

LESSON: Space Shuttle Operations

Title: Space Shuttle Operations
Author: Sandy Mills-Alford

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School/Org: AliveTek, Inc.

Lesson Overview:

This lesson should be presented in tandem with the Shuttle Information lesson set. The presentation and activities describe the Space Shuttle operations for Space Shuttle Systems leading up to launch, including launch, and after launch. It takes months to prepare for a Shuttle launch, and the processes and systems that KSC has in place are incredible. The presentation was adapted from actual weather officer training, so it is in the voice of Kathy Winters, Launch Weather Officer. For those who are preparing students for the roles and responsibilities of being a Shuttle launch team members, this lesson helps to show them the big picture: how much teamwork is involved and how many decisions must be made for every launch.

Suggested Classroom Time: 120-180 minutes

Grade Levels: 6-10

KLASS Module: 2-Orientation

Topic/Console: Shuttle Information

Materials Needed:

| Activity | Documents | Other Materials |
|----------|---|---|
| 1 | Background Information: http://spaceflight1.nasa.gov/shuttle/reference/basics http://spaceflight1.nasa.gov/shuttle/support/planning/ http://science.ksc.nasa.gov/shuttle/countdown/tour.html Concept mapping: Do an internet search if you need more background information on guiding students to create descriptive concept maps. Consider these search terms: <ul style="list-style-type: none"> • “concept map” • “Joseph D. Nova” • ”constructivism” | Demonstration computer with Internet connection |
| 2 | PRES_ Shuttle-Operations.doc PRES_ Shuttle-Operations.ppt RDG_Space-Shuttle-Info-Additional (Folder of documents) | Demonstration computer or student computers with Internet connection and Microsoft PowerPoint |
| 3 | ACT_Shuttle-Operations.doc KEY_Shuttle-Operations.doc | |

National Standards/Objectives:

| Discipline | Standard | Objective |
|------------|----------------------------------|---|
| Science | A. Science as Inquiry | Students gain understandings about scientific inquiry. |
| Science | E. Science and Technology | Students discover the abilities of technological design. |
| Science | G. History and Nature of Science | Students explore science as a human endeavor. |
| Technology | Basic operations and concepts | Students demonstrate a sound understanding of the nature and operation of technology systems. |
| Math | Representation | Students use representations to model and interpret physical, social, and mathematical phenomena and ideas. |

Desired Results:

Students will be able to answer these essential questions

- What are the operations involved before, during, and after a Shuttle launch?
- How do the Space Shuttle teams work together to prepare for launch?

Students will know

- Space Shuttle operations is an integrated set of systems driven by dedicated people such as scientists and engineers
- The Space Shuttle is comprised of various systems that make up each of its three main components.

Students will be able to

- Discuss the Space Shuttle operations and the teamwork that is involved.

Learning Plan/Activities:**1. Introducing the Lesson.**

Review what you have covered so far regarding KSC and the Space Shuttle.

Script: “As you have no doubt discovered, the Space Shuttle is an amazing vehicle that showcases the talents and hard work of many dedicated individuals. Yet, you may be surprised to hear that there’s even more to learn. So, let’s turn our attention to the Space Shuttle’s many systems and its many teams – all necessary for a successful launch.”

2. Presenting and Exploring Operations.

Either start the lesson with the *Shuttle Operations* PowerPoint (PRES_Shuttle-Operations.ppt) used as a presentation or as a student exploratory tool. You also may want to print the slides you plan on covering as notes pages, since there are very detailed notes embedded in the presentation.

Go through the various RDG documents and decide if and how you are going to use them. You could print a copy of each and ask students to study different documents as homework. During a class session this week, you could ask them to report on the details of the particular topic they were asked to study.

3. Evaluating the Lesson.

Have students work through the *Shuttle Operations* concept mapping activity (ACT_Shuttle-

Operations.doc). Their concept maps will contain evidence that they grasped the concept of Shuttle operations at KSC.

Assessment Evidence:

Performance Tasks

1. Collect and evaluate the student work from the *Shuttle Operations* concept mapping activity (ACT_Shuttle-Operations.doc).
2. Give feedback regarding how they worked during the class session, and discuss strategies used for creating a concept map.

Other Evidence

1. Perform normal classroom observation and assessment of progress and participation.

Extensions and Going Further Resources:

Using the data found in the reading, implement one or more of the following activities based on the subject and grade level.

- Have a contest to see who can create the longest list of acronyms and/or the longest list of English-to-metric measurements that are presented in the material.
- Have the students analyze trends in the mission data. This is a skill that NASA engineers perform in their quest for process and product improvement. Possible tools could be Excel, charts, and tables or graphs.
- Advanced courses could include a more in-depth study of the actual logistical processing of all parts of the Shuttle system, including researching the manufacturers and suppliers of the Space Shuttle components.
- Be sure to check for student opportunities, additional educational resources and more at: <http://www.nasa.gov/education>