

NEWS BREAK

Article: Martian parachute? Bothell firm made it pop

Section: BUSINESS, D1

Sunday's News Break selects an article from **Sunday, December 2, 2018** of The Seattle Times print replica for an in-depth reading of the news. Read the selected article and answer the attached study questions.

You are encouraged to modify this lesson to fit the needs of your students. For example, some classrooms may be able to use this as a worksheet and others might need to ask and answer the questions in a small group or larger, class discussion.

**Please be sure to preview all NIE content before using it in your classroom to ensure it is appropriate for all of your students.*

Standards:

CCSS.ELA-Literacy.RI.4.1

- Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-Literacy.RI.4.2

- Determine the main idea of a text and explain how it is supported by key details; summarize the text.

Objectives:

Students will learn about local companies that were involved with the latest Mars landing. They'll learn about the team of 30 engineers at Bothell's General Dynamics Ordnance and Tactical Systems and the mortar deployment system they've designed. Students will learn about how important their device was in this recent mission to Mars. They will talk about whether they're interested in science and engineering as a career and also whether they'd be interested in taking a trip to Mars when that becomes a reality. They will also talk about the pressure that engineering teams face as they create and build devices to do important work.

Pre-Reading Discussion:



- What do you think the article will be about?
- Are there clues in the picture?
- What can you infer?

Vocabulary Building:

Read this sentence, what do you think the highlighted words mean using *context clues*? A **context clue** is a word or words that are hints and refers to the sources of information outside of words that readers may use to predict the identities and meanings of unknown words.

“The company’s engine facility was sold to Sacramento-based Aerojet-Rocketdyne while the remaining operations were moved to Bothell and became part of General Dynamics’s **Ordnance** and Tactical Systems.”

Write your guess and then look up the definition and write it below your guess. How close did you come to the correct definition?

Ordnance Guess:

Ordnance Definition:

Comprehension Questions:

1. The parachute for the InSight mission to Mars is tested at NASA Ames Research Center in California. What did a Bothell firm’s device enable the parachute to do?
2. In nearby Bothell, a team at the General Dynamics Ordnance and Tactical Systems operation sat in front of a live video feed from NASA’s Mission

- Control, waiting for news about their own piece of the mission. What is the Mortar Delopment System and what did it do?
3. Why is this technology such an important piece of the mission?
 4. This isn't the first mission to the Red Planet for the General Dynamics team at the Bothell facility. Lichon and others there have worked on _____ Mars missions, starting with Pathfinder, back in 1996, and have turned explosive deployment into a fine art.
 5. The roughly _____ engineers and others on the mortar team handle every phase of development, from design and manufacturing to rigorous testing of what is, essentially, a parachute in a can.
 6. How does the team ignite the explosive propellant?
 7. How many times are the mortars tested? Where are they tested?
 8. Still, even with the rigorous testing, Lichon's team, like their crosstown counterparts at Aerojet-Rocketdyne, were on pins and needles during the now-famous "seven minutes of terror" phase that preceded the actual touchdown on the Martian surface Monday. When did his team receive notification that the parachute was deployed?
 9. What do the two companies have in common?

Discussion Questions (small/large groups), Journal Prompts or Essay Questions:

"If our system doesn't work, the whole mission is lost." -PAUL LICHON,
Director of General Dynamic's

- What kind of pressure must that be like for this team/company?
- How do they prepare for the mission?

Do you ever think about going into science and engineering as a career? Does working on a project like this sound fun and interesting? Why or why not?

How do you feel about more missions going to Mars to study the planet?

Some local companies are developing rockets to transport people to Mars. Would you be interested in going? Why or why not?

Did you know local companies were doing work like this?

News Break is posted to the Web on Monday. Please share this NIE News Break program with other teachers. To sign-up for the print replica for your class, please [register on-line](#) or call 206/652-6290 or toll-free 1-888/775-2655.
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Newsbreak Answer Key: December 2, 2018

Pre-Reading Discussion:

Answers will vary

Vocabulary Building:

Ordnance: Mounted guns; artillery. "The gun was a brand new piece of ordnance." Military weapons, ammunition, and equipment used in connection with them. "Unexploded ordnance"

Comprehension Answers:

1. They enabled the parachute to pop, aiding in the landing.
2. It's a small but powerful cannon designed to blast out the parachute that helped slow the InSight landing craft as it plunged through the Martian atmosphere.

The so-called Mortar Deployment System is a wastebasket-sized cylindrical device, roughly 18 inches long and 10 inches across, that uses a precisely calibrated explosion to rapidly inflate the a huge parachute behind the lander. That high-caliber shove is needed because the Martian atmosphere, at only one-hundredth the density of Earth's, is so thin that the parachute won't unfold on its own, said Paul Lichon, director of General Dynamic's Bothell operation.

3. And unless the chute deploys unfolds fully and precisely on time, correctly, within moments, Lichon said, the lander's braking rockets — supplied by Aerojet-Rocketdyne — wouldn't slow the lander sufficiently in time to avoid a crash landing.

"This is one of the few systems on the spacecraft that is 'single-point failure,' " said Lichon. "If our system doesn't work, the whole mission is lost."

4. 8 missions
5. 30 engineers
6. At one end of the can is a gas generator that uses two initiators which, at a command from onboard computers, ignite a proprietary explosive propellant to blast the chute out of the back of the falling lander.
7. Lichon says the mortars are tested hundreds of times, both at the Bothell facility and at a location in Moses Lake, where technicians have enough space to deploy the entire parachute.

8. Indeed, the main difference, Lichon said, was that his team's moment of truth came about halfway through the seven-minute descent, when they got "confirmation that the parachute was deployed."
9. The two companies share more than a role on the In-Sight Lander Mission: both can trace their corporate lineage back to a Boeing aerospace spinoff called the Rocket Research Company.

Founded in the 1960s, Rocket went through a series of name changes and restructurings until 2001, when it was purchased by Falls Church, Virginia-based General Dynamics and split into two entities.

The company's engine facility was sold to Sacramento-based Aerojet-Rocketdyne while the remaining operations were moved to Bothell and became part of General Dynamics's Ordnance and Tactical Systems.

Discussion Questions (small/large groups), Journal Prompts or Essay

Questions: Answers will vary