Work Sample & Commentary: *Snails*
Middle School Science

The task[131]

Students were asked to design and conduct an experiment to determine how snails react to changes in their environment. The task included writing a report that describes the procedure, the outcome, and students' conclusions.

Circumstances of performance

This sample of student work was produced under the following conditions:

	alone	√	in a group
√	in class	√	as homework
√	with teacher feedback	√	with peer feedback
	timed	√	opportunity for revision

This work sample illustrates a standard-setting performance for the following parts of the standards: [132]

S2c Life Sciences Concepts: Regulation and behavior.

S4a Scientific Connections and Applications: Big ideas and unifying concepts.

S5f Scientific Thinking: Work individually and in teams.

S7e Scientific Communication: Communicate in a form suited to the purpose and audience.

What the work shows

S2c Life Sciences Concepts: The student produces evidence that demonstrates understanding of regulation and behavior, such as senses and behavior, and response to environmental stimuli.

(A) (B) The student demonstrates an understanding of a response to an environmental stimulus by describing several observations of snail locomotion in response to a light source; and by making inferences based on those observations. While the inferences include some incorrect terminology (e.g., "tentacles"), it is clear that the student understands that the snail's actions were responses to the light.

S4a Scientific Connections and Applications: The student produces evidence that demonstrates understanding of big ideas and unifying concepts, such as…cause and effect.

(C) The conclusion uses the concept of cause and effect to explain why the snails in the experiment moved towards the light and away from the darkness.

S5f Scientific Thinking: The student works individually and in teams to collect and share information and ideas.

(D) Throughout the report, use of the plural "we" indicates that the student worked within a team to collect data and share information and ideas.

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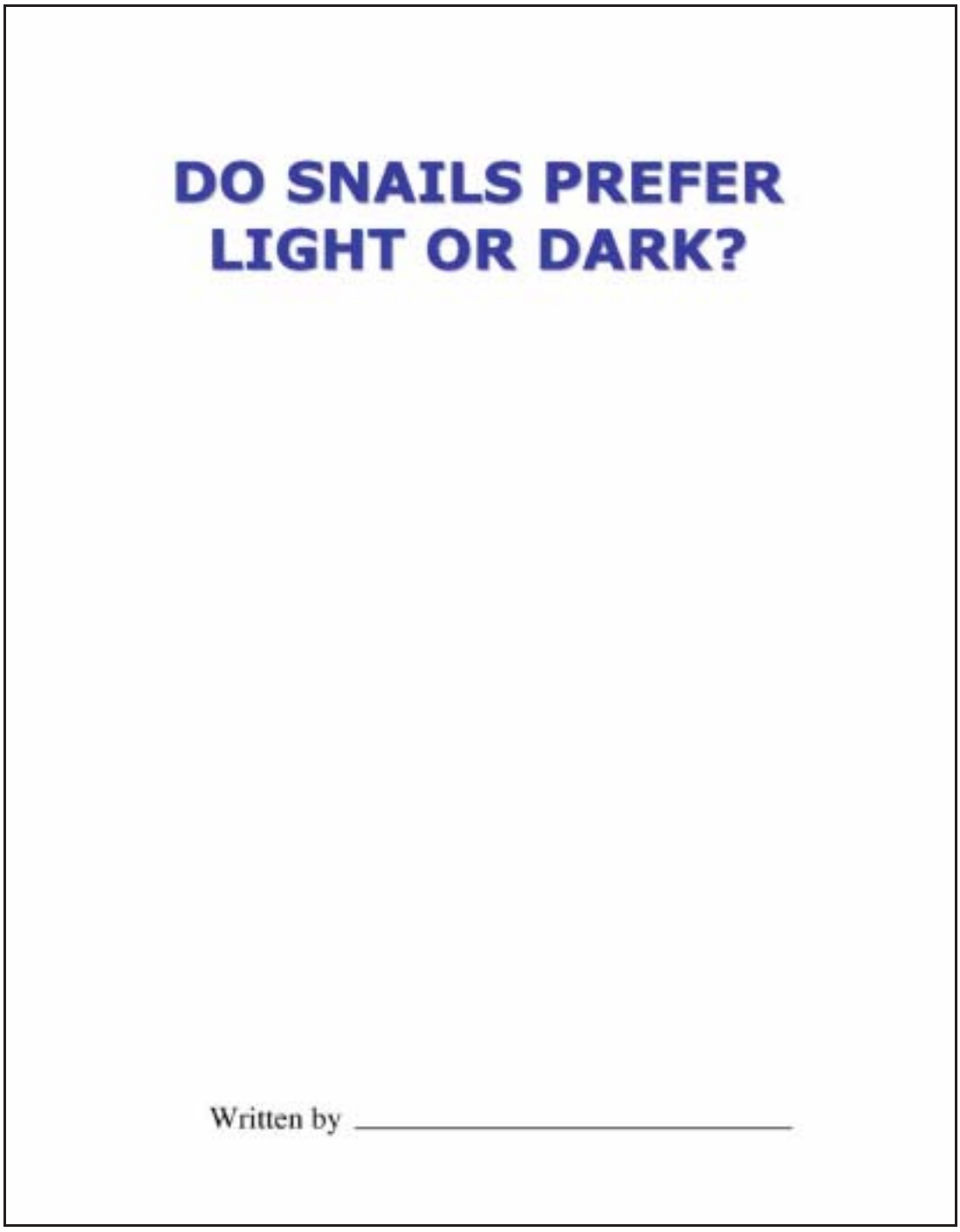
[131] For related work on Response to Environment, see "Bean Farmers", page 81, "Water Tolerance", page 98, "Toasted Bread", page 111, and "Endocrine Feedback", page 449.

[132] The quotations from the Science performance descriptions in this commentary are excerpted. The complete performance descriptions are shown on pages 152-187.

S7e Scientific Communication: The student communicates in a form suited to the purpose and audience, such as by writing instructions that others can follow.

(E) The student's written procedure indicates the ability to communicate the experimental design in detail.

(F) The written procedure is supported by a diagram that clarifies the construction of the apparatus.



Do Snails Prefer Light or Dark Better

Investigative question: Do snails prefer light better or dark better?

D **Hypothesis:** We think that the snails will prefer the dark better since the light may blind them.

Materials:

Box
Scissors
Marker
Ruler
Flashlight
Divider (Card Board)
Snail

Procedure:

E First get a regular sized box and divide it in half so that from a bird's view you can see two squares. Color one side white and one side black. Then carefully with a scissors cut out a two- inch square hole on the side of the box right in the middle of one of the squares. Then do the same to the one next to it. Next make another hole on the back of the box the same way except do it only to the black side. Carefully with a maker mark a spot (one centimeter from the corner of the box.) Do the same with the other side. Place the flashlight in rest position on the white hole in the back without any coverings, and turn it on. Put one snail on the marked spot on the white side with the light on and watch from the plastic window. Wait two minutes and then take it out and measure the amount it went. Do the same thing with the other side where there is no light on. Compare the difference and you'll see which they prefer better with the movement they took.

Observations-

LIGHT-
When we first shinned the flashlight at the snail, the snail looked around stretching its four tentacles as wide as it could. Then as it got it adjusted to the light, and the snail began to move. Slowly the snail moved up coming almost out of his shell and then pulling the shell back into its body. We then thought, maybe if we moved the light away it would move faster, but instead the snail followed it and always went toward where the light would go. In total the snail's gooey trial in the light moved 6.3 inches.

A

DARK-
When we put the same snail into the dark side, we thought it would go a lot faster. Yet the results were totally different. When we lifted the box we saw that the snail went toward the side were there was more light and to our amazement the snail's trail only went 5.4 inches and seemed totally lost.

INFERENCE-
We can infer that the snail prefers the light better because of the fact that the snail moved more quickly and followed the light. Also the distance of trail showed us that the snail prefer the light. We think this happened because the snail's eyes are similar to ours. If we were to turn off the lights and go some where we would walk a distance but seem confuse and likely we will go to a place where there is more light and then stay in the darkness. In the light we would walk much faster and move along the bright side. Snails like us have eyes too but their eyes are much smaller and are inside the tip of the two larger tentacles. Where the snail can distinguish between light, dark and feel their way around.

B

CONCLUSION-
In conclusion the snails prefer the light better than the dark because the slimy trail left behind read 6.3inches for the light side and 5.4 inches for the dark side.

C

F

The task[133]

Before working on this task the teacher engaged the whole class in a series of discussions about genotype, phenotype, and dominant and recessive traits. The teacher then instructed the students to create a three column chart with the following column headings—*Characteristic*, *Dominant*, *Appearance* or *Phenotype*. Students filled in the first column with a given list of twelve human characteristics; the second column with the dominant phenotype for each characteristic; and they left the third column blank. The teacher then broke the class into groups with each group member receiving a copy of the chart. Each student then filled in the third column, recording his or her own phenotype as determined by the other members of the group. The class then created a large graph to organize the data recorded by each student. On the X axis students listed the twelve dominant phenotypes. On the Y axis the class indicated the number of students expressing each dominant trait. The students were instructed to discuss a series of questions about their results and to compose individual responses.

Circumstances of performance

This sample of student work was produced under the following conditions:

	alone	√	in a group
√	in class		as homework
√	with teacher feedback	√	with peer feedback
	timed	√	opportunity for revision

This work sample illustrates a standard-setting performance for the following parts of the standards: [134]

S2b Life Sciences Concepts: The role of genes and environment.

S5f Scientific Thinking: Collect and share information and ideas.

S7a Scientific Communication. Represent data and results in multiple ways.

What the work shows

S2b Life Sciences Concepts: The student produces evidence that demonstrates understanding of…the role of genes and environment on trait expression.

(A) The student observed, "Our traits are first determined by the genotype. We get this from our parents. The genes carry the traits. The mixture of genes partially determines what traits you get."

(B) The student correctly infers the role of the environment in the expression of a specific trait.

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[133] For related work on Reproduction, see "Butterflies", page 89, "DNA Models", page 433, and "DNA Concept Map", page 439.

[134] The quotations from the Science performance descriptions in this commentary are excerpted. The complete performance descriptions are shown on pages 152-187.

S5f Scientific Thinking: The student works individually and in teams to collect and share information and ideas.

(C) Throughout this task students worked together gathering and representing data and sharing data and ideas. The production of the written work demonstrates the students ability to use the shared data and ideas to produce an individual piece of work.

(D) (E) The student worked with other team members in gathering data for the table of personal characteristics, and contributed to the bar graph that displays the whole class's characteristics.

S7a Scientific Communication. The student represents data and results in multiple ways, such as numbers, tables, and graphs…and technical and creative writing.

(C) This evidence demonstrates the student's ability to explain results in narrative form.

(D) This evidence demonstrates the student's ability to represent data as a table.

(E) This evidence demonstrates the student's ability to represent data as a graph.

C

Science 12/11/98

The difference between phenotype and genotype is that you can see the phenotype and the genotype makes up the phenotype. Our traits are first determined by the genotype. We get this from our parents. The genes carry the traits. The mixture of genes partially determines what traits you get. A

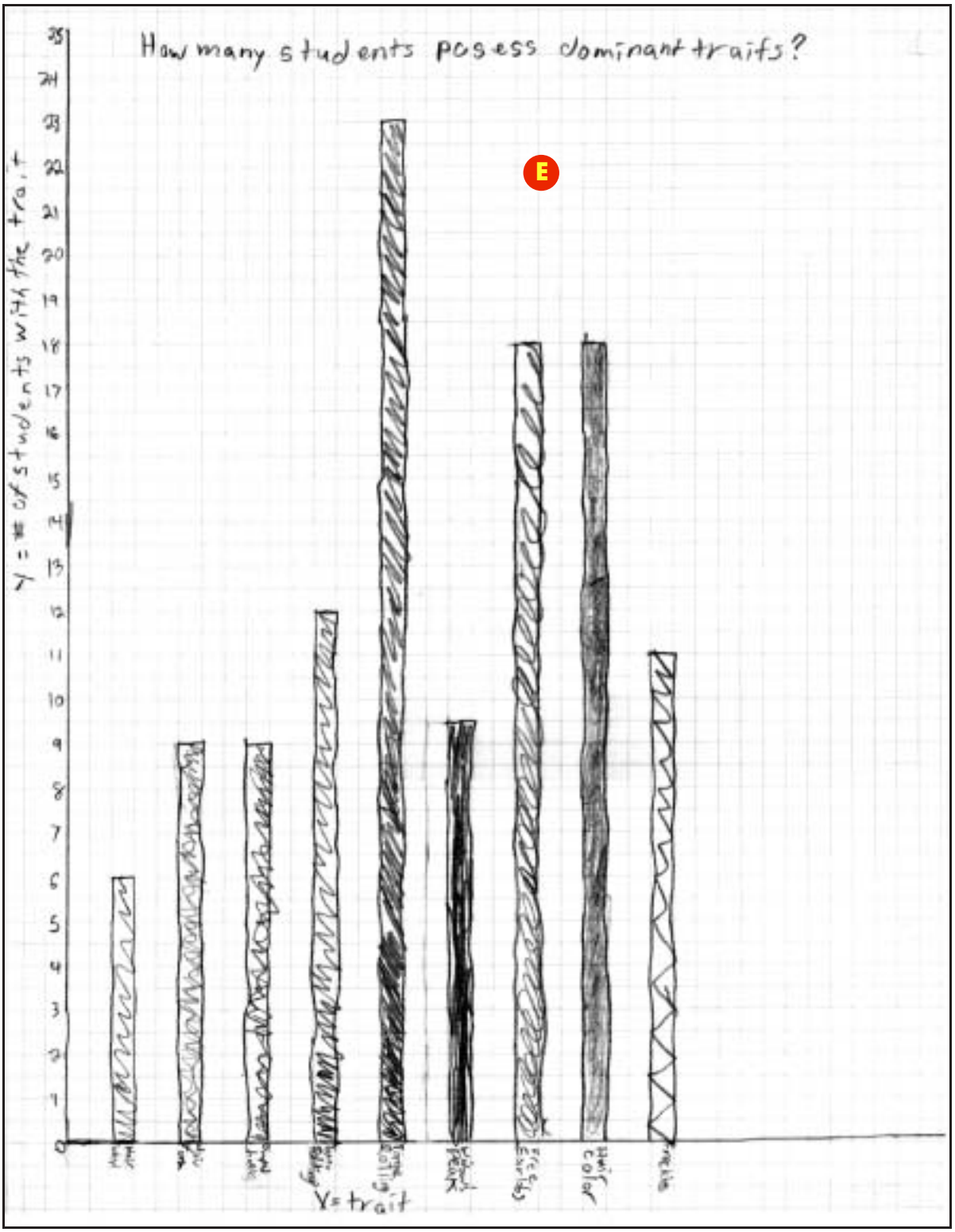
Tongue rolling, free earlobes and dark hair are the three most common traits in our class. Curly hair, dimples, and clockwise hair form are the least common. I think that the hair form wasn't tested correctly enough. One person out of 27 people had all of the dominant traits. One person out of 27 people had the least amount, with 3 out of 9 traits. We have different traits because we each have a different genetic make up.

I think the environment has an effect on our traits too. For example, freckles are affected by the environment. People who have freckles usually show them during the spring and summer. I think people with freckles live in environments where they have exposure to a lot of sun.

B I think that if people with the trait for freckles lived in a cold environment where it is cloudy and rains a lot, their freckles would not show as much. However, I think this type of environment would be more suitable for people with freckles, because they have spots of melanin in their skin instead of an even amount of melanin, which helps to protect the skin cells from damage due to exposure to the sun.

D

Characteristic	Dominant	Appearance or Phenotype
Hair Whorl	Clockwise	Clockwise
Hair Form	Curly	Curly
Dimpled Cheeks	Dimpled Cheeks	Dimpled Cheeks
Tongue folding	Folder	Folder
Tongue Rolling	Roller	Roller
Long Eyelashes	Long Lashes	Short Lashes
Widow's Peak	Present	Absent
Free Earlobes	Free Lobes	Free Lobes
Hair Color	Dark	Dark
Normal Vision (Not Color Blind)	Normal	Normal
Eyesight	Normal	Normal
Freckles	Freckles	Absent


How many students possess dominant traits?
E
Y = # of students with the trait
X = trait

Work Sample & Commentary: *Diffusion*
Middle School Science

The task

After a unit of study on cells, students were asked to demonstrate how diffusion occurs and write a report about their demonstrations.

Circumstances of performance

This sample of student work was produced under the following conditions:

	alone	√	in a group
√	in class		as homework
√	with teacher feedback		with peer feedback
	timed		opportunity for revision

The work was done in a group but written up individually.

This work sample illustrates a standard-setting performance for the following parts of the standards: [135]

S1a Physical Sciences Concepts: Properties and changes of properties in matter.

S2a Life Sciences Concepts: Structure and function of living systems.

S4a Scientific Connections and Applications: Big ideas and unifying concepts.

S5a Scientific Thinking: Frame questions; identify or control variables.

S5b Scientific Thinking: Use concepts from Science Standards 1 to 4.

S6a Scientific Tools and Technologies: Use technology and tools.

S7e Scientific Communication: Communicate in a form suited to the purpose and audience.

What the work shows

S1a Physical Sciences Properties: The student produces evidence that demonstrates understanding of properties and changes of properties in matter….

(A) (B) The student accurately describes the meaning of "semipermeable."

S2a Life Sciences Concepts: The student produces evidence that demonstrates understanding of structure and function of living systems, such as the complementary nature of structure and function in cells….

(A) (C) The student demonstrates conceptual understanding of the structure and diffusive function of cell membranes.

S4a Scientific Connections and Applications: The student produces evidence that demonstrates understanding of big ideas and unifying concepts, such as…cause and effect.

(D) The student correctly identifies an example of diffusion, ruling out gravity as an alternative cause of the observed phenomena.

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[135] The quotations from the Science performance descriptions in this commentary are excerpted. The complete performance descriptions are shown on pages 152-187.

S5a Scientific Thinking: The student frames questions to distinguish cause and effect; and identifies or controls variables in experimental and non-experimental research settings.

(B) The student identifies pore size as a variable.

(E) The student frames her results as a series of questions and answers.

S5b Scientific Thinking: The student uses concepts from Science Standards 1 to 4 to explain a variety of observations and phenomena.

(C) (D) The student applies elements of S1a and S2a in her discussion of the property of semipermeability and the process of diffusion.

S6a Scientific Tools and Technologies: The student uses technology and tools (such as traditional laboratory apparatus…) to observe and measure…phenomena directly….

(F) (G) The list of materials and the four parts of the procedure indicate that the student used traditional laboratory apparatus to observe the process of diffusion directly.

(H) (I) (J) (K) The student provides photographs of the laboratory set-ups.

S7e Scientific Communication: The student communicates in a form suited to the purpose and audience, such as by writing instructions that others can follow….

(G) The student demonstrates effective scientific communication by clearly outlining a procedure that other students could follow.

工作：我们如何证明扩散作用？

材料：食物色素、烧杯、试管、Lugol's液、淀粉、橡皮筋、全蜀区膜。

F 基础知识：物质通过细胞膜的扩散作用对生物的功能很重要。它说明消化了的食物和氧气如何进入细胞、废物如何离开细胞。

G 步骤：(A)液体中的扩散作用

1. 把食物色素滴入烧杯中的水。
2. 食物色素很快地向杯底盖四散开来
3. 整杯水未经搅拌，全部变红。

H

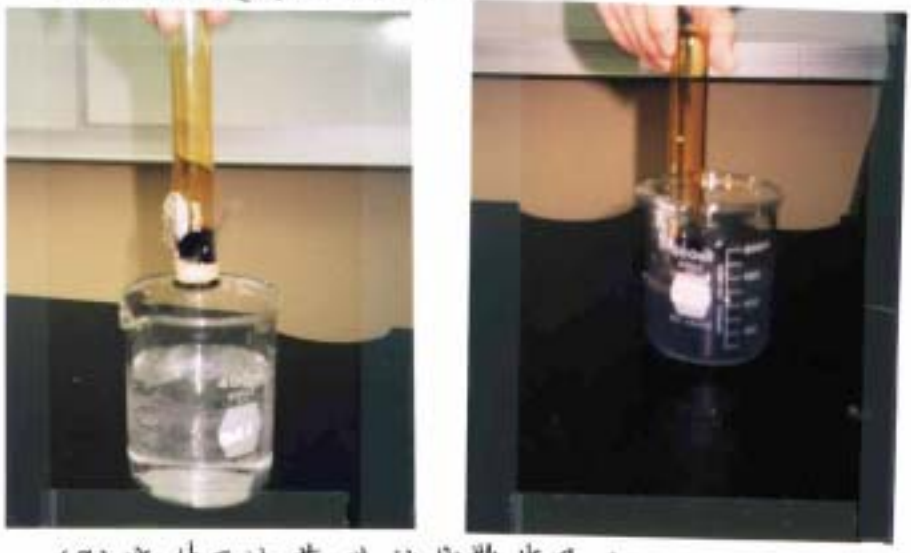
(B)液体通过薄膜的扩散作用(之一)

1. 用Lugol's液装满半个试管
2. 用橡皮筋把一片全蜀区膜把住试管口。
3. 管口朝下放入含淀粉是液的烧杯。

- 1 -

4. 用试管搅动澱粉液.
5. 澱粉变成深蓝色.

I



(a) 液体通过薄膜的扩散作用 之二.

1. 把实验例设备颠倒:
   试管放澱粉液.
   烧杯放 Lugol's 液.

J

2. 用倒放的试管搅拌
   碘液.
3. 澱粉变蓝.

-2-

(4) 气体通过薄膜的扩散作用

1. 用无色的酚酞浆滴半个试管.
2. 用橡皮筋把一片塑胶膜固在管口.
3. 管口朝下，放在滴开的氨水瓶上半小时候，试管壁试纸变红

K

E 讨论：(1) 金鱼肠膜代表细胞的那一部分？它是否半透性？如果在实验B中？何者可以透过？

A —— 金鱼肠膜代表细胞膜，它是半透性的，碘和氯可以通过.

(2) 如果膜上的小孔容许有些物质通过，它的大小如何？

B —— 膜上的孔比碘液和氨大，比淀粉和酚酞小.

(3) 从实验C中，我可得到什么结论？

-3-

D —— 实验C的装置刚好和B相反，但棉粉仍然变蓝。证明碘分子能扩散并明通过薄膜，而不是靠细胞的引力。

(4) 这个物质从高浓度到低浓度的过程叫什么？它如何在消化和循环作用中发挥作用？

C —— 叫扩散。小肠消化了的食物能扩散作用进入血液，又经血液进入全身的细胞，细胞产生的废物则扩散作用进入血液运到特定器官排出。

-4-

Translation

PROBLEM: How can we demonstrate diffusion?

BACKGROUND INFORMATION: Diffusion of substances through cell membranes is important to the functioning of living things. It explains how digested food and oxygen enter cells, and how wastes leave cells.

F

MATERIALS: food coloring, beakers, test tubes, iodine solution, starch, rubber band, goldbeater membrane

G

PROCEDURE:

(A) Diffusion in liquid

1. Add a drop of food coloring into the water in a beaker.
2. Allow the food coloring to settle to the bottom and then spread all over.
3. Wait until the whole beaker of water turns red without stirring.

(B) #1. Diffusion of molecules in liquid through a membrane

1. Fill a test tube half-full with Lugol's solution.
2. Use a rubber band to cover the mouth of the test tube with a piece of goldbeater membrane.
3. Place the test tube, mouth downward, into a beaker containing a suspension of starch and water.
4. Stir the starch mixture with the test tube.
5. Wait until the starch turns deep blue.

(C) #2. Diffusion of molecules in liquid through a membrane #2

1. Reverse the set-up in #1: Place starch in a test tube and Lugol's solution in a beaker.
2. Follow the same procedure as above.
3. Wait until the starch in the test tube turns blue.

(D) #3. Diffusion of molecules in gas through a membrane

1. Fill a test tube half-full with colorless phenophthalein
2. Use a rubber band to cover the mouth of the test tube with a piece of goldbeater membrane.
3. Place the test tube, mouth downward, on the mouth of a uncovered bottle of ammonia solution.
4. Wait until the phenophthalein solution in the test tube turns pink red.

E DISCUSSION:

1. Which part of an actual cell does the goldbeater membrane represent? Is it semi-permeable? Suppose in a situation specified in experiment #2, which substance would pass through the goldbeater membrane?

A • The goldbeater membrane represents the cell membrane. It is semipermeable and therefore both iodine and ammonia can pass through it.

2. If certain materials can pass through the goldbeater membrance, what could you determine about the size of the cell of that substance?

B • The pores in the goldbeater membrane are larger than iodine or ammonia, but smaller than starch or phenophthalein.

3. What conclusions can you draw in experiment #3?

D • The set-up in experiment #3 is the reverse of that in #2. Nonetheless, the starch still turns blue. This symbolizes that the iodine molecules pass through the goldbeater membrane by way of diffusion, not as a result of the functioning of gravitational force.

4. What name is given to the process in which substances move from areas of high concentration to areas of low concentration? How does the process function in life activities, such as digestion, transport, and excretion?

C • The process is called diffusion. The digested food in small intestine enters blood and then into body cells by diffusion. On the other hand, the wastes produced by the cells leave cells by entering blood and into excretory organs also by diffusion.

Work Sample & Commentary: *The Rock Cycle*
Middle School Science

The task

Students were asked to develop graphic models of the rock cycle as the culmination of six weeks of study. During those six weeks, classroom lessons and laboratory experiences were conducted to study the three major rock groups; and the class went on two field trips to observe rock formations and collect rocks. In developing their graphic models, students were asked to include any forces and processes that cause rocks to change.

Circumstances of performance

This sample of student work was produced under the following conditions:

	alone	√	in a group
√	in class		as homework
√	with teacher feedback		with peer feedback
	timed	√	opportunity for revision

This work sample illustrates a standard-setting performance for the following parts of the standards: [136]

S3a Earth Sciences Concepts: Structure of the Earth system.

S4a Scientific Connections and Applications: Big ideas and unifying concepts.

S5b Scientific Thinking: Use concepts from Science Standards 1 to 4.

S6d Scientific Tools and Technologies: Acquire information from multiple sources.

S7a Scientific Communication: Represent data and results in multiple ways.

What the work shows

S3a Earth Sciences Concepts: The student produces evidence that demonstrates understanding of structure of the Earth system, such as…rock cycles.

(A) The student shows a clear understanding of the cyclical relationship that exists between igneous, sedimentary and metamorphic rocks, and many of the forces that cause these changes.

S4a Scientific Connections and Applications: The student produces evidence that demonstrates understanding of big ideas and unifying concepts, such as…cause and effect.

(B) (C) (D) The student correctly shows that forces such as subduction, volcanic eruptions, etc. are cause agents for change in the rock cycle.

[136] The quotations from the Science performance descriptions in this commentary are excerpted. The complete performance descriptions are shown on pages 152-187.

S5b Scientific Thinking: The student uses concepts from Science Standards 1-4 to explain a variety of observations and phenomena.

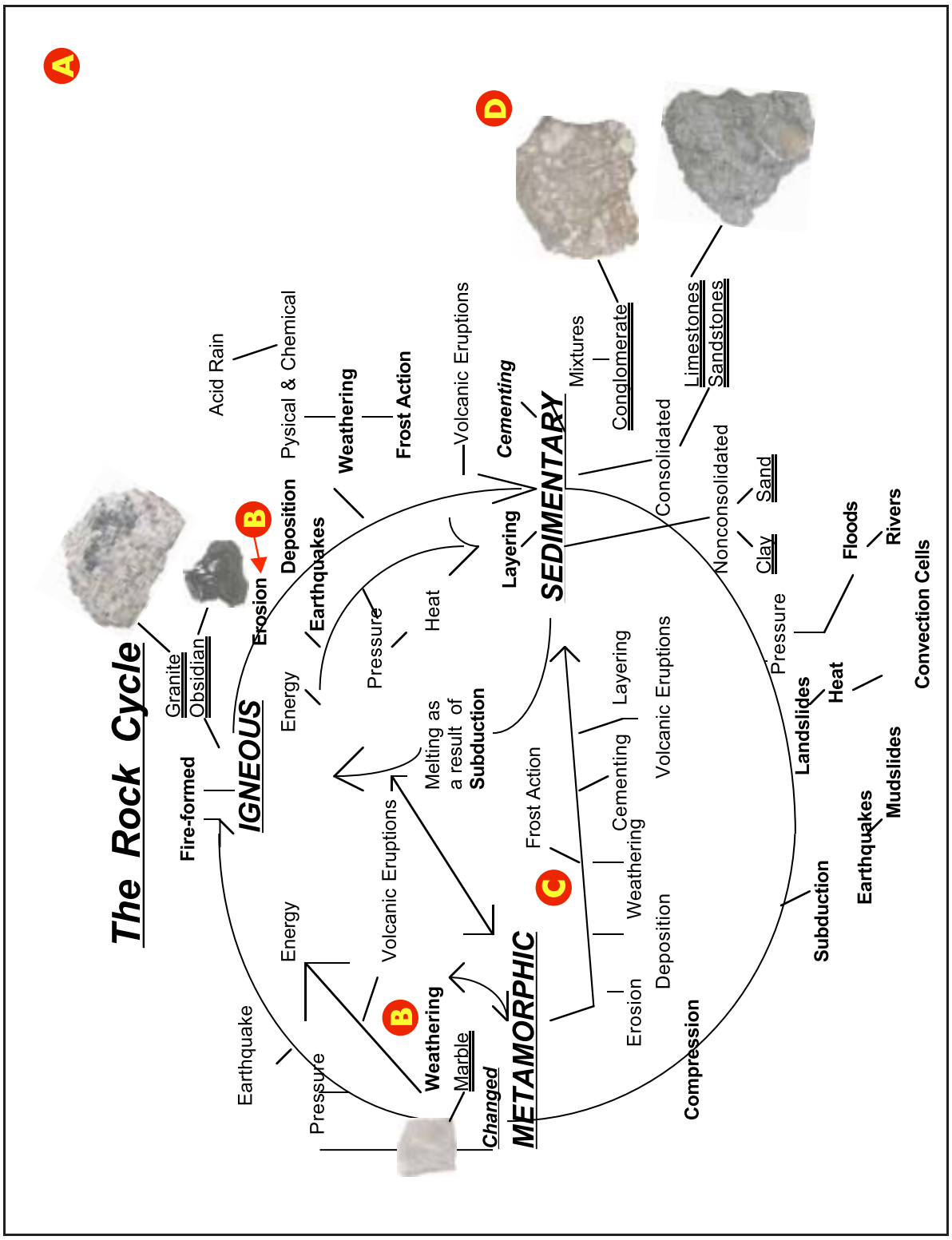
(B) (C) (D) The student uses the concept of Earth processes (Standard S3b) to explain how rocks change from one form to another. In a revision, the student should be asked to rethink the order of erosion and weathering in both places where these processes are noted.

S6d Scientific Tools and Technologies: The student acquires information from multiple sources, such as print, the Internet, computer data bases, and experimentation.

(A) Examples of the rocks were chosen by the student, using an internet web site: www.calvin.edu. The pictures were reduced on a photocopier to fit into the diagram.

S7a Scientific Communication: The student represents data and results in multiple ways, such as…tables…artwork.

(A) Student effectively blends a concept map and downloaded images to convey understanding of the rock cycle.


The Rock Cycle
A
Granite
Obsidian
Fire-formed
IGNEOUS
Erosion
B
Deposition
Earthquakes
Energy
Pressure
Heat
Melting as a result of Subduction
Volcanic Eruptions
Acid Rain
Pysical & Chemical
Weathering
Frost Action
Volcanic Eruptions
Cementing
Layering
SEDIMENTARY
D
Mixtures
Conglomerate
Consolidated
Limestones
Sandstones
Nonconsolidated
Clay
Sand
Pressure
Floods
Rivers
Heat
Landslides
Convection Cells
Subduction
Earthquakes
Mudslides
Compression
Erosion
Deposition
Weathering
Cementing
Layering
Volcanic Eruptions
Frost Action
C
Energy
Volcanic Eruptions
B
Weathering
Marble
Changed
METAMORPHIC
Earthquake
Pressure

The task[137]

After extensive study on river formation, students conducted a stream-table activity generated from the GEMS guide *River Cutters*, revised edition. Each student team was asked to design a stream-table experiment that would model the production of various land features shaped by running water.

Circumstances of performance

This sample of student work was produced under the following conditions:

√ alone	√ in a group
√ in class	as homework
√ with teacher feedback	with peer feedback
timed	√ opportunity for revision

This work sample illustrates a standard-setting performance for the following parts of the standards: [138]

S3b Earth Sciences Concepts: Earth's history.

S4a Scientific Connections and Applications: Big ideas and unifying concepts.

S5b Scientific Thinking: Use concepts from Science Standards 1 to 4.

S5f Scientific Thinking: Work individually and in teams.

S6a Scientific Tools and Technologies: Use technology and tools.

S6d Scientific Tools and Technologies: Acquire information from multiple sources.

S7a Scientific Communication: Represent data and results in multiple ways.

S8a Scientific Investigation: Controlled experiment.

What the work shows

S3b Earth Sciences Concepts: The student produces evidence that demonstrates understanding of Earth's history, such as earth processes including erosion and…change over time….

(A) The "Observations" section clearly demonstrates that the student understands that running water causes landforms such as V-shaped valleys and oxbow lakes.

(B) (C) (D) The three diagrams and their accompanying notes demonstrate that the student understands the progressive nature of landform-building. In D, the student notes, "This water session was a big success because the running time was longer. This happened because the longer water runs the greater the effect it can have on the earth."

(E) The student directly relates the formation of certain landforms to longer periods of time.

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[137] For related work on Erosion, see "Erosion", page 135.
[138] The quotations from the Science performance descriptions in this commentary are excerpted. The complete performance descriptions are shown on pages 152-187.

S4a Scientific Connections and Applications: The student produces evidence that demonstrates understanding of big ideas and unifying concepts, such as…cause and effect.

(A) The entire "Observations" section presents implicit cause and effect relationships. At (F), for example, the student relates the disappearance of the delta to the longer duration of water flow.

In the notes accompanying diagram (D), the statement "...the longer water runs, the greater the effect it can have on the earth..." is evidence that the student understands cause and effect.

S5b Scientific Thinking: The student uses concepts from Science Standards 1 to 4 to explain a variety of observations and phenomena.

(G) Throughout the conclusion, the student applies Science Standard S3b in concluding that water flowing over land causes the formation of geographical features.

S5f Scientific Thinking: The student works individually and in teams to collect and share information and ideas.

(H) The photographs show that the student worked as part of a team. The entire lab report, however, is an individual effort.

S6a Scientific Tools and Technologies: The student uses technology and tools (such as traditional laboratory equipment…) to observe and measure objects, organisms, and phenomena, directly, indirectly, and remotely.

(I) The student used various tools to conduct the investigation.

S6d Scientific Tools and Technologies: The student acquires information from multiple sources, such as print…and experimentation.

(I) The observations are first-hand information the student acquired from experimentation.

(J) The bibliography demonstrates that the student acquired information from print sources.

S7a Scientific Communication: The student represents data and results in multiple ways, such as numbers, tables, and graphs; drawings, diagrams, and artwork; and technical and creative writing.

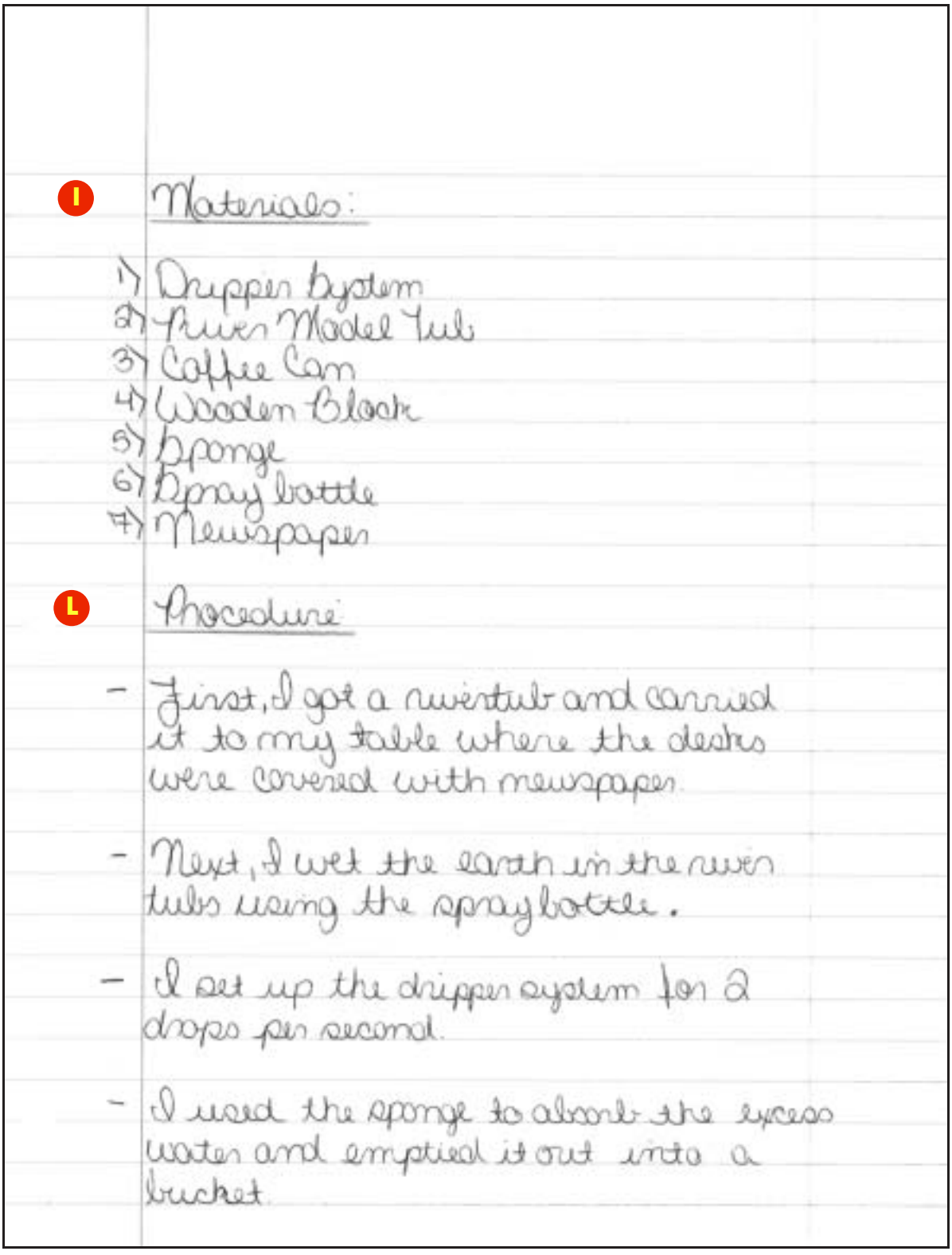
(B) (C) (D) The student represents data in diagrams accompanied by narrative writing.

(G) The conclusion presents data in narrative form.

(K) The student also represents data in table form.

S8a Scientific Investigation: The student demonstrates scientific competence by completing [a] controlled experiment.

(I) The student's procedure indicates that all conditions remained the same except one variable: duration of time.



I

Materials:

1) Dripper System
2) River Model Tub
3) Coffee Can
4) Wooden Block
5) Sponge
6) Spray bottle
7) Newspaper

L

Procedure:

- First, I got a rivertub and carried it to my table where the desks were covered with newspaper.
- Next, I wet the earth in the river tubs using the spray bottle.
- I set up the dripper system for 2 drops per second.
- I used the sponge to absorb the excess water and emptied it out into a bucket.

Procedure

- I put the coffee can on the side of the river tub and placed the Dripper System on top facing inside of the tub.

- I turned on the Dripper System for different time periods of five, five and ten minutes.

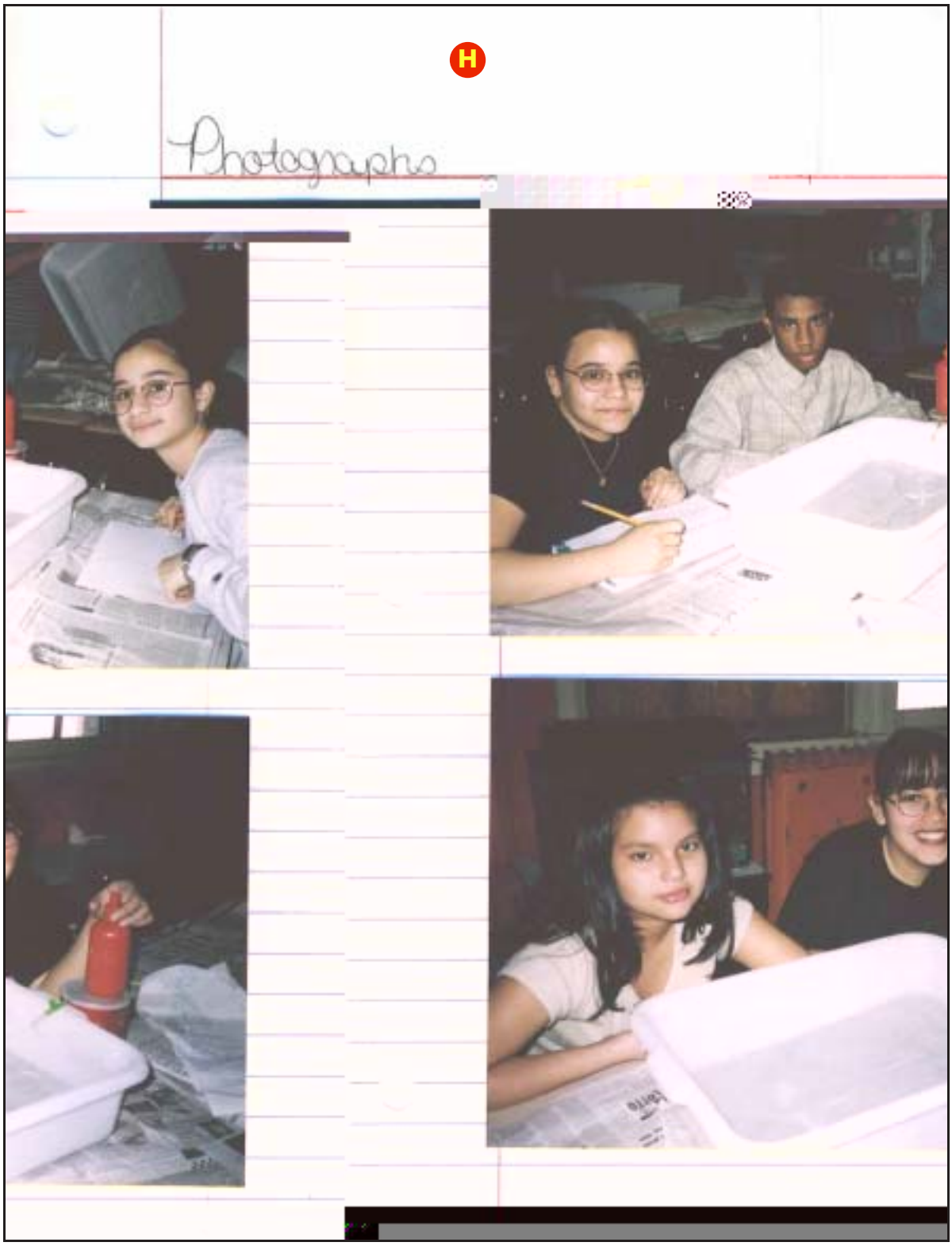
- I watched the river form and I wrote down what I observed for each time period.

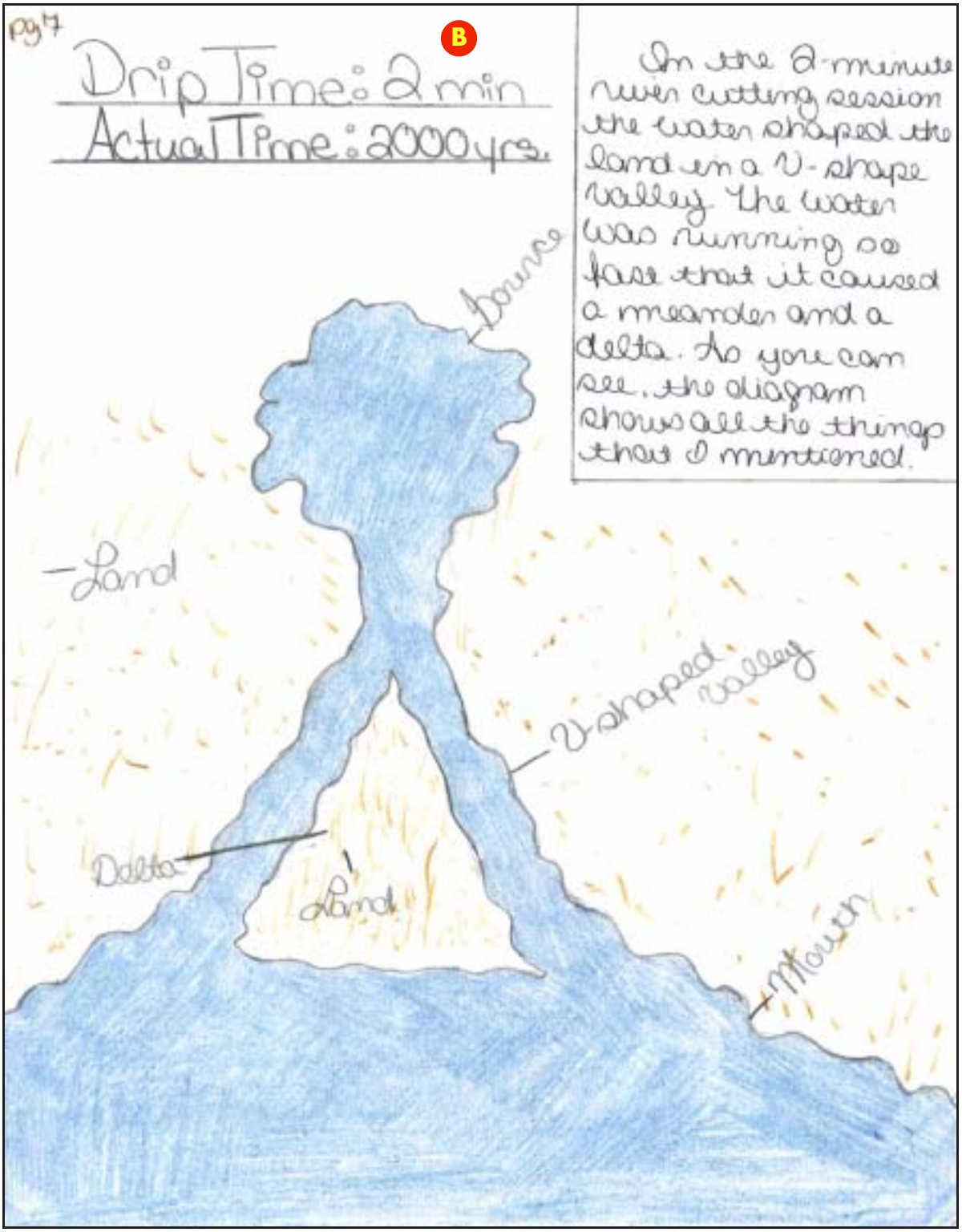
- I drew a diagram for each period of time and studied the model some more.

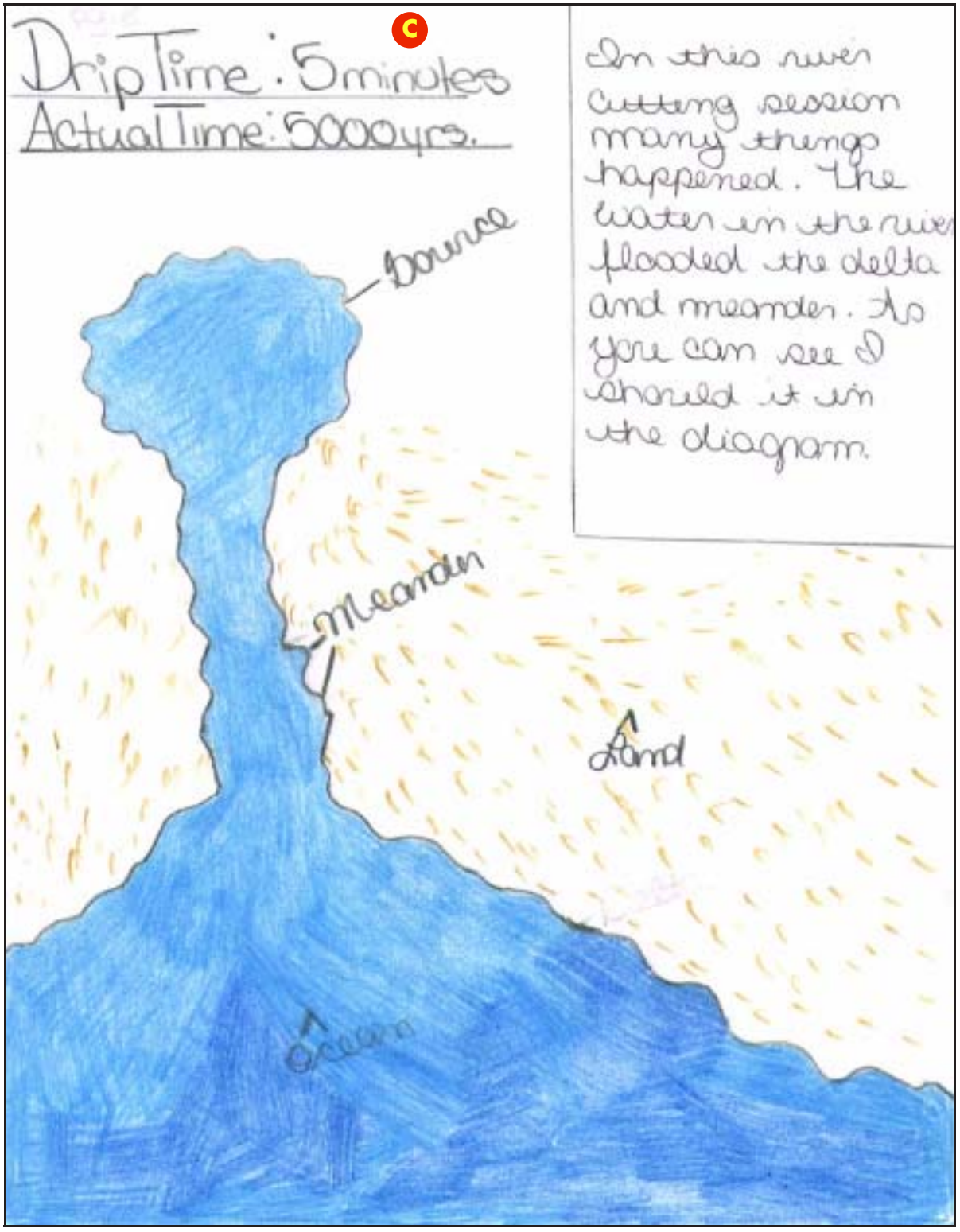
A

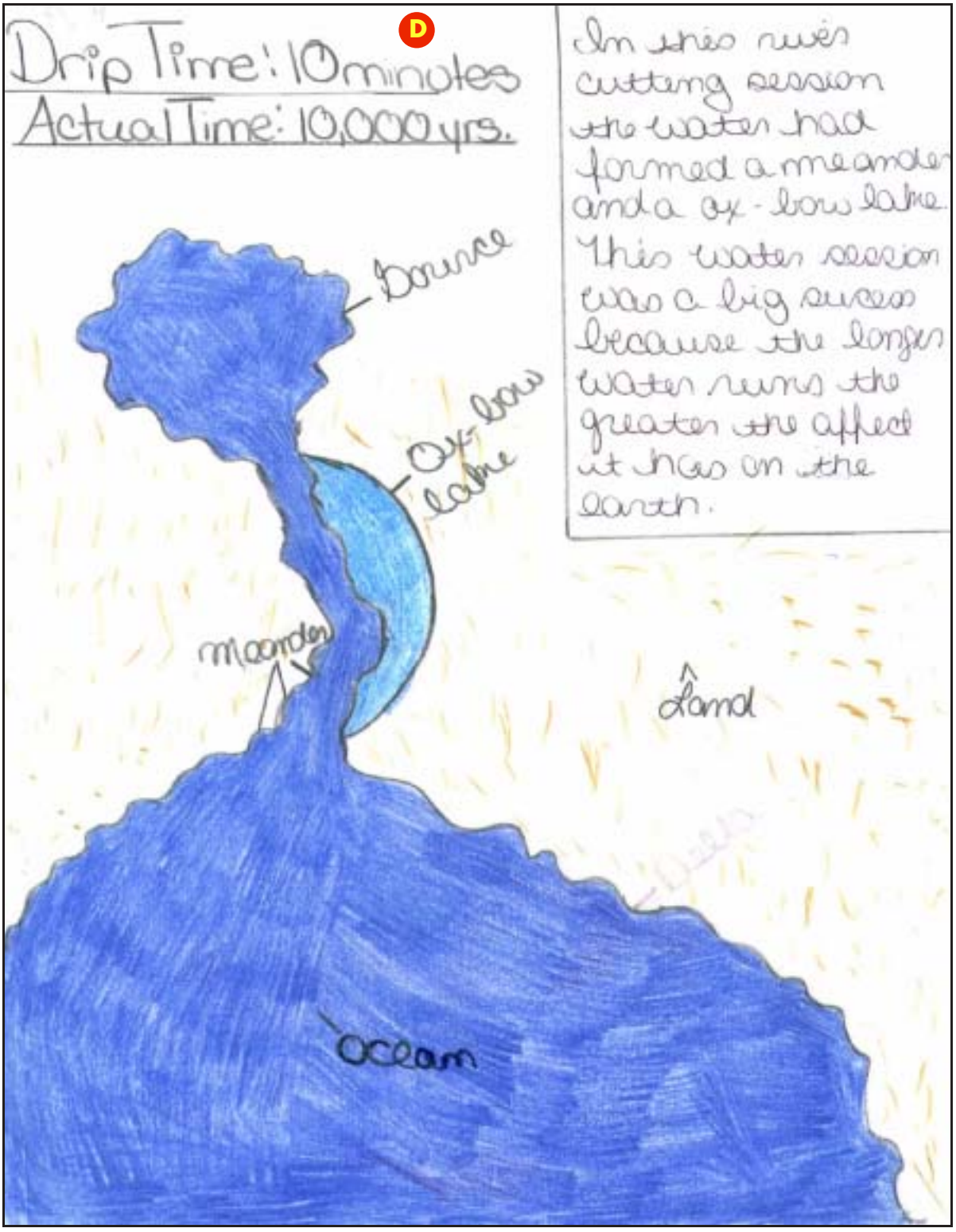
Observation.

- During the experiment, a river formed on the land. In my 5 minute river cutting session, two V-shaped valleys formed as well as a delta.
- During the 5-minute river cutting session, a straight river formed with a few meanders. The water also flooded the delta and it disappeared.
- During the 10 minute river cutting session, an ox-bow lake formed and many meanders. The river got curvy. That's what I observed during my river cutting sessions.
- When I was observing the river, I took notes, drew diagrams with labels and photographs. You can see all of this in my report.


H
Photographs


pg 7
B
Drip Time: 2 min
Actual Time: 2000 yrs.
In the 2-minute river cutting session the water shaped the land in a V-shape valley. The water was running so fast that it caused a meander and a delta. As you can see, the diagram shows all the things that I mentioned.
Source
Land
V-shaped valley
Delta
Land
Mountain


C
Drip Time: 5 minutes
Actual Time: 5000yrs.
In this river cutting session many things happened. The water in the river flooded the delta and meander. As you can see I shaded it in the diagram.
Source
Meander
Land
Ocean


D
Drip Time: 10 minutes
Actual Time: 10,000 yrs.
In this river cutting session the water had formed a meander and a ox-bow lake. This water session was a big success because the longer water runs the greater the affect it has on the earth.
Source
Ox-bow lake
Meander
Land
Ocean

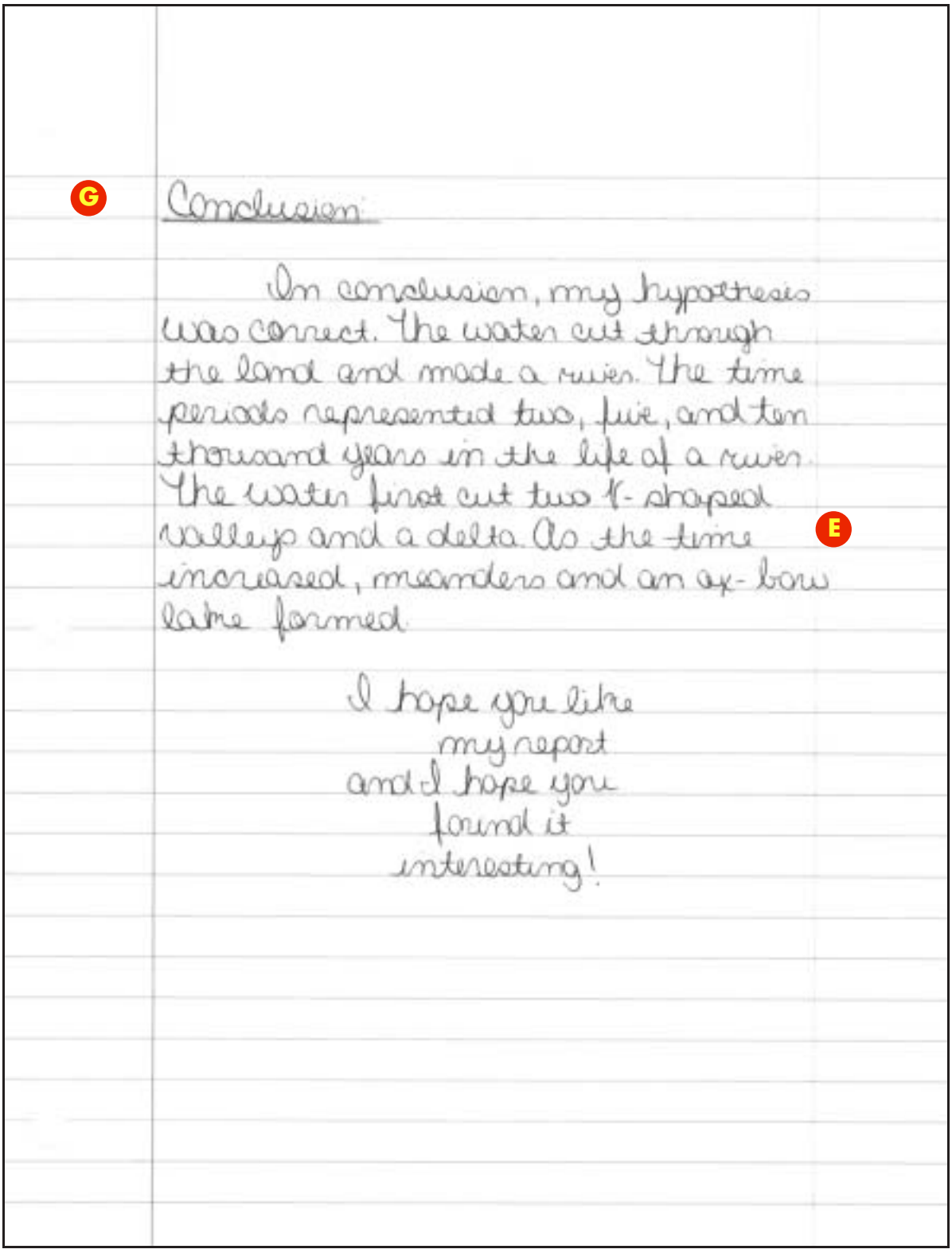
Observation Chart

K

How does water shape the land?

River Features	0	2	5	10
Source		X	X	X
V-shaped valley		X		
Delta		X	X	X
Mouth		X	X	X
Meander		X	X	X
Ox-bow lake				X

The X's indicate what happened during 0, 2, 5 and 10 minutes. Nothing happened during 0 minutes because the river cutting session just began.



G

Conclusion

In conclusion, my hypothesis was correct. The water cut through the land and made a river. The time periods represented two, five, and ten thousand years in the life of a river. The water first cut two V-shaped valleys and a delta. As the time increased, meanders and an ox-bow lake formed.

E

I hope you like
my report
and I hope you
found it
interesting!

Definitions:

1) Ox-bow river- A crescent-shaped lake formed from a curve or a meander of a river.

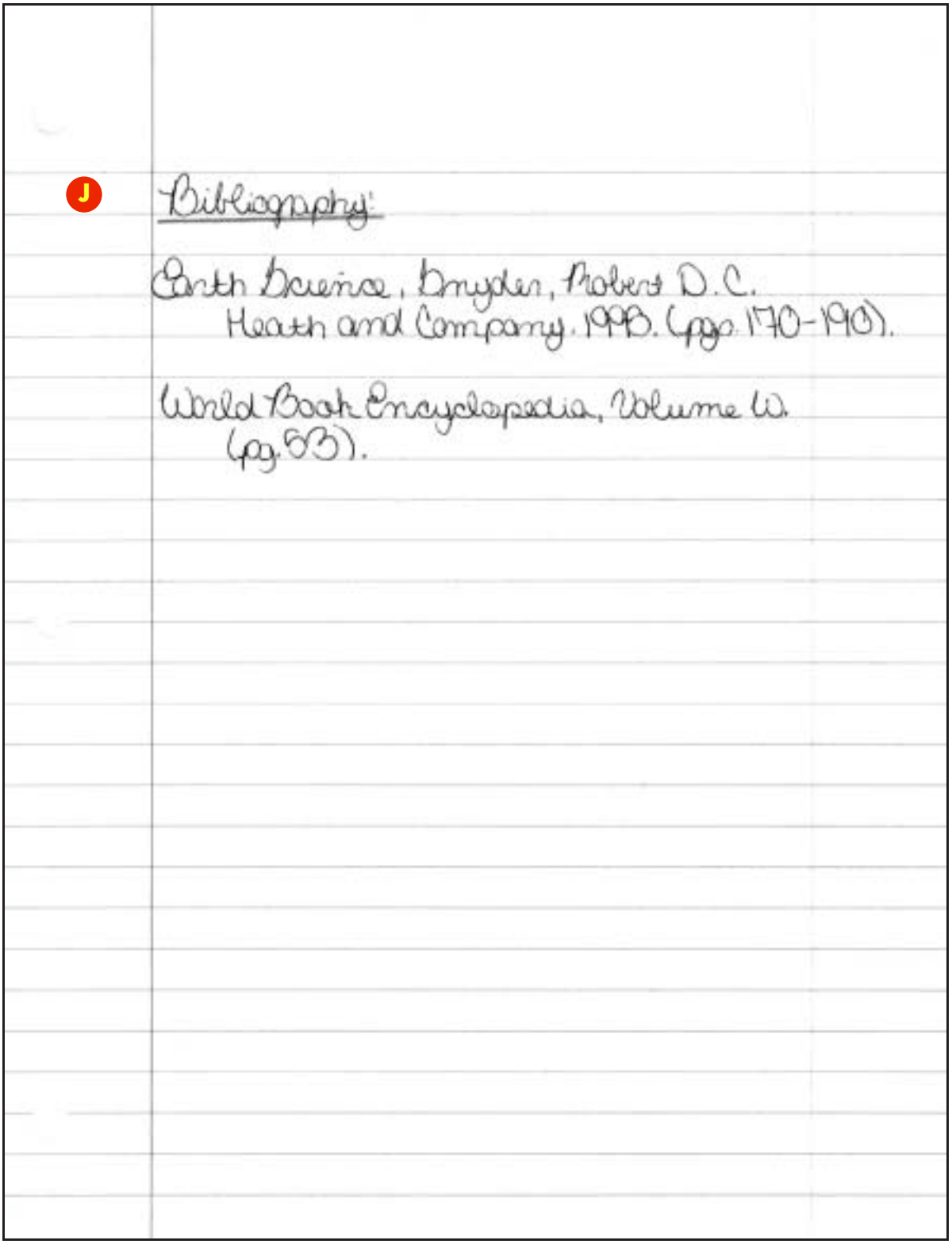
2) V-shaped valley- A valley with a "V" shaped profile, carved by a river.

3) Meander- A rounded or "c" shaped bend or loop usually seen in an "older" or "mature" river.

4) Delta- The deposit formed at the mouth of a stream or river as it enters another body of water, slows its flow rate, and drops its load of sediment.

5) Source- The beginning or origin of a stream or river.

6) Mouth- Part of a river where it flows into another body of water.


J
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(pg. 83).

Work Sample & Commentary: *Where in the World Am I?* Middle School Science

The task

Students were given the following scenario: "You step off a plane and suddenly realize that you took the wrong flight. You are in a strange country. Remembering your Earth science, you decide to figure out where you are by determining your longitude and latitude. In a narrative form, describe your situation and explain how you propose to find your location by determining your longitude and latitude."

Circumstances of performance

This sample of student work was produced under the following conditions:

√	alone		in a group
√	in class		as homework
√	with teacher feedback		with peer feedback
	timed	√	opportunity for revision

This work sample illustrates a standard-setting performance for the following parts of the standards:[139]

S3c Earth and Space Sciences Concepts: Earth and the solar system.

S4e Scientific Connections and Applications: Impact of science.

S5b Scientific Thinking: Use concepts from Science Standards 1 to 4.

S5e Scientific Thinking: Identify problems; propose and implement solutions; and evaluate the accuracy, design, and outcomes of investigations.

S7a Scientific Communication: Represent data and results in multiple ways.

What the work shows

S3c Earth and Space Sciences Concepts: The student produces evidence that demonstrates understanding of Earth and the solar system, such as the predictable motions of planets, moons, and other objects in the solar system….

(A) The student states that the Earth rotates from west to east, indicating that the student understands that the Earth's motion is regular and predictable.

S4e Scientific Connections and Applications: The student produces evidence that demonstrates understanding of the impact of science, such as…interactions between science and society.

(A) (B) (C) The student bases the work on an application of science facts and process skills used to solve a real-world, albeit imaginary, problem.

[139] The quotations from the Science performance descriptions in this commentary are excerpted. The complete performance descriptions are shown on pages 152-187.

S5b Scientific Thinking: The student uses concepts from Science Standards 1 to 4 to explain a variety of observations and phenomena.

(A) (B) The student uses concepts from S3c in describing a connection between the direction of Earth's rotation and time differences at different longitudes.

S5e Scientific Thinking: The student identifies problems; proposes and implements solutions; and evaluates the accuracy, design, and outcomes of investigations.

(D) The student identifies the problem.

(E) The student proposes a solution to the problem.

(F) The student considers a possible method for determining latitude, but knows that the method is not feasible.

(G) (H) The student describes how to use simple materials to build a device that can determine latitude.

(I) The student states that errors may occur during measuring, and that it would be necessary to repeat the procedure several times to obtain a more accurate mean measurement.

S7a Scientific Communication: The student represents data and results in multiple ways, such as…drawings, diagrams, and…technical and creative writing; and selects the most effective way to convey the scientific information.

(H) (J) (K) (L) (M) The student supports the narrative with diagrams and drawings.

(N) The narrative is essentially a work of creative writing that moves fluidly back and forth between the imaginary scenario and technical descriptions.

如何把自体在地图上的位置？

N 一下飞机就发现自己身处在英国的首都，伦敦。随着其它的观众一起参观了许多英国著名的地方，包括格林威治。而且在那买了一块已上的发条的手表。两天后我又登上了飞机，向下一个目的地出发。直到下了飞机才发现自己身处于一个陌生的地方。我迷路了。在语言不通，身无分文的情况下，我并没有慌张。我决定先找出自己的所在地，然后通知家人给予帮助。

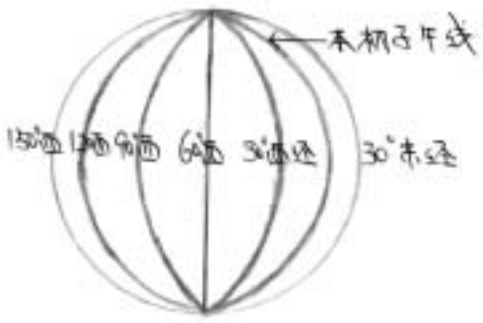
D

一个人在地图上的位置可由经、纬度来确定。经线是测量地球东西半球的线。伦敦的格林威治为起点，规作本初子午线。经度的单位是度，其最大的度数为180°。(见图一) 我找出当地的时间为上午9点时我在英国买的手表指着上午5点，表明当地与格林威治的时差为4个钟。跟据我在"地球科学"教室中学得的知识，

E

B 我把每一个钟与英国的时差代表了15°经度的不同。因此我的经度为15°乘4等于60°。

(图1)



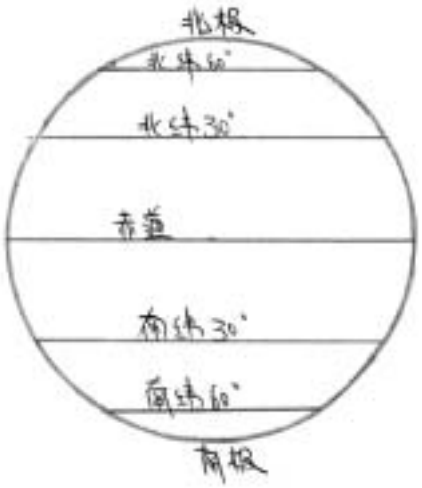
由于当地时间比格林威治早4个小时，再跟据地球向东转的事实，我可以知道我在东半球。但是只知道经度仍无法知道我在地球上的确实位置，我也必须知道我的纬度。

A

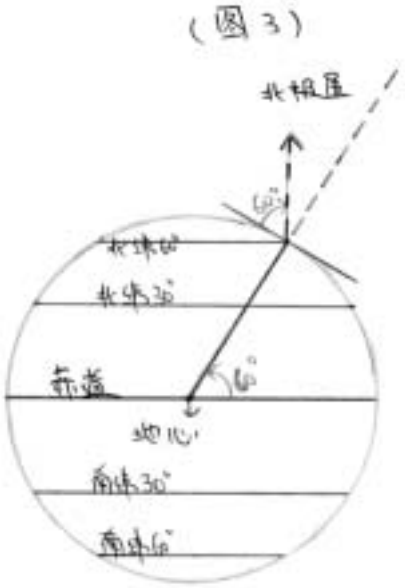
纬度是测量南北半球的线段，以赤道为起点，最大的度数为90°。(见图2) 北极为北纬90°，南极为南纬90°。纬度可以通过测量北极星的高度来确定。假设可以在地球的中心画一条直线到我的所在地，那么赤道与线段间的夹角就是我的纬度。(见图3) 可惜我无法在地球的中心画线，所以我只能测量北极星的高度来求我的纬度。

F

(图2)



K



L

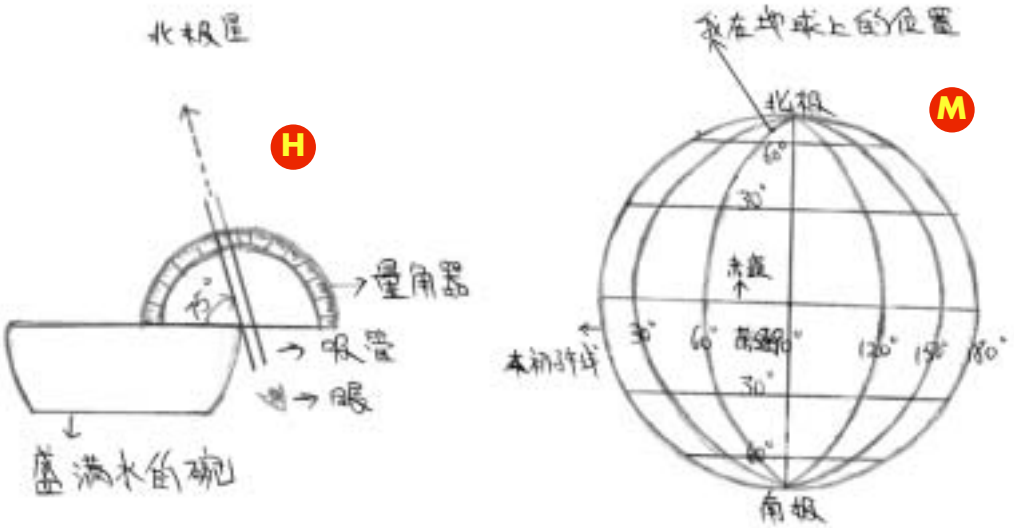
C 在北半球，北极星在水面上的高度等于观测北极星者的纬度。根据这一点我就可以测量出我的纬度。测量所需的材料包括吸管，碗，及一个量角器。到了晚上，我将盛满水的碗放在空地上的一张桌子上。首先我先确定可以在空地上看见北极星，然后将吸管贴在碗边，从吸管的下方往上看，通过小孔来找北极星。慢慢移动吸管直到找到北极星。（见图4）接住吸管不动，用量角器测量水面与吸管间的角度，那么夹角的度数就是我的纬度。在测量过程中，我们通常会有误差，所以我连续测量五次并取之平均值以减小误差。最后得到的度数约为75°。我的纬

G

I

度为北纬75° 因为我可以看见北极星。

(图A)



经过测量与计算，我在地球上的位置为东经60°，北纬75°。根据世界地图可以看见我在一个叫作 Novaya Zemlya 的地方。

我正得意在自己的成果时，听见有人唤我，一转身进入眼睛的是刺眼的灯泡与母亲的面庞。原来刚才所有的一切只不过是一场梦。然而从中我学得历史、数学、科学等学校要求的必修课看似无用其实却有着一定的重要性。而且学习这些科目也让我们变得更聪明因为它让我们有了更多思考的空间与分析的能力。

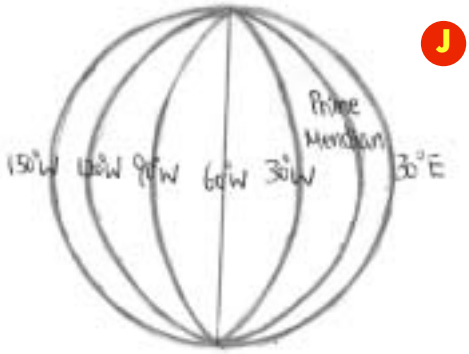
Translation

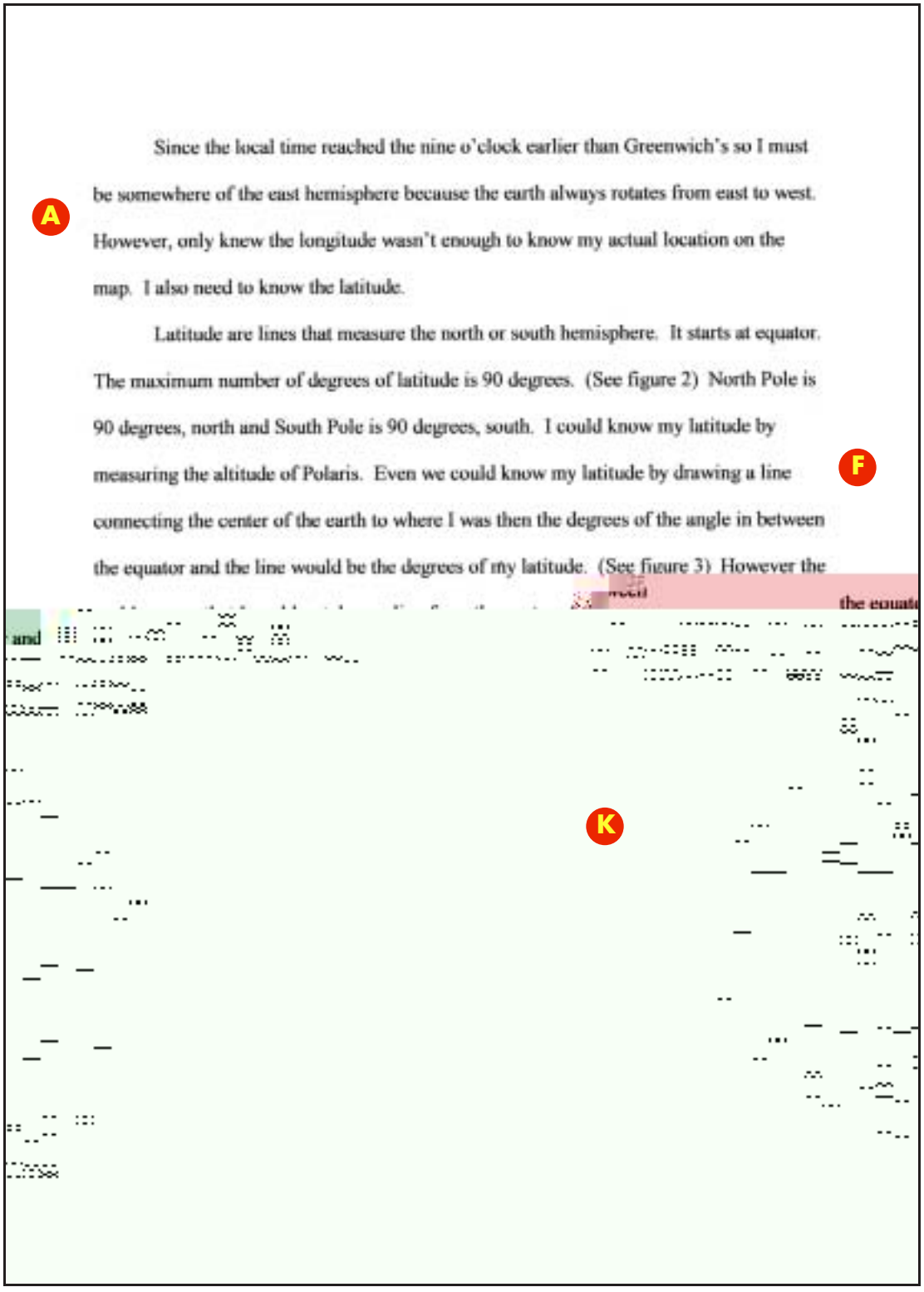
How Can You Find Your Location on the Map?

I was in the capital of England, London, when I got off from an airplane. With some tourists, I visited some famous places in England including Greenwich. There I bought a watch that was already set. After 2 days, I got on an airplane again to my next stop. I suddenly realized that I was in an unknown place when I got off from the airplane. I was lost. With the situation that I did not have much money and did not speak the language people speak there I faced, I did not get nervous. I decided to find out where I was first then ask people to come for help.

A person's location could be known through measuring the latitude and longitude. Longitude are lines that measure the east or west hemisphere. Longitude starts at Greenwich, London, and it is called Prime Meridian. The unit of longitude is degree and the maximum number of it is one hundred and eighty degrees. (See figure 1) I got to know that the local time was 9 a.m. when my watch which I bought from Greenwich was 5 a.m. It showed that the time difference between Greenwich and local was 4 hours. According to the knowledge I learned from the earth science's class, I know that per hour's difference between local time and London's represents 15 degrees difference of longitude comparing with London's. So my longitude was 15 degrees times 4 which is equal to 60 degrees.

(figure 1)





Since the local time reached the nine o'clock earlier than Greenwich's so I must be somewhere of the east hemisphere because the earth always rotates from east to west. However, only knew the longitude wasn't enough to know my actual location on the map. I also need to know the latitude.

Latitude are lines that measure the north or south hemisphere. It starts at equator. The maximum number of degrees of latitude is 90 degrees. (See figure 2) North Pole is 90 degrees, north and South Pole is 90 degrees, south. I could know my latitude by measuring the altitude of Polaris. Even we could know my latitude by drawing a line connecting the center of the earth to where I was then the degrees of the angle in between the equator and the line would be the degrees of my latitude. (See figure 3) However the