

LESSON: Aeronautics of the Space Shuttle

Title: Aeronautics of the Space Shuttle
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Lesson Overview:

While reading about the aeronautics of the Space Shuttle, students will begin to understand the aeronautical features that allow the Space Shuttle to be a lifting body that launches like a rocket, orbits like a spacecraft, and lands like a glider.

Suggested Classroom Time: 60-120 minutes

Grade Levels: 7-9

KLASS Module: 2-Orientation

Topic/Console: Shuttle Information

Materials Needed:

Activity	Documents	Other Materials
1	Background information: http://www.nasa.gov/audience/forstudents/9-12/features/F_Aeronautics_of_Space_Shuttle.html	Demonstration computer with Internet connection or Shuttle diagrams or orbiter model
2	RDG_Aeronautics-Space-Shuttle.doc	
3	AS_Aeronautics-Space-Shuttle.doc KEY_Aeronautics-Space-Shuttle.doc MMAS_Aeronautics-Space-Shuttle.htm	Demonstration or student computers for reviewing the multimedia assessment or writing tools for handout

National Standards/Objectives:

Discipline	Standard	Objective
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	Social, ethical, and human issues	Students understand the ethical, cultural, and societal issues related to technology.
Math	Measurement	Students apply appropriate techniques, tools, and formulas to determine measurements.

Desired Results:

Students will be able to answer these essential questions

- How does the Space Shuttle fly in space and in the Earth's atmosphere?
- What are the aeronautical features of the orbiter?

Students will know

- There are many differences between an airplane and the Space Shuttle orbiter.
- The Space Shuttle can fly up to hypersonic speeds.

Students will be able to

- Describe the orbiter as a unique aerospace vehicle, one with a lifting body that launches like a rocket, orbits like a spacecraft and lands like a glider.

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

Show a diagram of the orbiter or pass around a model of the orbiter.

Script: "Many of us might take for granted what a truly amazing machine the Space Shuttle orbiter is. But think of it! It's a huge vehicle with the firepower of a rocket and the grace of a bird. So, let's discover what accounts for its unparalleled brilliance."

2. Presenting and Exploring Information.

Pass out the *Aeronautics of the Space Shuttle* document (RDG_Aeronautics-Space-Shuttle.doc). Explain to the class whether you want them to read quietly, read along with you, or take turns reading aloud.

3. Evaluating the Lesson.

Have students work through the *Aeronautics of the Space Shuttle* assessment (AS_Aeronautics-Space-Shuttle.doc). When they are finished, review their answers with them, and help them work through any questions they may have. Note that this activity has a multimedia component (MMAS_Aeronautics-Space-Shuttle.htm). You may have them do this with you as a fun review activity in lieu of the printed assessment.

Assessment Evidence:

Performance Tasks

1. Collect and evaluate the student work on the *Aeronautics of the Space Shuttle* assessment (AS_Aeronautics-Space-Shuttle.doc).
2. Give feedback regarding how they worked during the class session, and discuss strategies used for finding the answers.

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.

http://www.nasa.gov/audience/forstudents/9-12/features/F_Aeronautics_of_Space_Shuttle.html

- Have the students create a collaborative sequence drawing of the Space Shuttle launching, orbiting or landing. Assign each student a segment of flight to research and have him or her diagram using the provided measurements. Hang the sequenced drawings across the front of the classroom.
- Have the students each write 3 computation problem sets to exchange with their peers. Of course, before they can “quiz” others with their problems, they will have to create the answer key.
- 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.
- Be sure to check for student opportunities, additional educational resources and more at:
<http://www.nasa.gov/education>