Linear Equations: NASA Connect--Breaking Barriers

Presented by: Jordan Snyder

October 17, 2012
6:30 p.m. – 8:00 p.m. Eastern time
Introducing today’s presenter…

Jordan Snyder
NASA Explorer Schools Education Specialist
NASA Goddard Space Flight Center
Greenbelt, MD
Linear Equations: NASA Connect—Breaking Barriers
NASA Needs You!

- Faster
- Safer
- More efficient designs
Agenda

- Standards, subjects and grade level
- NASA in Aeronautics
- Breaking Barriers: The 5 E’s
- Extensions
- NASA Explorer Schools
Subject/Grade Level

- 6-8
- Science
- Technology
- Engineering
- Mathematics
National Standards

- Science as inquiry
- Evidence, models & explanation
- Development & use of technology
Common Core Math Standards

- 6.RP - Ratios and Proportional Relationships
- 6.EE - Represent and Analyze Quantitative Relationships
- 6.SP - Summarize and Describe Distributions
- 7.RP - Analyze Proportional Relationships
- 8.EE - Analyze Linear Equations
- 8.F - Define, Evaluate and Compare Functions
Learning Objectives

What will students learn?

- Apply algebra in real world problems
- Collect and record data
- Design and build model aircraft
- Calculate speed
- Discover linear functions
Time to Complete

NASA Connect Video – 30 minutes

Engage Activity – 30 minutes

Explore Activity – 60 minutes
NASA in Aeronautics
NASA in Aeronautics
NASA in Aeronautics
What Happens?
As an aircraft travels at the speed of sound, it begins to overtake the sound waves which pile up in front of the aircraft.

When the aircraft moves faster than the sound waves can travel, a massive shock wave is formed, creating a sonic boom which can be heard on the ground.
What’s NASA Up To Now?
What’s NASA Up To Now?
Questions?
Option: Engineering Design
What is an Engineering Design?

A. A way for you to be creative

B. Practical applications to real-world problems

C. A process for learning beyond the traditional textbook

D. All of the above
Step 1: Define the Problem
Step 2: Identify the Limits

STEP 1: Define Problem

STEP 2: Identify Criteria/Constraints
Step 3: Brainstorm
Step 4: Select Your Solution
Step 5: Make a Model

**STEP 1:** Define Problem

**STEP 2:** Identify Criteria/Constraints

**STEP 3:** Brainstorm Solutions

**STEP 4:** Select a Solution

**STEP 5:** Construct a Prototype or Model
Step 6: Test and Evaluate
Step 7: Share Results

STEP 1: Define Problem

STEP 2: Identify Criteria/Constraints

STEP 3: Brainstorm Solutions

STEP 4: Select a Solution

STEP 5: Construct a Prototype or Model

STEP 6: Test/Evaluate the Solution

STEP 7: Share the Solution
Step 8: Redefine and Redesign

- **STEP 1:** Define Problem
- **STEP 2:** Identify Criteria/Constraints
- **STEP 3:** Brainstorm Solutions
- **STEP 4:** Select a Solution
- **STEP 5:** Construct a Prototype or Model
- **STEP 6:** Test/Evaluate the Solution
- **STEP 7:** Share the Solution
- **STEP 8:** Refine the Design
What does the circular nature tell you?

- **STEP 1:** Define Problem
- **STEP 2:** Identify Criteria/Constraints
- **STEP 3:** Brainstorm Solutions
- **STEP 4:** Select a Solution
- **STEP 5:** Construct a Prototype or Model
- **STEP 6:** Test/Evaluate the Solution
- **STEP 7:** Share the Solution
- **STEP 8:** Refine the Design
Repeatability
Questions?
The Lesson
Preparation

- Watch the video
- Read the guide
- Gather materials
- Build and test the design
- Set up the classroom
Criteria & Constraints

- Set material limits
- Add a budget component
- Level playing field

NASA Goes Hypersonic
5 E’s: Engage

- NASA Connect Video
- Background Knowledge
- Engagement
5 E’s: Engage

- Marble activity
- Model average speed
- Journal: assess
5 E’s: Explore

- Build model
- Find speed as linear function
- Journals 2-3: check for understanding

Solar Airplane
5 E’s: Explore
Questions?
Important Note

- Altimeter image inaccurate. Use a yardstick or tie string to the hole in the protractor.
5 E’s: Explain

- Linear Functions
5 E’s: Elaborate

- Linear Functions
- Journal 4: Application
Evaluate

- Make a rubric
- Find Mach number
Questions?
Extensions

- Storyboard
- Aeronautics Research
- NASA Now: Flight Testing and Global Hawk
- NASA Now: The Speed of Sound
Why NES?
NASA + YOU = FUTURE
NASA Now classroom videos

- Words to know
- Discussion questions
- Career information
- Corresponding teaching materials
- Log your participation
Live video chat

explorerschools.nasa.gov
Questions?
Thanks to today’s presenter!

Jordan Snyder
NASA Explorer Schools Education Specialist
NASA Goddard Space Flight Center
Greenbelt, MD
Thank you to the sponsor of tonight’s web seminar:

This web seminar contains information about programs, products, and services offered by third parties, as well as links to third-party websites. The presence of a listing or such information does not constitute an endorsement by NSTA of a particular company or organization, or its programs, products, or services.
National Science Teachers Association
Gerry Wheeler, Interim Executive Director
Zipporah Miller, Associate Executive Director, Conferences and Programs
Al Byers, Ph.D., Assistant Executive Director, e-Learning and Government Partnerships
Flavio Mendez, Senior Director, NSTA Learning Center

NSTA Web Seminars
Brynn Slate, Manager
Jeff Layman, Technical Coordinator