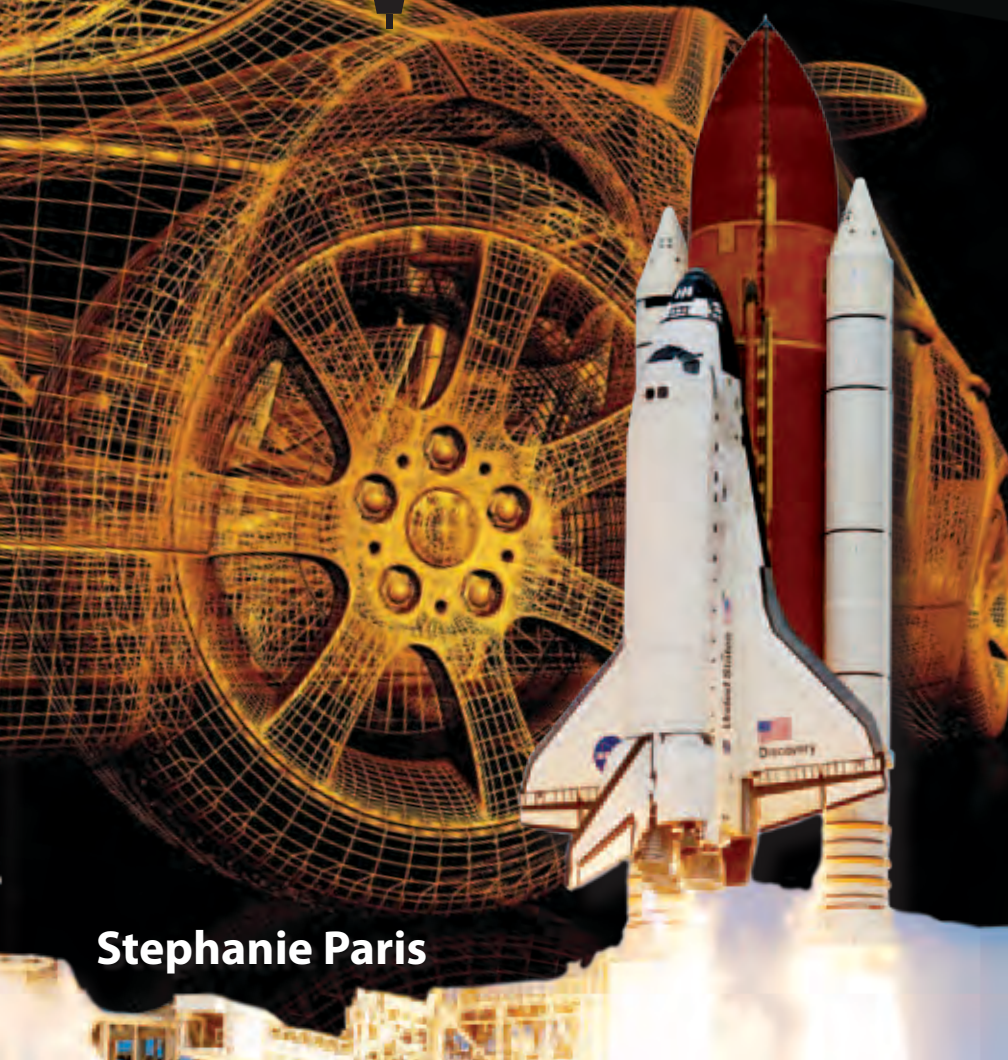
TIME FOR KIDS

Engineering

Feats & Failures



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For teachers' inspection ONLY

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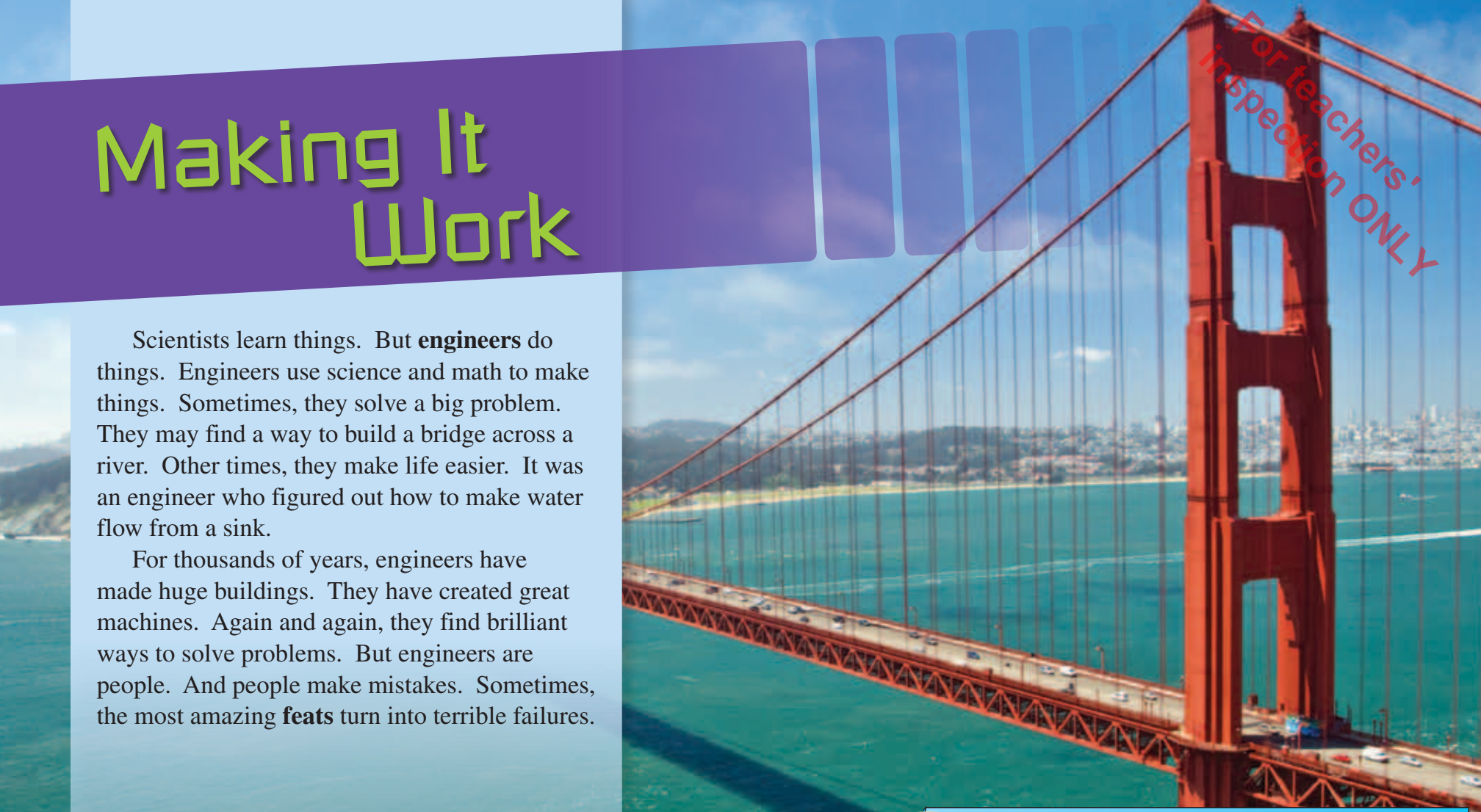
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Making It Work

Scientists learn things. But **engineers** do things. Engineers use science and math to make things. Sometimes, they solve a big problem. They may find a way to build a bridge across a river. Other times, they make life easier. It was an engineer who figured out how to make water flow from a sink.

For thousands of years, engineers have made huge buildings. They have created great machines. Again and again, they find brilliant ways to solve problems. But engineers are people. And people make mistakes. Sometimes, the most amazing **feats** turn into terrible failures.

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- How is new technology developed?
- Why are failures and mistakes big parts of success?
- How have advances in science, technology, and engineering improved our lives?

Early Engineers

Ancient engineers made huge structures with basic tools. They used ramps, levers, and simple rollers. These tools helped them build monuments that still impress people today. People are still trying to figure out how these ancient engineers did their work!

The Great Pyramid of Giza

Because they were built so long ago, few ancient feats can still be seen today. But there are some. The Great Pyramid is the only Ancient Wonder of the World that still exists. It was built as a tomb for **Pharaoh** Khufu. It is nearly 450 feet high. Each side measures 756 feet long. It is made from over two million blocks of stone. Each block weighs over two tons! Scientists think workers built large wooden ramps. Then, they dragged each block into place.

There are seven official Ancient Wonders of the World, including gardens, monuments, temples, and a great lighthouse. All the ancient wonders were built between 2650 BC and 280 BC.

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Pyramid Workers

Egyptian records show that many of the pyramid workers were forced to work. But they were treated well by the standards of the time. There were rules about how many hours they could work each day. They had fair **wages**, and there were even official holidays.

Monument Math

If the Great Pyramid has 2,300,000 stones and each stone weighs 2.5 tons, how heavy is the Great Pyramid?

2.5 tons x 2,300,000 stones = ?

The Great Wall

Ancient Chinese rulers had a problem. They needed a better way to stop invaders. So they built a wall nearly 25 feet tall and 2,000 miles long. The wall wasn't built overnight. It took close to 1,800 years to complete.

The wall was made in **segments**. The segments were connected over many years. Together, they form the giant wall that exists today. **Passes** allowed people to travel from one side of the wall to the other. Soldiers watched for danger from **signal towers**.

Engineers used rivers, lakes, and mountains to extend the wall. With these natural dividers, the wall protects over 5,500 miles.



The Great Failure

Even though the Great Wall is the longest wall in the world, eventually it failed to keep out invaders. Genghis Khan (GANG-gus KAHN), a Mongol ruler, and his army were a threat to China. In part, the wall was built to stop them, but they found a way around it. Kahn and his army **conquered** most of China in AD 1211.

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