

The task⁵⁷

Students investigated the life cycle of butterflies by observing a live butterfly as it developed through its life cycle stages in a commercially prepared butterfly habitat; and by accessing information in reference materials. Students recorded their observations in journals and reported what they learned in writing and artwork.

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:⁵⁸

- S2a** Sciences Concepts: Characteristics of organisms.
- S2b** Life Sciences Concepts: Life cycles of organisms.
- S5c** Scientific Thinking: Use evidence from reliable sources.
- S6c** Scientific Tools and Technologies: Acquire information from multiple sources.
- S7a** Scientific Communication: Represent data and results in multiple ways.
- S8b** Scientific Investigation: Systematic observation.

What the work

S2b Life Sciences Concepts: The student produces evidence that demonstrates understanding of life cycles of organisms,...that all plants and animals have life cycles.

(A) (B) The student provides evidence of understanding of the butterfly’s life cycle by keeping a narrative journal of observations and by making a diagram that illustrates the four stages of the life cycle, three of which were personally observed.

(C) (D) The student summarized information about butterfly life cycles from reference sources in narrative form and in a diagram.

⁵⁷ For related work on Reproduction, see “It’s All in the Genes”, page 249, “DNA Models”, page 433, and “DNA Concept Map”, page 439.

⁵⁸ The quotations from the Science performance descriptions in this commentary are excerpted. The complete performance descriptions are shown on pages 22-53.

Work Sample & Commentary: *Butterflies*

Elementary School Science

S2a Life Sciences Concepts: The student produces evidence that demonstrates understanding of characteristics of organisms, such as...the relationship between structure and function.

(E) (F) The student relates the structure of a butterfly's probe to its function of getting nectar. This relationship is described in both written form and in an illustration.

S5c Scientific Thinking: The student uses evidence from reliable sources.

(A) (B) The student reports from personal observations.

(G) The student's bibliography lists several references used in developing the report.

S6c Scientific Tools and Technologies: The student acquires information from multiple sources, such as experimentation and print and non-print sources.

(G) The student's bibliography lists references, both print and software, used in developing the report.

S7a Scientific Tools and Technologies: The student uses tools...to gather data.

The student presents data in narrative form

((A), (C), (E)) accompanied by diagrams ((B), (D)) and artwork ((F)).

S8b Scientific Investigation: The student demonstrates scientific competence by completing...a systematic observation....

(A) (B) The student's observations of a closed habitat were made systematically over a period of weeks. During this time, the student recorded observations of three of the stages of development of a butterfly, and used reference materials to find out about the unobserved stage.

The Stages of A Butterfly

A Butterflies pass through four stages in their life cycle. The first stage is the egg. Adult females lay eggs on the kind of plant their young will eat as food. The eggs hatch into worm-like looking creatures known as larvae. The name for the larvae of butterflies is caterpillar. Caterpillars are busy and hungry. They may eat more than their weight in leaves each day. That is the second stage.

After several days of feeding, they get so big their skin and the skin splits open and the caterpillar crawls out of the dead skin.

In the third stage the caterpillar goes into a resting stage called pupa.

Some caterpillars rest in cocoons, which they make by spinning thread from their mouths.

The pupa does nothing except rest. This stage may last 2 weeks; it may last a whole winter. During this period the caterpillar changes into a full-grown butterfly. These are the four stages of a butterfly.

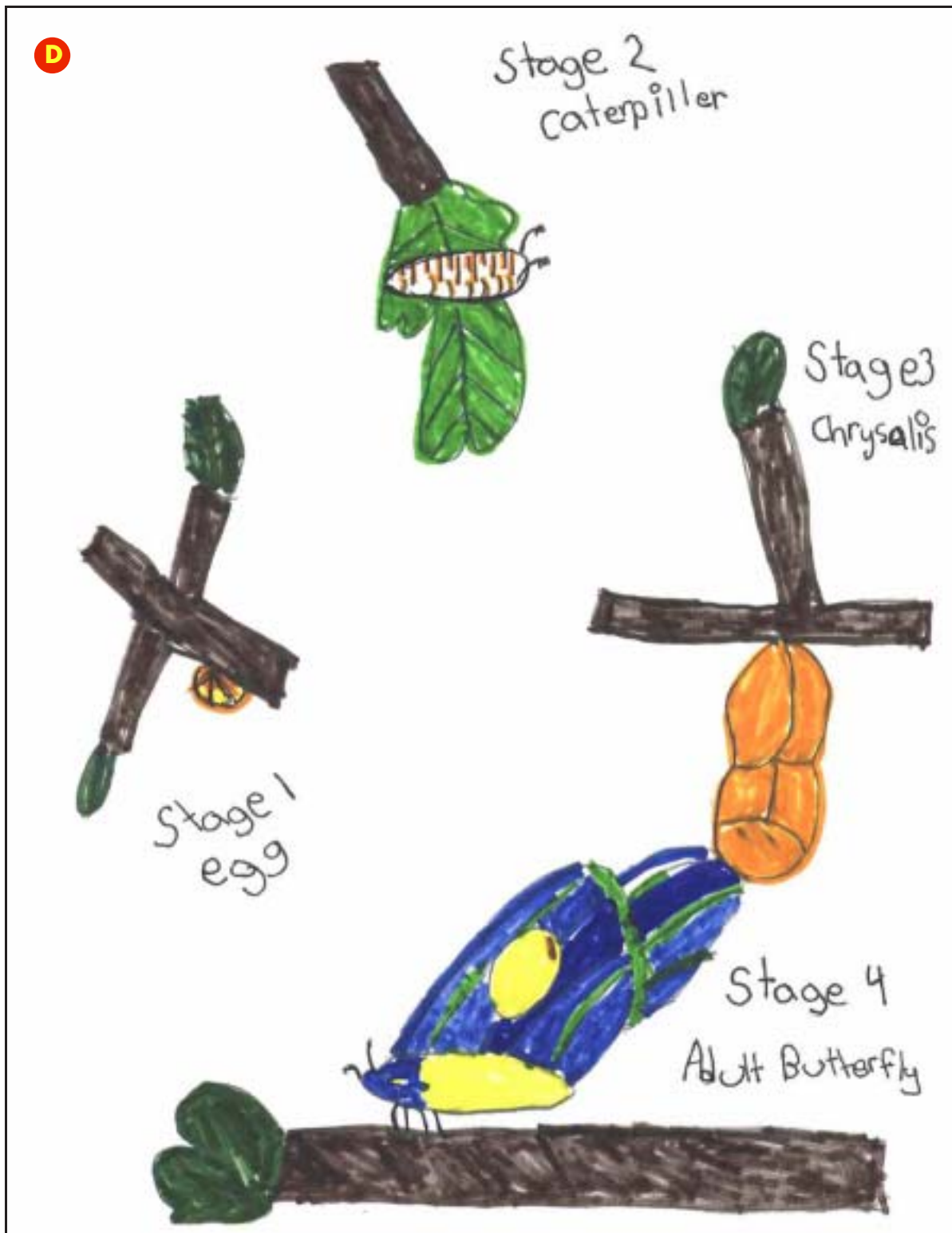


Journal

10/22/98

C

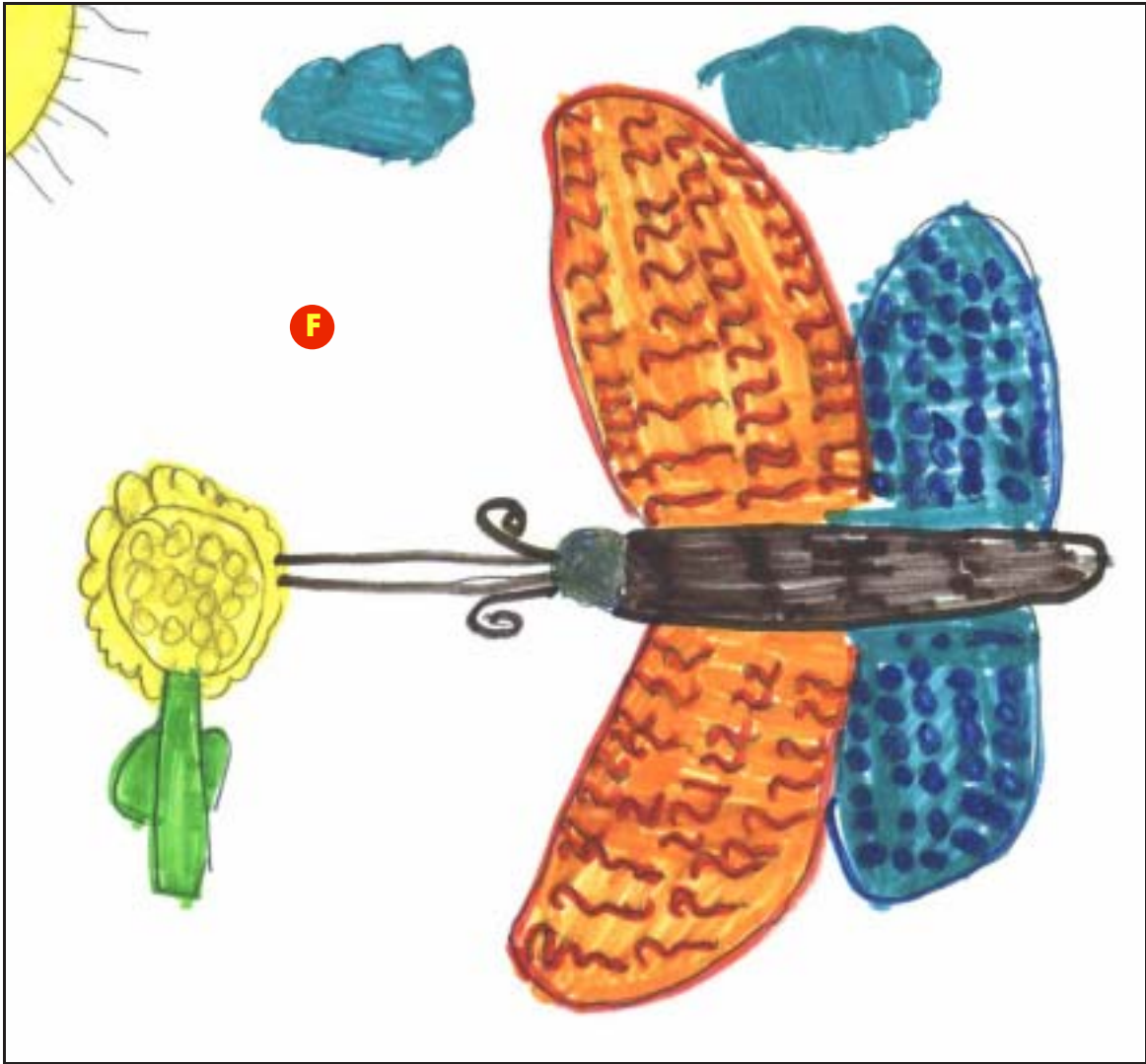
When my class got the butterfly kit we didn't see any eggs, we only saw them when they became caterpillars. The caterpillars were sent in a little container. It had brown stuff on the bottom of it. The teacher, Mrs. _____, said it is food for them to eat. Then a few days past and the caterpillars were making something that looked like a web but it wasn't. The caterpillars were making chrysalis. Then two of them broke out of the chrysalis. Mrs. _____ found a net and made a house for them in the net. Now all of them turned into butterflies. Two weeks past and Mrs. _____ let them free.



E

Butterflies

Butterflies are a group of insects. During the daytime they eat and fly. During the night they sleep with their wings held upright and closed. Butterflies drink nectar from flowers by using their long slender sucking tubes. They are called proboscis. That is how butterflies live.



G

Bibliography

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World Book Encyclopedia. Vol. 2. 1967.
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Work Sample & Commentary: *Water Tolerance* Elementary School Science

The task⁵⁹

In a seed germination and plant growth experiment, students were required to keep all conditions equal except for a single variable, the volume of water. Each student team was required to monitor growth of four sets of seeds; each set included seeds of four different plant species. The four seed sets were grown in four cups, with each cup receiving a different volume of water. Over the course of the investigation, students observed the cups at regular intervals to determine the most favorable water quantity (of the quantities used) for seed germination and growth.

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
timed | with peer feedback
√ opportunity for revision |

This work sample illustrates a standard-setting performance for the following parts of the standards:⁶⁰

S2a Life Sciences Concepts: Survival and environmental support.

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

S5f Scientific Thinking: Work individually and in teams.

S6a Tools and Technologies: Use technologies and tools.

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

What the work shows

S2a Life Sciences Concepts: The student produces evidence that demonstrates understanding of characteristics of organisms, such as survival and environmental support....

(A) Throughout the observations and especially in the conclusion, the student demonstrates understanding of the impacts of different volumes of water on seed germination and plant growth.

⁵⁹ For related work on Response to Environment, see “Bean Farmers”, page 81, “Toasted Bread”, page 111, “Snails”, page 244, and “Endocrine Feedback Exercise”, page 449.

⁶⁰ The quotations from the Science performance descriptions in this commentary are excerpted. The complete performance descriptions are shown on pages 22-53.

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

(B) The conclusion states, “By observing the four cups over three weeks, we saw that the plants that were watered 40 ml 2 x a week grew best...” In comparison, the student goes on to explicitly describe the relationship between too much water and lack of germination in the 80ml cup. While use of the word “drowned” is technically incorrect, it doesn’t detract from the student’s understanding that a causal relationship exists.

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

(C) The student places individual work within the context of the team assignment: “I am planting corn in each cup. The other students are planting pea, radish and barley.” (In a revision, it would be appropriate to have the student go on to explain that data were collected individually and analyzed cooperatively to reach the conclusion.)

S6a Scientific Tools and Technologies: The student uses...tools...to gather data.

(D) The “Environment” columns in the “Data Table” imply evidence of the use of graduated cylinders for measuring volume.

(E) The “Height...” columns in the Data Table provide evidence of the use of rulers.

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

(A) The written conclusion presents the outcome and data analysis clearly, concisely.

(F) (G) The two tables (“Plant Observations” and “Plant Profile”) required students to organize and present their data in graphic formats that encompass numbers, tables, drawings, and written statements.

Work Sample & Commentary: *Water Tolerance*
Elementary School Science

Names _____ Date 10/8/98

PLANT EXPERIMENT SETUP

1. Environmental factor tested
Water Tolerance
2. Planting date 10/8/98
3. Number of each seed planted
Barley 3 seeds
Corn 3 seeds
Pea 3 seeds
Radish 3 seeds
4. Map where each seed is planted.
5. Plant all four containers in exactly the same way.

KEY			
▲	Barley	■	Corn
●	Pea	+	Radish

Comments On the planting date we have setup 4 planter cups. All 4 cups have 3 of each seed the same way. The label for the water amount is on the front eg (20ml). I am planting corn in each cup. The other three students will plant pea, radish, and barley the same. The only difference is the water amounts. The first cup, black gets 10ml 2x a week, the second cup, blue gets 20ml 2x a week, the third cup, green gets 40ml 2x a week, the fourth cup, red 80ml 2x

Week

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Name _____
Date 10/16/98

Environmental factor Water Tolerance
 Planting date 10/8/98
 Seed type Barley, corn, radish, pea
 Number of seeds of this kind planted 2 of each

F **PLANT OBSERVATIONS**

Part 1. Number of days after planting 7/10/15/98

Environment	How many plants came up	Height of tallest plant
1 blue 20 ml	12	4 inches
2 black 10 ml	8	2 inches
3 green 40 ml	11	4 inches
4 red 80 ml	0	—

Part 2. Number of days after planting 14/10/22/98

Environment	How many plants came up	Height of tallest plant	Most leaves on one plant	Observations
1 blue 20 ml	12	4 inches	12 leaves	The soil is dry but plants are growing. Look very small. Color is different. Doing very well. Soil is wet. Flooded, not grown, drowned
2 black 10 ml	8	3 inches	10 leaves	
3 green 40 ml	11	6 inches	13 leaves	
4 red 80 ml	0	—	—	

Part 3. Number of days after planting 21/10/29/98

Environment	How many plants came up	Height of tallest plant	Most leaves on one plant	Length of longest leaf	Length of longest root	Observations
1 blue 20 ml	12	7 inches	12 leaves	—	8 inches	Green well grown not grain look stalk Did very well
2 black 10 ml	8	4 inches	10 leaves	—	4 inches	
3 green 40 ml	11	8 inches	13 leaves	—	8 inches	
4 red 80 ml	0	—	—	—	—	

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Work Sample & Commentary: *Water Tolerance*
 Elementary School Science

Name _____ Date 10/29/98





Plant type Corn

Environmental factor Water Tolerance

Days of growth 21 days

PLANT PROFILE

Label the columns with the environmental factor tested. Tape the plants in place.

	Dry	10 ml water	20 ml water	40 ml water	80 ml water
Corn Plants ↳					
Soil level			Shoot above Root below		

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10/29/98

A

Conclusion - water Tolerance

We understand that the experiment tested water tolerance. Water tolerance means the ability of the plants to survive under the certain environmental condition of the amount of water.

B → what was the optimum, or best water condition? By observing the four cups over three weeks we saw that the plants that were watered 40 ml 2x a week had grown best. This cup had the tallest plants, the most leaves, and the best roots. The 10 ml cup had smaller plants and the 80 ml cup had no plants because the seeds drowned. The 20 ml cup plants grew, but not as well as the 40 ml cup. The 40 ml cup was the optimum water condition.

Work Sample & Commentary: *Biomes* Elementary School Science

The task⁶¹

Each student was asked to research an animal species using a variety of reference sources, including accessing information on a CD-ROM, and to prepare a brief written report about the animal. The reports were then used collectively to help teams of students create murals that depicted animals representing the major biomes.

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
timed | with peer feedback
√ opportunity for revision |

This work sample illustrates a standard-setting performance for the following parts of the standards:⁶²

S2a Life Sciences Concepts: Characteristics of organisms.

S6a Scientific Tools and Technologies: Acquire information from multiple sources.

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

What the work shows

S2a Life Sciences Concepts: The student produces evidence that demonstrates understanding of characteristics of organisms, such as...the relationship between structure and function.

(A) (B) (C) The students clearly describe the functions of specific structures.

⁶¹ For related work on Interdependence, see “Bio Box”, page 225, “Owl Pellets”, page 234, “Eagles”, page 456, and “The Invincible Cockroach”, page 460.

⁶² The quotations from the Science performance descriptions in this commentary are excerpted. The complete performance descriptions are shown on pages 22-53.

S2a Life Sciences Concepts: The student produces evidence that demonstrates understanding of organisms and environments, such as the interdependence of animals and plants in an ecosystem....

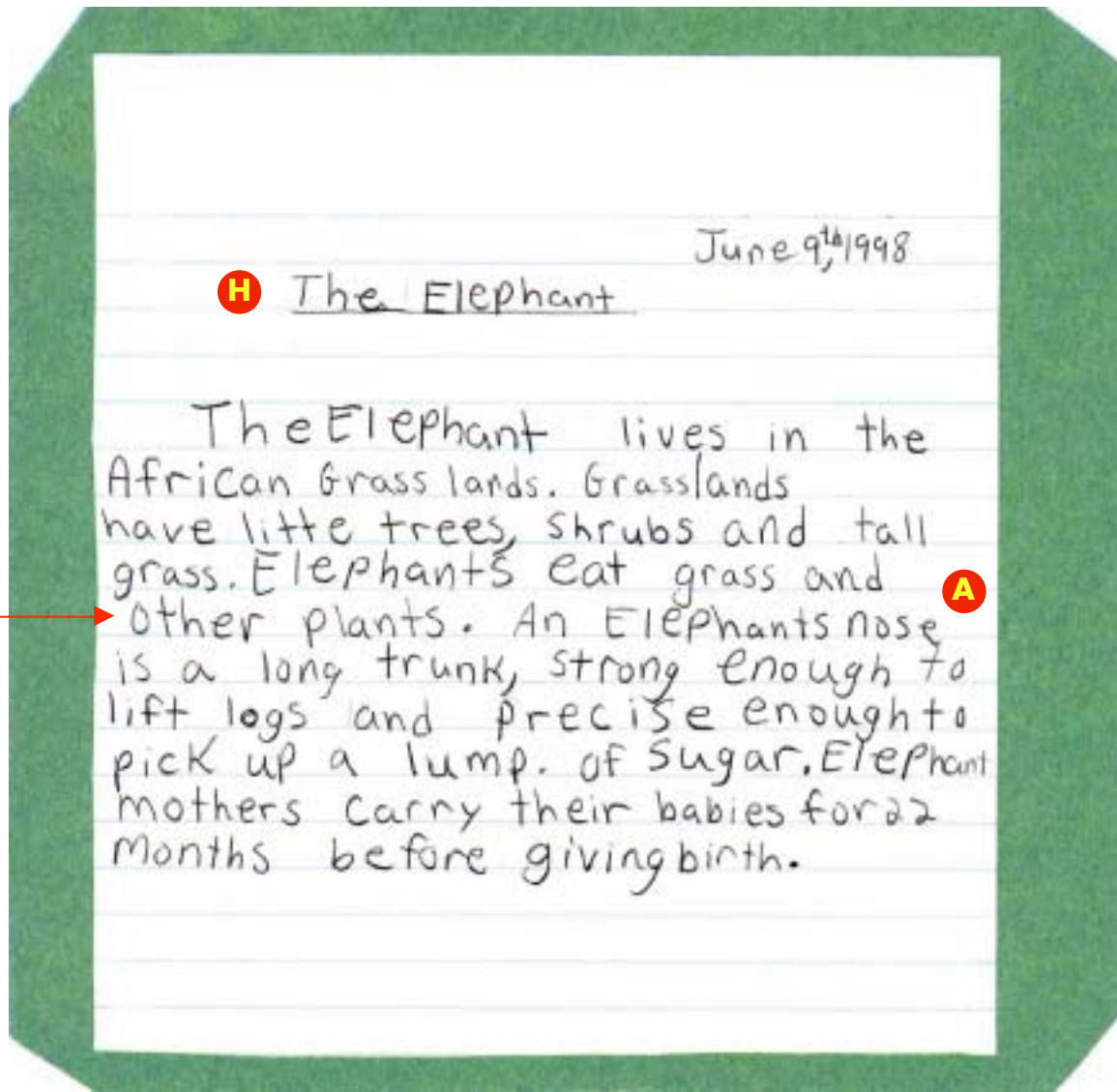
(D) (E) (F) (G) The students provide specific examples of interdependence of species.

S6a Scientific Tools and Technologies: The student acquires information from multiple sources, such as experimentation and print and non-print sources.

(H) (I) (J) It is evident from the description of the task and the tone of the writing that the students used print and software resources. In a further revision, however, students should be asked to include a bibliography with the written piece.

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

(H) (I) (J) (K) The students presented data in narrative form and in artwork.



J

June 8, 1998

The name of my animal is a tree Boa
and it lives in the rainforest. It is hot in
the rainforest and it rains all the time.

F

The boa survives by eating fish, frogs, grasshoppers,
and Birds egg. The tree Boas are some of the
largest snakes in the world and may grow up
to 14 feet long. Boas feed on live birds and

G

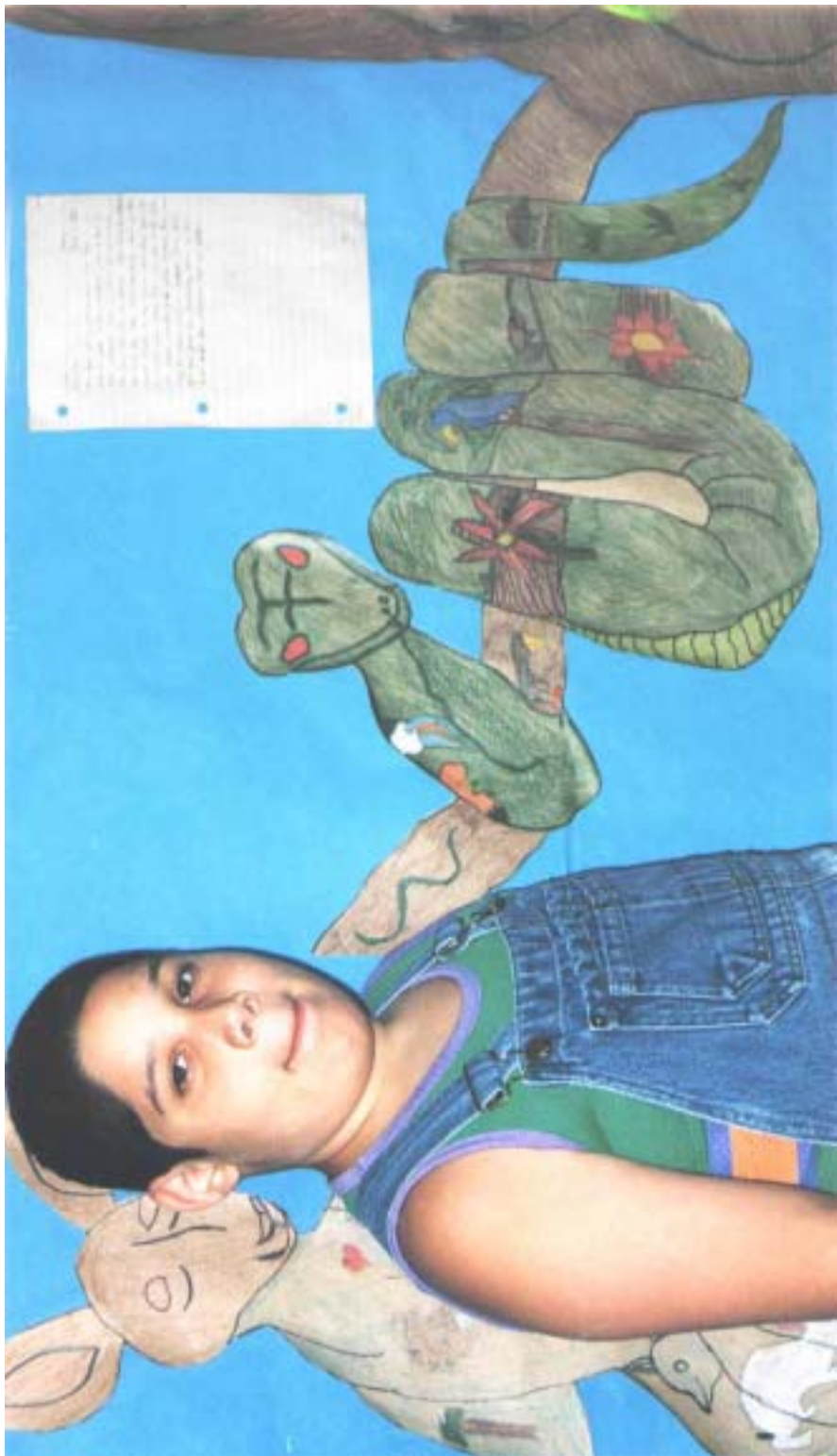
and small rodents and other snakes. They can
live for many months without food. Boas
kill their prey by squeezing them in their
coils. Boas are sometimes kept as pets.

C

June 8, 1998

I Octopus

E The octopus lives in the ocean. They live in the Atlantic, Pacific and Indian oceans. The octopus eats crabs, lobsters and shellfish. The octopus has eight strong tentacles. The common octopus can hide by changing its color from pinkish to brown. B





Work Sample & Commentary: *Toasted Bread vs. Non-Toasted Bread* Elementary School Science

The task⁶³

Students were asked to conduct a controlled experiment.

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:⁶⁴

S2a Physical Sciences Concepts: Properties of objects and materials.

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

S7c Scientific Communication: Communicate in a form suited to the purpose and the audience.

S8a Scientific Investigation: An experiment.

What the work shows

S2a Life Sciences Concepts: The student produces evidence that demonstrates understanding of characteristics of organisms, such as survival and environmental support.

(A) The students indicated that there is a relationship between heat and the growth of mold.

S7a Scientific Communication: The student represents data and results in multiple ways, such as drawings...and...writing.

(B) (C) Both in the “Observation” section of the text and the illustration, the results are clearly communicated.

S7c Scientific Communication: The student communicates in a form suited to the purpose and the audience, such as writing instructions that others can follow.

(C) (D) The “Experimentation” section of the text is clear and supported by the illustration.

S8a Scientific Investigation: The student demonstrates scientific competence by completing an experiment, such as a fair test.

(E) The “Experimentation” section, particularly the third step, shows that the only variable that was changed was the toasting condition.

(F) The conclusion provides evidence that the students recognized that their results were different from what they expected.

⁶³ For related work on Response to Environment, see “Bean Farmers”, page 81, “Water Tolerance”, page 98, “Snails”, page 244, and “Endocrine Feedback Exercise”, page 449.

⁶⁴ The quotations from the Science performance descriptions in this commentary are excerpted. The complete performance descriptions are shown on pages 22-53.

Work Sample & Commentary: *Toasted Bread vs. Non-Toasted Bread* Elementary School Science

Note: Although the student has made some grammatical errors in Haitian (capitalization, punctuation, misuse of the accent, etc.) the content of the work remains intact. It can be understood by a Haitian reader.

①

Tit: Pen ki toste ak Pen ki Pa toste.

Question: Ki Pen ki ap gate avan 10 Jou, Pen ki toste oubyen Pen ki Pa toste.

Y Potez: nou Panse si nou mete 6 moso Pen ki Pa toste nan yon Shache Plastik epi kite nan kless la pou 10 Jou, yo tout ap gate. Men si nou mete Pen ki toste nan shache plastik yo pa gate.

materyel: 12 moso Pen blan, 12 Shache Plastik ak yon tete.

D Ekspérimentasyon: nou pran 12 moso Pen blan nan yon shache pen yo te asite nan mache.

① nou pran sis moso Pen epi nou mete yo chak nan yon shache Plastik.

E ② nou pran sis lot moso pen nou toste yo epi nou mete yo chak nan yon Shache Plastik.

③ nou pa vle Pen ki Sho yo boule Plastik la nou tan yo frèt avan nou mete yo nan Shache Plastik la.

④ nou kite tout 12 shache yo sou tab anndan kless la pou 10 Jou.

B Observasyon: nou observe Pen yo Pandan 10 Jou men sa nou wè

Premye Jou: Pa te genyen ankan chanjman nan tou

12 moso Pen yo. ②

Deziem Jou: Pa te genyen ankan chanjman toujou.

Twaziem Jou: toujou Pa te genyen ankan chanjman nou te ka wè.

Katryem Jou: nou te ka wè bagay kite san bli ak "spide webb" kite nan Pen blan yo.

Senkyem Jou: nou observe plis tach blan ki te parèt nan Pen blan yo, men Pen ki te toste yo fin rasé (hard).

Jou sis ak Jou sét: nou pote Pen yo lakay nou wè anpil bagay vét ak nwa nan Pen blan yo, yo se bakteria (bacteria).

Jou 8: nou pote Pen yo tounen nan kless la nou wè plis bakteria. Men Pen toste yo te vini pi di.

Jou 9 ak Jou 10: Pen blan yo gen plis bakteria toujou epi yo komanse santi. Epi Pen toste yo rete men Jan. Selman yo vin di anpil epi yo kap krazé.

Rezilta: nou observe ke bakteria te grandi nan tout moso Pen blan yo. Epi lot sis moso Pen ki te toste yo te vini pi di. yo te pi fasil pou yo krazé. Men Pen blan yo te vini mou epi yo te santi paske yo pat toste. Chak toste a tiyé tout Jan pou bakteria grandi nan Pen an.

A

Work Sample & Commentary: *Toasted Bread vs. Non-Toasted Bread*
Elementary School Science

③

Konklusyon: nou te byen Predi ke Pen blan yo ki Pat
toste ka pa b fé bakterya apre 10 Jou fomen nan yon
Shachi Plastik. Men nou Pat ka di ke Pen toste yo te
ka pa b kraze. Vwasi nou ka fze Pen kraze yo pou fe
Bread Crumbs? **F**

Work Sample & Commentary: *Toasted Bread vs. Non-Toasted Bread*
Elementary School Science

C

Experiment K: pan K. pa gen Mold K. pa n. pa gen Mold
K. sa n. pa Fe' adik eksperiment

Zip-Lock

Day 1 - Premye pan pin Fre	Premye pan - Day 1 toastel mem baga
Day 2 - Premye pan pin Fre	2 mem baga
3 mupwen	3 mem baga
4 spider webb	4 mem baga
5	5 mem baga
6 mold vet	6 mem baga
7 mold vet	7 mem baga
8 mold vet	8 mem baga
9 mold vet	9 mem baga
10 tute pin so vet	10 mem baga
Pan K: pa taste gen Mold	toastel Pain Pa gen Mold

Work Sample & Commentary: *Toasted Bread vs. Non-Toasted Bread*
Elementary School Science

Translation

①

Title: *Toasted Bread vs. non-toasted bread*

Question *which bread is more likely to grow mold? toasted bread or non-toasted bread?*

Hypothesis: *We think if we put some slices of white plain bread in plastic bags and leave them in the classroom for ten days, they will most likely grow mold. However, if they are toasted they will not develop mold after ten days.*

Materials: *twelve regular slices of white bread, 12 plastic bags, toaster.*

D Experimentation: *we take six slices of plain white bread from a bag that was bought from the local grocery store.*

② *We put each slice into a zip-lock bag.*

E ③ *We take six other slices of the same plain white bread from the same bag. Then we toasted them up until they turn really*

Translation

②

brown,

④ We do not want the hot bread to burn the plastic bag, so we let the bread cool off a bit before we put them one in each zip-lock bag as we did for the plain white or non-toasted bread.

⑤ We let all 12 bags on a table in the classroom for ten days.

B observation: This is what we observe during the ten days of the experiment.

Day #1: There is no change in all 12 slices of bread.

Day #2: There is no change.

Day #3: Still there is no visible in all 12 slices of bread.

Day #4: Some white thing like tiny spider web appear in some places on all six slices of the plain white bread, while the toasted bread remain the same.

Translation

③

Day #3 we observe more white things on more spots on the Plain white bread. But the toasted bread get harder.

Day #6 and day #7. We take the bread home. We see round and greenish and black spots with spongy white thing on the white bread. They are molds. They are similar bacteria.

Day #8 We take the experiment back into the classroom. We see more molds. They are darker. But the toasted bread become harder and harder.

Day #9 and day #10 The white Plain bread with more molds became smelly. The toasted breads have not grown mold, but they are easier to crunch.

Result: We have seen that the six slices of white bread grew mold. And the six slices of toasted bread gets harder and easier to crunch. The Plain white bread that also

Translation

(4)

A Soggy and Smelly because it was not toasted. Maybe the heat from the toaster destroys ways for mold to grow.

F Conclusion: We were right to Predict that the Plain White (non-toasted) bread would develop mold. But we did not predict the toasted bread would get, instead, Crunchy.