mystery science

Grades K-5
Mini-Lesson: “How do you build a bridge that lasts for 100 years?”

VIDEO TRANSCRIPT

Hi, it's Jay! Check out these amazing bridges. There are millions of bridges around the world. Some built super recently like this one in Singapore or this one in Brazil, and others like this stone bridge in the Czech Republic that have been standing for a long time. Someone named James has a question about bridges. Let's give James a call now.

[Video Call]

- Hi, Jay!

- Hi, James!

- I have a question for you. How do you build bridges that last over a hundred years?

- That's a great question.

Building a major city bridge is hard. It takes many people. Engineers to design and plan the bridge, politicians and business leaders to raise money and supply materials, construction workers to actually build it, and more. All those people have to work together. Think about if you were a member of a team building a bridge. What job would you want to have? Now would be a good time to pause the video and discuss. Okay, are you ready? A lot of work goes into constructing a bridge. Designing it, planning where and when to build it, gathering materials, building, testing, and more. But if the team building it works together, a finished bridge can be an amazing accomplishment. Like, check this out. This is the Brooklyn Bridge. The Brooklyn

Bridge connects two of the busiest parts of New York City, Manhattan and Brooklyn. Even though it's over a hundred years old, still thousands of people cross the Brooklyn Bridge each day and more than a million tourists visit it each year. Given that it's one of the most famous and beloved bridges in the entire world, you might think it was built by experts who knew exactly how to make building a bridge go smoothly. But that's not what happened. Building the Brooklyn Bridge was a difficult task from the beginning. The bridge had to be really long because the river it was supposed to cross—the East River—is really wide. The East River was crowded with boats. so the bridge had to be really tall so huge ships could pass underneath. And the bridge had to be really strong. Strong enough to support traffic from two of the most crowded cities on earth. The plan was to start by building two tall towers. The base of each tower would be buried deep in the bottom of the river. The bridge itself would hang or suspend from wires attached to the towers. This is what's called a suspension bridge. If everything went according to plan, the Brooklyn Bridge would be the longest bridge ever built and the tallest structure anywhere in North America. But everything did not go according to plan. Construction was one disaster after another. To build the foundations of the towers, workers had to dig deep underwater and underground. For hours and hours each day, they hauled heavy loads of rock and earth around dark, hot, cramped spaces. Many workers quit each week. Even worse, building the towers turned out to be very dangerous. People got hurt and sick from their work. Some even died. Three years into the build, the unfinished bridge sat in the river. Two useless hunks of stone and metal. The project had already cost way more money than it was supposed to. Dozens of workers were too injured to return. The project's first leader, the Chief Engineer had been killed in a construction accident and his replacement Chief Engineer, Washington Roebling was hurt so badly from working on site that he couldn't even leave his bedroom. Everyone was close to giving up. Then, this woman got involved. This is Emily Roebling. Emily Roebling was married to

Washington Roebling, the Chief Engineer. Unlike her husband, Emily had no formal training as an engineer. She'd never worked in politics or as a construction worker but she was determined to get the bridge built. She started with her husband. Though he was very sick, she helped him keep working, writing letters for him so he could supervise construction from his bedroom window. At this point, the project leaders decided to change plans. They'd originally planned to dig the second tower deeper into the riverbed, but that clearly wasn't safe for workers. Plus, it was expensive. It would have to be good enough as it was. And the build had another huge task ahead. Hanging the wires from the towers and building the road itself. This wasn't going to be easy. To hang the wires, workers climbed high into the air. Sometimes higher than 200 feet. Look how small the rest of the city looks from way up there. At this time, there were no high-tech safety helmets to help. Workers had to climb from tower to tower on shaky bundles of wires and boards. It was a bit like working on a jungle gym. A 20-story tall, really, *really* dangerous jungle gym. Emily took on more and more work. She visited the construction site daily. She met with workers, engineers, and politicians. She helped the huge team resolve disagreements, work through their daily problems, and convinced them not to give up on the goal—a finished bridge! It took 11 more years of difficult, dangerous, expensive work, but eventually, the Brooklyn Bridge was completed. It was tall, strong, and beautiful—everything the team that built it had ever hoped it would be. The Brooklyn Bridge opened to the public and it's still open now over a hundred years later. So in summary, building a bridge isn't always a smooth process. It takes a lot of people working together and that team has to figure out ways to keep going even when things go wrong. Building the Brooklyn Bridge nearly failed but because the team behind it persisted through challenges, they made something that people still use and love today. That's all for this week's question. Thanks, James, for asking it!