starch and Sugar 2, with a different degree of structure

Safety:

- Students must wear safety goggles when working with iodine solution.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Starch and Sugar Testing 1

Task: At this station, you will experiment to determine which of three solutions contain starch and sugar.

Materials:

dropper bottles **A - C**
dropper bottle with iodine solution
glucose test strips
test card
wax paper sheets
waste cup
paper towels
safety goggles

Background:

Iodine solution turns blue-black in the presence of starch.

Glucose test strips turn green in the presence of the sugar glucose.

Directions:

1. Put your safety goggles on.
2. Place a wax paper sheet over the test card.
3. Place two drops of each solution on the wax paper over the circle on the test card with the same letter.
4. Dip the end of a glucose test strip in each of the three solutions. Use a new strip for each solution.
5. Record the **COLOR** of the glucose test strips on the data table below.

Indicator	Solution A	Solution B	Solution C
Glucose Test Strip			

6. Add one drop of iodine solution to each solution.
7. Record the **COLOR** of the solutions on the data table below.

Indicator	Solution A	Solution B	Solution C
Iodine Solution			

8. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

9. Using the data you have collected and the background information, which solutions contain sugar?

_____

In the space below, explain the reason for your answer.

_____

_____

_____

10. Using the data you have collected and the background information, which solutions contain starch?

_____

In the space below, explain the reason for your answer.

_____

_____

_____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Starch and Sugar Testing - Scoring Rubric
Maximum Score - 10 points

Question 5. Glucose strip data table. — 2 points total

Indicator	Solution A	Solution B	Solution C
Glucose Test Strip	*green*	*green*	*yellow or no change*

Point Criteria:
- Allow 1 point if <u>both</u> Solutions A and B are correct.
- Allow 1 point if Solution C is correct.

Question 7. Iodine solution data table. — 2 points total

Indicator	Solution A	Solution B	Solution C
Iodine Solution	*orange or no change*	*orange or no change*	*blue, black, or brown*

Point Criteria:
- Allow 1 point if <u>both</u> solutions A & B are correct.
- Allow 1 point if solution C is correct.

Question 9. Identify sugar solutions — 3 points total

Point Criteria:
- Allow 1 point for identifying <u>both</u> solutions A and B as containing sugar.
  - Accept any student's response correctly based on his/her data
- Allow 2 points for an explanation relating student data to background information.
  - Solutions A and B turned the test strips green which indicates sugar.
  - Allow only 1 point if the student states the background information without relating it to his/her data.

Question 10. Identify starch solutions — 3 points total

Point Criteria:
- Allow 1 point for identifying starch solution as C.
  - Accept any student's response correctly based on his/her data
- Allow 2 points for an explanation relating student data to background information.
  - Solution C turned the iodine solution black which indicates starch.
  - Allow only 1 point if the student states the background information without relating it to his/her data.

Highest possible score - 10 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Scoring Form - Starch & Sugar Testing 1**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Glucose strip data table Solutions A & B Solution C	0 1 0 1	_____
7. Iodine solution data table Solutions A & B Solution C	0 1 0 1	_____
9. Sugar solutions Solutions named Explain choice	0 1 0 1 2	_____
10. Starch solution Solution named Explain choice	0 1 0 1 2	_____

Total Score _____
Total possible score - 10 points

#1

Student ID G-01 **Scoring Form - Starch & Sugar Testing 1**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Glucose strip data table Solutions A & B Solution C	0 (1) (0) 1	1
7. Iodine solution data table Solutions A & B Solution C	0 (1) 0 (1)	2
9. Sugar solutions Solutions named Explain choice	(0) 1 (0) 1 2	0
10. Starch solution Solution named Explain choice	(0) 1 (0) 1 2	0

Total Score 3

Total possible score - 10 points

Starch and Sugar Testing 1

#1

Task: At this station, you will experiment to determine which of three solutions contain starch and sugar.

MATERIALS:

- dropper bottles A - C
- dropper bottle with iodine solution
- glucose test strips
- test card
- wax paper sheets
- waste cup
- paper towels
- safety goggles

BACKGROUND:

Iodine solution turns blue-black in the presence of starch.

Glucose test strips turn green in the presence of the sugar glucose.

DIRECTIONS:

1. Put your safety goggles on.
2. Place a wax paper sheet over the test card.
3. Place two drops of each solution on the wax paper over the circle on the test card with the same letter.
4. Dip the end of a glucose test strip in each of the three solutions. Use a new strip for each solution.
5. Record the **COLOR** of the glucose test strips on the data table below.

Indicator	Solution A	Solution B	Solution C
Glucose Test Strip	green	green	green

6. Add one drop of iodine solution to each solution.
7. Record the **COLOR** of the solutions on the data table below.

Indicator	Solution A	Solution B	Solution C
Iodine Solution	blue-black		

8. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#1

9. Using the data you have collected and the background information, which solutions contain sugar? 3

In the space below, explain the reason for your answer.

10. Using the data you have collected and the background information, which solutions contain starch? 3

In the space below, explain the reason for your answer.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#2

Student ID G-07 **Scoring Form - Starch & Sugar Testing 1**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Glucose strip data table Solutions A & B Solution C	0 (1) 0 (1)	2
7. Iodine solution data table Solutions A & B Solution C	(0) 1 0 (1)	1
9. Sugar solutions Solutions named Explain choice	0 (1) 0 (1) 2	2
10. Starch solution Solution named Explain choice	0 (1) (0) 1 2	1

Total Score 6

Total possible score - 10 points

G-07
M
#2

Starch and Sugar Testing 1

Task: At this station, you will experiment to determine which of three solutions contain starch and sugar.

MATERIALS:

- dropper bottles A - C
- dropper bottle with iodine solution
- glucose test strips
- test card
- wax paper sheets
- waste cup
- paper towels
- safety goggles

BACKGROUND:

Iodine solution turns blue-black in the presence of starch.

Glucose test strips turn green in the presence of the sugar glucose.

DIRECTIONS:

1. Put your safety goggles on.
2. Place a wax paper sheet over the test card.
3. Place two drops of each solution on the wax paper over the circle on the test card with the same letter.
4. Dip the end of a glucose test strip in each of the three solutions. Use a new strip for each solution.
5. Record the **COLOR** of the glucose test strips on the data table below.

Indicator	Solution A	Solution B	Solution C
Glucose Test Strip	green	green	yellow

6. Add one drop of iodine solution to each solution.
7. Record the **COLOR** of the solutions on the data table below.

Indicator	Solution A	Solution B	Solution C
Iodine Solution	Black	Black	Black

8. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

9. Using the data you have collected and the background information, which solutions contain sugar? A B

#2

In the space below, explain the reason for your answer.

[redacted] It change

10. Using the data you have collected and the background information, which solutions contain starch? A B C

In the space below, explain the reason for your answer.

It change

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#3

Student ID G-15 **Scoring Form - Starch & Sugar Testing 1**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
5. Glucose strip data table Solutions A & B Solution C	0 (1) 0 (1)	2
7. Iodine solution data table Solutions A & B Solution C	0 (1) (0) 1	1
9. Sugar solutions Solutions named Explain choice	0 (1) 0 1 (2)	3
10. Starch solution Solution named Explain choice	0 (1) 0 1 (2)	3

Total Score 9

Total possible score - 10 points

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February 1, 1995

G-15-F

#3

Starch and Sugar Testing 1

Task: At this station, you will experiment to determine which of three solutions contain starch and sugar.

MATERIALS:

- dropper bottles A - C
- dropper bottle with iodine solution
- glucose test strips
- test card
- wax paper sheets
- waste cup
- paper towels
- safety goggles

BACKGROUND:

Iodine solution turns blue-black in the presence of starch.

Glucose test strips turn green in the presence of the sugar glucose.

DIRECTIONS:

1. Put your safety goggles on.
2. Place a wax paper sheet over the test card.
3. Place two drops of each solution on the wax paper over the circle on the test card with the same letter.
4. Dip the end of a glucose test strip in each of the three solutions. Use a new strip for each solution.
5. Record the **COLOR** of the glucose test strips on the data table below.

Indicator	Solution A	Solution B	Solution C
Glucose Test Strip	green	yellow/ light green	yellow/ light green

6. Add one drop of iodine solution to each solution.
7. Record the **COLOR** of the solutions on the data table below.

Indicator	Solution A	Solution B	Solution C
Iodine Solution	red orange	red orange	black

8. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#3

9. Using the data you have collected and the background information, which solutions contain sugar?

Solution A solution B & C have a little

In the space below, explain the reason for your answer.

The test striped used for solution A turned all green which ment it contained sugar. The test strips I used for solutions B & C turned light green.

10. Using the data you have collected and the background information, which solutions contain starch?

Solution C

In the space below, explain the reason for your answer.

The solution in baddle C turned black which ment it contained starch.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Starch and Sugar Testing 2
Task Information

Grade: 8th Grade

Format: Manipulative

Purpose: The students will design and carry out an experiment to determine the presence of starch and sugar in unknown solutions

Content: Physical Science - Block H - VIA, VIIIA

Skills:

Primary: Observing, Recording Data, Interpreting data.
Secondary: Classifying, Generalizing/Inferring

Time: 10 -15 minutes

Materials:

- dropper bottles labeled A, B, and C
- dropper bottle with iodine
- glucose test strip/stick
- laminated test card or transparency test card
- waste container (cup or small pail)
- wax paper
- paper towels
- safety goggles

Preparation:

- Glucose and starch solutions can be obtained from a science supply company
- Put glucose solutions in bottles A and B
- Put starch solutions in bottle C
- Glucose test strips/stick can be obtained from a science supply company or a drugstore
- Keep the glucose strips away from the iodine solution. The fumes will turn the strips black or green
- Be sure to test glucose and starch solutions before using them with the students
- The glucose and starch solutions can be diluted two or three times. They will be more effective than full strength.
- Wax paper should be cut to fit over the test card. This will keep the test card from becoming contaminated. If using transparency test card be sure to discard when each student is finished.

Modifications and Extensions:

- Glucose test tape is no longer manufactured. You may use glucose test strips/sticks found at a drugstore. These are quite expensive so a teacher demo may be more appropriate.
- To do a Teacher Demo you might use an overhead projector with a transparency sheet marked with three circles marked "A", "B", and "C". The students could then check the color on the glucose strips as well as see the iodine change when the materials were added.
- There is also Starch and Sugar 1, with a different degree of structure

Safety:

- Students must wear safety goggles when working with iodine solution.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Starch and Sugar Testing 2

Task: At this station, you will design and carry out an experiment to determine which of three solutions contain starch and sugar.

Materials:

- dropper bottles A - C
- dropper bottle with iodine solution
- glucose test strips
- test card
- wax paper sheets
- waste cup
- paper towels
- safety goggles

Background:

> Iodine solution turns blue-black in the presence of starch.
> Glucose test strips turn green in the presence of the sugar glucose.

Directions:

1. Put your safety goggles on.

2. You have been provided with three(3) unknown solutions and two (2) indicators. Using the background above and your knowledge of science, think carefully about an experiment you could do to determine if starch and/or sugar are present in any of the three solutions.

3. In the space below, describe the procedures you followed in conducting your experiment.

_____

_____

_____

_____

_____

_____

4. **CARRY OUT YOUR EXPERIMENT.**

   When carrying out your experiment, place a wax paper sheet over the test card to protect it.

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

5. Record the **COLOR** of the test strips and the solutions in the data table below.

Indicator	Solution A	Solution B	Solution C
Glucose Test Strips			
Iodine Solution			

6. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

7. Using the data you have collected and the background information, which solutions contain sugar?

_____

In the space below, explain the reason for your answer.

_____

_____

_____

8. Using the data you have collected and the background information, which solutions contain starch?

_____

In the space below, explain the reason for your answer.

_____

_____

_____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Starch and Sugar Testing 2 - Scoring Rubric
Maximum Score - 11 points

Question 3. Experimental procedures. 2 points total

Point Criteria:

- Allow 1 point for a correct testing method for a sugar.
- Allow 1 point for correct testing method for a starch.

Acceptable responses include:

- Use glucose test strips in all three solutions. (1 point)
- Use iodine solution in all three solutions. (1 point)
- Record and compare which are sugar and/or starch.

or

- Use glucose strips to test for sugar. (1 point)
- Use iodine solution to test for starch. (1 point)

Question 5. Glucose strip and iodine solution data table 2 points total

Indicator	Solution A	Solution B	Solution C
Glucose Test Strips	*green*	*green*	*yellow or no change*
Iodine Solution	*orange or no change*	*orange or no change*	*blue, black, or brown*

Point Criteria:

- Allow 1 point for correct data for sugar method according to student plan (See question #3).
- Allow 1 point for correct data for starch method according to student plan (see question #3).

Question 7. Identify sugar solutions. 3 points total

Point Criteria:

- Allow 1 point for identifying both sugar solutions as A and B.
  - Accept any student's response correctly based on his/her data
- Allow 2 points for an explanation relating student data to background information.
  - Solutions A and B turned the test strips green which indicates sugar.
  - Allow only 1 point if the student states the background information without relating it to his/her data

Question 8. Identify starch solutions. 3 points total

Point Criteria:

- Allow 1 point for identifying starch solution as C.
  - Accept any student's response correctly based on his/her data
- Allow 2 points for an explanation relating student data to background information.
  - Solution C turned the iodine solution black which indicates starch.
  - Allow only 1 point if the student states the background information without relating it to his/her data.

Highest possible score - 11 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _ _____ Scoring Form - Starch and Sugar Testing 2
Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points earned
3. Experimental Procedures		
Sugar Testing method	0 1	_____
Starch Testing Method	0 1	
5. Glucose Strips and Iodine Solution data table		
Solution A	0 1	
Solution B	0 1	_____
Solution C	0 1	
7. Sugar Solution(s)		
Solution(s) named	0 1	
Explain choice	0 1 2	_____
8. Starch solution(s)		
Solution(s) named	0 1	
Explain choice	0 1 2	_____

Total Score _____
Total Possible Score - 11 points

#1

Student ID GMS-3 **Scoring Form - Starch and Sugar Testing 2**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points earned
3. Experimental Procedures Sugar Testing method Starch Testing Method	(0) 1 0 (1)	1
5. Glucose Strips and Iodine Solution data table Solution A Solution B Solution C	(0) 1 0 (1) (0) 1	1
7. Sugar Solution(s) Solution(s) named Explain choice	0 (1) 0 1 (2)	3
8. Starch solution(s) Solution(s) named Explain choice	(0) 1 (0) 1 2	0

Total Score 5

Total Possible Score - 11 points

CMS-3 #1

Starch and Sugar Testing 2

Task: At this station, you will design and carry out an experiment to determine which of three solutions contain starch and sugar.

MATERIALS:

dropper bottles **A - C**
dropper bottle with iodine solution
glucose test strips
test card
wax paper sheets
waste cup
paper towels
safety goggles

BACKGROUND:

Iodine solution turns blue-black in the presence of starch.

Glucose test strips turn green in the presence of the sugar glucose.

DIRECTIONS:

1. Put your safety goggles on.
2. You have been provided with three(3) unknown solutions and two (2) indicators. Using the background above and your knowledge of science, think carefully about an experiment you could do to determine if starch and/or sugar are present in any of the three solutions.
3. **CARRY OUT YOUR EXPERIMENT.**

   When carrying out your experiment, place a wax paper sheet over the test card to protect it.
4. Record the **COLOR** of the test strips and the solutions in the data table below.

Indicator	Solution A	Solution B	Solution C
Glucose Test Strips	Turned green	Turned green	Turned Green.
Iodine Solution	Turned Black	Turned Black	Turned Black

5. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

PLEASE CONTINUE THIS TASK ON THE NEXT PAGE

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

6. In the space below, describe the procedures you followed in conducting your experiment.

I put Solution A.B.C and the Iodine on different strips.

/

7. Using the data you have collected and the background information, which solutions contain sugar? A.B.C

In the space below, explain the reason for your answer.

They all turned green.

2

8. Using the data you have collected and the background information, which solutions contain starch? Abc

In the space below, explain the reason for your answer.

All three strips turned green.

2

#2

Student ID GMS-1 **Scoring Form - Starch and Sugar Testing 2**
Male or (Female) (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points earned
3. Experimental Procedures		
Sugar Testing method	0 (1)	2
Starch Testing Method	0 (1)	
5. Glucose Strips and Iodine Solution data table		
Solution A	(0) 1	
Solution B	0 (1)	2
Solution C	0 (1)	
7. Sugar Solution(s)		
Solution(s) named	0 (1)	3
Explain choice	0 1 (2)	
8. Starch solution(s)		
Solution(s) named	0 (1)	2
Explain choice	0 (1) 2	

Total Score 9
Total Possible Score - 11 points

Starch and Sugar Testing 2

Task: At this station, you will design and carry out an experiment to determine which of three solutions contain starch and sugar.

MATERIALS:

- dropper bottles A - C
- dropper bottle with iodine solution
- glucose test strips
- test card
- wax paper sheets
- waste cup
- paper towels
- safety goggles

BACKGROUND:

Iodine solution turns blue-black in the presence of starch.

Glucose test strips turn green in the presence of the sugar glucose.

DIRECTIONS:

1. Put your safety goggles on.
2. You have been provided with three(3) unknown solutions and two (2) indicators. Using the background above and your knowledge of science, think carefully about an experiment you could do to determine if starch and/or sugar are present in any of the three solutions.
3. **CARRY OUT YOUR EXPERIMENT.**

   When carrying out your experiment, place a wax paper sheet over the test card to protect it.
4. Record the **COLOR** of the test strips and the solutions in the data table below.

Indicator	Solution A	Solution B	Solution C
Glucose Test Strips	green	green	yellow
Iodine Solution	black	black	black

2

5. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

PLEASE CONTINUE THIS TASK ON THE NEXT PAGE

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

6. In the space below, describe the procedures you followed in conducting your experiment.

I put dots of Solution A, B, C, under the Colors on the test card and then dipped the Glucose test taper in. I did the same for the Iodine. 2

7. Using the data you have collected and the background information, which solutions contain sugar? A & B

In the space below, explain the reason for your answer.

Because when I dipped the strip in the new turned green. 3

8. Using the data you have collected and the background information, which solutions contain starch? A, B & C

In the space below, explain the reason for your answer.

When I dipped the strip in Iodine it turened black. 2

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#3

Student ID GMS-12 **Scoring Form - Starch and Sugar Testing 2**
Male or (Female) **(circle one)**

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points earned
3. Experimental Procedures		
Sugar Testing method	0 (1)	2
Starch Testing Method	0 (1)	
5. Glucose Strips and Iodine Solution data table		
Solution A	0 (1)	
Solution B	0 (1)	3
Solution C	0 (1)	
7. Sugar Solution(s)		
Solution(s) named	0 (1)	3
Explain choice	0 1 (2)	
8. Starch solution(s)		
Solution(s) named	0 (1)	3
Explain choice	0 1 (2)	

Total Score 11
Total Possible Score - 11 points

Starch and Sugar Testing 2

Task: At this station, you will design and carry out an experiment to determine which of three solutions contain starch and sugar.

MATERIALS:

dropper bottles **A - C**
dropper bottle with iodine solution
glucose test strips
test card
wax paper sheets
waste cup
paper towels
safety goggles

BACKGROUND:

Iodine solution turns blue-black in the presence of starch.

Glucose test strips turn green in the presence of the sugar glucose.

DIRECTIONS:

1. Put your safety goggles on.
2. You have been provided with three(3) unknown solutions and two (2) indicators. Using the background above and your knowledge of science, think carefully about an experiment you could do to determine if starch and/or sugar are present in any of the three solutions.
3. **CARRY OUT YOUR EXPERIMENT.**

   When carrying out your experiment, place a wax paper sheet over the test card to protect it.
4. Record the **COLOR** of the test strips and the solutions in the data table below.

Indicator	Solution A	Solution B	Solution C
Glucose Test Strips	green	green	yellow-green
Iodine Solution	red	black	black

3

5. Blot the wax paper with a paper towel and wipe off the test card. Throw any garbage into the waste cup.

PLEASE CONTINUE THIS TASK ON THE NEXT PAGE

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

6. In the space below, describe the procedures you followed in conducting your experiment.

1. On wax paper - place 4 drops of sugar + starch on each letter (A, B, C) with that letter bottle.
2. I tested the drops with 1 piece of glucose test tape on each and record my observations
3. I made another drop of sugar starch seperate from the others and dropped iodine

3

7. Using the data you have collected and the background information, which solutions contain sugar?

A, B C

In the space below, explain the reason for your answer.

There were 3 which contained sugar because the glucose test strips turned green

2

8. Using the data you have collected and the background information, which solutions contain starch?

B, C.

In the space below, explain the reason for your answer.

In letter A, the iodine did not change to blue-black when iodine was dropped onto it.

3

Sun and Temperatures
Task Information

Grade: 8th Grade

Content: Physical Science/Earth Science
Block I, I - D - 1
Block E, VII - E

Format: Paper / Pencil

Purpose: To assess students practical understanding of the relationship of temperature to the environmental conditions (shade, ground, etc.)

Skills:

Primary: Inferring
Secondary: Recording data

Time: 5 - 10 minutes

Materials: Task sheets

Preparation: None

Safety: None

Extensions/Modifications:

Can be used with Earth science classes also.

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Sun and Temperatures

Task: To infer the temperature of four thermometers and explain why they should have those values inferred.

Four thermometers called A, B, C, and D were put outdoors near each other. It was at noontime on a bright sunny day in June. **Thermometer A** was left out in the sunlight on a light colored sidewalk. **Thermometer B** was put on the same sidewalk, but in the shade. **Thermometer C** was placed in an inflated air tight clear plastic bag and left on the same sidewalk in the sunlight. **Thermometers D** was placed in an inflated air tight clear plastic bag and put in the sunlight in a swimming pool.

After one hour, The temperature readings of the thermometers were as follows:

- 31°C (88°F)
- 34°C (94°F)
- 44°C (112°F)
- 54°C (130°F)

Also at that time the temperature of the air was 31°C(88°F) and the pool temperature was 29°C(85°F).

1. Record on the chart below those thermometer readings from above that you think goes with each thermometer (A, B, C, D) based on where each thermometer had been located.

Thermometer	Temperature You Think
A - Open air, in sunlight, on white sidewalk	℃
B - Open air, in shade, on white sidewalk	℃
C -Plastic bag, in sunlight, on white sidewalk	℃
D - Plastic bag, in sunlight, in swimming pool	℃

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

2. Explain why you think **each** of the thermometers had the reading you gave compared to the other thermometers.

A. _____

B. _____

C. _____

D. _____

3. Compare conditions from one thermometer (A, B, C, or D) to support the following "public service announcement" that is heard on radio and TV and seen in the press. "Do not leave pets unattended in a closed-up car during clear, warm days."

_____

_____

_____

_____

_____

_____

_____

_____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Sun and Temperature - Scoring Rubric

Maximum Score - 10 points

Question 1. Chart — 4 points total

Criteria:

- Allow 1 point for each correct response
  - ~ A - 94° F (34°C)
  - ~ B - 88° F (31°C)
  - ~ C - 130° F (54°C)
  - ~ D - 112° F (44°C)

Question 2 Explanation — 4 points total

Criteria:

- Allow 1 point for each correct explanation based on student's responses in the chart.

  Acceptable student responses;
  - Thermometer A will be warmer than the air temperature because it is in full sun.
  - Thermometer B will be the same as the air temperature (88°F) because it is always recorded in the shade.
  - Thermometer C will be the hottest because the bag traps sunlight and won't let the heat out.
  - Thermometer D won't warm as much as C because, even if it is in a bag the water will keep it cooler longer.
- Allow 0 credit for a response that states a numerical comparison, but does not give a reason.

Question 3. Leaving Pets in a car on a warm day — 2 points total

Criteria:

- Allow 1 point for referring to thermometer C information
- Allow 1 point for a comparison of a closed up car to the plastic bag conditions of thermometer C.

  Acceptable 2 point response;
  - The closed up car is just like the plastic bag in the sun. The temperatures were the highest.

  Acceptable 1 point response;
  - The closed up car will get very hot because the heat can't get out.

Highest possible score - 10 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Scoring Form - Sun & Temperature**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Chart **A - 34°C** **B - 31°C** **C - 54°C** **D - 44°C**	 0 1 0 1 0 1 0 1	_____
2. Explanations **A** **B** **C** **D**	 0 1 0 1 0 1 0 1	_____
3. Evidence to support public service announcement	0 1 2	_____

Total Score _____

Total possible score - 10 points

Student ID 2H-2 **Scoring Form - Sun & Temperature** #1

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Chart **A - 34°C** **B - 31°C** **C - 54°C** **D - 44°C**	(0) 1 0 (1) 0 (1) (0) 1	2
2. Explanations **A** **B** **C** **D**	(0) 1 (0) 1 (0) 1 (0) 1	0
3. Evidence to support public service announcement	(0) 1 2	0

Total Score 2

Total possible score - 10 points

#1

April 29, 1995

SUN AND TEMPERATURES

Task: To infer the temperature of four thermometers and explain why they should have those values inferred.

Four thermometers called A, B, C, and D were put outdoors near each other. It was at noontime on a bright sunny day in June. **Thermometer A** was left out in the sunlight on a light colored sidewalk. **Thermometer B** was put on the same sidewalk, but in the shade. **Thermometer C** was placed in an inflated air tight clear plastic bag and left on the same sidewalk in the sunlight. **Thermometers D** was placed in an inflated air tight clear plastic bag and put in the sunlight in a swimming pool.

After one hour, The temperature readings of the thermometers were as follows:

- 31°C (88°F)
- 34°C (94°F)
- 44°C (112°F)
- 54°C (130°F)

Also at that time the temperature of the air was 31°C(88°F) and the pool temperature was 29°C(85°F).

1. Record on the chart below those thermometer readings from above that you think goes with each thermometer (A, B, C, D) based on where each thermometer had been located.

Thermometer	Temperature You Think
A - Open air, in sunlight, on white sidewalk	44 °C
B - Open air, in shade, on white sidewalk	31 °C
C -Plastic bag, in sunlight, on white sidewalk	54 °C
D - Plastic bag, in sunlight, in swimming pool	34 °C

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

2. Explain why you think each of the thermometers had the reading you have given to it in comparison to the other thermometers.

The reason I put the temperatures of the thermometers is because the Sunlight reflects differently on certain objects.

3. Explain how information in this investigation would support the following "public service announcement" that is heard on radio and TV and seen in the press. "Do not leave pets unattended in a closed-up car during clear, warm days."

The reason the announcement is said is because there is no oxygen moving around in the car.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID 2H - 14 **Scoring Form - Sun & Temperature** #2

Male or (Female) (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Chart **A - 34°C** **B - 31°C** **C - 54°C** **D - 44°C**	(0) 1 0 (1) 0 (1) (0) 1	2
2. Explanations **A** **B** **C** **D**	(0) 1 0 (1) 0 (1) (0) 1	2
3. Evidence to support public service announcement	0 (1) 2	1

Total Score 5

Total possible score - 10 points

April 29, 1995

SUN AND TEMPERATURES

Task: To infer the temperature of four thermometers and explain why they should have those values inferred.

Four thermometers called A, B, C, and D were put outdoors near each other. It was at noontime on a bright sunny day in June. **Thermometer A** was left out in the sunlight on a light colored sidewalk. **Thermometer B** was put on the same sidewalk, but in the shade. **Thermometer C** was placed in an inflated air tight clear plastic bag and left on the same sidewalk in the sunlight. **Thermometers D** was placed in an inflated air tight clear plastic bag and put in the sunlight in a swimming pool.

After one hour, The temperature readings of the thermometers were as follows:

- 31°C (88°F)
- 34°C (94°F)
- 44°C (112°F)
- 54°C (130°F)

Also at that time the temperature of the air was 31°C(88°F) and the pool temperature was 29°C(85°F).

1. Record on the chart below those thermometer readings from above that you think goes with each thermometer (A, B, C, D) based on where each thermometer had been located.

Thermometer	Temperature You Think
A - Open air, in sunlight, on white sidewalk	(112°F) 44 °C
B - Open air, in shade, on white sidewalk	(88°F) 31 °C
C -Plastic bag, in sunlight, on white sidewalk	(130°F) 54 °C
D - Plastic bag, in sunlight, in swimming pool	(94°F) 34 °C

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

2. Explain why you think each of the thermometers had the reading you have given to it in comparison to the other thermometers.

Open Air Sun - I gave it that, because the sun was beating directly on it
Open Air Shade - I gave it that, because the shade is always cooler
plastic bag sun - Because the rays get intensified because of the plastic bag
plastic bag pool - I gave it that, because the pool water was 94°

3. Explain how information in this investigation would support the following "public service announcement" that is heard on radio and TV and seen in the press. "Do not leave pets unattended in a closed-up car during clear, warm days."

Because the Sun Shining through the window gets intensified because of the glass window & the Car would get so unearthly hot that the pet could died, you should always leave a couple windows open.

Student ID 2H-5 **Scoring Form - Sun & Temperature** #3

(Male) or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Chart **A - 34°C** **B - 31°C** **C - 54°C** **D - 44°C**	0 (1) 0 (1) 0 (1) 0 (1)	4
2. Explanations **A** **B** **C** **D**	0 (1) 0 (1) 0 (1) 0 (1)	4
3. Evidence to support public service announcement	0 1 (2)	2

Total Score 10

Total possible score - 10 points

2H-5 #3

April 29, 1995

SUN AND TEMPERATURES

Task: To infer the temperature of four thermometers and explain why they should have those values inferred.

Four thermometers called A, B, C, and D were put outdoors near each other. It was at noontime on a bright sunny day in June. **Thermometer A** was left out in the sunlight on a light colored sidewalk. **Thermometer B** was put on the same sidewalk, but in the shade. **Thermometer C** was placed in an inflated air tight clear plastic bag and left on the same sidewalk in the sunlight. **Thermometers D** was placed in an inflated air tight clear plastic bag and put in the sunlight in a swimming pool.

After one hour, The temperature readings of the thermometers were as follows:

- 31°C (88°F)
- 34°C (94°F)
- 44°C (112°F)
- 54°C (130°F)

Also at that time the temperature of the air was 31°C(88°F) and the pool temperature was 29°C(85°F).

1. Record on the chart below those thermometer readings from above that you think goes with each thermometer (A, B, C, D) based on where each thermometer had been located.

Thermometer	Temperature You Think
A - Open air, in sunlight, on white sidewalk	34 °C
B - Open air, in shade, on white sidewalk	31 °C
C -Plastic bag, in sunlight, on white sidewalk	54 °C
D - Plastic bag, in sunlight, in swimming pool	44 °C

Please Continue on the Next Page

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

2. Explain why you think each of the thermometers had the reading you have given to it in comparison to the other thermometers.

I THINK THAT THERMOMETER "C" WOULD BE THE WARMEST BECAUSE THE BAG TRAPS THE HEAT. "D" WILL BE THE 2ND WARMEST (SAME AS C BUT H2O COOLS IT). "A" IS THE 3RD WARMEST BECAUSE THE SUN WARMED IT. "B" IS THE COOLEST BECAUSE IT HAS NO SUN.

3. Explain how information in this investigation would support the following "public service announcement" that is heard on radio and TV and seen in the press. "Do not leave pets unattended in a closed-up car during clear, warm days."

THE CAR TRAPS THE HEAT, (LIKE THE PLASTIC BAG) AND GETS VERY WORM.

Unknown Liquids
Task Information

Grade: 8th Grade

Content:

Density

- Block D (The Earth's Changing Surface). Section I.C.1.a.7. page 7

Format:

Manipulative

Purpose:

The student will use available information to design a procedure for determining and comparing the masses and densities of two (2) unknown substances.

Skills:

Primary: Interpreting data
Secondary: Applying math

Time: 10 -15 minutes

Materials:

Teacher:

- yellow and blue food coloring
- water
- rubbing alcohol
- salt
- sealant - hot glue or paraffin

Per Student or Station:

- 2 screw top bottles (28 ml) with solutions X and Z
- triple beam or double pan balance
- eye goggles
- calculator

Preparation:

- The yellow solution (Z) is a saturated salt solution with yellow food coloring.
  - start with one liter (1000 ml) of **warm** water. Add as much salt that will dissolve with constant stirring. Let cool. Filter out any undissolved salt. Add a few drops of yellow food coloring.
- The blue solution (X) is isopropyl rubbing alcohol and blue food coloring.
- Bottle - screw cap vials - flint glass, 28 ml
- Seal the caps on the bottles with glue or liquid paraffin to avoid evaporation and to facilitate reuse.
- Determine the mass of the bottles before student use.
- Pretest the mass difference between X and Z to determine if adequate for proper grading.

Safety:

- **Safety goggles must be worn.**
- Check MSDS (Materials Safety Data Sheet) for further precautions.
- Proper lab safety precautions are required
- Students should be instructed not to open the vials.
- Caution with breakage of glass bottles.

Extensions/Modifications: None

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Unknown Liquids

Task: At this station, you will be determining which of two solutions is liquid X and which is liquid Z.

Materials

- bottle containing a blue liquid
- bottle containing a yellow liquid
- triple beam or double pan balance
- calculator
- eye goggles

Directions

The labels on the two bottles have fallen off. The labels had read "Liquid X" and "Liquid Z." Your job is to determine which bottle contains liquid X and which contains liquid Z. The real challenge is that you must do this **without opening the bottles**. All of the information you need to reach your conclusion is listed in the box below:

- The bottles and lids are identical in mass, volume, and shape when empty.
- Both bottles contain the same volume of solution.
- The density of liquid Z is greater than the density of liquid X.

1. In the space below, list the steps you will follow to determine which bottle contains liquid X and which contains liquid Z.

2. **Put on eye goggles. Be careful not to drop either bottle. CARRY OUT YOUR PLAN.**

Please Continue on the Next Page

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

3. Record the results of your experiment in the space below.
   *** Show all work. ***

4. Using the data collected in your experiment, which liquid is liquid X and which is liquid Z?

   Blue Liquid _____ **Yellow Liquid** _____

5. Based on the results of your experiment, write a statement explaining the relationship between mass, volume, and density. Writing the formula is **not** sufficient.

_____

_____

_____

_____

_____

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Unknown Liquids - Scoring Rubric

Maximum score - 8 points

Question 1. Procedure for Identifying Liquids — 3 points total

Point Criteria:

- Allow 3 points for a valid, logical procedure that includes the finding and comparing the masses of the two liquids. (The mass, volume, and density of the bottle is irrelevant to the student's responses for this activity.)
- Acceptable responses include:
  - **Mass Method**
    - Find the mass of the yellow liquid (1 point)
    - Find the mass of the blue liquid (1 point)
    - Compare to find which would have the greater density (1 point)

      or
    - Mass the yellow and the blue (2 points)
    - The heavier will be more dense (1 point)
  - **Density Method**
    - Find the mass of both liquids (1 point)
    - Assign a volume to both liquids (1 point)
    - Compare densities (1 point)

Question 3. Results of Experiment — 2 points total

Point Criteria:

- Allow 1 point for correct blue liquid data based upon the student's plan.
- Allow 1 point for correct yellow liquid data based upon the student's plan.
  - **Mass Method**
    - Qualitative mass comparison using a double pan balance is acceptable.
    - Quantitative mass must be within +/- 1.0 grams
  - **Density Method**
    - Density must be within +/- 0.5 g/mL

Question 4. Identification of Liquids — 1 point total

Point Criteria:

- Allow 1 point for correctly identifying both liquids
  - Blue liquid = X
  - Yellow liquid = Z

  (Accept any student response based on his/her data)

Question 5. Density/Mass Relationship — 2 points total

Point Criteria:

- Allow 2 points for a generalized statement about the density/mass relationship.
  - If two substances (solutions) have equal volumes, the one with the greater mass will have the greater density.
  - The mass of the yellow was greater than the blue. Since the volumes were the same, the yellow is more dense.
- Allow 1 point if the student does **not** address a constant volume.
  - The liquid with the greater mass has a greater density.

Highest possible score - 8 points

NYS Alternative Assessment in Science Project
NSF Grant #MDR-9154506

Student ID _____ **Scoring Form - Unknown Liquids**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Procedure/Plan	0 1 2 3	_____
3. Results of Experiment		
Measurement Yellow	0 1	_____
Measurement Blue	0 1	
4. Identifying Liquids	0 1	_____
5. Density/Mass Relationship	0 1 2	_____

Total Score _____

Total possible Score - 8 points

Student ID _____ **Scoring Form - Unknown Liquids**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Procedure/Plan	0 1 2 3	_____
3. Results of Experiment		
Measurement Yellow	0 1	_____
Measurement Blue	0 1	
4. Identifying Liquids	0 1	_____
5. Density/Mass Relationship	0 1 2	_____

Total Score _____

Total possible Score - 8 points

Student ID HM 81 -19 **Scoring Form - Unknown Liquids**

Male or Female (circle one)

#1

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Procedure/Plan	0 (1) 2 3	1
3. Results of Experiment Measurement Yellow Measurement Blue	 0 (1) 0 (1)	2
4. Identifying Liquids	0 (1)	1
5. Density/Mass Relationship	(0) 1 2	0

Total Score 4

Total possible Score - 8 points

Unknown Liquids

Task: At this station, you will be determining which of two solutions is liquid X and which is liquid Z.

MATERIALS:

bottle containing a blue liquid
bottle containing a yellow liquid
triple beam or double pan balance
calculator

DIRECTIONS:

The labels on the two bottles have fallen off. The labels read "Liquid X" and "Liquid Z." Your job is to determine which bottle contains liquid X and which contains liquid Z. The real challenge is that you must do this **without opening the bottles**. All of the information you need to reach your conclusion is listed below:

- The bottles and lids are identical in mass, volume, and shape.
- Both bottles contain the same amount of solution.
- The density of liquid Z is greater than the density of liquid X.

1. In the space below, list the steps you will follow to determine which bottle contains liquid X and which contains liquid Z.

will find the mass of both bottles containing the liquid then since the volume is the same the one with the less mass will have the most density

2. **CARRY OUT YOUR PLAN.**

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

3. Record the results of your experiment in the space below. *** Show all work. ***

b = 60.5 g = D

y = 50.18 g = D

$\frac{M}{Dx}$

fatal comparative

4. Using the data collected in your experiment, which liquid is liquid X and which is liquid Z?

Blue Liquid X **Yellow Liquid** Z

5. Based on the results of your experiment, explain the relationship between mass and density.

something with the same volume has a larger density if the mass is less.

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

#2

Student ID HM-81-17 **Scoring Form - Unknown Liquids**

Male or Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Procedure/Plan	0 1 2 (3)	3
3. Results of Experiment Measurement Yellow Measurement Blue	 0 (1) 0 (1)	2
4. Identifying Liquids	0 (1)	1
5. Density/Mass Relationship	0 1 (2)	0

Total Score 6

Total possible Score - 8 points

Unknown Liquids

Task: At this station, you will be determining which of two solutions is liquid X and which is liquid Z.

MATERIALS:

bottle containing a blue liquid
bottle containing a yellow liquid
triple beam or double pan balance
calculator

DIRECTIONS:

The labels on the two bottles have fallen off. The labels read "Liquid X" and "Liquid Z." Your job is to determine which bottle contains liquid X and which contains liquid Z. The real challenge is that you must do this **without opening the bottles.** All of the information you need to reach your conclusion is listed below:

- The bottles and lids are identical in mass, volume, and shape.
- Both bottles contain the same amount of solution.
- The density of liquid Z is greater than the density of liquid X.

1. In the space below, list the steps you will follow to determine which bottle contains liquid X and which contains liquid Z.

1. Find mass of yellow liquid
2. Find mass of blue/green liquid
3. Conclude which has the higher density
4. Conclude which is liquid Z and which is liquid X.

2. **CARRY OUT YOUR PLAN.**

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

2

3. Record the results of your experiment in the space below. *** Show all work. ***

yellow liq = 51.6 g
(inc bottle etc)
blue liq = 60.8 g
(inc bottle etc)

Since volume is always the same
∴ the blue liquid is more dense

yellow blue

$\frac{51.6}{x} < \frac{60.8}{x}$

this statement is always true whe $x \neq 0$ or + is not negative

4. Using the data collected in your experiment, which liquid is liquid X and which is liquid Z?

Blue Liquid Liquid Z **Yellow Liquid** Liquid X

5. Based on the results of your experiment, explain the relationship between mass and density.

It will always happen that when volume increases, mass increases, but no matter what volume you have, if it is pure (the make-up is the same throughout the object) the density will always remain the same

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

Student ID HM81-1 **Scoring Form - Unknown Liquids**

Male or Female (circle one)

#3

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

Question	Circle Point Breakdown	Points Earned
1. Procedure/Plan	0 1 2 (3)	3
3. Results of Experiment Measurement Yellow Measurement Blue	 0 (1) 0 (1)	2
4. Identifying Liquids	0 (1)	1
5. Density/Mass Relationship	0 1 (2)	2

Total Score 8

Total possible Score - 8 points

HM-81-1

 #3

Unknown Liquids

Task: At this station, you will be determining which of two solutions is liquid X and which is liquid Z.

MATERIALS:

bottle containing a blue liquid
bottle containing a yellow liquid
triple beam or double pan balance
calculator

DIRECTIONS:

The labels on the two bottles have fallen off. The labels read "Liquid X" and "Liquid Z." Your job is to determine which bottle contains liquid X and which contains liquid Z. The real challenge is that you must do this **without opening the bottles**. All of the information you need to reach your conclusion is listed below:

- The bottles and lids are identical in mass, volume, and shape.
- Both bottles contain the same amount of solution.
- The density of liquid Z is greater than the density of liquid X.

1. In the space below, list the steps you will follow to determine which bottle contains liquid X and which contains liquid Z.

Since both containers are of equal volume & mass, and the volume of liquid is the same in each bottle, whichever bottle has the most mass will have greater density, thus being Liquid Z. I will measure the mass of each bottle using a triple beam balance.

2. **CARRY OUT YOUR PLAN.**

NYS Alternative Science Assessment Project
NSF Grant #MDR-9154506

3

3. Record the results of your experiment in the space below. *** Show all work. ***

Blue's mass = 58.4 g

Yellow's mass = 44.1 g

58.4 g > 44.1 g

∴ Blue's mass > yellow's mass

Since density (Z) > density (X) and

volume (Z) = volume (X) — in our experiment

then mass (Z) > mass (X)

∴ Blue = liquid Z and Yellow liquid = X

4. Using the data collected in your experiment, which liquid is liquid X and which is liquid Z?

Blue Liquid Z **Yellow Liquid** X

5. Based on the results of your experiment, explain the relationship between mass and density.

A) If the volume of two substances is the same then:

1 If the mass of the first is higher then the density of the first is higher

2 If the mass of the second is higher then the density of the second is higher

3 If the mass of the two are equal then the densities are equal

B) If the volume of the first substance is greater then:

1 If the mass of the first substance is greater, then you cannot tell which has greater density

2 If the

3

C)

1

2

3

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NSF Grant #MDR-9154506