



Computers are Everywhere

A digital revolution! Channel your inner computer scientist while designing a supercomputer that solves big-world problems.

Materials:

- Pencil
- Paper
- Scissors
- Assorted craft supplies, such as: cardboard, cups, duct tape, masking tape, paperclips, pipe cleaners, popsicle sticks, rubber bands

How To:

First, read through the STEM Explanation below to learn more about computers and their problem-solving capabilities!

Next, think about a problem that you face in your everyday life. Or, think about a problem that the world faces. How could a computer help solve this problem? Take out a paper and pencil and sketch a design for your computer. To help with your brainstorm, answer the following questions about your problem-solving computer:

1. What problem will your computer solve?
2. What types of materials will your computer be made out of? Why?
3. How big or small would your computer be?

Now, build a prototype of your problem-solving computer! A prototype is a sample, or model, of your computer, and doesn't have to look exactly like the final product.

STEM Explanation:

Computers are electronic tools that process information. We use computers to watch videos, listen to music, video chat, store data, online shop, and so much more! Where have you seen computers?

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Computers are nearly EVERYWHERE! We see them in schools, homes, the cell phones in our hands, and even our cars. Computers come in different shapes and sizes! Cell phones and smartwatches are tiny computers. In contrast, many of the most powerful supercomputers take up multiple rooms.

Today, all computers have something called a Central Processing Unit, or CPU. Many computers just have one CPU, but some have *thousands* of CPUs! Computers with thousands of CPUs are so fast that they are called supercomputers. A supercomputer is capable of processing vast amounts of information in an incredibly short amount of time. Supercomputers perform functions that our day-to-day computers can't handle. They can also be used in the following ways:

- Weather Forecasters used the Texas Advanced Computing Center (TACC) supercomputer Ranger to determine the path of Hurricane Ike in 2008, improving the five-day hurricane forecast by 15 percent.
- Researchers at the Texas Advanced Computing Center (TACC) simulated how the first galaxies formed, and scientists at NASA Ames Research Center in Mountain View, CA, simulated the birth of stars.
- AMD's Frontier supercomputer can solve a quintillion (one followed by eighteen zeroes), calculations per second. If every single person on Earth completed one calculation per second, it would take more than 4 YEARS to do what a supercomputer like Frontier, called an exascale computer, can do in 1 SECOND.

Computer scientists and engineers brainstorm big (and little) problems that could be made easier with computers. They help improve and create new technologies all the time. Computers are everywhere! And we need people to design and program them to help make our lives easier and to solve big world problems.

Career:

Computer scientists design computer software and improve computer hardware to develop more efficient technologies. They use topics from math, physics, engineering, and design to build computers that solve real-world problems.

Resources:

<https://www.amd.com/en/corporate/about-amd>

<https://www.livescience.com/38332-how-supercomputers-solve-giant-problems.html>

<https://cs.calvin.edu/activities/books/rit/chapter1/lesson1/index.htm>

<https://www.racksolutions.com/news/blog/university-of-michigan-retakes-record-for-worlds-smallest-computer/>

<https://www.ornl.gov/news/frontier-supercomputer-debuts-worlds-fastest-breaking-exascale-barrier>

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