



Lesson 7: Why College Is Important

Arizona Science Standards

7.P2U1.3 - Plan and carry out an investigation that can support an evidence-based explanation of how objects on Earth are affected by gravitational forces.

Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity, Systems and System Models, Energy and Matter, Structures and Function, Stability and Change.

Background Information : There is gravitational force between two masses, but it is very small except when one of both objects have large mass. On Earth, gravity results in everything being pulled down towards the center of the Earth. We call this downward attraction the weight of an object. The object pulls the Earth as much as the Earth pulls the object, but because the Earth's mass is much bigger, we observe the resulting motion of the object, not of Earth.

Hello, welcome to Engineers of the Future remote learning. My name is Nicki Langley, and I am a student at Arizona State University. I am going to be your mentor for today's lesson.

Our program is going to teach you about science, technology, engineering, and math. It is called STEM learning.

We will build a fun project about the strength of bridges in a minute, but first I want to tell you more about why you should consider going to college after graduating from high school and how it can “determine your future.”

Why is it important to go to college?

- Earning a college degree is important for your future.
- Attending college is a great way to learn about many subjects, such as math, science, communications, history, computer program, and writing.
- Going to college you might discover what interests you, so you can study for the job you want to work at in the future.
- Earning a college degree can determine the job you are qualified to get and how much money you earn.
- Right now, in a competitive job market that is happening, it is crucial to have a degree from the skills and lessons you earned in college.
- In fact, many jobs require you to have a college degree. If you do not, they will not even consider hiring you.

There are several types of degrees you can earn

- An Associate Degree requires two to three years of college.
- To earn a bachelor’s degree, you are required to take 4 years of college.
- A Master’s Degree requires you to earn to bachelor’s degree – and then, two more years of college.
- To earn a Doctorate degree. You must earn a bachelor’s and master’s degree, and then spend another two to three years to earn your PhD.

These are the “top paying” jobs

- Mechanical engineering
- Computer engineering
- Geological and geophysical engineering
- Computer science
- Civil engineering
- Applied mathematics
- Industrial and manufacturing engineering
- Physics

College can be expensive but there are ways you can get money to help you attend a University.

- Many students qualify for financial aid, scholarships, grants, and loans.
- The less money you have, the more financial aid you will qualify for.
- There is work-study money that is set aside that you work for.

What if I an immigrant with no legal documents, can I still go to college? Yes, you Can!

- You can start early, by telling your school counselor that you want to go to college.
- They will let you know the classes you need to take in high school to be admitted to college.
- People from all over the world attend college, whether they are U.S. Citizens.

“Today we are going to: Build the Best Bridge”

Credit: Ben Finio, PhD, Science Buddies

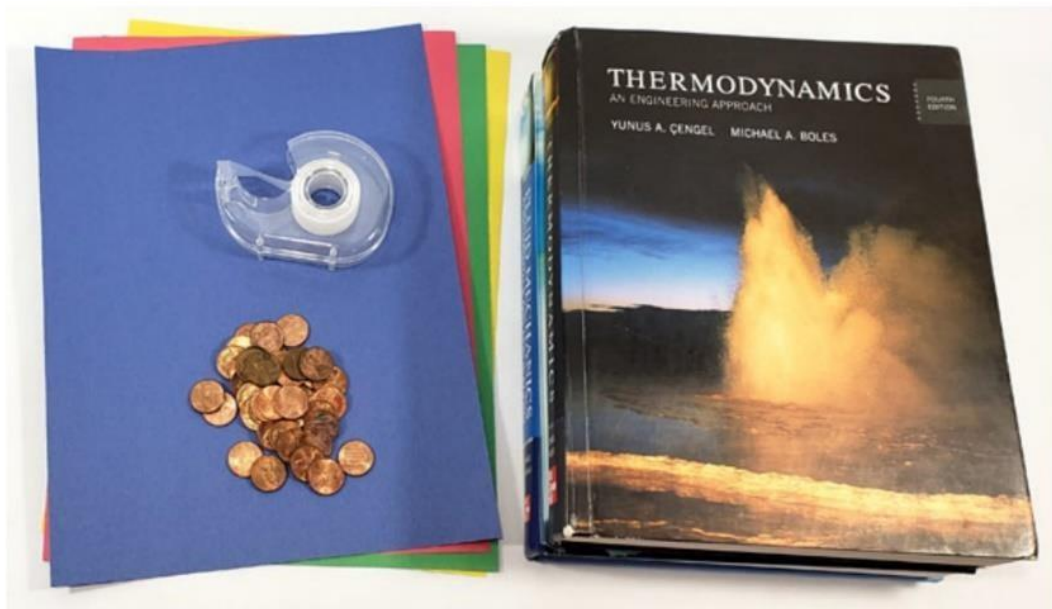
Here are the Key Concept we are going to learning about:

MATERIAL PROPERTIES, STRENGTH AND WEIGHT.

Details: Bridges come in all shapes, sizes, and materials. What makes a bridge the strongest? We are going build a simple bridge with paper and test to see how much weight your bridge can hold.

MATERIALS:

- Two thick books or small boxes
- Paper
- Tape
- Coins or other small, heavy objects to use as weights (small rocks, nuts and bolts, etc.)



Procedure

1. Place your books about 10 inches apart.
2. Lay a single piece of paper across the books.
3. Place a penny in the middle of the paper. What happens? If the “bridge” does not collapse, try adding more pennies.
4. Fold the piece of paper in half lengthwise and try again. Does the bridge hold more pennies this time?
5. Now fold the paper into a “channel” shape. Fold the paper in half lengthwise twice. Then, fold up the edges to form walls. Use tape to hold the edges in place, to prevent the bridge from unfolding.
6. Place a penny in the middle of the bridge. One at a time, keep adding pennies along the length of the bridge.
7. This simulates how real cars and people are spread out along the length of a bridge. Do not stack them all on top of each other in the middle.
8. If you fill up the whole bridge, start a second layer of pennies. Keep adding pennies until the bridge collapses.
9. Experiment with different shapes for your bridge. For example, try changing the number of times you fold the paper in half, the width of the base, or the height of the walls.



What shape makes the strongest bridge?



What Happened?

- You probably found that a single, flat piece of paper could barely support its own weight, let alone any pennies.
- Folding the paper in half may have made it strong enough to support a few pennies.
- The more times you folded the paper in half, the stronger it got.
- Changing the shape of the bridge to give it vertical "walls" made it significantly stronger, and it could probably hold dozens of pennies.
- While a horizontal piece of paper is very easy to bend in the vertical direction, the vertical wall sections are very difficult to bend in the vertical direction, making the bridge very strong.

Thanks for watching today's lesson.

Remember to keep studying, to go to college.

We will have even more cool STEM lessons and project builds coming up, right here on the Engineers of the Future YouTube channel.