**Assignment #3 notes**

It is important that students have a project they are proud of, so it is a good idea give them about 4-6 weeks to work on it. Unfortunately, many students, regardless of how much time they are given, will wait until the night before an assignment is due to begin work. The purpose of these preliminary assignments is to overcome that tendency.

The goal of this assignment is to encourage students to develop a vision of what their model will look like. It is easy to under-appreciate how much information about a planet or colony a student is able to display visually. This assignment is graded on the quality of the drawing, the amount of detail it contains, the amount of creativity and effort it reflects, and the completeness of the caption.

*Astronomy Project Assignment #3: Picture Yourself in Your Colony*

By now you should have researched your planet (or one of its moons) and thought about what resources you must provide to support human life. Your next step is to begin picturing your space station in your mind. This next assignment will help you start doing that.

**Assignment #3:** Imagine that you are standing in your space colony and looking out of a window onto your planet. What do you see? Draw a picture of what you see as you look out the window. Use unlined 8½” x 11” or larger paper. Be sure to use color, and fill the entire page with your drawing. Include a caption describing or explaining the objects in your drawing.

Think about what you already know about your planet. How far away is the sun? Are there any moons or planets nearby? What does the surface of your planet look like? Are there volcanoes, mountains, cliffs, canyons? Can you see the sun, any stars, other moons, or rings?

Think about your colony or space station. Are you on a hard surface, hovering in the atmosphere, or in outer space circling the planet? Are there any out-buildings? What other wings, buildings or structures can you see from the window?

Your caption needs to be only a few sentences. It must: 1) state what planet or moon is depicted; 2) identify the objects in your drawing; and 3) explain what part of your space outpost you are looking out of. Also, if there is anything peculiar about the lighting or coloring of your drawing—if, for example, your drawing is from deep within the atmosphere of a gas giant that makes everything appear unusually bluish—you will want to explain this in your caption.
Part 1: Colonize the Solar System

The assignment will be graded based on the quality of your drawing, the amount of detail it contains, the amount of creativity and effort it reflects, and the completeness of your caption. A reminder: you must use color and your drawing must be on unlined paper. Please do not give me a hastily scribbled pencil sketch on lined notebook paper.

Sample (Fake!) Caption: This is the view from the central cafeteria of our space colony on planet Zorg. To the right is the Flibbideath Canyon, which is over 14 miles deep. The colony’s greenhouse and sewage treatment facilities are on the left. You can see two of Zorg’s seven moons, Twilbane and Snotflobbery, in the sky above the greenhouse.

This assignment is due ____________.

If there is an art teacher, it is a good idea to let her or him know about this assignment around 1 - 2 weeks before assigning it. Sometimes art teachers will allow students to work on their drawings during art class, which usually makes for much higher quality work. Occasionally an art teacher will develop an art lesson around this assignment. An art teacher for one of my classes used this assignment to teach the idea of foreground vs. background. She added specific requirements of her own to this assignment. Her instructions were to include the foreground, in this case the inside of the colony, the mid-ground—the surface of the planet outside the window or other parts of the colony visible through the window—and the background—the stars, moons and sky behind the planet or colony. I got some spectacular drawings that year.

A simple form for grading this assignment is available in Appendix B.
Appendix A

Standards Addressed

Benchmarks (Grades 3 through 5)

1B – Scientific Inquiry
Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments. Investigations can focus on physical, biological, and social questions.

3A – Technology and Science
Technology enables scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving at all.

3B – Design and Systems
There is no perfect design. Designs that are best in one respect (safety or ease of use, for example) may be inferior in other ways (cost or appearance). Usually some features must be sacrificed to get others. How such trade-offs are received depends upon which features are emphasized and which are down-played.

4A – The Universe
Planets change their positions against the background of stars.

The earth is one of several planets that orbit the sun, and the moon orbits around the earth.

Stars are like the sun, some being smaller and some larger, but so far away that they look like points of light.

5D – Interdependence of Life
For any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

Benchmarks (Grades 6 through 8)

3A – Technology and Science
Technology is essential to science for such purposes as access to outer space and other remote locations, sample collection and treatment, measurement, data collection and storage, computation, and communication of information.

3C – Issues in Technology
The human ability to shape the future comes from a capacity for generating knowledge and developing new technologies-and for communicating ideas to others.
Part 1: Colonize the Solar System

4A – The Universe
Nine planets of very different size, composition, and surface features move around the sun in nearly circular orbits. Some planets have a great variety of moons and even flat rings of rock and ice particles orbiting around them. Some of these planets and moons show evidence of geologic activity. The earth is orbited by one moon, many artificial satellites, and debris.

Benchmarks (Grades 9 through 12)
1B – Scientific Inquiry
Sometimes, scientists can control conditions in order to obtain evidence. When that is not possible for practical or ethical reasons, they try to observe as wide a range of natural occurrences as possible to be able to discern patterns.

3A – Technology and Science
Mathematics, creativity, logic and originality are all needed to improve technology.

National Standards (Grades 5-8)
Nature of Science
Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models. Although all scientific ideas are tentative and subject to change and improvement in principle, for most major ideas in science, there is much experimental and observational confirmation. Those ideas are not likely to change greatly in the future. Scientists do and have changed their ideas about nature when they encounter new experimental evidence that does not match their existing explanations.

National Standards (Grades 9-12)
Understandings about Science and Technology
Creativity, imagination, and a good knowledge base are all required in the work of science and engineering.

Indiana Standards
Grade 5
Science – The Nature of Science and Technology
5.1.4 – Give examples of technology, such as telescopes, microscopes, and cameras, that enable scientists and others to observe things that are too small or too far away to be seen without them and to study the motion of objects that are moving very rapidly or are hardly moving.

The Physical Setting
5.3.2 – Observe and describe that stars are like the sun, some being smaller and some being larger, but they are so far away that they look like points of light.

5.3.7 – Describe that, like all planets and stars, Earth is approximately spherical in shape.

Models and Scale
5.6.2 – Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail.

Grade 6

Science – The Physical Setting
6.3.1 – Compare and contrast the size, composition, and surface features of the planets that comprise the solar system, as well as the objects orbiting them. Explain that the planets, except Pluto, move around the sun in nearly circular orbits.

6.3.2 – Observe and describe that planets change their position relative to the background of stars.

Grade 7

Science – Common Themes
7.7.2 – Use different models to represent the same thing, noting that the kind of model and its complexity should depend on its purpose.

Grade 8

Science – Scientific Thinking
8.2.3 – Use proportional reasoning to solve problems.
Appendix B

Astronomy Project Assignment #3

Name: ___________________________

Drawing
  Quality (0 to 20 points) _______
  Detail (0 to 20 points) _______
  Creativity (0 to 15 points) _______
  Effort (0 to 15 points) _______

Caption (0 to 30 points) _______

Total Points _______

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