THE NATION'S REPORT CARD
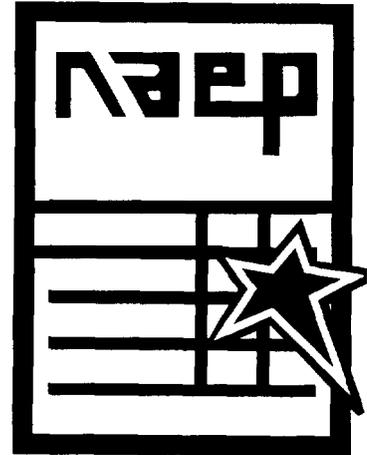
**1996 Assessment
SCIENCE-PUBLIC RELEASE
Grade 8**

Number of Items: 51

1996 ASSESSMENT

SCIENCE PUBLIC RELEASE

GRADE 8

NO. OF ITEMS: 54

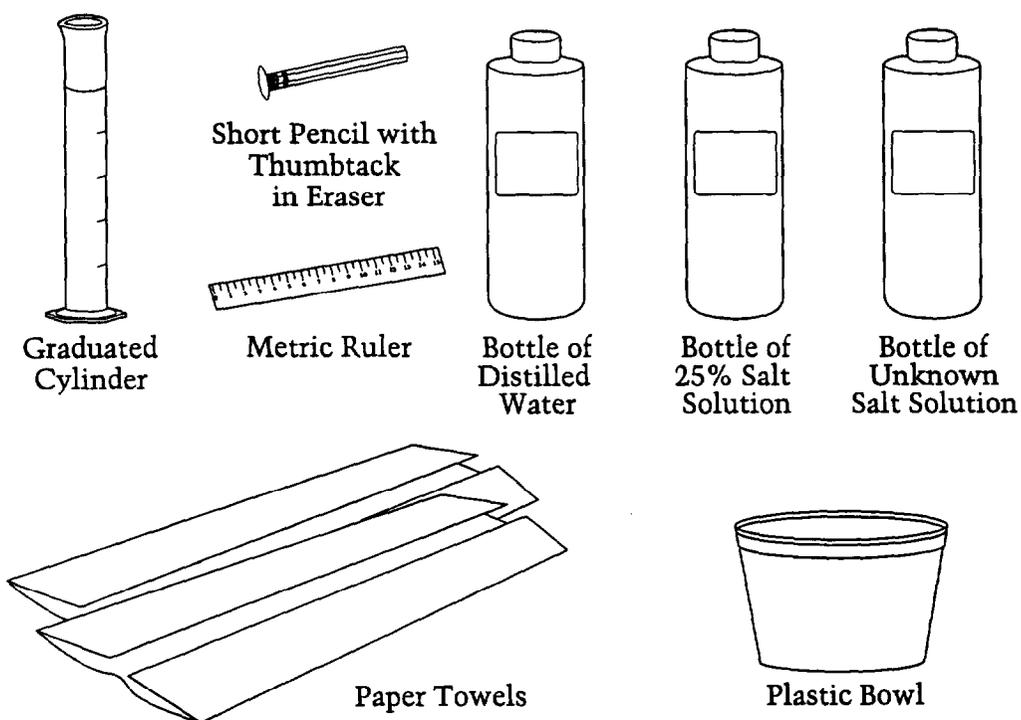*This package of released items includes:*

- *information about the framework classification codes available for each item,*

- *information about the item difficulty, as provided for each item,*

- *text of each item,*

- *item identification for each item, framework classification codes for each item, the key for each multiple-choice item, and the scoring guide for each constructed-response item.*

SALT SOLUTIONS

Estimating the Salt Concentration of an Unknown Salt Solution Using the "Floating Pencil Test"

For this task, you have been given a kit that contains materials that you will use to perform an investigation during the next 30 minutes. Please open your kit now and use the following diagram to check that all of the materials in the diagram are included in your kit. If any materials are missing, raise your hand and the administrator will provide you with the materials that you need.

Graduated Cylinder

Short Pencil with Thumbtack in Eraser

Metric Ruler

Bottle of Distilled Water

Bottle of 25% Salt Solution

Bottle of Unknown Salt Solution

Paper Towels

Plastic Bowl

STOP

Every body of water in natural ecosystems has salts and other substances dissolved in it. The concentration of dissolved salt varies from less than 0.2 percent in most freshwater streams and lakes to about 3.5 percent in most of the world's oceans. In this task, you will observe and measure how much of the length of a pencil floats above the water surface in water with very low salt concentration and in water with very <u>high</u> salt concentration. You will then use the same procedures to estimate the salt concentration of an unknown solution. Follow the directions step-by-step and write your answers to the questions in the space provided in your booklet.

LD000020

1. Open the plastic bottle labeled **Distilled Water.** The salt concentration of this water is very close to 0 percent. Pour the distilled water into the cylinder <u>up to the black line.</u> Put the cap back on the bottle.

Now take the pencil and put it in the water in the cylinder, eraser-end down. Part of the pencil will float above the water, as shown in the picture below.
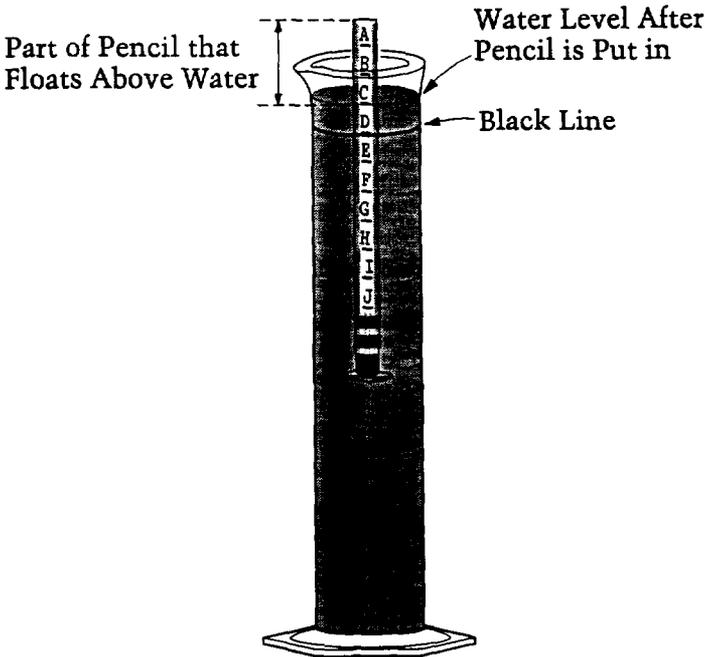
Explain why the pencil floats when it is put in the water.   LD000021

_____

_____

_____

_____

_____

_____

GO ON TO THE NEXT PAGE

2. Look at the pencil in the water. There are letters along the side of the pencil. Make sure that the pencil is not touching the side of the cylinder. Note the exact level where the water surface meets the side of the pencil, as shown in Picture A. Then draw a line on Picture B where the <u>water surface</u> comes to on your pencil. This line will help you to remember where the water level came to on your pencil for the next step (3).
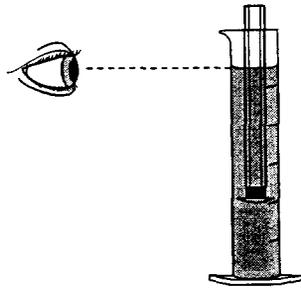
Picture A
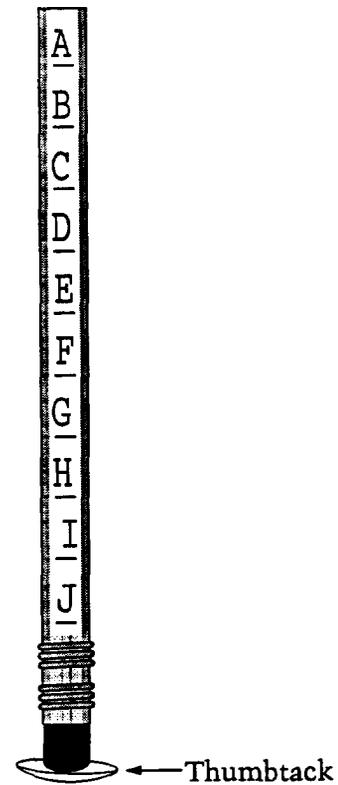
Picture B

←—Thumbtack

GO ON TO THE NEXT PAGE

3. Now take the pencil out of the water and dry it with a paper towel.

Use the ruler to measure the length of the pencil that was <u>above</u> the

water. Record the length in Table 1 below under **Measurement 1.**

TABLE 1

Type of Solution	Length of Pencil Above Water Surface (cm)		
	Measurement 1	Measurement 2	Average
Distilled Water			
Salt Solution			
Unknown Salt Solution			

LD000022

4. Now place the pencil back in the distilled water and repeat steps 2 and 3.

Record your measurement in Table 1 under **Measurement 2.** LD000023

5. Calculate the average of Measurements 1 and 2 and record the result

in the data table.

(You can calculate the average by adding Measurement 1 + Measurement 2

and then dividing by two.) LD000024

6. Explain why it is better to measure the length of the pencil that was above the water more than once. LD000025

_____

_____

_____

Now pour the distilled water out of the cylinder into the large plastic bowl. Later you will throw this water away.

Open the plastic bottle labeled **Salt Solution.** This solution contains 25% salt. Pour the salt solution into the cylinder <u>up to the black line</u>. Put the cap back on the bottle.

7. Now take the pencil and put it in the 25 % salt solution in the cylinder, eraser-end down. How does the pencil float in this solution compared to how it floated in the distilled water? (Fill in the oval in front of the correct answer.)

Ⓐ In the salt solution, more of the pencil is above the surface.

Ⓑ In the salt solution, more of the pencil is below the surface.

LD000026

8. Now use the same procedure that you used with the pencil in the distilled water to obtain two measurements of the length of the pencil that floats above the surface of the 25% salt solution. Record these two measurements in Table 1. Then calculate the average and record this result in the table.   LD000027

9. Why does the pencil float at a different level in the salt solution than in the distilled water?   LD000028

_____

_____

_____

_____

10. If you added more salt to the 25% salt solution and stirred the solution until the salt was dissolved, how would this change the way that the pencil floats? (Fill in the oval in front of the correct answer.)

   Ⓐ Less of the pencil would be above the surface.

   Ⓑ More of the pencil would be above the surface.

   Ⓒ There would be no difference in the amount of pencil above the surface.

Now pour the 25% salt solution out of the cylinder into the large plastic bowl. Later you will throw this solution away.   LD000029

Now open the plastic bottle labeled **Unknown Salt Solution.** You will now estimate the concentration of this unknown salt solution. Pour the unknown solution into the cylinder <u>up to the black line</u>. Put the cap back on the bottle.

11. Put the pencil in the solution in the cylinder, eraser-end down. Then repeat the same procedure that you used for the distilled water and the 25% salt solution. Obtain two measurements of the length of the pencil that floats above the surface of the unknown salt solution. Record these two measurements in Table 1. Then calculate the average and record this result in the table. LD000030

12. On the graph below, plot the average values you obtained for the distilled water and the 25% salt solution. Draw a straight line between the two data points. Assume that this line represents the relationship between the length of pencil that is above the water surface and the concentration of salt in the water. LD000031

% Salt in Water

INFORMATION ABOUT THE FRAME WORK CLASSIFICATION CODES AVAILABLE FOR EACH ITEM

Following this description of the classification codes, there is a single sheet with NAEP ID numbers, short descriptions of the items, item keys (1-4 if the item is multiple-choice; blank of the item is open-ended), as well as the mean p-values for the items in the released block.

The classification codes for each item can be viewed within each item in the scoring guide.

Field 1)   **Program profile:**
N27S NAEP, year 27 of Science

Field 2)   **Grade:**
1   Grade 4 only item
1/2   Grade 4/8 overlap itern
2   Grade 8 only item
2/3   Grade 8/12 overlap item
3   Grade 12 only item

Field 3)   **Field of science:**
PS   Physical Science
ES   Earth Science
LS   Life Science

Field 4)   **Field of science subcontent area:**
The letter corresponds to the subcontent areas described in the *Science Assessment and Exercise Specifications for the 1996 National Assessment of Edycational Progress.*

Physical Science
A   Matter and Its Trandormations
B   Energy and Its Trantionnations
C   Motion

Earth science
A   Solid Earth (lithosphere)
B   Water (hydrosphere)
C   Air (atmosphere)
D   Earth in space

Life Science:
A   Change and Evolution
B   Cells and Their Functions
C   Organisms
D   Ecology

Field 5)   **Ways of knowing and doing science:**
SI   Scientific Investigation
PR   Practical Reasoning
CU   Conceptual Understanding

Field 6)   **Theme**
                                        SYS Systems
    MOD Models
    PC   Patterns of Change
    NA   Not Applicable

Field 7)   **Nature of Science/technology:**
    NS   Nature of Science
    NT   Nature of Technology
    NA   Not Applicable

Field 8)   **Item type:**
    MC Multiple-choice
    SCR Short Constructed-Response
    ECR Extended Construoted-Response
    NA Not Applicable

1996 Science Items

GRADE: 08   BLOCK: 27S4

RELEASE

ITEM	NAEP ID	SHORT DESCRIPTION	KEY	CONTENT	PROCESS	P-VALUE	STATUS
1A	K040701	SALT SOLUTIONS: WHY DOES PENCIL FLOAT OE		2	3	0.265	P
3A	K040702	SALT SOLUTIONS: MEASURE PENCIL		1	1	0.594	P
5A	K040704	SALT SOLUTIONS: DETERMINE AVERAGE MEASURE OE		1	1	0.681	P
6A	K040705	SALT SOLUTIONS: WHY MEASURE TWICE OE		1	1	0.166	P
7	K040706	SALT SOLUTIONS: FLOATING IN SALT SOLUTIONS OE	1	2	1	0.919	P
9A	K040708	SALT SOLUTIONS: WHY DIFF IN SALT/WATER OE		2	3	0.194	P
10	K040709	SALT SOLUTIONS: EFFECT OF MORE SALT MC	2	2	2	0.814	P
12A	K040711	SALT SOLUTIONS: PLOT GRAPH-SALT VS LENGTH OE		2	1	0.380	P
13	K040712	SALT SOLUTIONS: RELATING LENGTH TO SALT CONC. OE	1	2	3	0.764	P
13Z	K0407CL	SALT SOLUTIONS: CLUSTER		2	3	0.503	P
14A	K040713	SALT SOLUTIONS: CONCENTRATION OF UNKNOWN OE		2	1	0.306	P

Content: 1 = Physical Sciences
2 = Earth & space sciences
3 = Life sciences

Process: 1 = Scientific investigation
2 = Practical reasoning
3 = Conceptual understanding

Note:
Question #2: Directions only
Questions # 4, 8, 11 were scored with other items.

Item Number: NONE   Accession Number: LD000020

Key: N O N E

Classification Codes:
N27S   2   ES   B   CU   NA   NA   NA

Rationale Text:

Estimating the Salt Concentrate on of an Unknown Salt Solution
Using the "Floating Pencil Test"

In this task, students observe, measure, and compare the lengths of the portion of a pencil that floats above the water surface in distilled water and in a 25% salt solution.   They then predict how the addition of more salt to the salt solution would affect the floating pencil. Students then measure the length of the pencil that floats above the surface of a solution of unknown salt concentration, and use the results of their previous observations to estimate the salt concentration of the unknown solution. The task assesses students' ability to make simple observations, measure length using a metric ruler, apply their observations and make measurements to test an unknown, and make a generalized inference from their observations.   The task also assesses students' understanding of the value of performing multiple trials of the same procedure.

Item Number: 1 Accession Number: LD000021

Key: NONE

Classification Codes:
N27S   2   ES   B   CU   MOD   NA   ECR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of the concept of density by correctly explaining why the pencil floats when placed in water.

4 = Complete - Student response explains that the pencil floats because it (or the wood of the pencil) is less dense than water.

3 = Essential - Student response mentions density in some correct reasonable way, but does not clearly say that the pencil is less dense than water.

2 = Partial - Student response demonstrates a partial understanding of why the pencil floats (e.g., "the pencil is made of wood," "the mass of the pencil is less than the mass of the water"), or a reference to buoyancy, weight, pressure, forces, or lightness is made, but no mention is made of the key concept of density.

1 = Unsatisfactory/Incorrect - Student response indicates a lack of understanding of the fact that the wood of the pencil is less dense than water (e.g., "the pencil floats because of the eraser or the thumbtack").

Item Number: 3 Accession Number: LD000022

Key: NONE

Classification Codes:
N27S   2   PS   A   SI   NA   NA   ECR

Scoring Guide: This guide is used to <u>score items 3, 4, 8, and 11</u>.

Scoring Rationlale: Student demonstrates an ability to accurately observe, measure, and record the length of the pencil floating above the water surface. In each case, the student measures two lengths that are within +/- 0.2 cm or $\pm$ 1/16 inch of each other. The distilled water should have the lowest value, the salt solution the highest.

Scores to be entered:

4 = Complete - All three sets of measurements agree within tolerances, and the relative order of the solutions is correct

3 = Essential - All three sets of measurements agree within tolerances, but the relative order is incorrect

2 =   Partial - Only two sets of measurements agree within tolerances

1 = Unsatisfactory/Incorrect   - One or no sets of measurements agree within tolerances.

Item Number: 4 Accession Number: LD000023

Key: NONE

Classification Codes:
N27S   2   PS   A   SI   NA   NA   ECR

Scoring Guide: This item is scored with item 3.

Item Number: 5 Accession Number: LD000024

Key: NONE

Classification Codes:
N27S   2   PS   A   SI   NA   NA   SCR

Scoring Guide: This guide refers to items <u>5, 8, and 11,</u> which are scored together.

Scoring Rationale: Student demonstrates an ability to accurately calculate the average of two measurements.

3 = Complete - All three of the student-calculated averages is within $\pm$ 0.1 cm. or $\pm$ 1/32 inch of the correct average, as calculated from the measurements taken by the student.

2a = Partial - Two of the three student-calculated averages is within $\pm$ 0.1 cm. or $\pm$ 1/32 inch of the correct average, as calculated from the measurements taken by the student.

2b = Partial - One of the three student-calculated averages is within $\pm$ 0.1 cm. or $\pm$ 1/32 inch of the correct average, as calculated from the measurements taken by the student.

1 = Unsatisfactory/Incorrect - None of the three student-calculated averages is within $\pm$ 0.1 cm. or $\pm$ 1/32 inch of the correct average, as calculated from the measurements taken by the student.

Item Number: 6 Accession Number: LD000025

Key: NONE

Classification Codes:
N27S   2   PS   A   SI   NA   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of the concept of uncertainty (and error) in measurement by explaining that error in measurement can be reduced by taking several measurements and calculating their average.

3 = Complete - Student response acknowledges the differences between consecutive measurements and the fact that error is reduced when an average of several measures is obtained.

2a = Partial - Student response makes a reference to variability of measurement without providing a complete explanation.

2b = Partial - Student response refers to making a mistake when measuring.

2c = Partial - Student response refers to taking an average without mentioning the variability of measurements

1 = Unsatisfactory/Incorrect - Student response fails to acknowledge that a different answer might be obtained every time a measurement is made (i.e., that by making three measurements and dividing by three, error is reduced).

Item Number: 7 Accession Number: LD000026

Key: A

Classification Codes:
N27S   2   ES   B   SI   NA   NS   MC

Item Number: 8 Accession Number: LD000027

Key: NONE

Classification Codes:
N27S   2   PS   A   SI   NA   NA   ECR

Scoring Guide: This item is scored with items 3 (measurement) and 5 (average).

Item Number: 9 Accession Number: LD000028

Key: NONE

Classification Codes:
N27S   2   ES   B   CU   NA   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of the concept of relative density by explaining that the salt in the 25% salt solution causes this solution to have a higher density relative to the wood in the pencil than the distilled water does, and that the higher the relative density, the higher the pencil will float.

3 = Complete - Student response indicates that the 25% salt solution is more dense than the distilled water, and may say that the pencil floats higher in the solution that is more dense.

2 = Partial - Student response fails to identify the difference in density between the 25% salt solution and the distilled water, but does make reference to a difference between the two solutions (e.g., the salt solution is "heavier" or "thicker" than the distilled water, or the salt increases buoyancy, or exerts more force or has more pressure). The student may also refer to density of the salt solution, but compares it to the pencil instead of the distilled water.

1 = Unsatisfactory/Incorrect - Student response fails to indicate that the 25% salt solution is more dense than the distilled water, and that this difference accounts for the pencil floating higher in the salt solution that in the distilled water.

Item Number: 10 Accession Number: LD000029

Key: B

Classification Codes:
N27S   2   ES   B   PR   NA   NA   MC

Item Number: 11 Accession Number: LD000030

Key: NONE

Classification Codes:
N27S   2   PS   A   SI   NA   NA   ECR

Scoring Guide: This item is scored with items 3 (measurement) and 5 (average).

Item Number: 12 Accession Number: LD000031

Key: NONE

Classification Codes:
N27S   2   ES   B   SI   NA   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an ability to accurately plot two data points and connect these points with a straight line. The graph should match student data.

3 = Complete - Student correctly plots the results for both the distilled water and the salt solution and draws a line between the two data points.

2a = Partial - Student correctly plots one point required to draw the line but not both.

2b = Partial - Student plots both points correctly but fails to connect them with a straight line, or does not connect them.

1 = Unsatisfactory/Incorrect   - Student fails to accurately plot the results for both the distilled water and the salt solution.

Item Number: 13 Accession Number: LD000032

Key: A

Classification Codes:
N27S   2   ES   B   CU   NA   NA   MC

Item Number: 14 Accession Number: LD000033

Key: NONE

Classification Codes:
N27S   2   ES   B   SI   NA   NA   ECR

Scoring Guide

Scoring Rationale: Student demonstrates an ability to accurately make inferences from a line graph (or from data if the student does not have a good graph).

4 = Complete - Student gives a salt concentration consistent with the data and a satisfactory explanation is provided as to how the answer was obtained (i.e., by reading off the graph the point on the X-axis (% salt concentration) at which the point on the Y-axis (length of pencil above the water) intersects the line drawn by the student). Proportional reasoning is also appropriate. If attempt to explain is not clear or exactly correct, a point or other indication on the graph is acceptable.

3 = Essential - Student gives a salt concentration consistent with the graph, but does not give a correct explanation as to how the answer was obtained, or explains how to use the graph but makes an error in the value.

2 = Partial - Student response shows a use of proportional reasoning in the explanation, or an unclear explanation of how to use the graph, but does not have a graph that could be used to interpolate.

1 = Unsatisfactory/Incorrect - Student does not obtain a value consistent with the graph and does not give a correct explanation of the acceptable method of interpolation.

1. Open the plastic bottle labeled <u>Distilled Water</u>. The salt concentration of this water is very close to 0 percent. Pour the distilled water into the cylinder <u>up to the black line</u>. Put the cap back on the bottle.

Now take the pencil and put it in the water in the cylinder, eraser-end down. Part of the pencil will float above the water, as shown in the picture below.
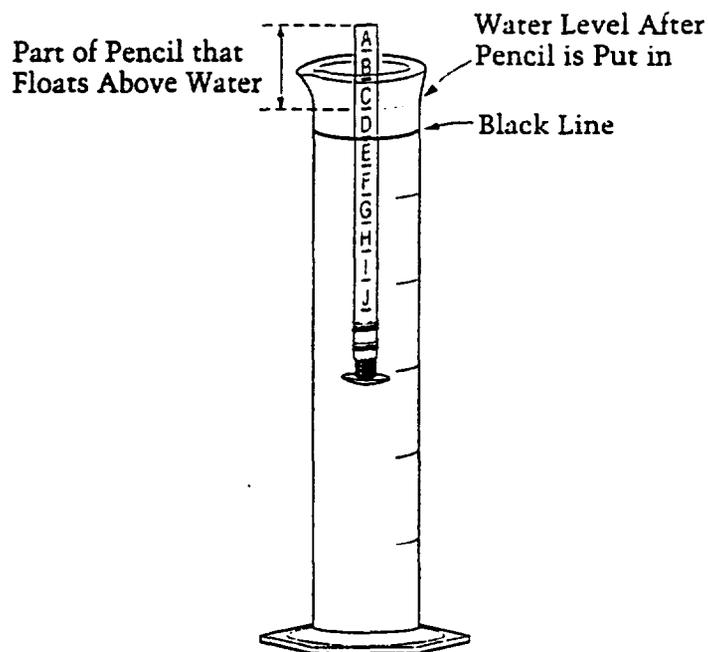
Explain why the pencil floats when it is put in the water.

It is floating at 1 A wood is less dense than water so it floats, the tack just keeps weighted

Level:
Complete (4)

1. Open the plastic bottle labeled <u>Distilled Water.</u> The salt concentration of this water is very close to 0 percent. Pour the distilled water into the cylinder up to the black line. Put the cap back on the bottle.

Now take the pencil and put it in the water in the cylinder, eraser-end down. Part of the pencil will float above the water, as shown in the picture below.

Part of Pencil that Floats Above Water

Water Level After Pencil is Put in

Black Line

Explain why the pencil floats when it is put in the water.

The pencil floats because the water has salt in it and the density of the pencil is light

Level: Essential (3)

1. Open the plastic bottle labeled <u>Distilled Water.</u> The salt concentration of this water is very close to 0 percent. Pour the distilled water into the cylinder <u>up to the black line.</u> Put the cap hack on the bottle.

Now take the pencil and put it in the water in the cylinder, eraser-end clown. Part of the pencil will float above the water, as shown in the picture Below.
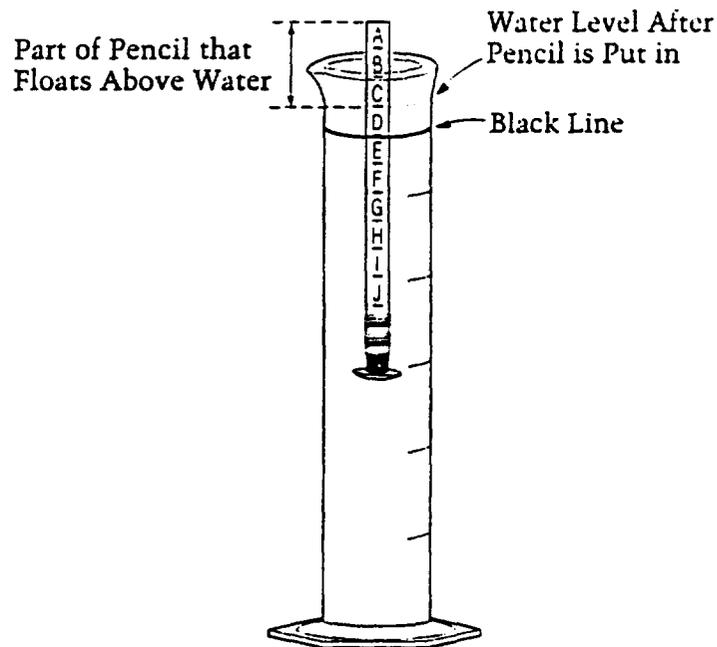

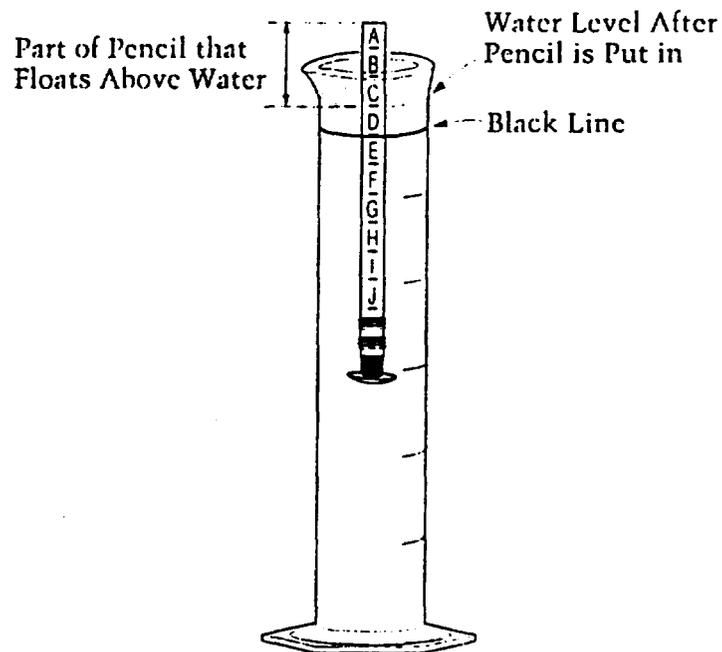Explain why the pencil floats when it is put in the water.

becaus the pencil is lighter than the water

Level:
Partial (2)

Student Sample Responses

1. Opcn the plastic bottle labled <u>Distilled Water</u>. The salt concentration of this water is very close to 0 percent. Pour the distilled water into the cylinder <u>up to the black line.</u> Put the cap back on the bottle.

Now take the pencil and put it in the water in the cylinder, eraser-end down. Part of the pencil will float above the water, as shown in the picture below.

Part of Pencil that
Floats Above Water

Water Level After
Pencil is Put in

Black Line
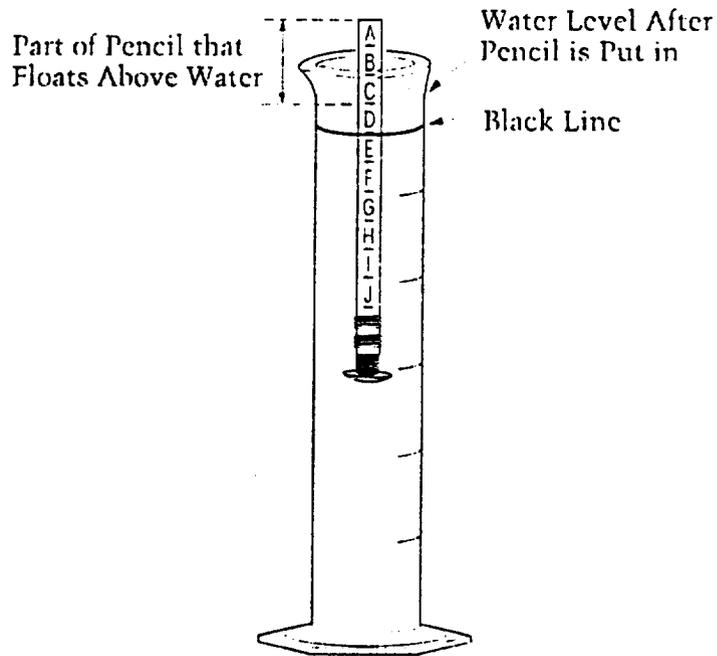
Explain why the pencil floats When it is put in the water.

There is a heavy part at the eraser and the pencil part is lighter so it causes it to float.

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

3. Now take the pencil out of the water and dry it with a paper towel. Use the ruler to measure the length of the pencil that was above the water. Record the length in Table 1 below under Measurement 1.

TABLE 1

Type of Solution	Length of Pencil Above Water Surface (cm)		
	Measurement 1	Measurement 2	Average
Distilled Water	1 cm	1 cm	1 cm
Salt Solution	2½ cm	2½ cm	2½ cm
Unknown Salt Solution	2 cm	2 cm	2 cm

④   ③

4. Now place the pencil back in the distilled water and repeat steps 2 and 3. Record your measurement in Table 1 under Measurement 2.   LD000024

Level:
Measurement-Complete (4)

5. Calculate the average of Measurements 1 and 2 and record the result in the data table.

(You can calculate the average by adding Measurement 1 + Measurement 2 and then dividing by two.

Level:
Average-Complete (3)   LD000024

12. On the graph below, plot the average values you obtained for the distilled water and the 25% salt solution. Draw a straight line between the two data points. Assume that this line represents the relationship between the length of pencil that is above the water surface and the concentration of salt in the water. LD000031

Level:
Complete (3)

Student Sample Responses

14. Based on the graph that you plotted, what is the salt concentration of the unknown solution? _____ about 16% _____

Explain how you determined your answer. LD000033

With the line connecting the distilled water and the salt solution I measured 2 cm. The measurement connects to the line at about 16% so the unknown solution is about 16%

Level:
Complete (4)

Student Sample Responses

3. Now take the pencil out of the water and dry it with a paper towel. use the ruler to measure the length of the pencil that was <u>above</u> the water. Record the length in Table 1 below under **Measurement 1.**

TABLE 1

| Type of Solution | Length of Pencil Above Water Surface (cm) | | |
	Measurement 1	Measurement 2	Average
Distilled Water	$1\frac{1}{2}$ cm	$1\frac{1}{2}$ cm	$1\frac{1}{2}$ in
Salt Solution	2 cm	2 cm	2 cm
Unknown Salt Solution	$2\frac{1}{2}$ cm	$2\frac{1}{2}$ cm	$2\frac{1}{2}$ cm

4. Now place the pencil back in the distilled water and repeat steps 2 and 3. Record your measurement in Table 1 under **Measurement 2.**   LD000023

Level:
Measurement-Essential (3)

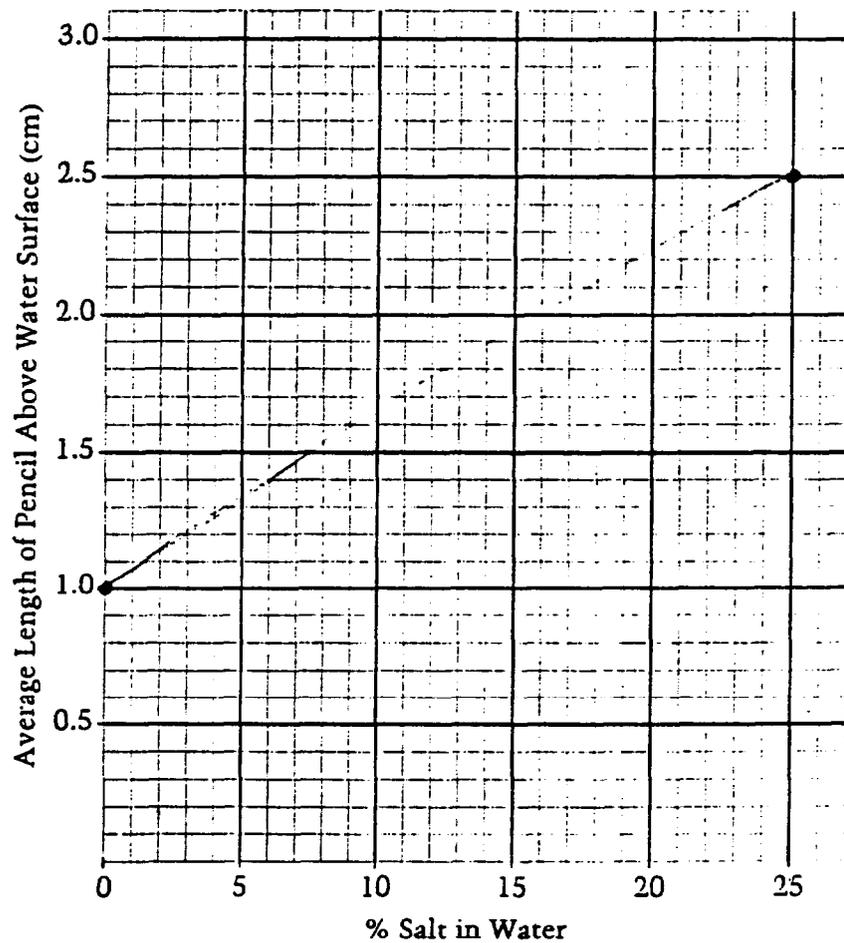5. Calculate the average of measurements 1 and 2 and record the result in the data table.

(You can calculate the average by adding Measurements 1 + Measurement 2 and then dividing by two.)   LD000024

Level:
Average-Complete (3)

12. On the graph below, plot the average values you obtained for the distilled water and the 25% salt solution. Draw a straight line between the two data points. Assume that this line represents the relationship between the length of Pencil that is above the water surface and the concentration of salt in the water.   LD000031
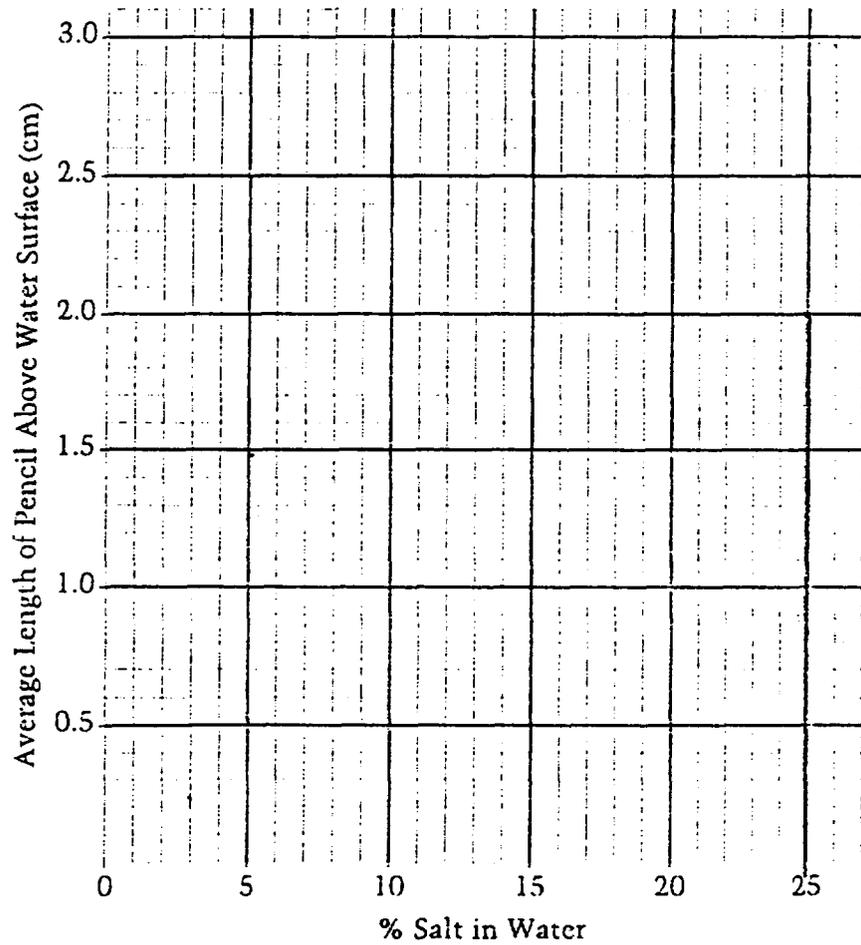
Level:
Partial (2)

Student Sample Responses

14. Based on the graph that you plotted, what is the salt concentration of the unknown solution? _____ *more salt* .

Explain how you determined your answer.

It floated more with the salt solution. It floated even more with the unknown.

Level:
Unsatisfactory/Incorrect (1)

3. Now take the pencil out of the water and dry it with a paper towel.
Use the ruler to measure the length of the pencil that was <u>above</u> the
water. Record the length in Table 1 below under **Measurement 1.**

TABLE 1

Type of Solution	Length of Pencil Above Water Surface (cm)		
	Measurement 1	Measurement 2	Average
Distilled Water	0.7	1	0.4
Salt Solution	2	1.9	1.9
Unknown Salt Solution	2	1.9	1.9

4. Now place the pencil back in the distilled water and repeat steps 2 and 3.
Record your measurement in Table 1 under **Measurement 2.**   LD00023

Level:
Measurement-Partial (2)

5. Calculate the average of Measurements 1 and 2 and record the result
in the data table.

Level:
Average-Partial (2)   (You can calculate the average by adding Measurement 1 + Measurement 2
and then dividing by two.)   LD000024

12. On the graph below, plot the average values you obtained for the distilled water and the 25% salt solution. Draw a straight line between the two data points. Assume that this line represents the relationship between the length of pencil that is above the water surface and the concentration of salt in the water.   LD000031

Level:
Partial (2)

14. Based on the graph that you plotted, what is the salt concentration of the unknown solution? _About 15_
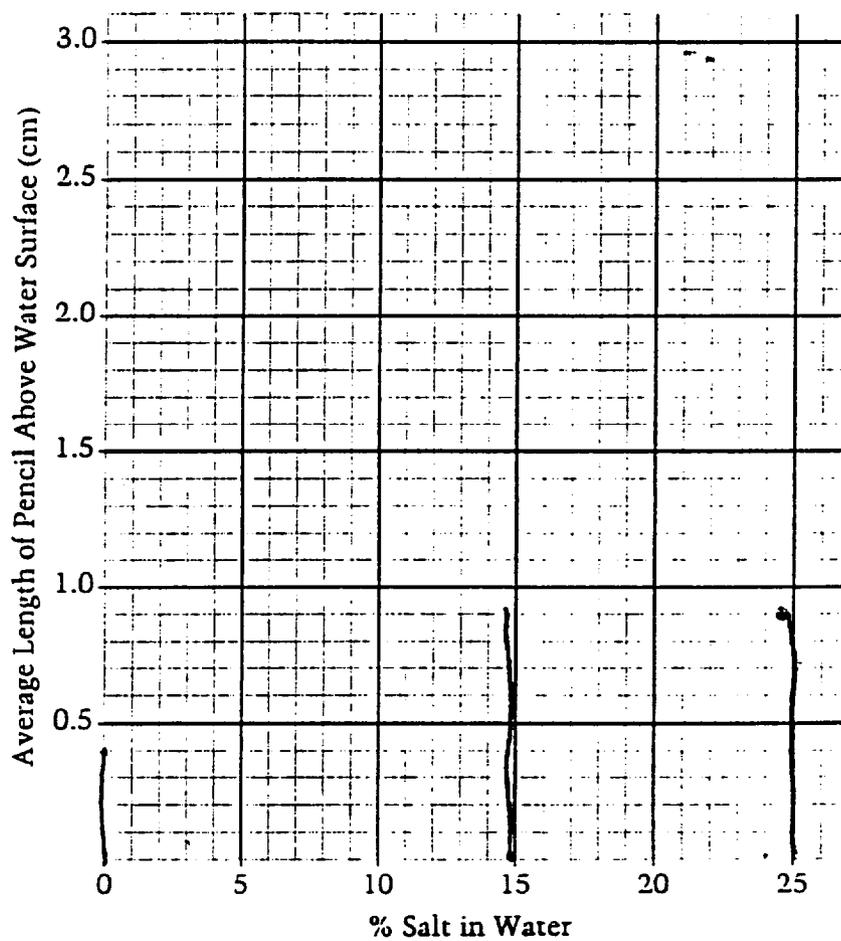
Explain how you determined your answer.   LD000033

Because it floated
higher than in distilled
& lower than in 25%

Level:
Unsatisfactory/Incorrect (1)

6. Explain why it is better to measure the length of the pencil that was above the water more than once.

Measurments are always different

Level:
Partial (2)

6. Explain why it is better to measure the length of the pencil that was above the water more than once.

because the pencil will take in water

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

9. Why does the pencil float at a different level in the salt solution than in the distilled water?   LD000028

> Because the salt makes the water more dense so it is easier for the pencil to float on it.

Level:
Complete (3)

9. Why does the pencil float at a different level in the salt solution than in the distilled water?   LD000028

> because the water has more of a mass so it can push the pencil higher

Level:
Partial (2)

9. Why does the pencil float at a different level in the salt solution than in the distilled water?   LD000028

> Because the water is mostly salt

Level:
Unsatisfactory/Incorrect (1)

In this section, you will have 30 minutes to answer 12 questions. Mark your answers in your booklet. Fill in only one oval for each question or write your answer on the lines. Please think carefully about your answers. When you are writing your answers, be sure that your handwriting is clear.

Do not go past the **STOP** sign at the end of the section. If you finish before time is called, you should go over your work again.

PLEASE TURN THE PAGE AND BEGIN NOW.

The picture below illustrates a simplified model of part of the Solar System. The Sun and the four planets closest to the Sun are represented by the shaded figures. The Earth's orbit (the path that it takes as it moves around the Sun) is represented by the large circle and the arrow on this circle shows the direction in which the Earth moves.   H001310
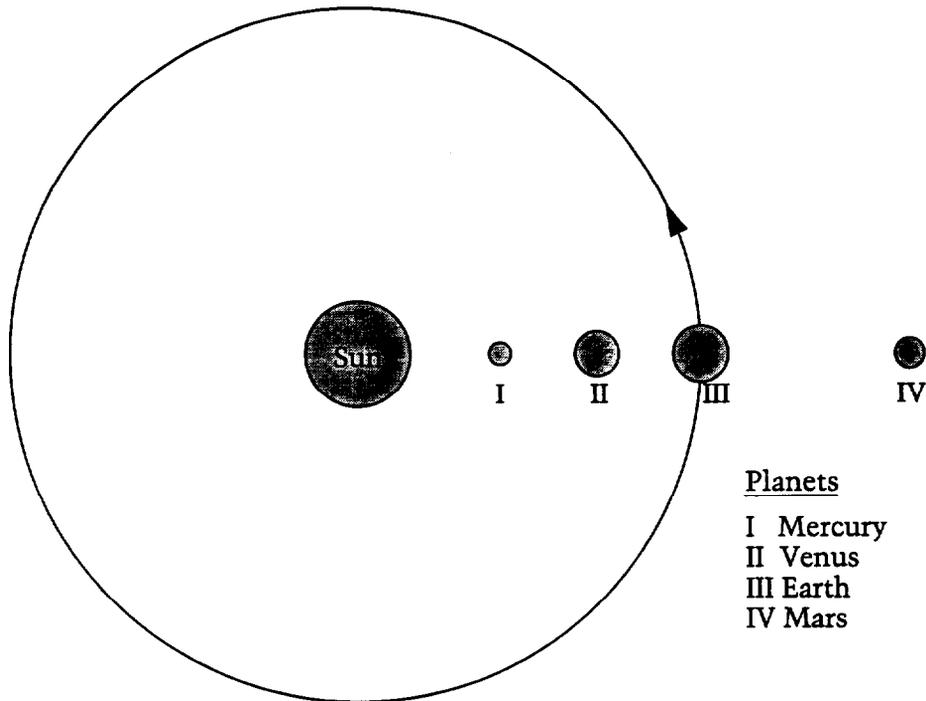
I

II

III

IV

Planets

I Mercury
II Venus
III Earth
IV Mars

1. Complete the simple model of the Solar System by drawing the paths that Mercury, Venus, and Mars take as they move around the Sun. Draw arrows on the paths to show the direction in which each moves.   HE001311

2. State two ways, other than the planets being in the correct order, in which this simple model is like the real Solar System.　HE001313

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3. State two ways, other than the relative sizes of the planets and the Sun, in which this simple model is different from the real Solar System.　HE001312

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4. Explain how the picture should be changed to show more correctly the relative sizes of the Sun and the Earth. HE001316

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5. Explain a problem that would be encountered if the other planets Jupiter, Saturn, Uranus, Neptune, and Pluto) and their orbits were added to the picture. HE001322

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The planets move at different speeds and require different amounts of time to circle the Sun. The following graph shows the number of Earth days it takes for each of the four planets to move around the Sun once.

I Mercury   III Earth
II Venus   IV Mars
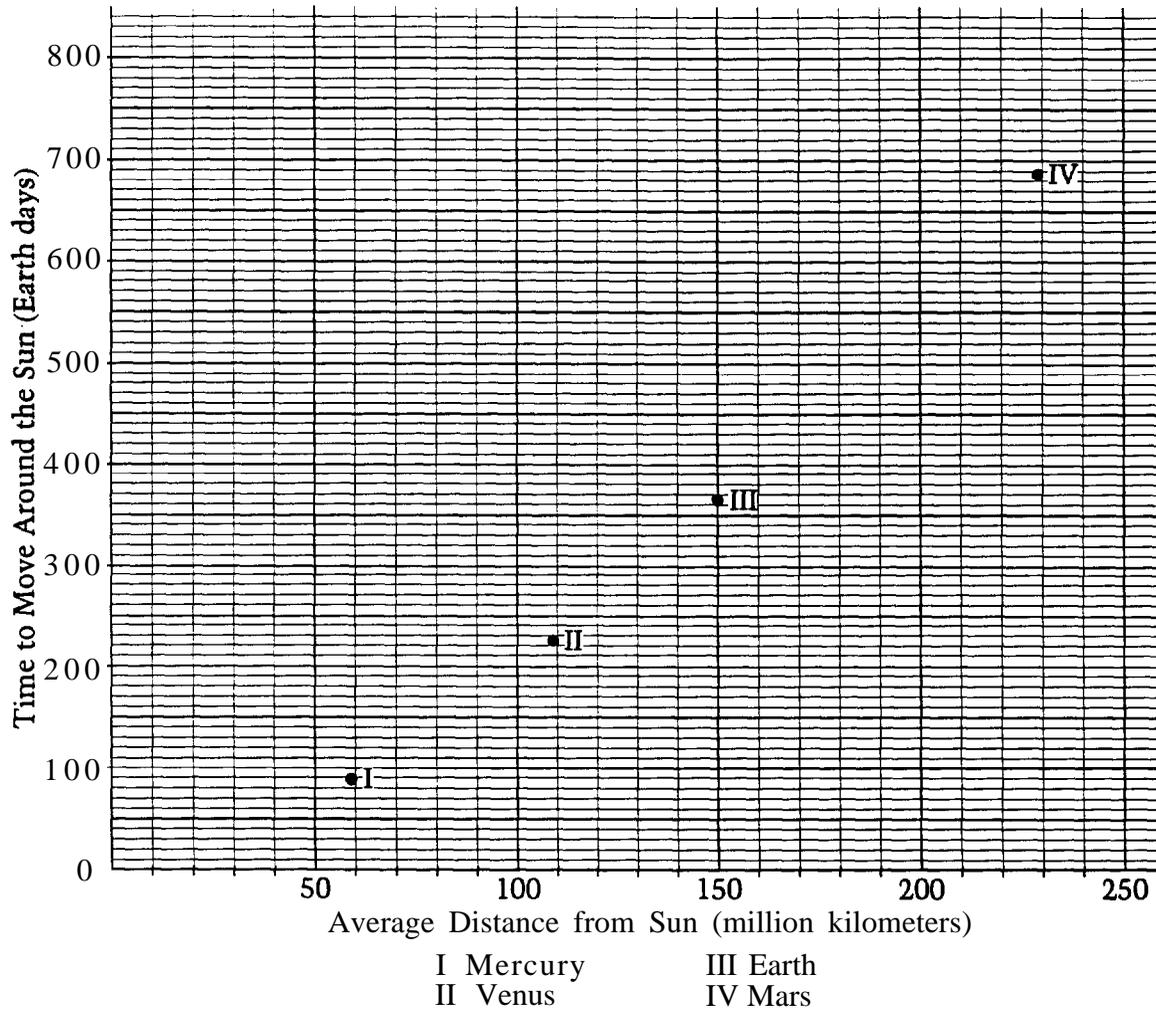
6. According to the graph, the number of Earth days it takes Mercury to circle the-Sun is most nearly

   Ⓐ   5 0

   Ⓑ   9 0

   Ⓒ   100

   Ⓓ   365

HE001317

7. Using information from the graph, name each planet that has a year that is shorter than a year on Earth. Explain how you arrived at your answer. HE001318

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8. Based on the graph, which of the following is true?

Ⓐ The farther a planet is from the Sun, the longer it takes for the planet to move around the Sun.

Ⓑ The closer a planet is to the Sun, the longer it takes for the planet to move around the Sun.

Ⓒ The smaller a planet is, the longer it takes for the planet to move around the Sun.

Ⓓ The larger a planet is, the longer it takes for the planet to move around the Sun. HE001319

9. Suppose that a new planet, K, is discovered that takes 520 Earth days to move around the Sun and whose orbit is halfway between the orbits of Earth and Mars.

Show this on the graph by plotting and labeling a point for planet K.

Using the graph, estimate the average distance of planet K from the Sun. HE001320

_____

10. In the picture below, the Earth and Mercury are lined up with the Sun. After Mercury has circled the Sun once, the Earth would be in a different location. Using information from the graph on page 5, put an X on the Earth's orbit in the picture to show the new location of the Earth.

HE001321

GO ON TO THE NEXT PAGE

Planets

I   Mercury
II Venus
III Earth

11. At the moment of time shown in the picture above, Venus is the planet closest to the Earth. Could Mercury ever be the planet closest to the Earth?

Ⓐ Yes

Ⓑ No

Explain why or why not. You can draw on the picture to help explain your answer.   HE001323

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GO ON TO THE NEXT PAGE

12. What additions or changes could be made to this model of the Solar System to best explain why the Northern Hemisphere of the Earth is colder in January than in July? You may draw a picture as part of your answer.

HE001324

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STOP

INFORMATION ABOUT THE FRAME WORK CLASSIFICATION CODES
AVAILABLE FOR EACH ITEM

Following this description of the classification codes, there is a single sheet with NAEP ID numbers, short descriptions of the items, item keys (1-4 if the item is multiple-choice; blank of the item is open-ended), as well as the mean p-values for the items in the released block.

The classification codes for each item can be viewed within each item in the scoring guide.

Field 1)   **Program profile:**
                      N27S NAEP, year 27 of Science

Field 2)   **Grade:**
                      1   Grade 4 only item
                      1/2   Grade 4/8 overlap item
                      2   Grade 8 only item
                      2/3   Grade 8/12 overlap item
                      3   Grade 12 only item

Field 3)   **Field of science:**
                      PS   Physical Science
                      ES   Earth Science
                      LS   Life Science

Field 4)   **Field of science subcontent area:**
                      The letter corresponds to the subcontent areas described in the
                      Science Assessment and Exercise Specifications for the 1996
                      National Assessment of Edycational Progress.
                      Physical Science
                       A   Matter and Its Trandormations
                       B   Energy and Its Trantionnations
                       C   Motion
                      Earth science
                       A   Solid Earth (lithosphere)
                       B   Water (hydrosphere)
                       C   Air (atmosphere)
                       D   Earth in space
                      Life Science:
                       A   Change and Evolution
                       B   Cells and Their Functions
                       C   Organisms
                       D   Ecology

Field 5)   **Ways of knowing and doing science:**
                      SI   Scientific Investigation
                      PR   Practical Reasoning
                      CU   Conceptual Understanding

Field 6)   **Theme**
                 SYS Systems
                 MOD Models
                 PC   Patterns of Change
                 NA   Not Applicable

Field 7)   **Nature of Science/technology:**
                 NS   Nature of Science
                 NT   Nature of Technology
                 NA   Not Applicable

Field 8)   **Item type:**
                 MC Multiple-choice
                 SCR Short Constructed-Response
                 ECR Extended Construoted-Response
                 NA Not Applicable

1996 Science Items

GRADE: 0 8   BLOCK: 27S7

ITEM	NAEP ID	SHORT DESCRIPTION	KEY	CONTENT	PROCESS	P-VALUE	RELEASE STATUS
1A	K040901	SOLAR SYSTEM: COMPLETE MODEL OE		2	3	0.566	P
2A	K040902	SOLAR SYSTEM: SIMILARITIES REAL/MODEL OE		2	3	0.281	P
3A	K040903	SOLAR SYSTEM: DIFFERENCES REAL/MODEL OE		2	3	0.380	P
4A	K040904	SOLAR SYSTEM: SHOW MORE CORRECT REL SIZES OE		2	2	0.292	P
5A	K040905	SOLAR SYSTEM: PROBS ADDING OUTER PLANETS OE		2	2	0.282	P
6	K041001	SOLAR SYSTEM: TIME FOR MECURY TO CIRCLE SUN MC	2	2	1	0.670	P
7A	K041002	SOLAR SYSTEM: PLANETS W/ SHORTER EARTH YR OE		2	3	0.531	P
8	K041003	SOLAR SYSTEM: IDENTIFY STATEMENT ABOUT MOVEMENT MC	1	2	1	0.849	P
9A	K041004	SOLAR SYSTEM: DISTANCE NEW PLANET FROM SUN OE		2	1	0.343	P
10A	K041101	SOLAR SYSTEM: MERCURY/EARTH REVOLUTION OE		2	3	0.258	P
11	K041203	SOLAR SYSTEM: CLOSEST PLANET TO EARTH MC	1	2	3	0.645	P
11A	K041201	SOLAR SYSTEM: CLOSEST PLANET TO EARTH OE		2	3	0.280	P
12A	K041202	SOLAR SYSTEM: ACCOUNT FOR SEASON IN SKETCH OE		2	3	0.142	P

Content: 1 = Physical sciences
2 = Earth & space sciences
3 = Life sciences

Process: 1 = Scientific investigation
2 = Practical reasoning
3 = Conceptual understanding

Information about the Item Difficulty Available for Each Item

Item identification a short item description and the key (for multiple-choice iterns) are provided, in addition to information about the item diflicuky, for each item. The items are identified by their position within a block and by their NAEP IDs. The NAEP IDs are used to identify items during the analysis of NAEP data, in the summary of item level results in data almanacs, and in the secondary user data sources.

The numbers in the column labeled "P-Value" on the item statistic sheet vary for itern types (multiple-choice and 2-category constructed-response items snd constructed-response items with more than two categories). For the multiple-choice items and for the 2-category constructed-response items that were scored correct or incomecz the number in that column is the percent of students mmctly responding to the item. This value is often called the p-value or the p+ for an item. For constructed-response items with more than two categories, the value in the column is the mean itern score for the itern.

For example, if the number of categories for a constructed-response item is 3 with a category unsatisfactory/incorect (category 1) worth 0 points, a partial category (category 2) worth 1/2 of a point and a complete category (category 3) worth 1 point, then a student can receive either 0, 1/2 or 1 point for his response to the item. The mean item score is the number that you would get ifthe scores on this itern are averaged for all of the students in the assessment. This value varies from O to 1 just as the percent comet for a multiple-choice item could vary. It can be interpreted as an indication of where on the O-1 scale for the itern that an "average" student might score. For instance, if the mean item score for a 3-catego~ constructed-response item is .8, then an "average" student would be expected to have a response in either category 2 (worth 1/2 or.5 of a point) or catego~ 3 (worth 1 point). In tic$ it is a little more likely that the student would have a response in category 3, since.8 is closer to 1.0 than to .5.

Item Number: NONE Accession Number: HE001310

Key: NONE

Classification Codes:
N27S   2   ES   NA   NA   MOD   NA   NA

Item Number: 1 Accession Number: HE001311

Key: NONE

Classification Codes:
N27S   2   ES   D   CU   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of a simple model of the solar system by drawing on a picture the orbits of Mercury, Venus, and Mars.

3 = Complete - Student response shows for each planet a closed path that encircles the Sun, that does not intersect any other orbit, and that has an arrow to indicate counterclockwise direction (needs 4 parts) .

2 = Partial - Student response shows paths that encircle the Sun but contains <u>one</u> of the following errors: paths that intersect another orbit, paths that are not closed, orbits that show no or incorrect arrows to indicate direction, or orbit that is missing.

1 = Unsatisfactory/Incorrect - Student response has more than one of the errors listed above, or demonstrates no understanding of how to draw the paths that Mercury, Venus, and Mars take as they orbit the Sun.

Item Number: 2 Accession Number: HE001313

Key: NONE

Classification Codes:
N27S   2   ES   D   CU   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of models by pointing out two similarities between the real Solar System and a simplified model.

3 = Complete - Student response identifies two correct similarities between the picture and the real Solar System.

2 = Partial - Student response identifies one correct similarity between the picture and the real Solar System.

1 = Unsatisfactory/Incorrect - Student response fails to identify any correct similarities between the picture and the real Solar System.

Credited responses include:

Both contain the Sun (at the center)
Both contain planets that orbit the Sun
The orbits in both are approximately in the same plane
The Sun and planets in both are approximately spherical
The relative sizes of planets are approximately correct
The Sun is (much) bigger than the planets

Item Number: 3 Accession Number: HE001312

Key: NONE

Classification Codes:
N27S   2   ES   D   CU   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of the limitations of models by pointing out two differences between the real Solar System and a simplified representational model.

3 = Complete - Student response contains two correct ways in which the picture is different from the real Solar System.

2 = Partial - Student response contains at least one correct difference between the picture and the real Solar System.

1 = Unsatisfactory/Incorrect - Student response fails to identify any correct difference between the picture and the real Solar System.

<u>Credited responses includes</u>

The Sun and planets are farther apart/too close
There are more planets/rest of solar system missing
There are moons and asteroids (2 separate answers)
Orbits are elliptical (not exactly circular)
Orbits are not in exactly the same plane
Planets are not perfect spheres
The real Solar System is 3-dimensional/model is flat
The planets don't line up as shown
Rotation of planets not shown, rotation of Sun not shown

Item Number: 4 Accession Number: HE001316

Key: NONE

Classification Codes:
N27S   2   ES   D   PR   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of scale in a picture, in relation to the real objects that are represented, by explaining how to correct a picture that is incorrectly scaled.

3 = Complete - Student response correctly states that the Sun should be made bigger and/or the Earth should be made smaller and may mention relative scaling or size of the Sun and Earth.

1 = Unsatisfactory/Incorrect - Student response fails to recognize that a change of relative size between the Sun and the Earth is needed, or student states that the Earth is bigger than the Sun.

Item Number: 5 Accession Number: HE001322

Key: NONE

Classification Codes:
N27S   2   ES   D   PR   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of scale in a diagram by stating scaling problems that can occur in extending a diagram to include representation of additional objects.

3 = Complete - Student response clearly indicates an awareness that the orbits of the other planets must be further out to be to scaled or indicates that one could not show them on the page without distorting the scale, or indicates that drawing their sizes to scale would make some larger than the diagram of the Sun.

2 = Partial - Student response indicates that there would be problems with fitting the diagram on the page without explicitly explaining why (e.g., "you would run out of room"), or response makes a brief reference to planets being too big without reference to scale of those shown.

1 = Unsatisfactory/Incorrect - Student response does not exhibit an awareness that the additional planets should be farther out, and makes no reference to problems of scale, either in regard to size of planets or their distance from the Sun.

Item Number: 6 Accession Number: HE001317

Key: B

Classification Codes:
N27S   2   ES   D   S I   MOD   NA   MC

Item Number: 7 Accession Number: HE001318

Key: NONE

Classification Codes:
N27S   2   ES   D   CU   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates both an ability to read a graph and an understanding that a year is the time for one complete revolution around the sun by selecting from the graph the two planets whose periods are less than 365 days.

3 = Complete - Student response correctly identifies both Mercury and Venus and gives a correct explanation of the procedure (i.e., stating data from the graph: Mercury year . 90 days, Venus year = 225 days).

2 = Partial - Student response correctly identifies Mercury and/or Venus but fails to give a correct explanation, or student response identifies either Mercury or Venus and gives a correct explanation.

1 = Unsatisfactory/Incorrect - Student response identifies Mars.

Note: If they name all 3, a 1 is given.

Item Number: 8 Accession Number: HE001319

Key: A

Classification Codes:
N27S   2   ES   D   SI   MOD   NA   MC

Item Number: 9 Accession Number: HE001320

Key: NONE

Classification Codes:
N27S   2   ES   D   SI   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an ability to recognize a relationship between variables and to interpolate between data points by graphing the position of plant *K* correctly and predicting its mean distance from the Sun."

3 = Complete - Student response demonstrates understanding by correctly plotting the position of the new planet (between 180-200 (horizontally) million km and between (vertically) 500-550 days) and estimating its mean distance from the Sun (c. 190 million kilometers and within 5 million km. of point on graph).

2 = Partial - Student response demonstrates some understanding by correctly plotting the position of the new planet, or estimating the mean distance correctly (180-200 million km).

1 = Unsatisfactory/Incorrect -   Student demonstrates no understanding of how to graph or how to predict the mean distance of the new planet from the Sun, or both point and answer are incorrect.

Item Number: 10 Accession Number: HE001321

Key: NONE

Classification Codes:
N27S   2   ES   D   CU   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an ability to use proportional reasoning by estimating the position of Earth given the position of Mercury and their relative periods.

3 = Complete - Student response shows en X on the Earth's orbit about 1/4 of the way around in the counterclockwise direction (within 20 degrees of 1/4 way round).

1 = Unsatisfactory/Incorrect **-** Student response does not show an X on the Earth's orbit, or shows it on the orbit but in the incorrect position.

Item Number: 11 Accession Number: HE001323

Key: NONE

Classification Codes:
N27S   2   ES   D   CU   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates understanding of the different periods of planets and how these can change their relative positions by showing or describing a possible configuration in which Mercury is the closest planet to Earth.

3 = Complete - Student response demonstrates understanding of how Mercury could be the planet closest to Earth by explaining or showing a picture in which Earth and Mercury are on one side of their orbits and Venus (and Mars) are in position(s) that are further away, such as being on the other sides of their orbits.   Must allude to or show possible configuration.   Picture alone can be adequate.   All information must be correct.

2 = Partial - Student response demonstrates an awareness that the planets do not stay aligned and an explanation of a situation in which Mercury is the closest planet to Earth may be attempted.

1 = Unsatisfactory/Incorrect - Student response shows no understanding of how Mercury could be the planet closest to Earth or responds "Yes" with no or incorrect explanation.

Item Number: 12 Accession Number: HE001324

Key: NONE

Classification Codes:
N27S   2   ES   D   CU   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of why the Earth is colder in January than in July by describing the necessary modifications to this model of the Solar System that will account for the differences in temperature.

3 = Complete - Student answers the question by describing or drawing changes to the model. Student adds the tilt of the Earth, and may also refer to rotation or traveling in the orbit or a brief description of why seasons occur.
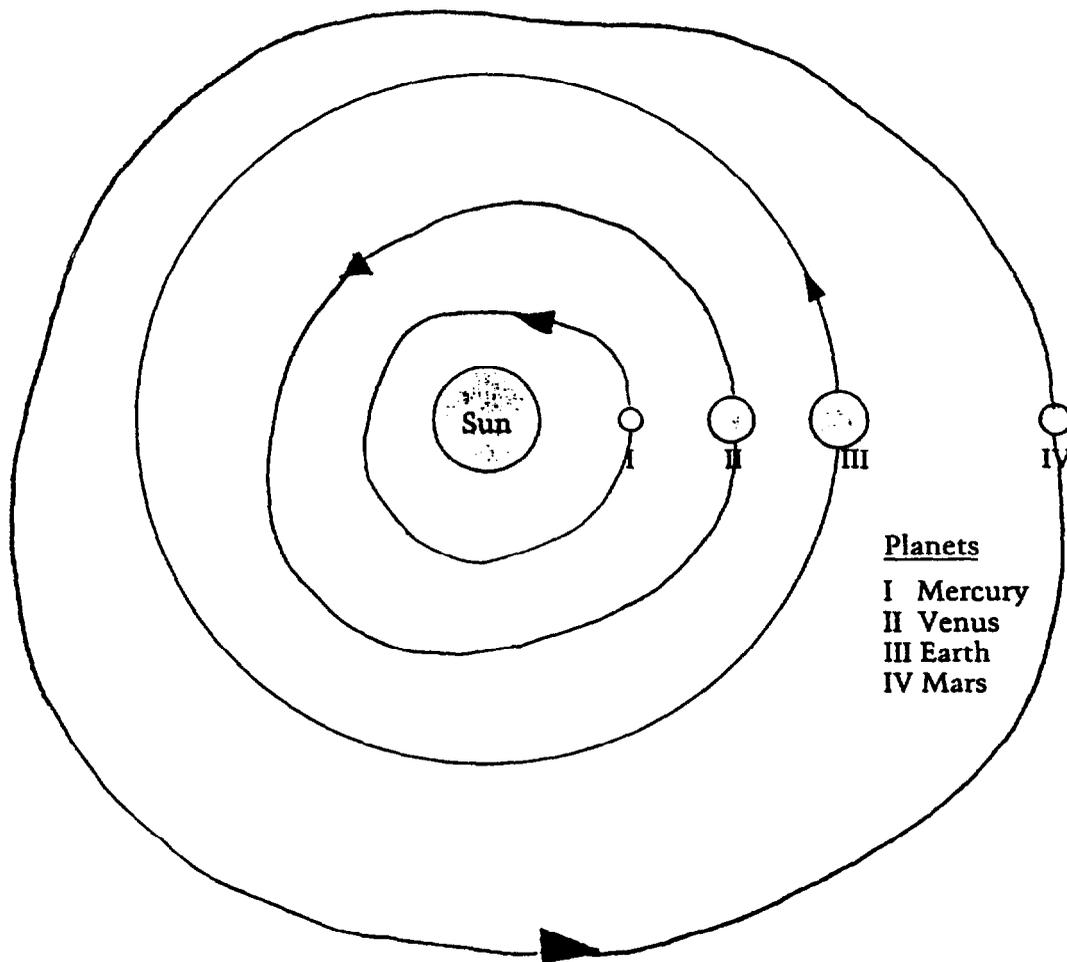
2 = Partial - Student does not make any additions to the model, but mentions the Earth's tilt or direct and/or indirect sunlight, or more and/or less sunlight.
                                        or
Student provides an incomplete diagram (no month and/or hemisphere labels) but makes an attempt at explaining why the Earth is colder in January.

1 = Unsatisfactory/Incorrect   - Student shows no understanding of the cause of the seasons. This includes responses that conflict with reality e.g., "the Earth is farther from the Sun in January than in July", or a description that indicates the northern hemisphere is in shadow (turned away from the Sun) in January.

The picture below illustrates a simplified model of part of the Solar System. The Sun and the four planets closest to the Sun are represented by the shaded figures. The Earth's orbit (the path that it takes as it moves around the Sun) is represented by the large circle and the arrow on this circle shows the direction in which the Earth moves.
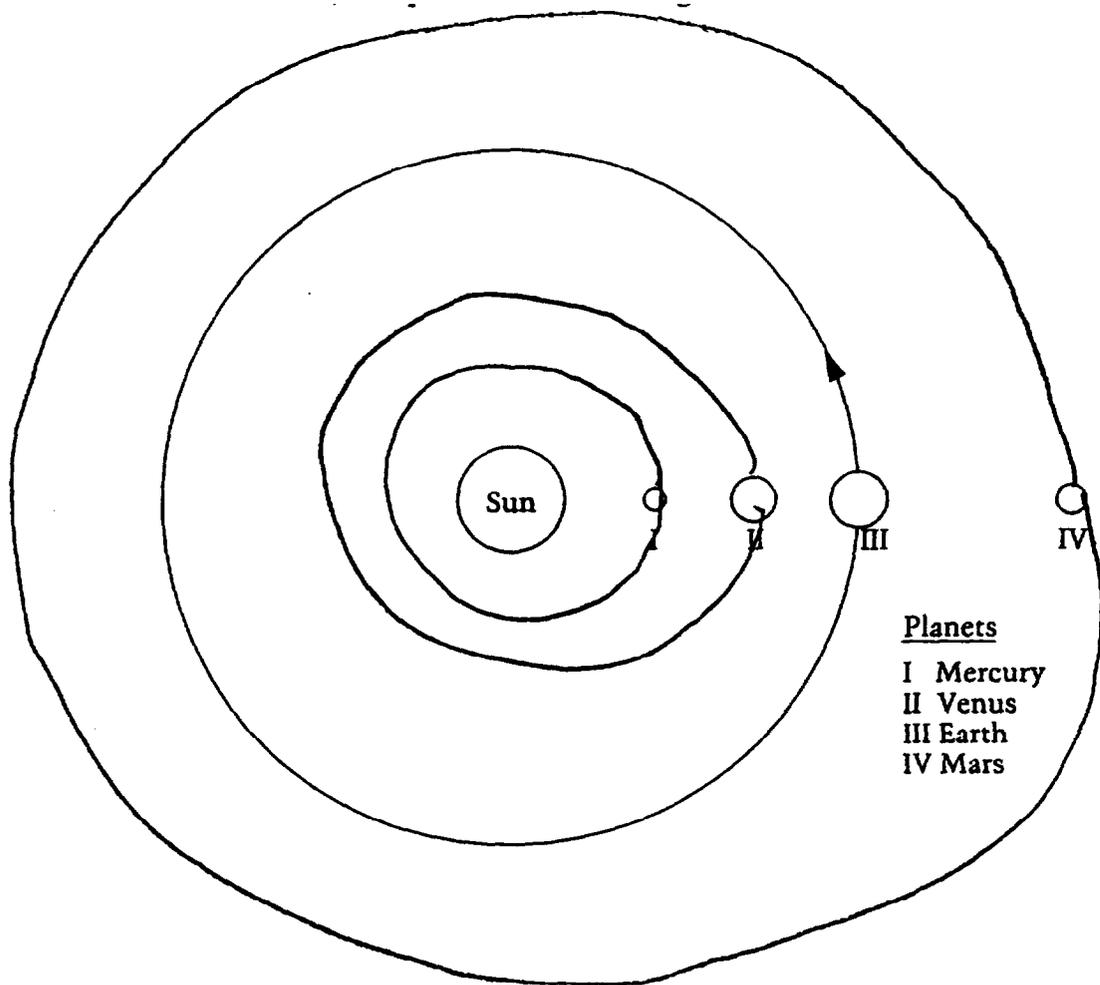

Planets

I Mercury
II Venus
III Earth
IV Mars

1. Complete the simple model of the Solar System by drawing the paths that Mercury, Venus, and Mars take as they move around the Sun. Draw arrows on the paths to show the direction in which each moves.

Level:
Complete (3)

The picture below illustrates a simplified model of part of the Solar System. The Sun and the four planets closest to the Sun are represented by the shaded figures. The Earth's orbit (the path that it takes as it moves around the Sun) is represented by the large circle and the arrow on this circle shows the direction in which the Earth moves.
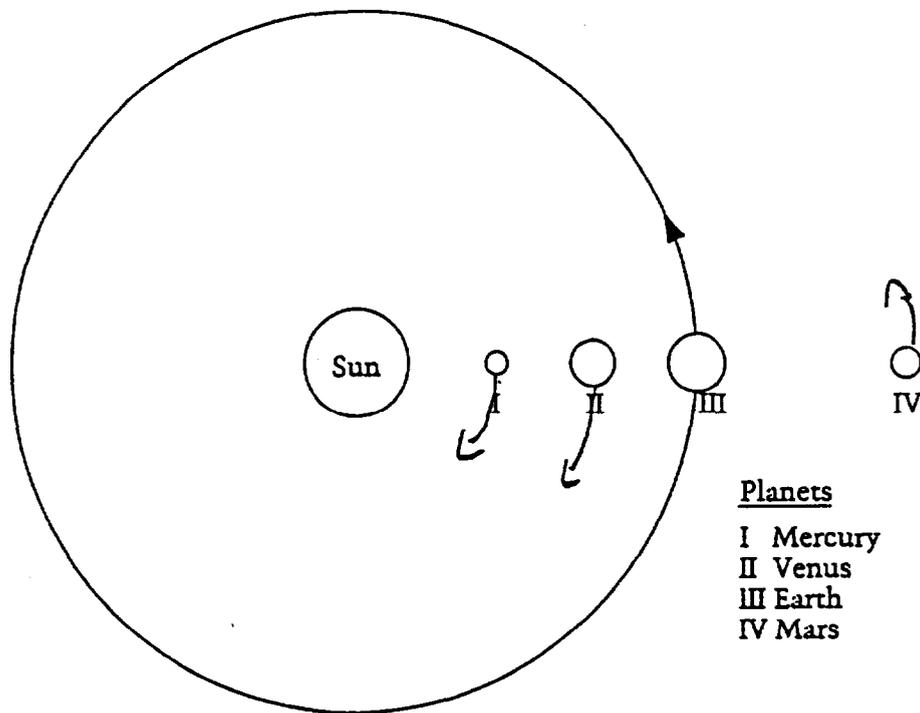

Planets

I   Mercury
II Venus
III Earth
IV Mars

1. Complete the simple model of the Solar System by drawing the paths that Mercury, Venus, and Mars take as they move around the Sun. Draw arrows on the paths to show the direction in which each moves.

Level:
Partial (2)

The picture below illustrates a simplified model of part of the Solar System. The Sun and the four planets closest to the Sun are represented by the shaded figures. The Earth's orbit (the path that it takes as it moves around the Sun) is represented by the large circle and be arrow on this circle shows the direction in which the Earth moves.

Sun

I
II
III
IV

Planets

I Mercury
II Venus
III Earth
IV Mars

1. Complete the simple model of the Solar System by drawing the paths that Mercury, Venus, and Mars take as they move around the Sun. Draw arrows on the paths to show the direction in which each moves.

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

2. State two ways, other than the planets being in the correct order, in which this simple model is like the real Solar System.

The Sun is in the middle of the Solar System.

Earth is bigger than the other 3 planets.

Level:
Complete (3)

2. State two ways, other than the planets being in the correct order, in which this simple model is like the real Solar System.

The Sun is the center of all the planets. It shows how big the planets are compared to the sun and eath other.

Level:
Partial (2)

2. State two ways, other than the planets being in the correct order, in which this simple model is like the real Solar System.

The planets are modeled the same way,

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

3. State two ways, other than the relative sizes of the planets and the Sun, in which this simple model is different from the real Solar System.

All of the planets are not normaly lined up like this, and the planets don't have perfect circle orbits around the sun like the earth in this drawing.

Level:
Complete (3)

3. State two ways, other than the relative sizes of the planets and the Sun, in which this simple model is different from the real Solar System.

It doesn't show all the planets

Level:
Partial (2)

3. State two ways, other than the relative sizes of the planets and the Sun, in which this simple model is different from the real Solar System.

The planets go in order from coldest to warmer.

Level:
Unsatisfactory/Incorrect (1)

4. Explain how the picture should be changed to show more correctly the relative sizes of the Sun and the Earth.

the sun needs to Be Bigger.

Level:
Complete (3)

4. Explain how the picture should be changed to show more Correctly the relative sizes of the Sun and the Earth.

The Color could be right. May not be the right size or rotate in a different way.

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

5. Explain a problem that would be encountered if the other planets (Jupiter, Saturn, Uranus, Neptune, and Pluto) and their orbits were added to the picture.

There wouldn't be enough space on the paper. Also if they were in scale with just the original planets, some of them like Jupiter would appear to be bigger than the Sun.

Level:
Complete (3)

5. Explain a problem that would be encountered if the other planets (Jupiter, Saturn, Uranus, Neptune, and Pluto) and their orbits were added to the picture.

The paper isn't big enough to accurately depict all of the planets and their orbits.

Level:
Partial (2)

5. Explain a problem that would be encountered if the other planets (Jupiter, Saturn, Uranus, Neptune, and Pluto) and their orbits were added to the picture.

it would be cluttered and the planets would run into each other.

Level:
Unsatisfactory/Incorrect (1)

7. Using information from the graph, name each planet that has a year that is shorter than a year on Earth. Explain how you arrived at your answer.

Mercury and Venus, They take the shortest ammount of time to circle the sun.

Level:
Complete (3)

7. Using information from the graph, name each planet that has a year that is shorter than a year on Earth. Explain how you arrived at your answer.

Mercury and Venus.

Level:
Partial (2)

7. Using information from the graph, name each planet that has a year that is shorter than a year on Earth. Explain how you arrived at your answer.

Mars, Because it is closer to the sun.

Level:
Unsatisfactory/Incorrect (1)

9. Suppose that a new planet, *K*, is discovered that takes 520 Earth days to move around the Sun and whose orbit is halfway between the orbits of Earth and Mars.

Show this on the graph by plotting and labeling a point for planet *K*.

Using the graph, estimate the average distance of planet *K* from the Sun.

190

The planets move at different speeds and require different amounts of time to circle the Sun. The following graph shows the number of Earth days it takes for each of the four planets to move around the Sun once.

Time to Move Around the Sun (Earth days) — vertical axis: 0, 100, 200, 300, 400, 500, 600, 700, 800

Average Distance from Sun (million kilometers) — horizontal axis: 50, 100, 150, 200, 250

• I (at ~60, ~90)
• II (at ~110, ~225)
• III (at ~150, ~365)
• (at ~190, ~510)
• IV (at ~230, ~690)

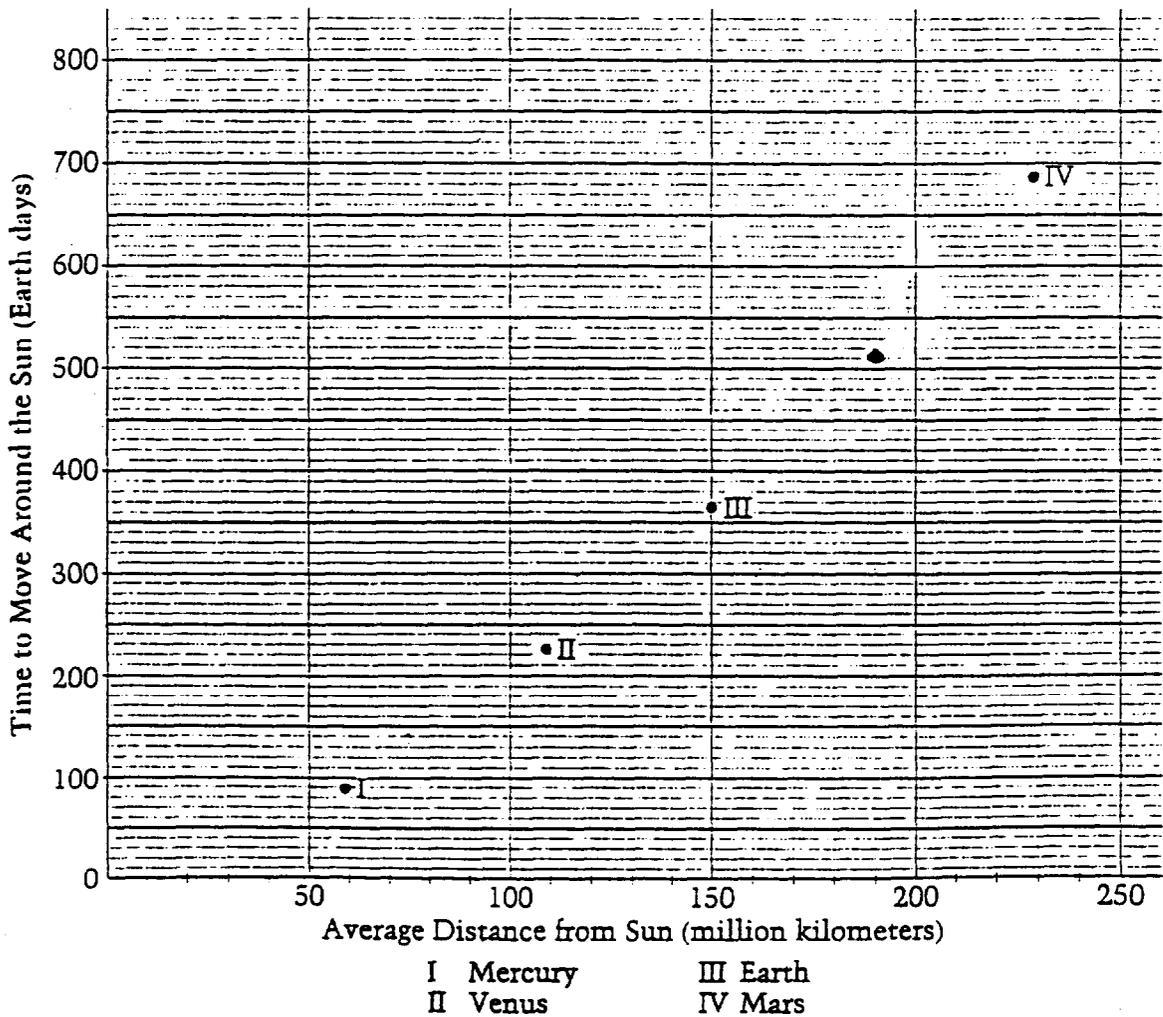I   Mercury   III Earth
II Venus   IV Mars

9. Suppose that a new planet, *K,* is discovered that takes 520 Earth days to move around the Sun and whose orbit is halfway between the orbits of Earth and Mars.

Show this on the graph by plotting and labeling a point for planet *K.*

Using the graph, estimate the average distance of planet *K* from the Sun.

[handwritten: Sun   K ← Earth   K   ← mars]

The planets move at different speeds and require different amounts of time to circle the Sun. The following graph shows the number of Earth days it takes for each of the four planets to move around the Sun once.
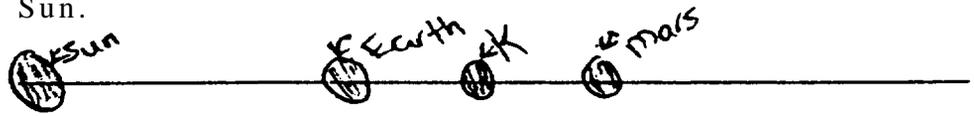
(Graph: Time to Move Around the Sun (Earth days) vs. Average Distance from Sun (million kilometers). Points plotted: I at ~(50, 90); II at ~(110, 220); III at ~(150, 360); IV at ~(225, 680); handwritten K at ~(190, 510).)

Average Distance from Sun (million kilometers)

I   Mercury   III Earth
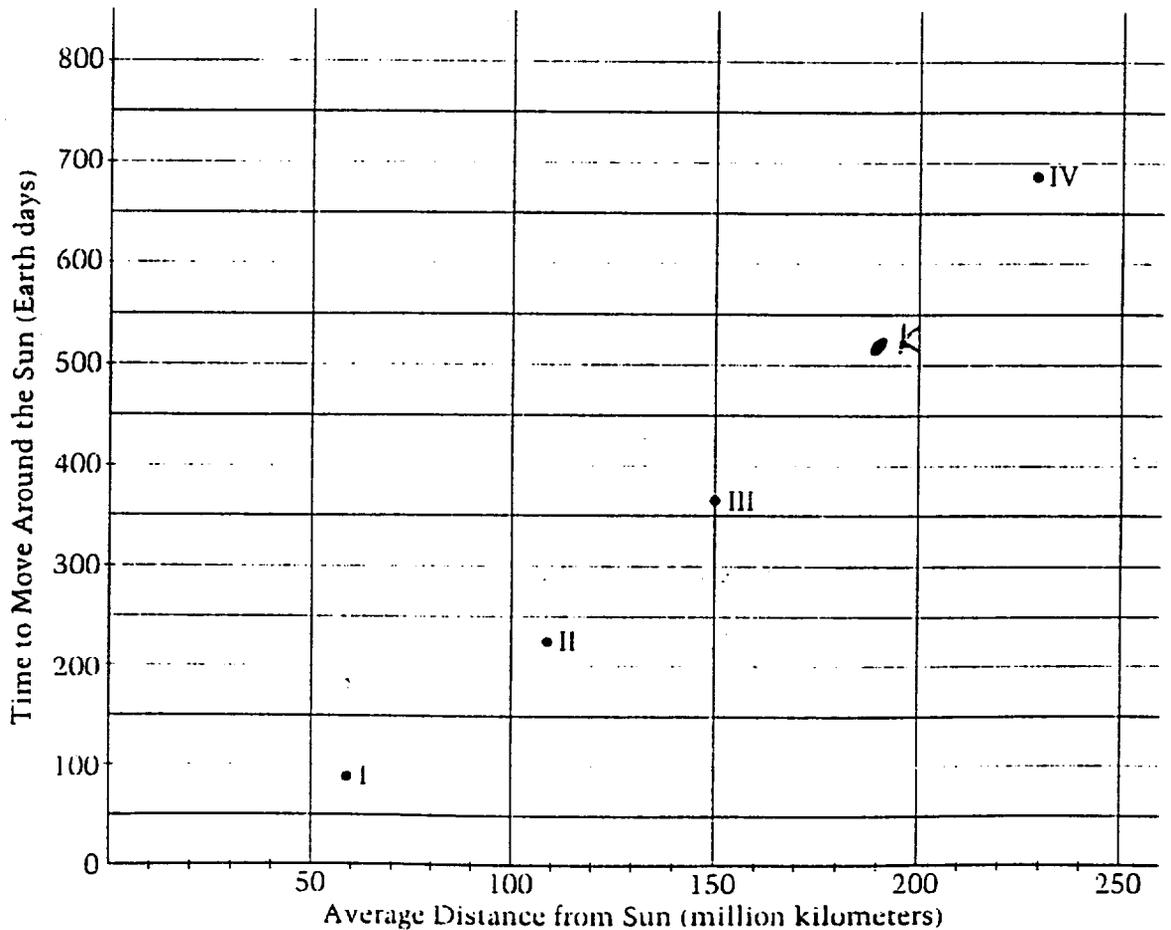II Venus   IV Mars

Level:
Partial (2)

**9.** Suppose that a new planet, *K,* is discovered that takes 520 Earth days to move around the sun and whose orbit is midway between the orbits of Earth and Mars.

Show this on the graph by plotting and labeling a point for planet *K.*

Using the graph, estimate the average distance of planet *K* from the Sun.

The planets move at different speeds and require different amounts of time to circle the Sun. The following graph shows the number of Earth days it takes for each of the four planets to move around the Sun once.

Time to Move Around the Sun (Earth days)

Average Distance from Sun (million kilometers)
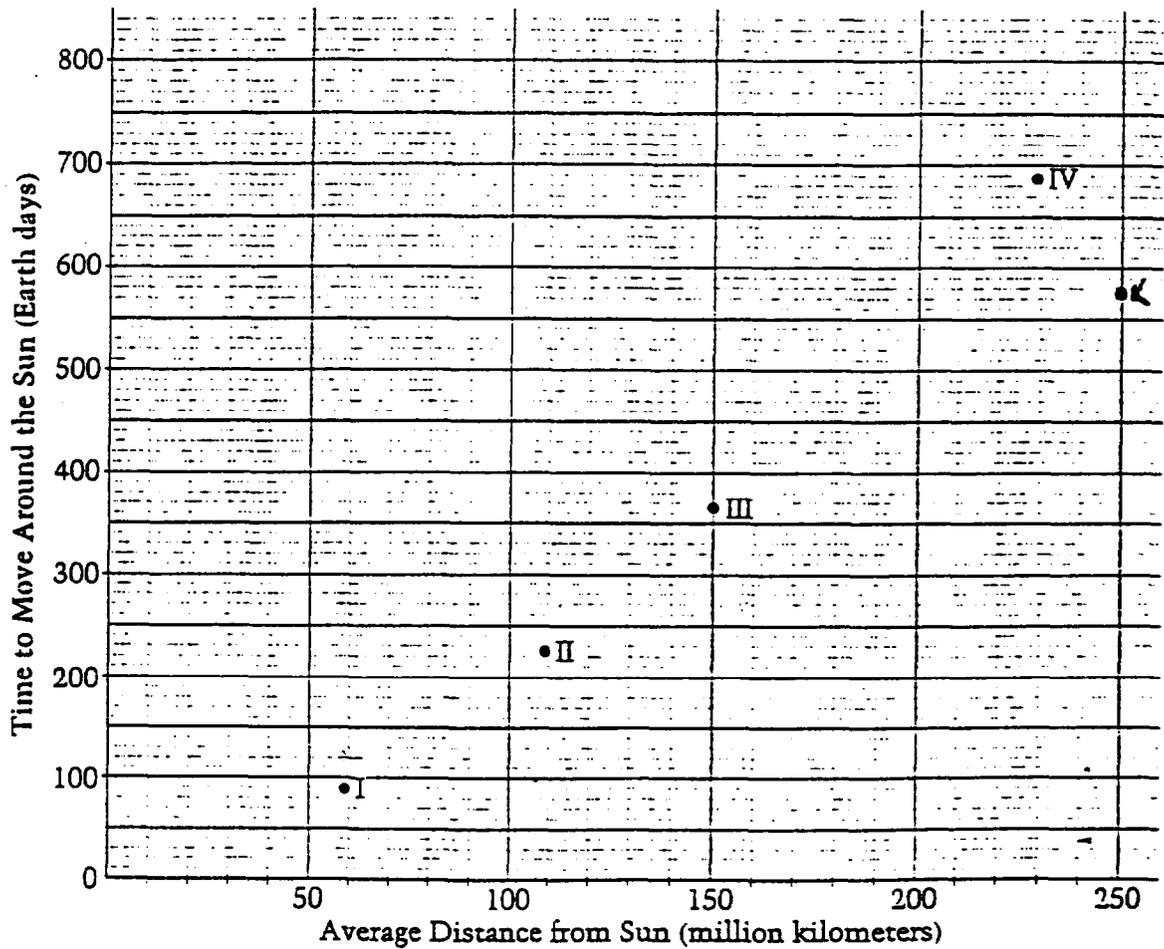
I   Mercury   III Earth
II Venus   IV Mars

10. In the picture below, the Earth and Mercury are lined up with the Sun. After Mercury has circled the Sun once, the Earth would be in a different location. Using information from the graph on page 5, put an X on the Earth's orbit in the picture to show the new location of the Earth.
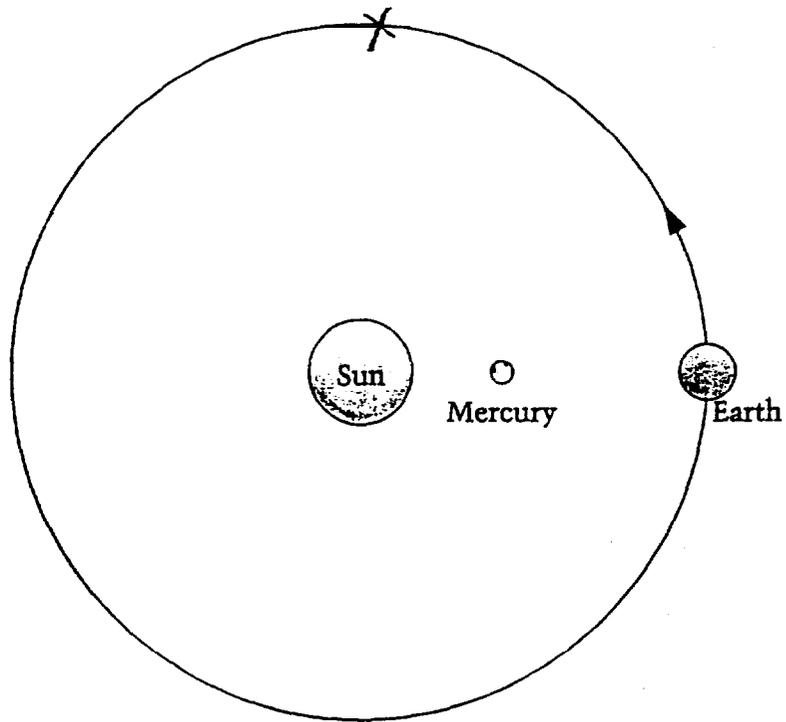
Level:
Complete (3)

Student Sample Responses and Assigned Scores

Grade : 8

Block : S2S7

10. In the picture below, the Earth and Mercury are lined up with the Sun. After Mercury has circled the Sun once, the Earth would be in a different location. Using information from the graph on page 5, put an X on the Earth's orbit in the picture to show the new location of the Earth.
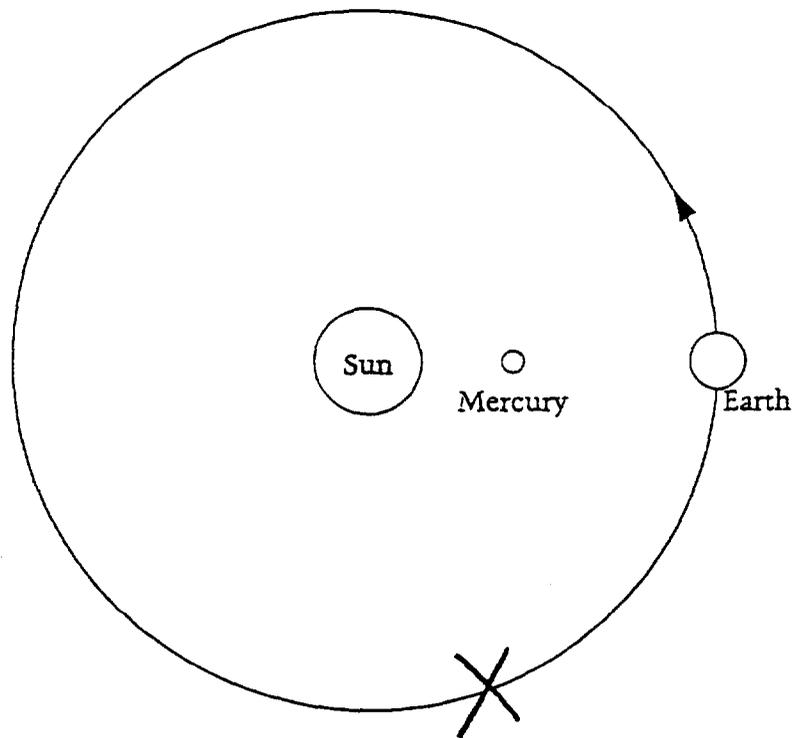

Level:
Unsatisfactory/Incorrect (1)
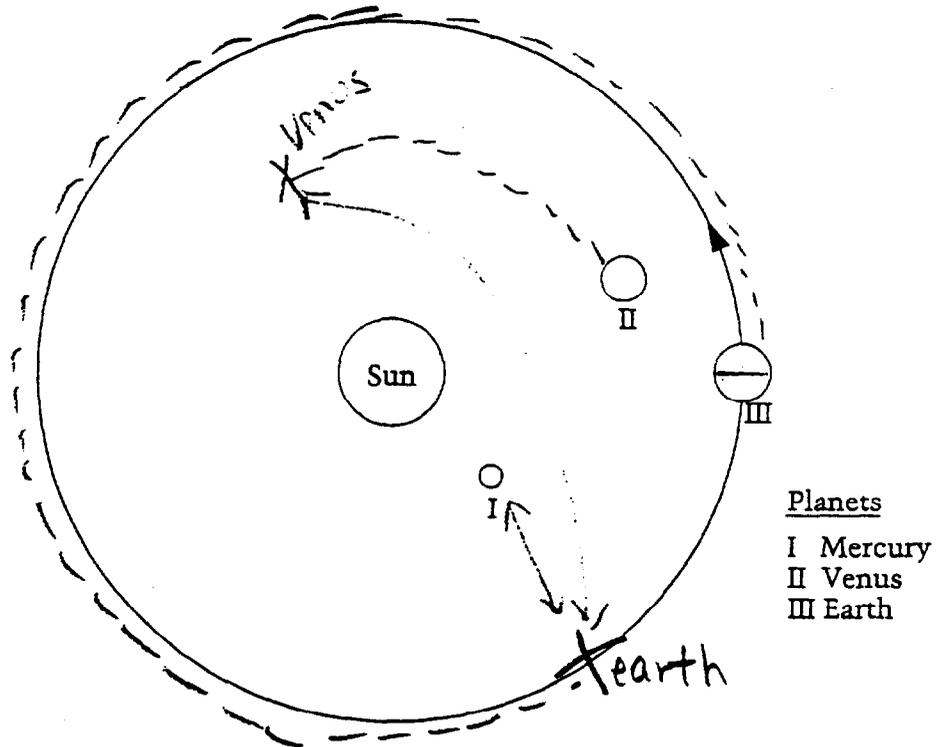
Planets

I Mercury
II Venus
III Earth

11. At the moment of time shown in the picture above, Venus is the planet closest to the Earth. Could Mercury ever be the planet closest to the Earth?

● Yes

◉ No

Explain why or why not. You can draw on the picture to help explain your answer.

Because It takes a shorter amount of time for Mercury to travel around the Sun than Earth. After a while, they will catch up with each other.

Level:
Complete (3)

Student Sample Responses

Planets
I Mercury
II Venus
III Earth

11. At the moment of time shown in the picture above, Venus is the planet closest to the Earth. Could Mercury ever be the planet closest to the Earth?

● Yes

◉ N o

Explain why or why not. You can draw on the picture to help explain your answer.

<u>You can draw on the</u>
<u>pitcure to find out where</u>
<u>Venus will be the Next</u>
<u>time Mercury circles the</u>
<u>sun. IF it's far away</u>
<u>than Mercury is closer.</u>

Level:
Partial (2)
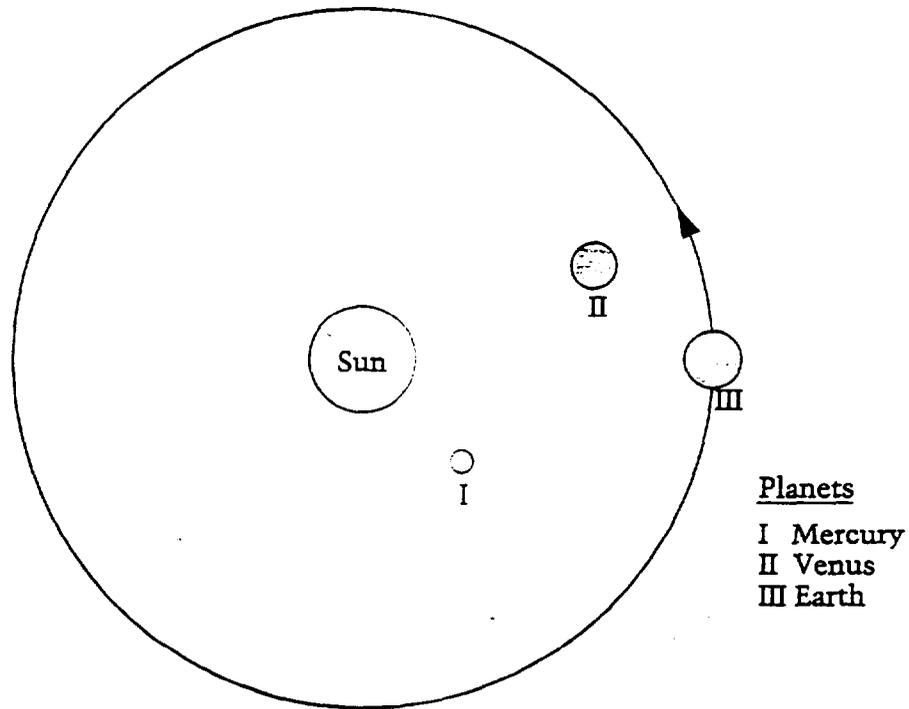
Student Sample Responses

11. At the moment of time shown in the picture above, Venus is the planet closest to the Earth. Could Mercury ever be the planet closest to the Earth?
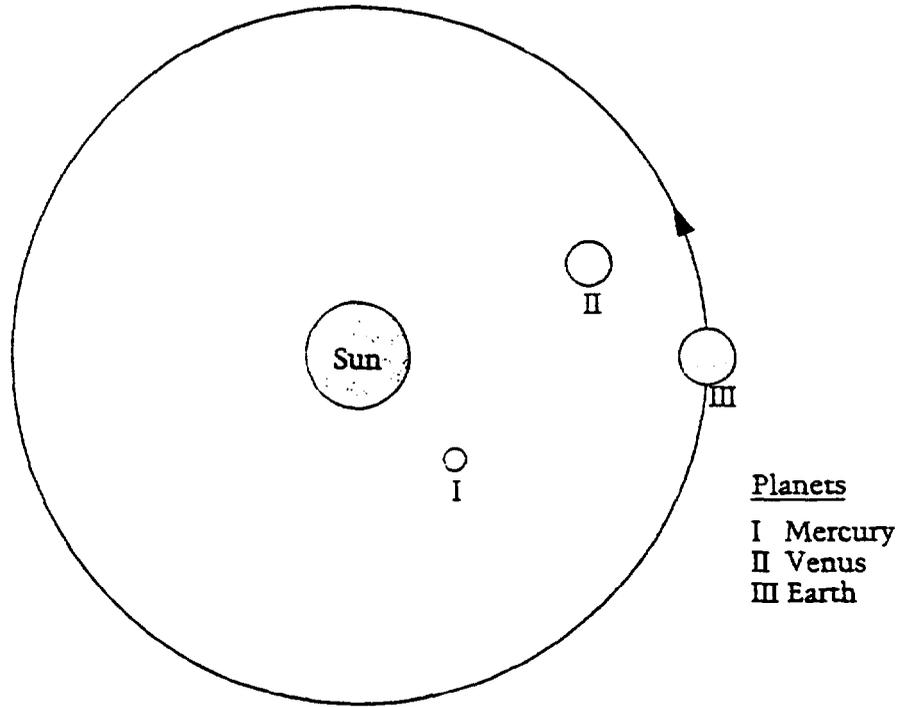
Ⓐ   Yes

●   No

Explain why or why not. You can draw on the picture to help explain your answer.

you can't becaue Mercury could never be the closest because it would never pass Venus

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

12. What additions or changes could be made to this model of the Solar System to best explain why the Northern Hemisphere of the Earth is colder in January than in July? You may draw a picture as part of your answer.

Earth Summer _____ Sun _____ B. Winter
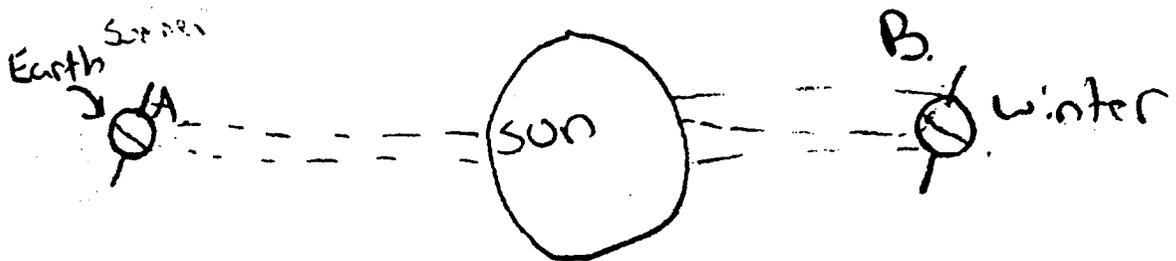
A. In the summer the earths axis tilts twords the sun. With this the Northern Hemisphere recieves more direct rays.
B. In the winter the Northern hemispher recieves less direct rays because the earths axis is tilted away from the sun.

Level:
Complete (3)

12. What additions or changes could be made to this model of the Solar System to best explain why the Northern Hemisphere of the Earth is colder in January than in July? You may draw a picture as part of your answer.

Sun's Rays →

Sun
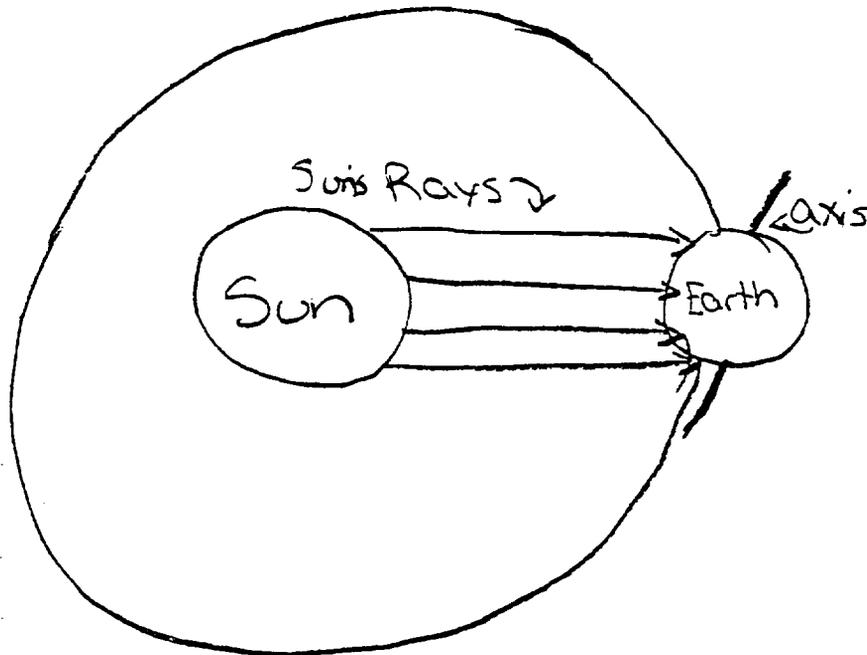
Earth

← axis

To make this model better they could show the Sun's rays in the direction they hit the Earth. Also the Earth is on its axis so when it turns the Sun's rays doesn't hit directly all the time.

Level:
Partial (2)

12. What additions or changes could be made to this model of the Solar System to best explain why the Northern Hemisphere of the Earth is colder in January than in July? You may draw a picture as part of your answer.

Because somewhere in the beginning of the year, the Earth tilted and the Northern Hemisphere has more distance away from the sun than in July

Level:
Unsatisfactory/Incorrect (1)

In this section, you will have 30 minutes to answer 16 questions. Mark your answers in your booklet. Fill in only one oval for each question or write your answer on the lines. Please think carefully about your answers. When you are writing your answers, be sure that your handwriting is clear.

Do not go past the **STOP** sign at the end of the section. If you finish before time is called, you should go over your work again.

PLEASE TURN THE PAGE AND BEGIN NOW.

1. Which of the following properties of the Earth is the result of the processes of living things?

  Ⓐ The Earth's oceans are salty.

  Ⓑ The Earth has magnetic poles.

  Ⓒ The Earth's atmosphere contains a lot of oxygen.

  Ⓓ The Earth's crust contains a lot of volcanic rock.   JL001087
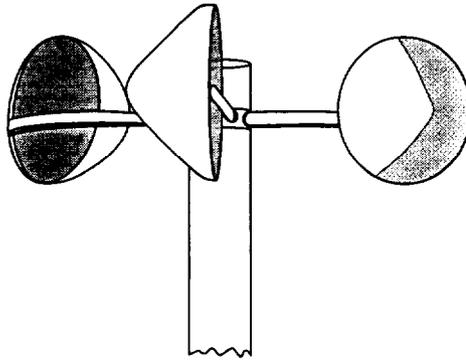
2. The instrument shown is used to measure

  Ⓐ wind direction

  Ⓑ wind speed

  Ⓒ air pressure

  Ⓓ relative humidity   JL001078

3. In which relative positions of the Sun (S), Earth (E), and Moon (M) is a lunar eclipse most likely to happen?   JL001137

Ⓐ

S   E **M**
              ●

Ⓑ

              M
              ●
S   E

Ⓒ

S   **M** E
         ●

Ⓓ

S   E
           ●
           M

GO ON TO THE NEXT PAGE
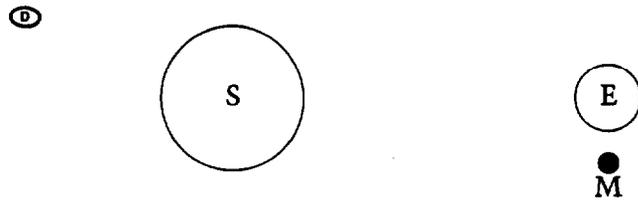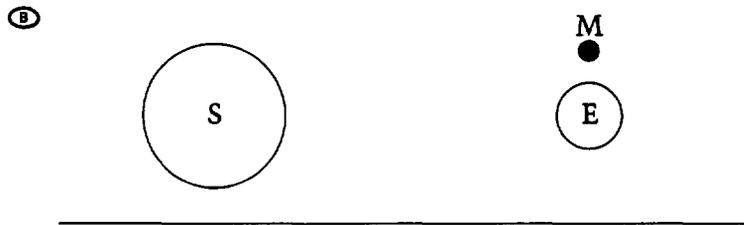
Questions **4-5** refer to the following table.

	Monday	Tuesday	Wednesday	Thursday	Friday
High Temperature (°F)	43	50	42	53	60
Low Temperature (°F)	28	38	28	39	45
Precipitation (inches)	0.0	1.0	1.5	0.0	1.6
Average Wind Speed (mph)	15	10	7	10	10

GO ON TO THE NEXT PAGE

4. Based on the weather data in the table, on which day was snowfall most likely to have occurred?

   (A) Monday

   (B) Tuesday

   (C) Wednesday

   (D) Thursday   JL001079

5. On which day was the average windchill temperature likely to be the lowest?

   (A) Monday

   (B) Tuesday

   (C) Wednesday

   (D) Friday   JL001081

GO ON TO THE NEXT PAGE

6. Raul's little sister, Sarah, wants to know why she can see herself <u>in</u> a mirror, but she can see <u>through</u> a window. What should Raul tell his sister to explain the differences between mirrors and windows?

HE001481

_____

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7. Hair color in humans is an inherited trait. How is it possible for two people who had brown hair from birth to produce a child with blond hair?

JL001033

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For Questions 8-9, think about what happens inside your body when you eat bread.

8. Which parts of your digestive system digest bread?

JL001020

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9. Describe how the nutrients from digested bread move from the digestive organs to muscles and other tissues where they are needed.

JL001021

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GO ON TO THE NEXT PAGE

10. The diagram below shows the boundary between a cold air mass and a warm, moist air mass.
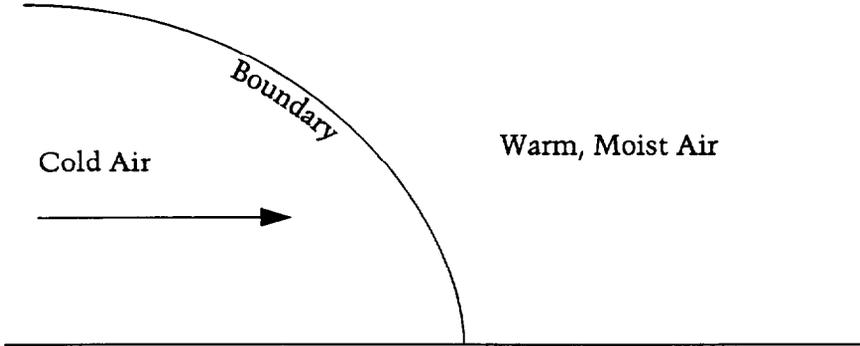
Describe how the interaction of the cold air and the warm air can cause rain at the boundary.   JL001036

_____

_____

_____

_____

_____

11. Which of the following represents the input/output energy forms for a stereo system?

	Input	Output
Ⓐ	Motion	Sound only
Ⓑ	Motion	Sound and heat only
Ⓒ	Electricity	Motion and sound only
Ⓓ	Electricity	Motion, sound, and heat

JL001049

GO ON TO THE NEXT PAGE

Concrete   Steel Joint   Concrete   Steel Joint   Concrete
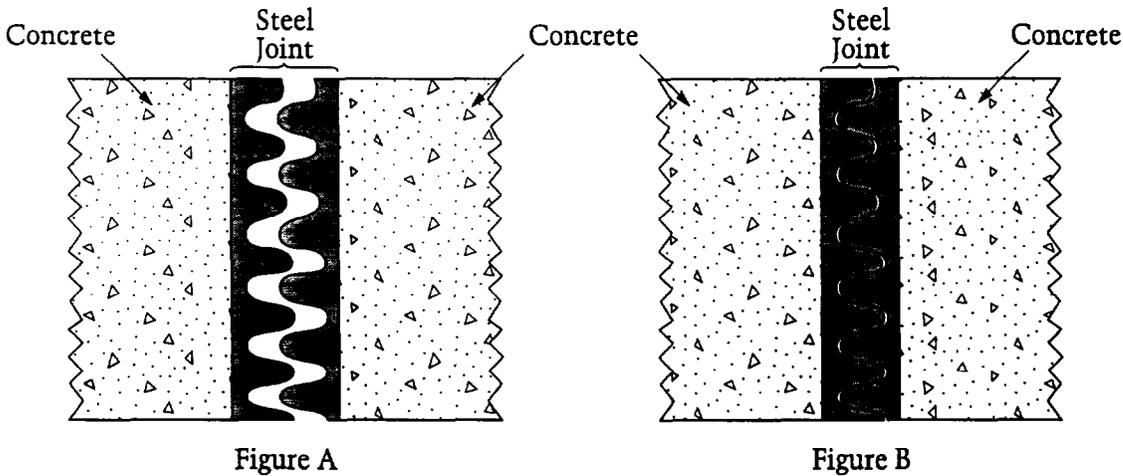
Figure A   Figure B

12. A concrete bridge was built using special steel joints between the sections of concrete. The figures above show one of these joints at two different times. Which of the following best explains why Figure A and Figure B look different?

Ⓐ Figure A shows the joint on a hot day and Figure B shows the joint on a cold day.

Ⓑ Figure A shows the joint on a cold day and Figure B shows the joint on a hot day.

Ⓒ Figure A shows the joint on a warm, dry day and Figure B shows the joint on a cool, rainy day.

Ⓓ Figure A shows the joint during the day and Figure B shows the joint at night.

JL001048

13. Imagine that you could put popcorn kernels into an airtight popcorn popper and measure the mass of the popper with the kernels. After the popcorn has popped, the mass of the popper and the popcorn will be

Ⓐ less than the original mass because popped corn is less dense than the kernels are

Ⓑ equal to the original mass because the container is airtight

Ⓒ geater than the original mass because the volume of the popped corn is greater than that of the kernels

Ⓓ impossible to determine accurately without weighing each piece of popcorn immediately

JL0010522

GO ON TO THE NEXT PAGE

Questions 14-16

Hydras are tiny (l-centimeter long) animals that live in streams and ponds. The picture below shows an adult hydra drawn larger than actual size.

Evita and Michael used 20 hydras for a class science project. They kept the hydras in a glass dish about 5 centimeters high, fed them regularly, and bubbled air into the water to make sure the hydras had enough oxygen.

Evita and Michael observed the hydras every day for 10 days. Each day they drew in their lab notebook the appearance of a typical hydra and recorded the total number of hydras. Their records for day 1, day 4, day 7, and day 10 are shown below.

HE001583

Day 1	Day 4	Day 7	Day 10

| Population: 20 | Population: 20 | Population: 20 | Population: 40 |

GO ON TO THE NEXT PAGE

14. Based on the information in the students' notebook, explain the changes in the appearance and number of the hydras between day 1 and day 10.   HE001584

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15. Evita and Michael predicted that if they fed the hydras twice as much food, the population of hydras would double their number in 5 days. Describe an experiment with appropriate controls that Evita and Michael could do to test this hypothesis.   HE001585

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16. Evita and Michael performed an experiment to test their hypothesis and found that the population of hydras <u>did</u> double in 5 days when they were fed twice the amount of food they would normally eat. Then they wondered if the population would double in <u>1</u> day if the hydras were fed <u>10</u> times the normal amount of food. Do you think this would happen? Explain your answer.   HE001586

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STOP

INFORMATION ABOUT THE FRAME WORK CLASSIFICATION CODES
AVAILABLE FOR EACH ITEM

Following this description of the classification codes, there is a single sheet with NAEP ID numbers, short descriptions of the items, item keys (1-4 if the item is multiple-choice; blank of the item is open-ended), as well as the mean p-values for the items in the released block.

The classification codes for each item can be viewed within each item in the scoring guide.

Field 1)   **Program profile:**
                      N27S NAEP, year 27 of Science

Field 2)   **Grade:**
                      1   Grade 4 only item
                      1/2   Grade 4/8 overlap itern
                      2   Grade 8 only item
                      2/3   Grade 8/12 overlap item
                      3   Grade 12 only item

Field 3)   **Field of science:**
                      PS   Physical Science
                      ES   Earth Science
                      LS   Life Science

Field 4)   **Field of science subcontent area:**
                      The letter corresponds to the subcontent areas described in the
                      Science Assessment and Exercise Specifications for the 1996
                      National Assessment of Edycational Progress.
                      Physical Science
                       A   Matter and Its Trandormations
                       B   Energy and Its Trantionnations
                       C   Motion
                      Earth science
                       A   Solid Earth (lithosphere)
                       B   Water (hydrosphere)
                       C   Air (atmosphere)
                       D   Earth in space
                      Life Science:
                       A   Change and Evolution
                       B   Cells and Their Functions
                       C   Organisms
                       D   Ecology

Field 5)   **Ways of knowing and doing science:**
                      SI   Scientific Investigation
                      PR   Practical Reasoning
                      CU   Conceptual Understanding

Field 6)	**Theme**
	SYS Systems
	MOD Models
	PC Patterns of Change
	NA Not Applicable
Field 7)	**Nature of Science/technology:**
	NS Nature of Science
	NT Nature of Technology
	NA Not Applicable
Field 8)	**Item type:**
	MC Multiple-choice
	SCR Short Constructed-Response
	ECR Extended Construoted-Response
	NA Not Applicable

1996 Science Items

GRADE: 08 BLOCK: 27S10

ITEM	NAEP ID	SHORT DESCRIPTION	KEY	CONTENT	PROCESS	P-VALUE	RELEASE STATUS
1	K041501	PROPERTY OF EARTH CAUSED BY ORGANISMS MC	3	2	3	0.812	P
2	K041601	IDENTIFICATION OF USE AN ANEMOMETER MC	2	2	1	0.648	P
3	K041701	IDENTIFY LUNAR ECLIPSE MC	1	2	3	0.206	P
4	K041801	WEATHER DATA: DAY WHEN IT SNOWED MC	3	2	3	0.717	P
5	K041802	WEATHER DATA: DAY OF LOWEST WINDCHILL FACTOR MC	1	2	3	0.408	P
6 A	K041901	PROPERTIS OF WINDOWS AMD MIRRORS OE		1	3	0.160	P
7 A	K042001	INHERITANCE OF HAIR COLOR OE		3	2	0.190	P
8 A	K042101	WHERE BREAD IS DIGESTED OE		3	3	0.088	P
9 A	K042102	HOW DIGESTED BREAD GETS TO TISSUES OE		3	3	0.272	P
10A	K042201	HOW RAIN CAUSED BY COLD AIR MEETING WARM OE		2	3	0.035	P
11	K042301	IDENTIFY INPUT/OUTPUT ENERGY FORMS MC	4	1	3	0.461	P
12	K042401	CAUSE OF GAP IN STEEL JOINT MC	2	1	2	0.328	P
13	K042501	CONVERSION OF MATTER: POPCORN AND POPPER MC	2	1	3	0.260	P
14A	K042601	HYDRA: EXPLAIN APPEARANCE + NUMBER CHANGE OE		3	1	0.403	P
15A	K042602	HYDRA: DESIGN EXPERIMENT BASED ON 2X FOOD OE		3	1	0.251	P
16A	K042603	HYDRA: RESULTS IF FEED 10X AMOUNT OE		3	2	0.171	P

Content: 1 = Physical sciences
2 = Earth & space sciences
3 = Life sciences

Process: 1 = Scientific investigation
2 = Practical reasoning
3 = Conceptual understanding

Item Number: 1 Accession Number: JL0001087

Key: C

Classification Codes:
N27S   2   ES   D   CU   NA   NA   MC

Item Number: 2 Accession Number: JL001078

Key: B

Classification Codes:
N27S   2   ES   C   S I   NA   NA   MC

Item Number: 3 Accession Number: JL001137

Key: A

Classification Codes:
N27S 2 ES D CU SYS NA MC

Item Number: NONE Accession Number: VL000001

Key: NONE

Classification Codes:
N27S   2   E S   C   CU   NA   NA   NA

Item Number: 4 Accession Number: JL001079

Key: C

Classification Codes:
N27S   2   ES   C   CU   NA   NA   MC

Item Number: 5 Accession Number: JL001080

Key: A

Classification Codes:
S27S   2   ES   C   CU   NA   NA   MC

Item Number: 6 Accession Number: HE001481

Key: NONE

Classification Codes:
N27S   2   PS   C   CU   NA   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of the properties of reflective materials by explaining why light passes through a window but is reflected by a mirror.

3 = Complete - Student response correctly includes statements about the physical properties of mirrors and windows and the reflective properties of mirrors and windows (light must be mentioned). Student includes statements referring to both the backing of reflective materials and the reflective properties.

2a = Partial - Student response demonstrates some understanding of the properties of reflective materials by identifying that mirrors have a <u>backing</u> on them but windows do not.

2b = Partial - Student response demonstrates some understanding of the properties of reflective materials by identifying that <u>light bounces off</u> a mirror but goes through glass.

1 = Unsatisfactory/Incorrect   - Student states mirrors and windows differ, but gives no reason for the difference, or restates the question.

Item Number: 7 Accession Number: JL01033

Key: NONE

Classification Codes:
N27S   2   LS   A   PR   NA   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of the recessive nature of some inherited human traits.

3 = Complete - Student explanation explicitly involves inheritance of recessive genes by a child from its parents. Recessiveness may be indicated by the use of terms such as "recessive," "expressed," "visible," and "didn't show," sperm and/or egg picking up (carrying) the blond gene or idea of a carrier (e.g. blond gene)'.

2 = Partial - Student explanation involves inheritance but does not explicitly involve recessiveness (e.g., "the child inherited blond hair from a grandparent through the parent") Must refer to grandparent or ancestors. Need only refer to <u>one</u> parent or grandparent for partial credit.

1 = Unsatisfactory/Incorrect - Student demonstrates no understanding of the concept of recessive traits, or makes an incorrect, implausible statement (e.g., "it could knock the original color away").

Item Number: 8 Accession Number: JL001020

Key: NONE

Classification   Codes:
N27S   2   LS   C   CU   SYS   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of the portions of the digestive tract where the digestion of carbohydrates occurs.

3 = Complete - Student correctly lists the 2 parts of the digestive system where bread is digested: mouth and small intestine. No incorrect organs are given.

2a = Partial - Student lists the mouth as one place in the digestive system where bread is digested.

2 b = Partial - Student lists the small intestine as one place in the digestive system where bread is digested.

1 = Unsatisfactory/Incorrect - Student lists none of the places in the digestive system where bread is digested, or gives a general answer (e.g., "organs"), or states or lists 3 or more parts of the digestive system (no understanding of the specific digestion of bread).

Item Number: 9 Accession Number: JL001021

Key: NONE

Classification Codes:
N27S   2   LS   C   CU   SYS   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of the processes of absorption and transport of digested food.

3 = Complete - Student describes the absorption of materials through the (wall) of the small intestine and the transport of these absorbed materials to tissues by the circulatory system (e.g., blood system, veins, arteries, blood).

2a = Partial - Student describes the absorsption of digested materials through the (wall) of the (small) intestine.

2b = Partial - Student describes the transport of digested materials to tissues by the circulatory system.

1 = Unsatisfactory/Incorrect - Student response describes neither absorption nor circulation.

Item Number: 10 Accession Number: JL001036

Key: NONE

Classification Codes:
N27S   2   ES   C   CU   SYS   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of the atmospheric interactions that occur with an advancing cold front.

3 = Complete - Student correctly describes the formation of rain at the boundary of an advancing cold front (a + b below).

2a = Partial - Student demonstrates some understanding by mentioning aspect (a) as given below.

2b = Partial - Student demonstrates some understanding by mentioning aspect (b) as given below. Student refers to condensation in the proper context.

1 = Unsatisfactory/Incorrect - Student shows no correct understanding of the weather conditions that occur with an advancing cold front.

a. When a front of cold air meets a mass of warm air, it causes the warm air to rise.
b. As the warm air rises, it cools and the vapor in the warm air will condense, forming clouds (condensation).

Item Number: 11 Accession Number: JL001049

Key: D

Classification Codes:
N27S   2   PS   B   CU   NA   NA   MC

Item Number: 12 Accession Number: JL001048

Key: B

Classification Codes:
N27S   2   PS   A   PR   PC   NA   MC

Scoring Guide

Scoring Rationale: Student demonstrates an understanding of the protective effect of high-atmosphere ozone, and the harmful effect of ultraviolet radiation on humans.

3 = Complete - Student explains 1) that a depletion of the ozone layer in the upper atmosphere allows more ultraviolet radiation from the Sun to penetrate the Earth's atmosphere and reach the Earth's surface and 2) if human skin absorbs these increased amounts of ultraviolet radiation, an increased incidence of skin cancer can result.

2 = Partial - Student explains that decreased ozone leads to increased UV radiation, or that decreased ozone leads to increased skin cancer, but does not connect the events in a cause-effect relationship (e.g., "if the ozone is gone, more ultraviolet radiation reaches the Earth," "if the ozone is gone, more people will get skin cancer")
OR student refers to Sun's <u>harmful</u> rays getting through <u>OR</u> Sun's (harmful) rays causing skin cancer (diseases).

1 = Unsatisfactory/Incorrect - Student demonstrates little or no understanding of the relationship between ozone depletion, UV radiation, and skin cancer.

Item Number: 13 Accession Number: JL001052

Key: B

Classification Codes:
N27S 2 PS A CU NA NA MC

Item Number: NONE Accession Number: HE001583

Key: NONE

Classification Codes:
N27S   2   LS   D   SI   PC   NA   NA

Item Number: 14 Accession Number: HE001584

Key: NONE

Classification Codes:
N27S   2   LS   D   SI   PC   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an ability to interpret data about changes in numbers and appearance of an asexually reproducing animal.

3 = Complete - Student explains changes in terms of reproduction.

2 = Partial - Student provides a complete or partial description of the diagram but does not connect budding to reproduction.

1 = Unsatisfactory/Incorrect - Student may give some description but makes major conceptual errors (e.g., the bud died) or student describes the hydra in terms of a bud blooming (plant), or description is inaccurate.

Credited response include:

The hydras each grew a bud on the side of their bodies that looked like a little hydra. At the end, the bud was gone but the number of hydras had doubled. So the buds must have become new, little hydras.
The hydras were reproducing by budding.

Item Number: 15 Accession Number: HE001585

Key: NONE

Classification Codes:
N27S   2   LS   D   S I   PC   NS   ECR

Scoring Guide

Scoring Rationale: Student is able to design an experiment, with appropriate controls, to test the effect of increasing the amount of food on the rate of increase of the hydra population.

4 = Complete - Student describes an experiment that would test the hypothesis. This includes a control and more than one hydra in each group.

3 = Essential - Student describes an experiment that would test the hypothesis. This includes a control and one hydra in each group.

2 = Partial - Student describes an experiment that includes feeding hydras twice as much food but has no control group. (A statement about comparing it to the previous setup is not a control.) Or student response includes a controlled experiment without mention of a specific amount of food.

1 = Unsatisfactory/Incorrect - Students experiment does not test the hypothesis. For example, students response states an <u>incorrect</u> amount of food (i.e. 3 times) .

Item Number: 16 Accession Number: HE001586

Key: NONE

Classification Codes:
N27S   2   LS   D   PR   PC   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates an ability to understand factors that limit population growth by predicting the effect of additional feeding on the rate of increase of the hydra population.

3 = Complete - Student responds "No" and explains that there is probably a limit to the rate at which a hydra population can grow.   Student may or may not link this to a specific factor such as food.

1 = Unsatisfactory/Incorrect - Student responds yes or no with no explanation or an incorrect explanation.

6. Raul's little sister, Sarah, wants to know why she can see herself <u>in</u> a mirror, but she can see <u>through</u> a window. What should Raul tell his sister to explain the differences between mirrors and windows?

HE001481

The back of mirrors are painted a dark color. This reflects light and any other object that can be seen. Glass doesn't have anything on the back or front that reflects.

Level:
Complete (3)

6. Raul's little sister, Sarah, wants to know why she can see herself <u>in</u> a mirror, but she can see <u>through</u> a window. What should Raul tell his sister to explain the differences between mirrors and windows?

HE001481

A mirror is a reflection of light and a window light can travel through it

Level:
Partial (2)

Student Sample Responses

6. Raul's little sister, Sarah, wants to know why she can see herself <u>in</u> a mirror, but she can see <u>through</u> a window. What should Raul tell his sister to explain the differences between mirrors and windows?

HE001481

Mirrors are made of different substances than windows.

Level:
Unsatisfactory/Incorrect (1)

7. Hair color in humans is an inherited trait. How is it possible for two people who had brown hair from birth to produce a child with blond hair?   JL001033

The may both have strong brown hair genes, but the both have a resesive blond gene that they both combin to produce a blond haired child,

Level:
Complete (3)

7. Hair color in humans is an inherited trait. How is it possibIe for two people who had brown hair from birth to produce a child with blond hair?   JL001033

There mom or dad parents could have had the humans (traits) of blond and the mom and dad still had the trait and the baby got it.

Level:
Partial (2)

Student Sample Responses

7. Hair color in humans is an inherited trait. How is it possible for two people who had brown hair from birth to produce a child with blond hair?

JL001033

Both parents could have a hidden (dominant gene that is blond.

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

8. Which parts of your digestive system digest bread?   JL001020

Your mouth started the digestion of
carbohydrates, your stomach starts
the digestion of protiens but most
of digestion is done in your small
intestine.

Level:
Complete (3)

8. Which parts of your digestive system digest bread?   JL001020

The small intestine, because
thats where all the absorbsion
takes place

Level:
Partial (2)

8. Which parts of your digestive system digest bread?   JL001020

The stomach digest the
bread.

Level:
Unsatisfactory/Incorrect (1)

9. Describe how the nutrients from digested bread move from the
   digestive organs to muscles and other tissues where they are needed.

JL001021

Once all of your bread is broken
down small enough in your small intestine,
the nutrients can be absorbed right
into your bloodstream where they
are carried to muscles and tissues.

Level:
Complete (3)

9. Describe how the nutrients from digested bread move from the
   digestive organs to muscles and other tissues where they are needed.

JL001021

The good nutrients get into
your blood stream and absorb
into muscles and other
tissues.

Level:
Partial (2)

9. Describe how the nutrients from digested bread move from the
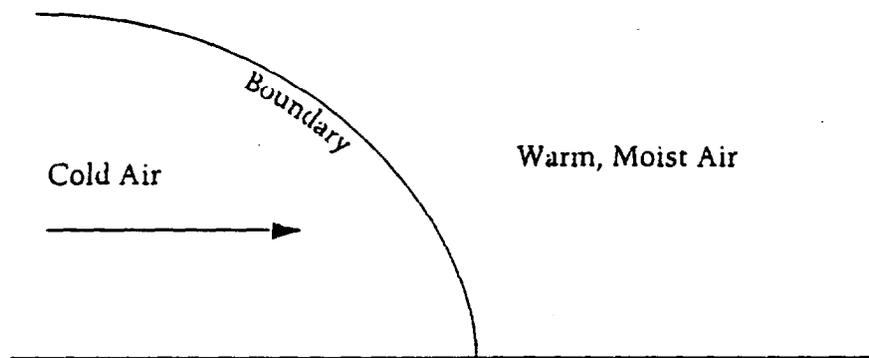digestive organs to muscles and other tissues where they are needed.

JL001021

The nutrients seep
from the stomach
and the cells eat
them.

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

10. The diagram below shows the boundary between a cold air mass and a warm, moist air mass.

Describe how the interaction of the cold air and the warm air can cause rain at the boundary.   JL001036

When cold air combines with warm moist air the warm air rises But it is also cooled by the cold air. The moisture condenses and turns to percipitation Which falls through the cold air and cools more into rain.

Level:
Complete (3)

10. The diagram below shows the boundary between a cold air mass and a warm, moist air mass.

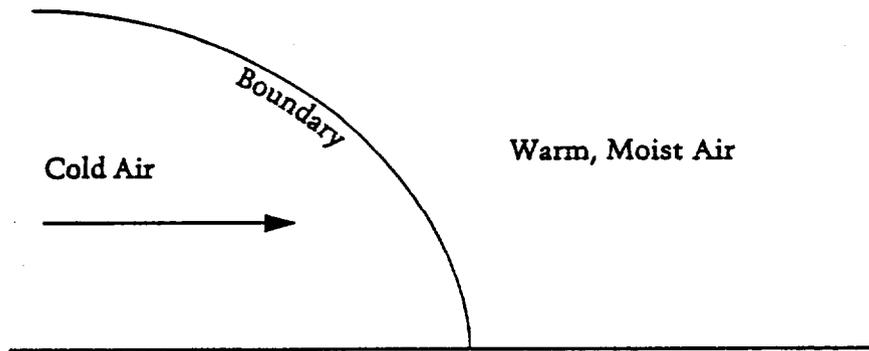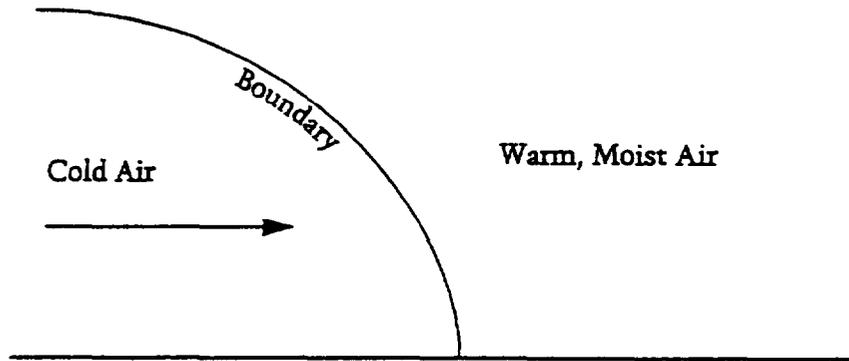Describe how the interaction of the cold air and the warm air can cause rain at the boundary.   JL001036

When anything warm and cold mix, the warm always rises to the top which would be a cause for the rain.

Level:
Partial (2)

10. The diagram below shows the boundary between a cold air mass and a warm, moist air mass.

Boundary

Cold Air

Warm, Moist Air

Describe how the interaction of the cold air and the warm air can cause rain at the boundary.

JI001036

The cold air mass moves in causing the warm air mass to mix with it & then it rains.

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

14. Based on the infromation in the students' notebook, explain the changes in the appearance and number of the hydras between day 1 and day 10.

HE001584

On day one, the hydras had a small bud. But days 4 and 7, the bud got bigger and bigger then Day 10, the bud was gone and the population had increased. I think that the hydras had babies.

Level:
Complete (3)

14. Based on the information in the students' notebook, explain the changes in the appearance and number of the hydras between day 1 and day 10.

HE001584

On day one there was a bud, day four it sprouted, day seven it was half the size of an adult hydras, on day ten the adult hydras started this process over. After the first process the population grew to double.

Level:
Partial (2)

14. Based on the information in the students' notebook, explain the changes in the appearance and number of the hydras between day 1 and day 10.

Because it started budding and getting bigger and then the end died. I think this happened because the plants doubled the population and caused it to die.

Level:
Unsatisfactory/Incorrect (1)

15. Evita and Michael predicted that if they fed the hydras twice as much food, the population of hydras would double their number in 5 days. Describe an experiment with appropriate controls that Evita and Michael could do to test this hypothesis.   HE001585

If they took 10 and put them in a seperate glass dish, and kept the rest in the same glass dish, they could feed one half twice the ammount of food and keep the other half with the regular ammount they had first Then test and see which one

Level:
Complete (4)

15. Evita and Michael predicted that if they fed the hydras twice as much food, the population of hydras would double their number in 5 days. Describe an experiment with appropriate controls that Evita and Michael could do to test this hypothesis.

They could take two hydras feed one twice as much as the other for five days.

Level:
Essential (3)

15. Evita and Michael predicted that if they fed the hydras twice as much food, the population of hydras would double their number in 5 days. Describe an experrment with appropriate controls that Evita and Michael could do to test this hypothesis. HE001585

Evita and michael would keep the jar the same size, and everything else the same. They would double the amount of food that the hydras received. Instead of feeding twice a day they would double that to feeding them four times a day

Level:
Partial (2)

15. Evita and Michael predicted that if they fed the hydras twice as much food, the population of hydras would double their number in 5 days. Describe an experiment with appropriate controls that Evita and Michael could do to test this hypothesis. HE001585

they could see how much
food a day it eats

Level:
Unsatisfactory/Incorrect (1)

16. Evita and Michael performed an experiment to test their hypothesis and found that the population of hydras did double in 5 days when they were fed twice the amount of food they would normally eat. Then they wondered if the population would double in 1 day if the hydras were fed 10 times the normal amount of food. Do you think this would happen? Explain your answer.

HE001586

No I don't think it would happen. Things don't grow just like that. Theirs probably a limit to the amount of growth it can have.

Level:
Complete (3)

16. Evita and Michael performed an experiment to test their hypothesis and found that the population of hydras <u>did</u> double in 5 days when they were fed twice the amount of food they would normally eat. Then they wondered if the population would double <u>in</u> <u>1</u> day if the hydras were fed <u>10</u> times the normal amount of food. Do you think this would happen? Explain your answer.

HE001586

No. They would get bigger because they would be recieving more food.

Level:
Unsatisfactory/Incorrect (1)

In this section, you will have 30 minutes to answer 16 questions. Mark your answers in your booklet. Fill in only one oval for each question or write your answer on the lines. Please think carefully about your answers. When you are writing your answers, be sure that your handwriting is clear.

Do not go past the **STOP** sign at the end of the section. If you finish before time is called, you should go over your work again.

PLEASE TURN THE PAGE AND BEGIN NOW.

1. A certain organism has many cells, each containing a nucleus. if the organism makes its own food, it would be classified as

   Ⓐ a bacterium

   Ⓑ a fungus

   Ⓒ a plant

   Ⓓ an animal   HE001824

2. If the locations of earthquakes over the past ten years were plotted on a world map, which of the following would be observed?

   Ⓐ Earthquakes occur with the same frequency everywhere on Earth.

   Ⓑ Earthquakes generally occur along the edges of tectonic plates.

   Ⓒ Earthquakes most frequently occur near the middle of continents.

   Ⓓ Earthquakes do not seem to occur in any consistent pattern.
                                                                          HE001852

3. Which of the following energy sources is the best example of a nonrenewable resource?

  Ⓐ Coal

  Ⓑ Wind

  Ⓒ Water

 Ⓓ Sunlight   HE001908

4. The two most common elements in the Earth's crust are

  Ⓐ oxygen and silicon

  Ⓑ oxygen and hydrogen

  Ⓒ carbon and iron

  Ⓓ carbon and sulfur   HE001848

GO ON TO THE NEXT PAGE

5. A space station is to be located between the Earth and the Moon at the place where the Earth's gravitational pull is equal to the Moon's gravitational pull. On the diagram below, circle the letter indicating the approximate location of the space station.

Earth

Moon

A   B   C
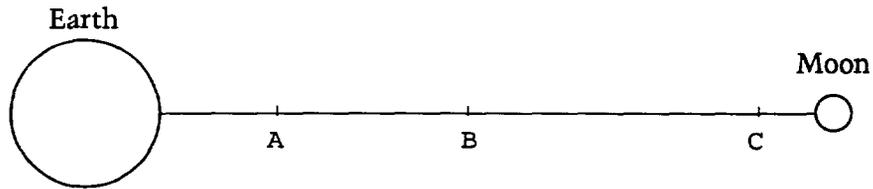
Explain your answer.   HE001703

_____

_____

_____

_____

_____

6. Many young people in their twenties have a significant hearing loss in the high-frequency range. Name one factor that contributes to this loss of hearing.

Name two ways people could prevent this loss of hearing.

VK000025

7. When operating, ordinary incandescent lightbulbs produce a lot of heat in addition to light. Fluorescent lightbulbs produce much less heat when operating.

If you wanted to conserve electricity, which type of bulb should you use?

_____

Explain your answer.   HE001905

_____

_____

_____

_____

8. Maria's house is near a stream. She wants to put her vegetable garden close to the edge of the stream.

Discuss one advantage and one disadvantage of putting the garden there.

Advantage:

_____

_____

_____

_____

Disadvantage: HE001944

_____

_____

_____

_____

_____

9. Mrs. Sanchez grows crops on her farm in a hilly region where soil erosion is a big problem. Which of the following would normally help most to protect the soil on her farm from eroding?

Ⓐ Rotating her crops on a yearly basis

Ⓑ Using contour plowing

Ⓒ Irrigating her crops more frequently

Ⓓ Using more chemical pesticides   VK000035

10. What does a mitochondrion do in a cell?

Ⓐ It controls the transport of substances leaving and entering the cell.

Ⓑ It contains the information to control the cell.

Ⓒ It produces a form of energy that the cell can use.

Ⓓ It breaks down waste products in the cell.   VK000034

GO ON TO THE NEXT PAGE

11. An insulated bottle keeps a cold liquid in the bottle cold by

  Ⓐ destroying any heat that enters the bottle

  Ⓑ keeping cold energy within the bottle

  Ⓒ trapping dissolved air in the liquid

  Ⓓ slowing the transfer of heat into the bottle   HE001728

12. According to current scientific theory, as the Solar System formed, matter in the solar nebula came together to form planets. The force most responsible for these formations was

  Ⓐ gravitational

  Ⓑ electrical

  Ⓒ magnetic

  Ⓓ nuclear   HE001699

13. A group of students took potato salad made with mayonnaise to a picnic on a very hot day. Explain how eating the potato salad could cause food poisoning.

_____

_____

_____

_____

_____

Describe something that could be done to the potato salad to prevent the people who eat it from getting food poisoning.   VK000021

_____

_____

_____

_____

_____

GO ON TO THE NEXT PAGE

14. When a population of mice is infected with parasites, many of the mice die from the parasitic infection, but some mice appear as healthy as they were before being infected. Some people are considering using these parasites to control the mouse population in people's homes.

Give one advantage and one disadvantage of using these parasites instead of mouse traps or poisons to limit the population of mice.

Advantage:

_____

_____

_____

_____

Disadvantage: HE001885

_____

_____

_____

_____

GO ON TO THE NEXT PAGE

Questions 15-16 refer to an experiment your teacher asks you to perform to compare the heating rate of soil with that of water. To do this, you are given the following materials.

     2 heat lamps
     2 bins
     2 thermometers
     1 sample of soil
     1 sample of water
     1 timer

You are instructed to heat a sample of soil and a sample of water with heat lamps, measuring the temperature of each sample once a minute for 8 minutes.

VK000027

15. There are many experimental variables that must be controlled for in order to perform this experiment accurately. Name three of these variables.

HE001751

_____

_____

_____

_____

_____

_____

16. Suppose that the experiment yielded the results shown in the table below.

Time (min)	0	1	2	3	4	5	6	7	8
Soil temp (°C)	20	21	22.5	24	26	27.5	29.5	30.5	32
Water temp (°C)	20	21.5	23	23.5	24	25.5	26	27.5	28.5

At a beach that has white sand, you measure the temperature of the sand and the temperature of the seawater at 9:00 a.m. You find that both have a temperature of 16°C. If it is clear and sunny all morning, what do the data from the experiment predict about the temperature of the white sand compared to the temperature of the seawater at noon?

_____

_____

_____

Explain your answer.

_____

_____

_____

_____

Explain why the prediction based on the data might be wrong. HE001752

_____

_____

_____

_____

STOP

INFORMATION ABOUT THE FRAME WORK CLASSIFICATION CODES AVAILABLE FOR EACH ITEM

Following this description of the classification codes, there is a single sheet with NAEP ID numbers, short descriptions of the items, item keys (1-4 if the item is multiple-choice; blank of the item is open-ended), as well as the mean p-values for the items in the released block.

The classification codes for each item can be viewed within each item in the scoring guide.

Field 1)   **Program profile:**
N27S NAEP, year 27 of Science

Field 2)   **Grade:**
1   Grade 4 only item
1/2   Grade 4/8 overlap itern
2   Grade 8 only item
2/3   Grade 8/12 overlap item
3   Grade 12 only item

Field 3)   **Field of science:**
PS   Physical Science
ES   Earth Science
LS   Life Science

Field 4)   **Field of science subcontent area:**
The letter corresponds to the subcontent areas described in the *Science Assessment and Exercise Specifications for the 1996 National Assessment of Edycational Progress.*

Physical Science
A   Matter and Its Trandormations
B   Energy and Its Trantionnations
C   Motion

Earth science
A   Solid Earth (lithosphere)
B   Water (hydrosphere)
C   Air (atmosphere)
D   Earth in space

Life Science:
A   Change and Evolution
B   Cells and Their Functions
C   Organisms
D   Ecology

Field 5)   **Ways of knowing and doing science:**
SI   Scientific Investigation
PR   Practical Reasoning
CU   Conceptual Understanding

Field 6)   **Theme**
                              SYS Systems
                              MOD Models
                              PC   Patterns of Change
                              NA   Not Applicable

Field 7)   **Nature of Science/technology:**
                              NS   Nature of Science
                              NT   Nature of Technology
                              NA   Not Applicable

Field 8)   **Item type:**
                              MC Multiple-choice
                              SCR Short Constructed-Response
                              ECR Extended Construoted-Response
                              NA Not Applicable

1996 Science Items

GRADE: 08   BLOCK: 27S20

ITEM	NAEP ID	SHORT DESCRIPTION	KEY	CONTENT	PROCESS	P-VALUE	RELEASE STATUS
1	K043701	CLASSIFICATIOON OF FOOD-MAKING ORGANISM MC	3	3	3	0.719	P
2	K043801	PATTERN/FREQUENCY OF EARTHQUAKES MC	2	2	3	0.597	P
3	K043901	EXAMPLE OF NONRENEWABLE RESOURCE MC	1	1	3	0.609	P
4	K044001	2 MOST COMMON ELEMENTS OF CRUST MC	1	2	3	0.090	P
5 A	K044101	LOCATION OF SPACE STATION OE		2	3	0.149	P
6 A	K044201	CAUSE/PREVENTION HEARING LOSS OE		1	2	0.535	P
7 A	K044301	EXPLAIN WHICH OF 2 BULBS MOST EFFICIENT OE		1	2	0.524	P
8 A	K044401	ADVANTAGE/DISADVANTAGE GARDEN BY STREAM OE		2	2	0.514	P
9	K044501	PROTECTION OF SOIL FROM EROSION MC	2	2	2	0.347	P
10	K044601	FUNCTION OF MITOCHONDRION MC	3	3	3	0.278	P
11	K044701	HOW INSULATED BOTTLE WORKS MC	4	1	3	0.305	P
12	K044801	FORCE RESPONSIBLE FOR SOLR SYSTEM FORMATION MC	1	2	3	0.594	P
13A	K044901	CAUSES/PREVENTION FOOD POISONING OE		3	2	0.399	P
14A	K045001	ADVANT/DISADVANT PARASITES TO CONTROL MICE OE		3	2	0.323	P
15A	K045101	SOIL/WATER HEATING RATE: NAME VARIABLES OE		1	1	0.216	P
16A	K045102	PREDICTION OF HEATING RATES FROM DATA OE		1	2	0.200	P

Content: 1 = Physical Sciences
2 = Earth & space sciences
3 = Life sciences

Process: 1 = Scientific investigation
2 = Practical reasoning
3 = Conceptual understanding

Item Number: 1 Accession Number: HE001824

Key: C

Classification Codes:
N27S   2   LS   A   CU   NA   NA   MC

Item Number: 2 Accession Number: HE001852

Key: B

Classification Codes:
N27S 2 ES A CU MOD NA MC

Item Number: 3 Accession Number: HE001908

Key: A

Classification Codes:
N27S   2   PS   B   CU   NA   NA   MC

Item Number: 4 Accession Number: HE001848

Key: A

Classification Codes:
N27S 2 ES A CU NA NA MC

Item Number: 5 Accession Number: HE001703

Key: NONE

Classification Codes:
N27S   2   ES   D   CU   MOD   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates ability to explain the role of gravity in a man-made satellite and relates the force of gravity to the mass (size) of the object pulling it.

3 = Complete - Student circles point C and gives a correct explanation that gravitational pull depends on mass and distance, thus the station must be closer to the Moon because the Moon's mass is less than that of the Earth.

2 = Partial - Student circles point C and explains that the moon has less gravity than the Earth but does not link it to mass.

1 = Unsatisfactory/Incorrect - Student circles A, B, or C and gives an incorrect explanation or no explanation.

Item Number: 6 Accession Number: VK000025

Key: NONE

Classification Codes:
  N27S   2   PS   C   PR   NA   NA   SCR

Rationale Text:

Scoring Guide:

Scoring Rationale: Student demonstrates an understanding of what could have contributed
to loss of hearing in the high frequency range and what can be done to prevent it.

3 = Complete - Student response demonstrates understanding of what can lead to loss of
hearing and names two ways people could prevent the loss.

2 = Partial - Student response demonstrates some understanding by naming one or two of
the required elements.

1 = Unsatisfactory/Incorrect - Student response demonstrates no understanding of the
cause of loss of hearing or preventative measures.

Note: Two references to turning down the volume is only counted as 1 action. Student
must give two different actions.

Credited responses include:

Noise exposure, such as loud concerts, playing stereos at high volume, or using earphones
with volume too high
Turn down the sound, set standards of acceptable noise levels and enforce them, wear
protective ear coverings during exposure, avoid noisy environments

Item Number: 7 Accession Number: HB001905

Key: NONE

Classification Codes:
N27S   2   PS   B   PR   NA   NT   SCR

Scoring Guide:

Scoring Rationale: Student can explain that fluorescent lightbulbs are more energy efficient than incandescent lightbulbs.

3 = Complete - Student response chooses fluorescent lightbulbs, and explains that heat energy comes from electrical energy and the less heat produced the more light you get for a given amount of electrical energy OR the less heat produced the less electricity you consume for a given amount of light. (Some link between heat and energy consumption must be made).

2 = Partial - Student response chooses fluorescent lightbulbs, but no or an incorrect explanation is given.

1 = Unsatisfactory/Incorrect - Student chooses incandescent lightbulbs or neither lightbulb with or without an explanation.

Item Number: 8 Accession Number: HE001944

Key: NONE

Classification Codes:
N27S   2   ES   B   PR   SYS   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates understanding of characteristics of a stream (river) by describing an advantage and a disadvantage of placing a garden close to a stream (river).

3 = Complete - Student response discusses one advantage and one disadvantage of placing a garden close to a stream.

2a = Partial - Student response discusses one advantage of placing a garden close to a stream.

2b = Partial - Student response discusses one disadvantage of placing a garden close to a stream.

1 = Unsatisfactory/Incorrect - Student response demonstrates no understanding of an advantage and disadvantage of placing a garden close to a stream.

Credited responses include:

Advantages: close to water for irrigation, fertile soil

Disadvantages: garden may flood, soil may erode, stream may attract wildlife that eats plants

Item Number: 9 Accession Number: VK000035

Key: B

Classification Codes:
N27S   2   ES   A   PR   NA   NA   MC

Item Number: 10 Accession Number: VK000034

Key: C

Classification Codes:
N27S   2   LS   B   CU   NA   NA   MC

Item Number: 11 Accession Number: HE001728

Key: D

Classification Codes:
N27S   2   PS   B   CU   NA   NA   MC

Item Number: 12 Accession Number: HE001699

Key: A

Classification Codes:
N27S   2   ES   D   CU   NA   NA   MC

Item Number: 13 Accession Number: VK000021

Key: NONE

Classification Codes:
N27S   2   LS   C   PR   NA   NA   SCR

Scoring Guide

Scoring Rationale: Student demonstrates understanding of how food poisoning can be caused by eating potato salad and what could be done to the potato salad to prevent it from causing food poisoning.

3 = Complete - Student response explains the cause of food poisoning and describes a method of preventing it.

2a = Partial - Student response explains the cause of food poisoning.

2b = Partial - Student response describes a method of preventing food poisoning, that is more than just keeping hot air out. Students need to say "cold" or insulated container.

1 = Unsatisfactory/Incorrect - Student response neither explains the cause of food poisoning nor describes a method of preventing it.

Credited responses include:

Bacteria/Salmonella growing in the salad release a poison/toxin that causes food poisoning (inflammation of the gastrointestinal tract). Slowing the growth of bacteria by refrigeration would help. Irradiation would destroy the bacteria.

Bacteria will grow is accepted as a cause.
"Germs" are accepted as a cause.
Keep food cold, cooler, or in insulated container is acceptable for preventative measure.

Item Number: 14 Accession Number: HE001885

Key: NONE

Classification Codes:
N27S   2   LS   A   PR   NA   NT   SCR

Scoring Guide

Scoring Rationale: Student demonstrates understanding of an advantage and a disadvantage of using parasites to control the mouse population in people's homes.

3 = Complete - Student response demonstrates understanding of an advantage and a disadvantage of using parasites to control the mouse population in people's homes.

2 = Partial - Student response demonstrates understanding of an advantage or a disadvantage of using parasites to control the mouse population in people's homes.

1 = Unsatisfactory/Incorrect - Student response demonstrates no understanding of the advantages and disadvantages of using parasites to control the mouse population in people's homes.

Credited responses include:

Advantages: mice will spread it to other mice; cheaper; more specific and directed than a trap or poison

Disadvantages: some mice are resistant; resistant mice will be selected for; the parasites may infect pets or people.

Item Number: NONE Accession Number: VK000027

Key: NONE

Classification Codes:
N27S 2 PS B SI MOD NS NA

Item Number: 15 Accession Number: HE001751

Key: NONE

Classification Codes:
N27S 2 PS B SI MOD NS ECR

Scoring Guide:

Scoring Rationale: Student demonstrates an understanding of the nature of science investigation as it relates to a model of the effect of oceans on climate.

4 = Complete - Student response provides three reasonable experimental variables to control from the list below.

3 = Essential - Student response provides two reasonable experimental variables to control from the list below.

2 = Partial b- Student response provides one reasonable experimental variable to control from the list below.

1 = Unsatisfactory/Incorrect - Student response provides no reasonable experimental variables that need to be controlled.

Credited responses include:

Samples: equal volume or equal amounts, size; adequate separation or insulation from each other; same starting temperatures

Bins: same size, shape, color, capacity

Heat lamp: equal wattage, voltage, power; equal distance from the sample

Thermometer: bulb placed equal distance under the surface; bulb placed in similar position in the sample relative to the heat lamp; temperatures measured at the same time

External factors: no external sources of heat or cooling, have identical surroundings (same room temperature), do experiments at same time (simultaneously).

Item Number: 16 Accession Number: HE001752

Key: NONE

Classification Codes:
N27S   2   PS   B   PR   MOD   NS   ECR

Scoring Guide

Scoring Rationale: Student demonstrates an ability to predict what the temperature of the sand and water will be at noon and explains why. The student will also be able to explain why the prediction may be incorrect.

4 = Complete - Student response provides a reasonable prediction and is able to explain the answer. Response also provides a reasonable explanation as to why the given prediction may be wrong.

3 = Essential - Student response provides a reasonable prediction and either an explanation of the prediction or an explanation of why the prediction may be wrong.

2 = Partial - Student response provides a reasonable prediction.

1 = Unsatisfactory/Incorrect - Student response provides no reasonable prediction or explanations.

Credited responses include:

Prediction: The sand will be hotter at noon than the water

Explanation: The soil temperature in the experiment was higher than the water temperature after 8 minutes. The heating rates of soil and water are different.

The explanation must refer to the experiment and therefore must refer "to the "soil" in addition to the "sand", cannot be derived from outside information for credit.

Problem: Difference in size of samples; difference in color of samples; difference in length of time; difference in source of heat; different types of samples (soil vs. sand , ocean water vs. fresh water)

5. A space station is to be located between the Earth and the Moon at the-place where the Earth's gravitational pull is equal to the Moon's gravitational pull. On the diagram below, circle the letter indicating the approximate location of the space station.

Earth

Moon

A   B   C
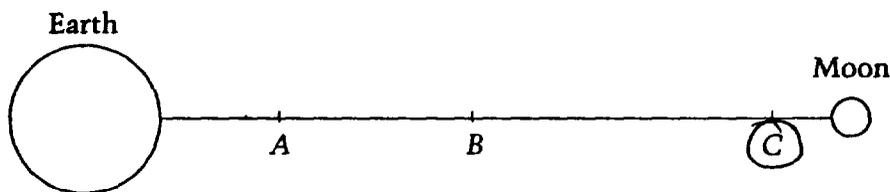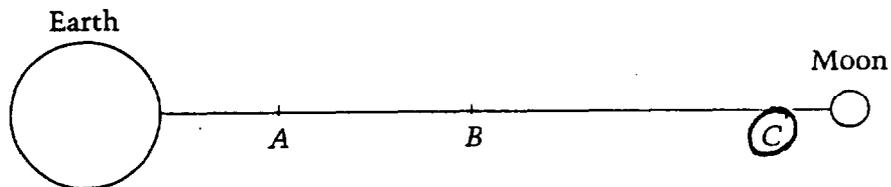
Explain your answer.   HE001703

Point C because the earth
has a stronger gravitational
pull because of its size
so the station would have to
located nearer to the moon to
equal pulls

Level:
Complete (3)

5. A space station is to be located between the Earth and the Moon at the place where the Earth's gravitational pull is equal to the Moon's gravitational pull. On the diagram below, circle the letter indicating the approximate location of the space station.

Earth

Moon

A   B   C

Explain your answer.   HE001703

The Earth has a greater gravitational pull then the moon so it needs to be closer to the moon.

Level:
Partial (2)

5. A space station is to be located between the Earth and the Moon at the place where the Earth's gravitational pull is equal to the Moon's gravitational pull. On the diagram below, circle the letter indicating the approximate location of the space station.

Earth

Moon

A   B   C
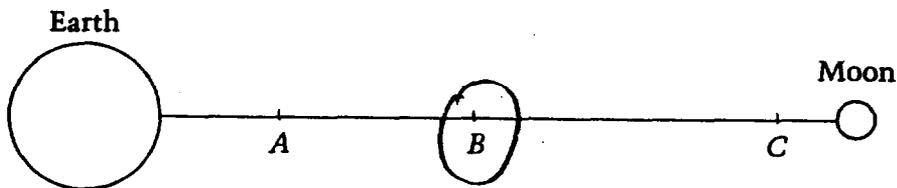
Explain your answer.   HE001703

It would be Wight in the middle due to gravitational forces

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

6. Many young people in their twenties have a significant hearing loss in the high-frequency range. Name one factor that contributes to this loss of hearing.

loud music

Name two ways people could prevent this loss of hearing.

They could turn music down to a lower level of sound waves.
They could wear ear plugs if at a rock concert.

Level:
Complete (3)

6. Many young people in their twenties have a significant hearing loss in the high-frequeney range. Name one factor that contributes to this loss of hearing.

loud music

Name two ways people could prevent this loss of hearing.

Be careful about sounds around you. Wear ear plugs!

Level:
Partial (2)

Student Sample Responses

6. Many young people in their twenties have a significant hearing loss in the high-frequency range. Name one factor that contributes to this loss of hearing.

old age

Name two ways people could prevent this loss of hearing.

VK000025

two ways the can prevent it from happening would be to more active at thier age, and to stay healthey

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

7. When operating, ordinary incandescent lightbulbs produce a lot of heat in addition to light. Fluorescent lightbulbs produce much less heat when operating.

If you wanted to conserve electricity, which type of bulb should you use?

Flourescent

Explain your answer.   HE001905

If flourescent lights are cooler that means they use less electricity to opperate.

Level:
Complete (3)

7. When operating, ordinary incandescent lightbulbs produce a lot of heat in addition to light. Fluorescent lightbulbs produce much less heat when operating.

If you wanted to conserve electricity, which type of bulb should you use?

Fluorescent lightbulbs.

Explain your answer.   HE001905

Cause it produce less heat.

Level:
Partial (2)

7. When operating, ordinary incandescent lightbulbs produce a lot of heat in addition to light. Fluorescent lightbulbs produce much less heat when operating.

If you wanted to conserve electricity, which type of bulb should you use?

A bulb that don't take up that much electricty.

Explain your answer.

HE001905

Beoasue a bulb that tke up electricity it cost to much for your bills to just about.

Level:
Unsatisfactory/Incorrect (1)

8. Maria's house is near a stream. She wants to put her vegetable garden close to the edge of the stream.

Discuss one advantage and one disadvantage of putting the garden there.

Advantage:

A stream brings fertile soil called silt. Plants grow very well in fertile soil.

Disadvantage: HE001944

During a storm the stream could flood and ruin the entire garden.

Level:
Complete (3)

8. Maria's house is near a stream. She wants to put her vegetable garden close to the edge of the stream.

Discuss one advantage and one disadvantage of putting the garden there.

Advantage:

The insects that feed off of vegetables hang around the stream, therefore the insects will enhance the vegetables for better growth.

Disadvantage: HE001944

If there was a really hard rain + the stream flooded, her garden would also flood, therefore causing all her vegetables to die.

Level:
Partial (2)

Student Sample Responses

8. Maria's house is near a stream. She wants to put her vegetable garden close to the edge of the stream.

Discuss one advantage and one disadvantage of putting the garden there.

Advantage:

Because it may have more space.

Disadvantage: HE001944

You wouldn't want to put it at the edge of the stream because something terrible might happen.

Level:
Unsatisfactory/Incorrect (1)

Student Sample Responses

13. A group of students took potato salad made with mayonnaise to a picnic on a very hot day. Explain how eating the potato salad could cause food poisoning.

Since it is a hot day, the potato salad needs to be kept cold, especially with mayonnaise, because the longer you leave it in the sun, more bacteria grows on it.

Describe something that could be done to the potato salad to prevent the people who eat it from

you could bring a cooler filled with ice and bring several small containers filled with potato salad, that way the salad would cool down faster.

Level:
Complete (3)

13. A group of students took potato salad made with mayonnaise to a picnic on a very hot day. Explain how eating the potato salad could cause food poisoning.

The potato salad can cause food poisoning is the potato salad can be ruining by - it being a hot day.

Describe something that could be done to the potato salad to prevent the people who eat it from getting food poisoning.

VK000021

it can be in a Cool area or bring a Cooler and wrap something over it and when you get ready to to eat just take it out.

Level:
Partial (2)

13. A group of students took potato salad made with mayonnaise to a picnic on a very hot day. Explain how eating the potato salad could cause food poisoning.

because it is a vesgetable and never no what it might have in it

Describe something that could be done to the potato salad to prevent the people who eat it from getting food poisoning.   VK000021

checking the potato be for makeing the salad

Level:
Unsatisfactory/Incorrect   (1)

14. When a population of mice is infected with parasites, many of the mice die from the parasitic infection, but some mice appear as healthy as they were before being infected. Some people are considering using these parasites to control the mouse population in people's homes.

Give one advantage and one disadvantage of using these parasites instead of mouse traps or poisons to limit the population of mice.

Advantage:

The infection could spread to all the mice and kill them faster than the other methods like the mouse trap and poision.

Disadvantage: HE001885

The mice could soon become immuned the the infection and not harm them at all and so the infection would be useless.

Level:
Complete (3)

14. When a population of mice is infected with parasites, many of the mice die from the parasitic infection, but some mice appear as healthy as they were before being infected. Some people are considering using these parasites to control the mouse population in people's homes.

Give one advantage and one disadvantage of using these parasites instead of mouse traps or poisons to limit the population of mice.

Advantage:

It could kill most of the mice.

Disadvantage: HE001885

Some mice are immune to it and all of them will produce more mice that are also immune to it.

Level:
Partial (2)

14. When a population of mice is infected with parasites, many of the mice die from the parasitic infection, but some mice appear as healthy as they were before being infected. Some people are considering using these parasites to control the mouse population in people's homes.

Give one advantage and one disadvantage of using these parasites instead of mouse traps or poisons to limit the population of mice.

Advantage:

You wouldn't have mice in your house.

Disadvantage: HE001885

If a mouse still stays healthy, it could still be living in your house

Level:
Unsatisfactory/Incorrect (1)

15. There are many experimental variables that must be controlled for in order to perform this experiment accurately. Name three of these variables.   HE001751

1. the heat lamps need to be the same temp.
2. you need to start timing at the same time
3. using the same amount of soil as water

Level:
Complete (4)

15. There are many experimental variables that must be controlled for in order to perform this experiment accurately. Name three of these variables.   HE001751

Both at room temp when started.
Same amount of each

Level:
Essential (3)

15. There are many experimental variables that must be controlled for in order to perform this experiment accurately. Name three of these variables.

HE001751

I must have the same amount of water; each time; make sure I check it every minute on the min prompt.

Level:
Partial (2)

15. There are many experimental variables that must be controlled for in order to perform this experiment accurately. Name three of these variables.

HE001751

You must heat the soil and water with heat lamps, You must mesure the tempture every minute for 8 minutes, You must have the right supplies to complete this

Level:
Unsatisfactory/Incorrect (1)

16. Suppose that the experiment yielded the results shown in the table below.

Time (min)	0	1	2	3	4	5	6	7	8
Soil temp (°C)	20	21	22.5	24	26	27.5	29.5	30.5	32
Water temp (°C)	20	21.5	23	23.5	24	25.5	26	27.5	28.5

At a beach that has white sand, you measure the temperature of the sand and the temperature of the seawater at 9:00 a.m. You find that both have a temperature of 16°C. If it is clear and sunny all morning, what do the data born the experiment predict about the temperature of the white sand compared to the temperature of the seawater at noon?

the sand will be hotter.

Explain your answer.

You can tell from the experiment that the soil is getting hotter faster than the water - So I believe the same thing will happen at the beach.

Explain why the prediction based on the data might be wrong. HE001752

because there are other factor to consider such as the ocean is constantly moving and the ocean has salt in it and the ocean is heated by the sun and not a lamp.

Level:

Complete (4)

16. Suppose that the experiment yielded the results shown in the table below.

Time (min)	0	1	2	3	4	5	6	7	8
Soil temp (°C)	20	21	22.5	24	26	27.5	29.5	30.5	32
Water temp (°C)	20	21.5	23	23.5	24	25.5	26	27.5	28.5

At a beach that has white sand, you measure the temperature of the sand and the temperature of the seawater at 9:00 a.m. You find that both have a temperature of 16°C. If it is clear and sunny all morning,a what do the data from the experiment predict about the temperature of the white sand compared to the temperature of the seawater at noon?

The sand will be hotter than the seawater at noon.

Explain your answer.

In the experiment the soil ended up getting hotter than the water. This information can be transferred to the sand & seawater.

Explain why the prediction based on the data might be wrong. HE001752

Some of the experimental variables may not have been performed correctly.

Level:
Essential (3)

16. Suppose that the experiment yielded the results shown in the table below.

Time (min)	0	1	2	3	4	5	6	7	8
Soil temp (°C)	20	21	22.5	24	26	27.5	29.5	30.5	32
Water temp (°C)	20	21.5	23	23.5	24	25.5	26	27.5	28.5

At a beach that has white sand, you measure the temperature of the sand and the temperature of the seawater at 9:00 a.m. You find that both have a temperature of 16°C. If it is clear and sunny all morning, what do the data from the experiment predict about the temperature of the white sand compared to the temperature of the seawater at noon?

White sands will be hotter than the water.

Explain your answer.

White sand attracts more heat than water usually.

Explain why the prediction based on the data might be wrong. HE001752

The water could be in a place where the tempature is higher.

Level:
Partial (2)

16. Suppose that the experiment yielded the results shown in the table below.

Time (min)	0	1	2	3	4	5	6	7	8
Soil temp (°C)	20	21	22.5	24	26	27.5	29.5	30.5	32
Water temp (°C)	20	21.5	23	23.5	24	25.5	26	27.5	28.5

At a beach that has white sand, you measure the temperature of the sand and the temperature of the seawater at 9:00 a.m. You find that both have a temperature of 16°C. If it is clear and sunny all morning, what do the data from the experiment predict about the temperature of the white sand compared to the temperature of the seawater at noon?

It will be hot in the after noon and cold in the moring.

Explain your answer.

If it's cold in the moring than it will or might be hot in the afternoon.

Explain why the prediction based on the data might be wrong. HE001752

because it might be both or right.

Level:
Unsatisfactory/Incorrect (1)