

Grades 6-8

NOVA “Meteor Strike”

Blinding streaks of light streaming across the Russian sky, followed by a shuddering blast strong enough to damage buildings and send more than 1000 people to the hospital. On the morning of February 15th, a 7000 ton asteroid crashed into the Earth's atmosphere, exploded and fell to earth across a wide swath near the Ural Mountains. According to NASA, the Siberian Meteor, which exploded with the power of 30 Hiroshima bombs, was the largest object to burst in the atmosphere since a 1908 event near Siberia's Tunguska River. That time there were few eyewitnesses and no record of the event except for thousands of acres of flattened trees. This time however the event was captured by countless digital dashboard cameras, which have lately become a common fixture in Russian autos and trucks. Within days, armed with this unprecedented crowd-sourced material, NOVA crews hit the ground in Russia along with impact scientists as they hunt for debris from the explosion and clues to the meteor's origin and makeup. To understand how lucky we were this time, we explore even greater explosions in the past, from Tunguska to the asteroid that extinguished the dinosaurs 65 million years ago. "Russian Meteor Strike" puts it all together and asks: Is our solar system a deadly celestial shooting gallery - with Earth in the cross-hairs? What are the chances that another, even more massive asteroid is heading straight for us? Are we just years, months or days away from a total global reboot of civilization, or worse?

After watching this episode, choose from the following questions and/or tasks to extend your learning

Question Box 1

- What happened on the morning of February 15, 2013?
- How big of a crater did the 7,000 ton asteroid leave on the surface of the Earth?
- Where are the Ural Mountains?
- Determine the power of 30 Hiroshima bombs.
- What event happened in 1908 near Siberia's Tunguska river?
- What was it that recorded the 1908 event?
- What captured the event of February 15, 2013?
- Why did NOVA crews hit the ground in Russia?
- Why did scientists hunt for debris from the explosion?

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- How can finding debris help scientists determine a meteor's origin and makeup?
- What are the chances that another, even more massive asteroid is heading straight for us?
- Are we just years, months or days away from a total global reboot of civilization, or worse?
- How does the computer simulation show the devastating blast wave?
- Explain the differences between metal and rock meteorites?
- Explain how the asteroids change their orbits.
- What is known as an evolutionary cauldron?
- What does Galapagos mean?

Question Box 2

- Do you think an asteroid extinguished the dinosaurs 65 million years ago? What evidence supports or refutes this hypothesis?
- Why do meteorites decrease in size?
- How can I calculate the age of the meteorite?
- Explain the density of meteorites?
- Why do the shock waves come after the light of the meteorite?
- How could scientists not track this meteorite?
- What did scientists mean by saying "we are driving through our solar system without insurance"?

Question Box 3 (Tasks)

- Record a shooting star and calculate its speed and direction.
- Make a model (drawing) of Earth's atmosphere and entry point of the meteorite.
- Make a shadow model of an object and do a STELLAR calibration.
- Create a star field model of your home area.
- If a 7000-ton asteroid was 30 times the power of a Hiroshima bomb (approximately 15 kilotons of TNT and a blast radius of 1 mile), where should scientists look for debris from this asteroid? If this is a proportional relationship, how much would an asteroid have to weigh to impact in Siberia and reach the United States (5,600 miles)?

Question Box 4 (Enrichment)

- As you learn about the meteor of 2013, investigate where other sizable meteors have fallen and have left a major impact on the earth's surface. *(ELD) Create a graph to show the sizes and list the places where they made the impact.*
- Record a shooting star and calculate its speed and direction.
- Help calculate the total distance and speed based on footage of the video.
- Estimate the size and mass of the meteor.
- Make a physical model of a meteorite as it comes through the atmosphere.
- Make a model of SENTINEL.
- How can asteroids be deflected from earth?
- Can we predict when the next BIG Rock will hit the Earth?

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Question Box 5 (Extend/Real-Life)

- Some people have a hard time visualizing what the impact would be from such a large object. This link provides you the opportunity to calculate the impact a meteor could have on the earth, moon, or mars. Go to this website:
http://down2earth.eu/impact_calculator/planet.html?lang=en-US
- Select the moon or planet of your choice.
- Select all of the variables (write down each variable)
- Submit your selections to see a simulation of the impact made by your meteor.
- Make sure to look at the width of the crater, the depth, and the data. Write down the results.
- Repeat steps 2-6. (Write down the results)
- What surprised you about the impact?
- What surprised you about the differences in the results? Why do you think they were so different?
- Do you enjoy calculating and predicting events based on data? Why or why not?
- List three careers that require these skills. (Hint: They are not all related to science.)
- Which of the three careers would you prefer, and why?