LESSON: Countdown 101

Title: Countdown 101
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Lesson Overview:

Even though we have learned that preparation to launch begins months before, today we are going to focus on Shuttle crew responsibilities for the 3 days leading up to launch, or T-43 hours. The KLASS simulation actually begins toward the very end of the launch. It begins with a hold, and when resumed, the countdown clock begins at T-4 minutes 17 seconds. Although the entire launch countdown process is important as an overview, each team should be well versed on what the key roles are from T-9 minutes and holding. This is where the launch process becomes really exciting!

Suggested Classroom Time: 60-180 minutes

Grade Levels: 6-10

KLASS Module: 1-Training

Topic/Console: Countdown 101

Materials Needed:

Activity	Documents	Other Materials
1	Basic overview documents: RDG_Countdown-T-6H.pdf (starts at T-6 hours) RDG_Countdown101-Basic.htm (local copy, starts at T-43H) RDG_Countdown101-Detailed.htm (local copy) KLASS_Shuttle-Launch-Team-Roles.doc Current Web Site: http://www.nasa.gov/mission_pages/shuttle/launch/countdown101.html Dated but detailed countdown documents: http://science.ksc.nasa.gov/shuttle/countdown/count.html#events RDG_Countdown101-Detailed.htm Additional Info: http://science.ksc.nasa.gov/shuttle/countdown/launch-team.html	Demonstration computer with projection and teacher's choice of these documents as printed handouts
2	ACT_Countdown101.doc ACT_Countdown101-Print-Cards.doc KEY_Countdown101.doc	Tape, scissors, printed launch event cards, and activity sheet for each student or group of students

National Standards/Objectives:

Discipline	Standard	Objective
Science	G. History and Nature of Science	Students explore science as a human endeavor.
Technology	Technology problem-solving and decision-making tools	Students use technology resources for solving problems and making informed decisions.
Math	Representation	Students create and use representations to organize, record, and communicate mathematical ideas.

Desired Results:

Students will be able to answer these essential questions

- What will I need to know as a member of the Shuttle launch team during the last 9 minutes of countdown?
- How can I contribute to a larger group within a complex operation such as the Space Shuttle countdown?
- How does the Shuttle countdown clock work?

Students will know

- The basic responsibilities for which the Shuttle launch team members are responsible.
- How to plan a sequence of job tasks in preparation for a simulated launch.

Students will be able to

- Record accurate observations while observing a variety of job tasks performed by key Shuttle launch team members.
- Synthesize specific countdown tasks into specific job/console responsibilities.

Learning Plan/Activities:

1. **Introducing the Lesson.**
   To launch this lesson (the pun was intended), there is nothing more appropriate than watching an actual Shuttle launch. So, before beginning, have a Shuttle launch video queued and ready to start when the students arrive. You can find plenty of launch videos to choose from at http://www.nasa.gov.

   Review, prepare, and distribute the appropriate documents (depending on the age/grade/level of your group). If job roles already have been assigned, ask students to pay particular attention to the responsibilities of their team or KLASS console. If job roles are not yet assigned, ask students to classify various job responsibilities based on the KLASS Shuttle Launch Team Roles document.

2. **Observing, Sequencing, and Recording.**
   Based on the RDG documents you chose to use, have students create a checklist of major events and decide if KLASS engineers or roles would be involved. So, in other words, have them decide which KLASS console team will be taking care of the launch countdown task (SSME, ET, OBS, ECLSS, Weather, Flight Director, or other). Some of the items listed in the documents will start at T-43 and counting, but you could have them concentrate on T-06 hours to speed things. Minimally, students should observe and record the important milestones from T-09M00S.

   A worksheet has been provided for this purpose. Depending on how much you would like them to record,

you may want to adjust the worksheet. If you are reinforcing Excel skills, or database creation skills, have them design and create their own tables or lists.

As a fun activity, print and cut the launch event cards (ACT_Countdown101-Print-Cards.doc). Shuffle them and pass them out. There are over 100 so decide how many each student or group gets. Ask them to write their names on the backs of the cards and place the cards in a sequential line across the front of the room, or tape them on a long wall, in order. Ask for a couple of volunteers to serve as “Flight Directors” to check the order using the key (KEY_Countdown101.doc). Events happening at the same time do not have to be in the exact order. Discussion could occur, however, on why some of the events should come before the others with the same countdown time.

An alternative activity might be to call out the countdown clock time (T minus 43 hours), and have students holding those cards come to the front of the class to share their events. You will need to reference the key for each of the unique countdown times mentioned in the exercise.

3. **Evaluating the Lesson.**
   During the above activities, students should be making the connection between the real Shuttle launch countdown and the KLASS countdown. Follow up with this activity by reinforcing the key roles that will be needed for the KLASS simulation. Ask students if they already have a preference for which teams they would like to be on or which roles they would like to fill for the launch. Revisit the *KLASS Shuttle Launch Team Roles* handout (KLASS_Shuttle-Launch-Team-Roles.doc).

Assessment Evidence:

Performance Tasks

1. Students will be able to piece together the Shuttle launch countdown by completing the activities, but do not need to completely understand what each event means.
2. Students should begin to understand the function of each KLASS module and the various roles that are used during the simulation.

Extensions and Going Further Resources:

- Have the students organize the countdown list by organizing the events in an Excel spreadsheet.
- Have students create an interactive timeline with presentation software.
- Have students conduct research on one or more of the launch event cards they were given, and report to the class. A great site for them to get shuttle manual information is: http://science.ksc.nasa.gov/shuttle/technology/sts-newsref/stsover-launch.html#stsover-prelnfinal
- Find an archive of an actual Shuttle launch, and ask the students to give date and time information based on the time the Shuttle actually launched. They will have to work backwards from the launch time, and assumptions will need to be made regarding actual countdown hold times. This type of sequencing could be a great exercise for advanced students or for reinforcing time calculations in math or science.
- Be sure to check for student opportunities, additional educational resources and more at: http://www.nasa.gov/education