1-13-2015

Theme B: Day 5 Plan

Purdue University College of Education

THEME B

Becoming a Spacewalker: My Journey to the Stars by Astronaut Jerry L. Ross

DAY FIVE STEM EXTENSION TO ACCOMPANY DAY FIVE SHARED READING OF *THE SPACE AGE*

To Ponder: Friday, October 4, 1957, the date when the first orbiting satellite was launched, was just an ordinary day at school for Jerry Ross. He played marbles at recess and he earned an "A" on his arithmetic test. But that night, history was changed forever with the launch of *Sputnik 1*. America became focused on the race to space. The first astronaut team was selected—the Mercury 7 astronauts. They were part of Jerry's legacy. Interestingly, one of the seven weighed just about the same as *Sputnik 1.* Let's discover which one and explore further mathematical comparisons.

SCIENCE/ENGINEERING/TECHNOLOGY/MATHEMATICS (STEM) ACTIVITIES:

STEM Investigation: *Space Age mathematics adventures* We have been exploring the beginning of the Space Age. Let's investigate mathematics, science, and technology, and the impact that they have had as history changed over time. Remember, we are still very much grounded in gravity for it is critical to our survival. Let's investigate measurement.

Vocabulary: orbit, venture, man-made, launched, satellite, bulletin, rocket

Goal: To investigate measurement in the "*Space Age mathematics adventures*."

Purpose of STEM Activity: To examine and understand science, mathematics, and technology through the eyes of a mathematician.

Materials: *Sputnik 1* and *Explorer 1* information, Wikipedia: Mercury 7 website, Mercury 7 information, science notebook/journal/iPad/computer/SmartBoard, calculator, pencil, chart paper, charts

Before Activity:

- *Activate prior knowledge:* Provide a prepared T chart displaying the following *Sputnik 1* facts on left column and *Explorer 1* facts on the right column. We have uncovered a few facts: (1) *Sputnik 1* was an artificial satellite launched into orbit by the Soviet Union on October 4, 1957. It was about the size of a beach ball and weighed about 184 pounds. (2) *Explorer 1,* America's first man-made satellite was launched on January 31, 1958. It was about 80 inches long and weighed about 30.66 pounds. Educator may want to post these facts on chart paper for future reference (refer to pp. 11–12).
- *Prompts to encourage prediction:* How do you think measurement will play a role in making mathematical comparisons between astronauts and man-made orbital satellites?
- *Draw on personal experiences:* If you have ever measured your height or weight for an amusement park ride, you may be aware why these measurements are important. They are just numbers, right? What do your height and weight have to do with gravity on a park ride?
- *Set purpose for investigation:* To explore the importance of mathematics and computation in the past, present, and future learning in science, technology, engineering and mathematics.
- *Draw or write data in science notebook/journal/iPad/computer/SmartBoard:* Record data as the educator sees as appropriate

During Activity:

Post *Sputnik 1* and *Explorer 1* data on T chart / Mercury 7 graph (provided after #4)

1. Provide the students time to think alone about the size of the two satellites. Students can illustrate/write about their observations. Then, share with their partner(s). Discuss with whole group. For example, some students may have compared by illustrating their shapes. Some students may have compared them mathematically. (184 lb – 31 lb = 153 lb) or 184/31 is approximately 6; Sputnik 1 is 6 times the weight of Explorer 1, etc.)

2. *How did* Sputnik 1 *and* Explorer 1 *compare in size? Use mathematics to prove your answer.* (*Sputnik 1* about 184 lb and *Explorer 1* about 31 lb; *Sputnik 1* weighed about 6 times the weight of *Explorer 1*; or *Explorer 1* = one/sixth the weight of *Sputnik 1*) FYI: For those students who love space exploration and weight comparisons with the moon, one-sixth is equal to a human's weight on the moon. Why you may ask, is for your students to further explore. Yes, as for mass, that's a whole new chapter, differentiate/compact the curriculum when/where it is appropriate.

3. Refer to p. 11 in the text and give students time to review the Mercury 7 picture. Divide the class into small groups. Provide each student with the Mercury 7 chart below. Go over information together. Let each group select one problem to solve (a–f). Allow ample time to discuss among group and solve. Document problem and answer in science notebook/journal/iPad/SmartBoard/computer. Share answers and discuss while modeling and documenting possible solutions.

4. Utilizing the following data below, discover which astronaut weighed just about the same as *Sputnik 1.* Weight: approximately 184 lb (83.6kg). Share the following with your students:

Mercury 7 Chart

Mercury Astronaut	Weight	Height
Alan Shepherd	179 lb (77 kg)	5 ft 11 in tall (1.80 m)
Gus Grissom	150 lb (68 kg)	5 ft 5 in tall (1.65 m)
John Glenn	168 lb (76 kg)	5 ft 10½ in (1.79 m)
Scott Carpenter	160 lb (73 kg)	5 ft 10 in (1.78 m)
Wally Schirra	185 lb (84 kg)	5 ft 10 in (1.78 m)
Gordon Cooper	155 lb (70 kg)	5 ft 8 in (1.73 m)
Deke Slayton	165 lb (75 kg)	5 ft 10 in (1.78 m)

5. Let's explore "Space Age mathematics adventures" and computation with the following problems:

Educator Note: There are six problems to complete. Please use the one(s) that you believe are most appropriate for your students' cognitive abilities.

a) One of the Mercury 7 astronauts weighed almost the same as *Sputnik 1.* Can you identify the astronaut? Show evidence to support your answer.
b) If a basketball weighs 8 pounds, how many basketballs would it take to equal John Glenn's weight? How many basketballs would it take to equal Scott Carpenter's weight? Provide evidence to support your answers. Combined totals would equal how many basketballs? Prove your answer.
c) Taking each astronaut's height, convert each to inches. For example, if an astronaut's height is 5 ft 5 in, then this would equal 65 in. (12 × 5) + 5 = 65
d) What is the difference between the tallest and the shortest astronaut in inches and meters?
e) What is the average weight of the Mercury 7 astronauts in kilograms?
f) Using logical reasoning and problem solving, about how many pounds would this be? Which Mercury 7 astronaut is this closest to?
g) Student/s compose(s) own problem and submits problem to class as an option to be solved.

Possible Solutions:
a) Wally Schirra =185 lb/Sputnik 1 =184 lb
b) John Glenn =168 lb/8 lb=21 basketballs, Scott Carpenter =160 lb/8 lb=20 basketballs, combined 20 + 21=41 basketballs
c) Alan Shepherd =71 in, Gus Grissom = 65 in, John Glenn =70.5 in, Scott Carpenter =70 in, Wally Schirra =70 in, Gordon Cooper = 68 in, Deke Slayton =70 in
d) Inches- Alan Shepherd =71 in – Gus Grissom =65 in =6 in, Meters-1.80 m – 1.65 m =0.15 m)
e) Add all seven/7 =74.71 kg; pounds – add all pounds/7 =166.00 lb; 74.71kg is close to 166 lb when utilizing the data above
f) 74.71 kg would be approximately 165 pounds—close to Deke Slayton's weight

After Activity: What does your evidence show?

- *When comparing the "Space Age" information, the mathematical data showed that* _____.
- *My conclusions about science, technology, engineering and mathematics (STEM) are* _____.
- *Reflections: Jerry Ross not only looked up to the stars at night, but he also looked up to other people like the Mercury 7 astronauts and his fourth-grade teacher, Mrs. Effie Laney, for encouragement and inspiration. Who do you look up to and why?* _____.

Extensions: Today we thought like a mathematician while analyzing STEM data. The following websites will provide more information for your open-ended inquiry mind. Are there any facts that interest you that you may want to keep in a safe place for future reference?

Resources:
Wikipedia: Mercury 7
http://en.wikipedia.org/wiki/Mercury_Seven

NASA History—*Explorer 1* Launch on
https://www.youtube.com/watch?v=NfMIrKkzRx8

Metric Conversion Chart
http://www.metric-conversions.org/weight/pounds-to-kilograms.htm