

Grades 6-8

Nova, “Why Bridges Collapse”

In 2018, Italy’s Morandi Bridge collapsed, tragically killing 43 people. For 50 years, the iconic bridge had withstood the elements—and stress from ever-increasing traffic. What went wrong that fateful day? And how can new engineering technology protect bridge infrastructure to prevent such tragic failures in the future? Through eyewitness testimony, expert interviews, and dramatic archival footage, NOVA investigates the Morandi disaster and other deadly bridge collapses.

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

Question Box 1

- What is the central idea? How is the central idea developed?
- Cite evidence from Nova “Why Bridges Collapse” to support your determination of the central idea.
- Provide an objective summary of the program.
- What details in the program influenced future events? Provide evidence.
- The Morandi bridge collapsed in 2018. You would think that modern engineering would not let that happen. Why did the bridge collapse?
- What was the bridge made of?
- Were there any warnings that certain bridges would collapse? What were they?
- How did this collapse help with future engineering of bridges?

Question Box 2

- What is the one thing you particularly want people to notice when they watch Nova “Why Bridges Collapse”?
- What were some of the most interesting parts of this program? Explain.
- Why do you think people ignore warning signs?
- What are some iconic bridges that come to your mind? Have you ever crossed one of these bridges? How did you feel? How do you think you would feel about walking across the Golden Gate Bridge?

Box 3 (Tasks)

- Research and discuss with evidence the use of triangles in bridge construction.

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- Beam bridges are simple bridges used to cross short distances, usually less than 250 feet. If a longer distance is required, multiple beam bridges are joined together. How many beam bridges would be needed to build a bridge that is $\frac{1}{2}$ a mile long? Justify your reasoning using mathematics.
- The Golden Gate Bridge is an example of a suspension bridge. Suspension bridges can be used in wide areas that other bridges cannot be used. They can also cost less because of the smaller amount of materials used to create them than other types of bridges. The Golden Gate Bridge is 8,981 feet long, 746 feet high and was completed in 1933. Use mathematics to justify why cars are charged \$8.20 in only one direction to use the bridge.
- Use toothpicks, scraps of wood, twigs or something else to create a bridge model. Estimate how much weight it will hold and then test it.

Box 4 (Enrichment)

- Research at least three different types of bridge designs and what each design is best suited for.
- Research modern bridge technology and contrast that with older techniques.
- Explore the highway to Key West, Florida. How was this bridge across a large span of water created? Can you think of another way?
- Can you make a cairn arch from rocks like in this video?
<https://www.youtube.com/watch?v=Z3xsP9GzbkY>

Box 5 (Extend/Real-Life)

- Research and discuss what measures are taking in the United States to insure bridges our bridges are dependable and in good working order.
- Research and describe the process engineers use to design bridges in the United States.
- Engineers work in many different industries from transportation to Arts, Media, and Entertainment.
- Research Engineer careers
 1. <https://www.cacareerzone.org/search/occupations/engineer>
 2. Note this link gives 244 Engineering related careers across 15 industry sectors.
 3. To narrow this search, from the drop-down menu select industries you are most interested in.
- What types of engineering careers surprised you the most? Why?
- If you were going to consider a career in Engineering what type of engineer would you be?
- What classes have you taken in school that would help prepare you for a career as an engineer?