
SpaceX Does What Government Won't

Segment Length: 5:36 minutes

Lesson Description:

What is happening with NASA and our space program? What is SpaceX? How are entrepreneurs revitalizing America's space exploration and making space flight more affordable? In this segment, John Stossel looks at entrepreneurship and innovation in space travel.

Concepts & Key Terms:

Free Enterprise – an economic system in which privately-owned businesses compete with relatively little government involvement.

Government Contract – an agreement in which government pays a business for products or services rather than create those products or services itself.

Commercial Space Flight – space flight services offered by private companies in pursuit of profit rather than by a government agency.

Objectives:

Students will be able to:

- list differences between government incentives and business incentives
- compare NASA to private companies such as SpaceX
- discuss how entrepreneurs are changing the future of space flight
- theorize about the future of space travel

Preview Activity and Questions:

Have students answer the following question in their notebooks:

If space travel and tourism become more commonplace and affordable, would you go?
Why / Why not?

OR

Use Think, Pair, Share to discuss what happens when businesses spend money to innovate and create new technologies.

OR

Distribute copies of the K-W-L worksheet to the class. Have students fill in the K and W sections. After showing the video, have students complete the L section and answer the question at the bottom of the worksheet.

Viewing Guide:

We recommend that teachers show the video segment twice: once to allow students to view the video and focus on the issues presented, and once to allow them time to complete the viewing guide. After they complete the viewing guide, allow students a few minutes to work in pairs sharing and verifying answers.

Answers to Viewing Guide

1. private companies
2. NASA
3. reusable
4. friction
5. entrepreneurs, profit

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Viewing Guide

Name _____

Date _____

Class _____

Teacher _____

Directions: As you watch the video, fill in the blanks with the correct words.

1. Robert Zubrin, author of *The Case for Space*, points out that _____
_____ now do what NASA couldn't even imagine doing: send people into space affordably.
2. _____ pays contractors development costs and then adds ten percent profit. The more projects cost, the bigger the contractor's profit.
3. One Musk innovation was _____ rocket boosters. For years NASA dropped theirs into the ocean.
4. With a system like Starship, you could travel on Earth from anywhere to anywhere in less than an hour flying through space because there's no _____ in space.
5. Government didn't know what to do with the Model-T, the early computer, the Wright brothers' plane. It took competing _____ pursuing _____ to turn them into the great things we have now.

Now, take a few moments to reflect on the video and answer the questions below:

What role does the profit motive play in innovation in private companies such as SpaceX? _____

How does that differ from NASA's contractors? _____

How have entrepreneurial innovations affected your life? _____

Discussion and Analysis:

1. Prior to the 2020 launch, how long had it been since a spacecraft with astronauts aboard was launched? Whose spacecraft was it?
2. What makes SpaceX different from NASA?
3. What similarities and difference are there in the way private companies and government agencies operate financially?
4. Why did the United States endeavor to land a man on the moon by the end of the 1960s?
5. “Apollo was purpose-driven,” Robert Zubrin said. What does that mean? Why is this significant to NASA’s success with the Apollo missions?
6. What was the point of Robert Zubrin’s story about Lockheed Martin’s resistance to his innovation that would deliver double the rocket payload capacity for ten percent additional cost?
7. In the video, a NASA administrator said that NASA has not been good at maintaining schedule and it has not been good a maintaining costs. Why might that not matter to a government agency? Why might that matter to a private business?
8. Had you seen a floppy disk before? Where? What types of data storage have come out since the introduction of floppy disks?
9. Aerospace lawyer James Dunstan noted that NASA provides jobs in many different states. Why is this important?
10. Why did Elon Musk’s SpaceX pursue reusable rocket boosters?
11. Now that there are competitors such as SpaceX and Blue Origin, launch costs are falling. Why?
12. SpaceX’s Starship is taller than what famous landmark? What is the plan for that ship?
13. Robert Zubrin told the story about Benjamin Franklin’s electricity demonstration. When asked what possible use electricity could have, Franklin answered, “Of what use is a baby?” What did Franklin mean? How does that apply to the invention of the car, computer, airplane? How might it apply to private space flight?
14. How is competition portrayed in this video, as something bad or good? Does that contradict the idea of teamwork, people working together to achieve a goal? Why / Why not?
15. If space travel and tourism become more commonplace and affordable, would you go? Why / Why not?

Discuss These Lines from the Video:

1. NASA hasn’t sent anyone into space for years. This rocket was launched by Elon Musk
2. When you don’t have a truly commanding purpose, the purpose of the program becomes to supply money to various suppliers.

3. You have good people engaged in cost maximization because you just gave them an incentive to do that.
4. Astronauts would bring their laptops with them in space because the shuttle computers were obsolete.
5. By spreading its centers across the country, NASA can get more support from more different [*sic*] congressmen.
6. Eleven years ago, an Obama committee concluded building a rocket as powerful as this would take twelve years and cost \$36 billion. Musk did it in six years with less than \$1 billion—because it was his money he was spending!
7. If you had to get a new plane every time you flew somewhere, very few people could afford to fly.
8. With a system like Starship, you could travel on Earth from anywhere to anywhere in less than an hour flying through space because there's no friction in space.
9. This is fascinating Dr. Franklin, but what possible use could this electricity ever have? He answered, "Of what use is a baby?"
10. Government didn't know what to do with a Model T, the early computer, the Wright brothers' plane. It took competing entrepreneurs, pursuing profit, to nurture them into the good things we have now.

Quotes for Discussion:

Space is for everybody. It's not just for a few people in science or math, or for a select group of astronauts. That's our new frontier out there, and it's everybody's business to know about space.
– Christa McAuliffe

The Earth is the cradle of humanity, but mankind cannot stay in the cradle forever.
– Konstantin Tsiolkovsky

I'd like to hear all these folks who call themselves commercial space tell me who their investors are. Tell me where their marketplace is. A commercial venture is supposed to use private money. And who are their users? Suppose we, NASA, have no need for their services. There's no other marketplace for them. So is it really a commercial venture, or is it not? – Gene Cernan

It's critically important that we change the contracting structure to be a competitive commercial bid—make sure there are always at least two entities that are competing to serve NASA and that the contracts are milestone-based with concrete milestones.... I can't tell you how important that contract structure is. That is night and day, and there is way too much in government where it's the sole source, cost-plus contract.
– Elon Musk

I think the best way for us at Blue Origin to help other space entrepreneurs is to solve that problem of getting payloads into orbit at incredibly low cost, because that would unlock the power of thousands of entrepreneurs. That's what we are focused on.
– Jeff Bezos

Private enterprise will never lead a space frontier. In all the history of human conduct, it's as clear to me as day follows night that private enterprise won't do that, because it's expensive. It's

dangerous. You have uncertainty and risks, because you're dealing with things that haven't been done before. That's what it means to be on a frontier.... The government is better suited to these kinds of investments. They have a longer time horizon. They're not shackled to quarterly reports like you see in a private enterprise.

– Neil Degrasse Tyson

Ever since I saw the moon landing as a young teenager, I was determined I would go into space one day. Because governments ran space travel, I soon realized they weren't really interested in you or me going to space. So I decided I would never have the chance to go into space unless I hurried up and created our own spaceline.

– Richard Branson

I believe that space travel will one day become as common as airline travel is today. I'm convinced, however, that the true future of space travel does not lie with government agencies— NASA is still obsessed with the idea that the primary purpose of the space program is science— but real progress will come from private companies competing to provide the ultimate adventure ride, and NASA will receive the trickle-down benefits.

– Buzz Aldrin

I think commercial space travel is critical. We're not really going to do much in space at all until the price to low-Earth orbit gets driven down. Then there will be a commercial space enterprise and economics will see to it from there. If you can imagine a scenario where, for \$50,000 you can go into space and spend a week on a space hotel, like a space station, and the whole process were as safe for you as international [air] travel is today, I think people would be lining up to do that. There would be infinite demand.

– Andy Weir

Activities:

1. Have students finish the K-W-L chart in class or for homework.
2. Have students complete the accompanying PMI chart in class or for homework.
3. Research the history of NASA and its Apollo moon missions. Then, research one of the commercial space flight companies (e.g., SpaceX, Blue Origin, Virgin Galactic, etc.). Write a brief history of how NASA succeeded and what important differences exist between NASA and the company you chose to research.
4. Read and write a summary of one of the following articles:
 - A) “SpaceX Is Giving an Open Demonstration of Crony Capitalism” by Sean Noble
<https://fee.org/articles/spacex-is-giving-an-open-demonstration-of-crony-capitalism/>
 - B) “NASA Price Increases Highlight The Need For An Open, Transparent Marketplace” by Michael Busler
<https://fee.org/articles/nasa-price-increases-highlight-the-need-for-an-open-transparent-marketplace/>
 - C) “You Can't Shut Down Space” by Katherine Mangu-Ward
<https://reason.com/2019/03/31/you-cant-shut-down-space/>
 - D) “Elon Musk's First Astronaut Launch Is One Giant Leap For Space Capitalism” by Alex Knapp
<https://www.forbes.com/sites/alexknapp/2020/05/25/elon-musks-first-astronaut-launch-is-one-giant-leap-for-space-capitalism/#8a5bb772b49a>

5. Produce a “man-on-the-street” video in which you ask people what they think of companies developing rockets and sending people into space for exploration or tourism. In lieu of person-to-person interviews, students can ask their online friends or conduct online video interviews.
6. Watch “Billionaires in Space: How Musk, Bezos, and Branson Could Save Humanity” and “The Silicon Valley Space Race: Elon Musk vs Jeff Bezos – BBC.” Then, write a short essay about what you learned from these videos and what you think the future of space travel will look like.
Billionaires in Space: <https://www.youtube.com/watch?v=hwyJXBWpAHw>
The Silicon Valley Space Race: <https://www.youtube.com/watch?v=pyG54C48KLU>
7. Research the history of the Space Race between the United States and Soviet Union. Then, create a short storybook to explain what happened and how the U.S. won the race to the moon. Include in your storybook your own illustrations or print them from the internet.
8. In the video, John Stossel says that the Pentagon stopped using floppy disks only recently. Research and write a brief report on this issue.
9. Write a profile on Robert Zubrin that includes his biographical details, his ideas about commercial space flight from the video and editorials he has written, and a summary of one review of his book, *The Case for Space*.
Editorial: <https://www.nationalreview.com/2019/06/nasa-human-spaceflight-priorities-moon-landing-goal/>
Editorial: <https://www.nationalreview.com/2020/01/mars-human-space-exploration-rebuttal-to-naysayers/>
Editorial: <https://www.nationalreview.com/2020/02/mars-elon-musk-plan-to-settle-red-planet/>
Review: <https://www.forbes.com/sites/gregautry/2019/05/16/robert-zubrin-makes-a-strong-case-for-space-development/#1bec23a0676f>
Review: <https://www.usatoday.com/story/opinion/2019/05/07/spacex-blue-origin-virgin-galactic-robert-zubrin-case-space-column/1119446001/>
10. Robert Zubrin and John Stossel argue that private companies have an advantage over government agencies such as NASA and that further space exploration is likely to be pioneered by the private sector. Create two infographics, one to support the views of Zubrin and Stossel, and another to promote the view that government is best suited for future space exploration. Finally, write a paragraph explaining which side you find more persuasive and why. (You may want to search the internet to find the best arguments for and against private space exploration.)
11. Research the history of U.S. space-related accidents, both with NASA and private companies. What were the causes of the accidents? What were the results?
12. Take one of the insights from the video (private businesses are usually better at innovating than is government, government contracts can incentivize cost maximization, agencies such as NASA have an incentive to win the support of many congressional representatives by creating jobs in different states, or another insight from the video) and apply it to a different innovation or government agency. Present your ideas in a slideshow.

13. Those who favor the free market have disagreements about Elon Musk's SpaceX. Find one article praising SpaceX as an example of the power of free markets and private enterprise and another article criticizing SpaceX as an example of crony capitalism. Write a summary of what you learn and conclude with your thoughts on what free market advocates should learn from SpaceX.

14. Imagine a future where the moon houses permanent bases and companies like Blue Origin and SpaceX have made space travel affordable. Write a story about a space entrepreneur living in this future. Describe the product or service he or she is selling and how today's entrepreneurs and innovators made that possible.

Name _____ Date _____
Class _____ Per _____ Teacher _____

SpaceX Does What Government Won't K-W-L Chart

Directions: Complete the **K** and **W** sections prior to watching the video. After you have seen the video, complete the **L** section and answer the two questions below the K-W-L chart.

K	W	L
What I know about space flight:	What I want to know about current and future space flight:	What I've learned about current and future space flight:

What is most interesting about what you learned from this video?

What is one prediction you can make about the future of space travel?

Name _____
Class _____ Per _____

Date _____
Teacher _____

SpaceX Does What Government Won't PMI Chart

- P = Plus:** What might be some positive effects of commercial space flights?
- M = Minus:** What might be some negative effects of commercial space flights?
- I = Interesting:** What is interesting about commercial space flights?

+ Pluses +	- Minuses -	I

How are entrepreneurs revitalizing America's space exploration and making space flight more affordable? _____

Should private space flight be allowed to continue or should the government stop it? Explain. _____

