eDay Lessons

Reading in the Content Areas 7
Standards

Reading for Literacy in Science and Technical Subjects

ST.6-8.1 Cite textual evidence to support analysis of science and technical texts.

ST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

ST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

ST.6-8.6 Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Writing

W.7.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

W.7.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

W.7.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Expectations for Learning

- Closely read scientific informational text and answer critical thinking questions.
- Determine meaning of Tier II and Tier III vocabulary within the context of its usage.
- Explain the scientific concept of microgravity.

Materials

- “Life Without Gravity” included on pages 3 and 4 of this packet (pages 424 – 428 of Prentice Hall’s Literature: Language and Literacy, Grade 7, 2010)
- Pencil/pen
- Notebook paper or plain white paper for foldable
- Optional—dictionary/thesaurus or online dictionary/thesaurus

Task

Create a 4-panel foldable explaining in detail the concept of microgravity.
Life Without Gravity
by Robert Zimmerman

Being weightless in space seems so exciting. Astronauts bounce about from wall to wall, flying! They float, they weave, they do somersaults and acrobatics without effort. Heavy objects can be lifted like feathers, and no one ever gets tired because nothing weighs anything. In fact, everything is fun, nothing is hard.

NOT! Since the first **manned** space missions in the 1960s, scientists have discovered that being weightless in space isn’t just flying around like Superman. Zero gravity is alien stuff. As space tourist Dennis Tito said when he visited the international space station, “Living in space is like having a different life, living in a different world.”

Worse, weightlessness can sometimes be downright unpleasant. Your body gets upset and confused. Your face puffs up, your nose gets stuffy, your back hurts, your stomach gets upset, and you throw up. If astronauts are to survive a one-year journey to Mars—the shortest possible trip to the Red Planet—they will have to learn how to deal with this weird environment.

Our bodies are adapted to Earth’s gravity. Our muscles are strong in order to overcome gravity as we walk and run. Our **inner ears** use gravity to keep us upright. And because gravity wants to pull all our blood down into our legs, our hearts are designed to pump hard to get blood up to our brains.

In space, the much weaker gravity makes the human body change in many unexpected ways. In **microgravity**, your blood is rerouted, flowing from the legs, which become thin and sticklike, to the head, which swells up. The extra liquid in your head also makes you feel like you’re hanging upside down or have a stuffed-up nose.

The lack of gravity causes astronauts to routinely “grow” between one and three inches taller. Their **spines** straighten out. The bones in the spine and the disks between them spread apart and relax.

But their bones also get thin and spongy. The body decides that if the muscles aren’t going to push and pull on the bones, it doesn’t need to lay down as much bone as it normally does. Astronauts who have been in space for several months can lose 10 percent or more of their bone tissue. If their bones got much weaker, they would snap once the astronauts returned to Earth.

And their muscles get weak and flabby. Floating about in space is too easy. If astronauts don’t force themselves to exercise, their muscles become so **feeble** that when they return to Earth they can’t even walk.

Worst of all is how their stomachs feel. During the first few days in space, the inner ear—which gives people their sense of balance—gets confused. Many astronauts become nauseous. They lose their appetites. Many throw up. Many throw up a lot!

Weightlessness isn’t all bad, however. After about a week people usually get used to it. Their stomachs settle down. Appetites return (though astronauts always say that food tastes **blander** in space). The heart and spine adjust.

Then, flying around like a bird becomes fun! Rooms suddenly seem much bigger. Look around you: The space above your head is pretty useless on Earth. You can’t get up there to work, and anything you attach to the ceiling is simply something you’ll bump your head on.

In space, however, that area is useful. In fact, equipment can be installed on every inch of every wall. In weightlessness you choose to move up or down and left or right simply by pointing your head. If you turn yourself upside down, the ceiling becomes the floor.

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1 **inner ears** internal parts of the ear that give people a sense of balance
2 **microgravity** state of near-weightlessness that astronauts experience as their spacecraft orbits Earth
And you can’t drop anything! As you work you can let your tools float around you. But you’d better be organized and neat. If you don’t put things back where they belong when you are finished, tying them down securely, they will float away. Air currents will then blow them into nooks and crannies, and it might take you days to find them again.

In microgravity, you have to learn new ways to eat. Don’t try pouring a bowl of cornflakes. Not only will the flakes float all over the place, the milk won’t pour. Instead, big balls of milk will form. You can drink these by taking big bites out of them, but you’d better finish them before they slam into a wall, splattering apart and covering everything with little tiny milk globules.

Some meals on the space station are eaten with forks and knives, but scooping food with a spoon doesn’t work. If the food isn’t gooey enough to stick to the spoon, it will float away.

Everyone in space drinks through a straw, since liquid simply refuses to stay in a glass. The straw has to have a clamp at one end, or else when you stop drinking, the liquid will continue to flow out, spilling everywhere.

To prevent their muscles and bones from becoming too weak for life on Earth, astronauts have to follow a boring two-hour exercise routine every single day. Imagine having to run on a treadmill for one hour in the morning and then ride an exercise bicycle another hour before dinner. As Russian astronaut Valeri Ryumin once said, “Ye-ech!”

Even after all this exercise, astronauts who spend more than two months in space are usually weak and uncomfortable when they get back to Earth. Jerry Linenger, who spent more than four months on the Russian space station, Mir\(^3\), struggled to walk after he returned. “My body felt like a 500 pound barbell,” he said. He even had trouble lifting and holding his fifteen-month-old son, John.

When Linenger went to bed that first night, his body felt like it was being smashed into the mattress. He was constantly afraid that if he moved too much, he would float away and out of control.

And yet, Linenger recovered quickly. In fact, almost two dozen astronauts have lived in space for more than six months, and four have stayed in orbit for more than a year. These men and women faced the discomforts of weightlessness and overcame them. And they all readapted to Earth’s gravity without problems, proving that voyages to Mars are possible . . . Even if it feels like you are hanging upside down the whole time!

\(^3\) Mir Russian space station
Day 1: Text-Dependent Questions
After reading the article "Life Without Gravity" included on pages 3 and 4 of this packet, answer the following text-dependent questions. Write all answers in complete sentences. Remember—you MUST give textual evidence for each question. (It might be helpful to number the paragraphs before you begin.)

1. What is the author’s purpose for including the negative effects of microgravity in the opening paragraphs?

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________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

2. Astronaut Jerry Linenger is quoted as saying, “My body felt like a 500 pound barbell.” Why is this simile in paragraph 18 a good representation of returning from life without gravity to life with gravity?

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________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

3. What do you think is the most difficult part of living in a state of weightlessness? Remember to give textual evidence to support your opinion.

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________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

4. What is the central idea of this essay? Support your thinking with two pieces of textual evidence.

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________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________
### Day 2: Using Vocabulary

Complete the graphic organizer for each term. You will need to go back to the text to determine the meaning (denotation) of the vocabulary terms.

<table>
<thead>
<tr>
<th>How I will remember the meaning:</th>
<th>Picture/Graphic:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denotation:</td>
<td>2 synonyms:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>How I will remember the meaning:</th>
<th>Picture/Graphic:</th>
<th>Denotation</th>
<th>2 synonyms</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANNED</td>
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<td>FEEBLE</td>
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<tr>
<td>BLANDER</td>
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<tr>
<td>MICROGRAVITY</td>
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</tbody>
</table>
Day 3: 4 – Panel Foldable

Today you will take all of the information you learned from Days 1 and 2 and synthesize it into a foldable. This writing activity will allow you to summarize the information about microgravity and to explain it using both words and graphics. **You will need notebook paper or plain white paper to make your foldable.**

**DIRECTIONS FOR FOLDABLE:**

1. Fold your paper once “hotdog” style, or long ways (vertically).

2. Fold your paper twice “hamburger” style, or fat ways—like a book (horizontally).

3. Unfold your paper so it is back to the “hotdog” fold.

4. Gently tear the paper at the three creases stopping at the middle fold. You should have four flaps when you are finished. (You are tearing where the solid black lines are in the diagram to the right.)

**LABEL YOUR FOLDABLE:**

<table>
<thead>
<tr>
<th>Negatives of Microgravity</th>
<th>Positives of Microgravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects on the Body</td>
<td></td>
</tr>
<tr>
<td>Things I Learned</td>
<td></td>
</tr>
</tbody>
</table>

Label the front of your foldable like the example to the left.

On the inside of the foldable, summarize each of the first three sections.

For the last section, “Things I Learned,” list 5-7 things you learned by reading the Zimmerman essay.

On the backside of each flap include a graphic that adequately represents each section. Your graphic can be hand drawn, clipart, cut from magazines, etc.