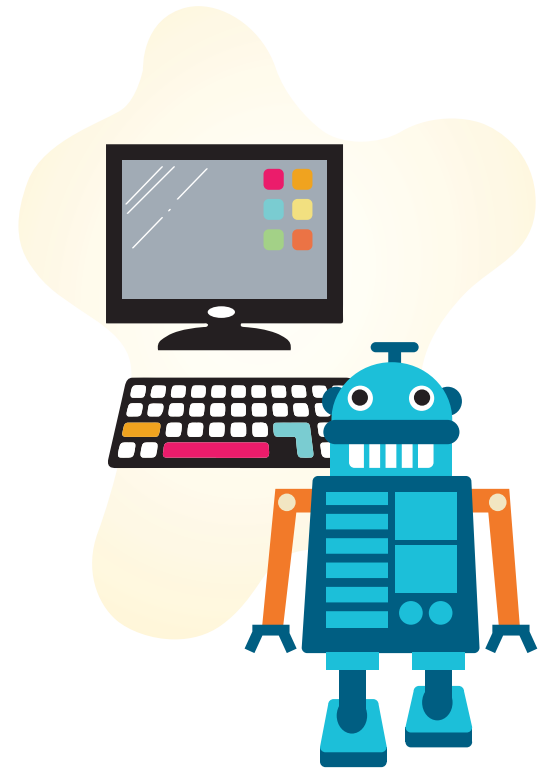# STEM Field: Computer Science

Change the World with a Career in Computer Science:

- **Build devices:** *Computer hardware engineers* design, develop, and test computer parts like circuit boards and memory chips. They stay on top of what's new and innovative in tech to make sure the new device, like a phone, tablet, car, or computer can run the latest apps and other programs.

- **Design with code**: *Programmers* write code to design things that are both useful and fun: from creating code for a robot, an app, website or video game to animating a movie or TV show. *Roboticists* build machines that complete tasks that are programmed by humans.

- **Solve cybercrimes:** *Digital forensics experts* search for digital clues to keep us, our computers, and all our data safe.

- **Analyze "big data:"** *Data engineers* write code, or instructions, for computers to collect and store large amounts of data or information. *Bioinformatics scientists* use computer programs to collect and analyze data like gene sequences.

- **Keep data and networks safe:** *Cryptographers* write code to encrypt sensitive data, keeping it safe from hackers and providing privacy for people, organizations, and businesses. *Cybersecurity analysts* monitor and protect networks and their proprietary or sensitive data from hackers. *Ethical hackers* use their computer skills to hack into company networks to help them strengthen their safeguards.

Can you complete the challenge?

Take on the role of **cybersecurity analyst**. Imagine you're at a coffee shop, park, or other public area and check for available Wi-Fi networks on a phone or other device. Which network do you choose? Which is most secure: *PublicWiFi*, *InternetGuest*, or *Members_SignIn*? What types of apps are safe to use on a public network: email, news and events, search engines, GPS maps, social media, video streaming, school accounts? How would you advise company employees to use a work computer in a public place?

STEM Field: Creative Technology & Design

Change the World with a Career in Creative Technology & Design:

- **Code apps, websites, or video games:** *Web designers* and *programmers* design and create engaging websites, apps, and other digital products for different companies and organizations.

- **Create digital designs:** *Digital sculptors* create 3D computer models of game characters, vehicles, and other objects for video games, movies, or even 3D printing. *Architects* and even some *carpenters* use computer software to sketch building plans. *Medical illustrators* use computer programs to create detailed scientific images used for research, education, and publication.

- **Design clothing and products:** *Industrial designers* use design software and other tools to create physical products like toys, shoes, and other items people use every day. *Creative designers* use paper and pencil as well as design software to create special features for vehicles or other products. *Fashion designers* might use sensors to create clothing styles that react to changes in weather and body temperature.

- **Create visual and sound effects:** *Sound producers* build the noises you hear in movies, TV shows, and video games. They use computers and other technology to record the sounds before carefully mixing them to fit the project. *Entertainment engineers* create museum exhibits that light up and respond to the viewer.

- **Make a statement:** *Visual designers* use computers to illustrate and design products like logos, brochures, ads, and websites for brands and businesses.
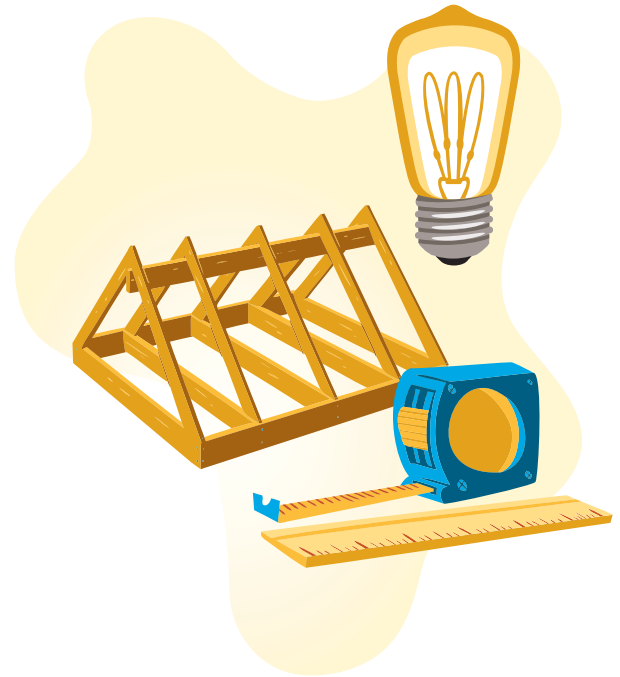
Can you complete the challenge?

Imagine you are a **creative designer** being asked to design a new or improved feature for a car or truck that makes the vehicle safer. Sketch your idea in an app or on paper and add a description. What technology is involved in building it? What materials is it made of? How is it tested for safety?

STEM Field: Engineering

Change the World with a Career in Engineering:

- **Build our world:** *Civil engineers* design infrastructure like bridges, water systems, and roads. *Mechanical engineers* create all types of machines, from batteries to refrigerators.

- **Power our world:** *Electrical engineers* design machines that use electricity, like personal electronics, electric motors, surveillance systems, and electrical systems for vehicles and aircraft.

- **Invent our world:** *Chemical engineers* work in chemistry, physics, and biology to design new foods, medicines, and materials.

- **Explore our world:** *Aerospace engineers* are experts on flight and help astronauts travel to space. They develop, design, test, and produce aircrafts, spacecrafts, satellites, missiles, and defense systems. *Marine engineers* design a variety of naval ships from smaller sailboats to ocean liners and tankers.

- **Improve our world:** *Aerodynamics engineers* test planes and vehicles to find ways to make them safer and operate at their top performance. *Petroleum engineers* create new oil and gas extracting technologies while maintaining standards for minimal environmental impacts.
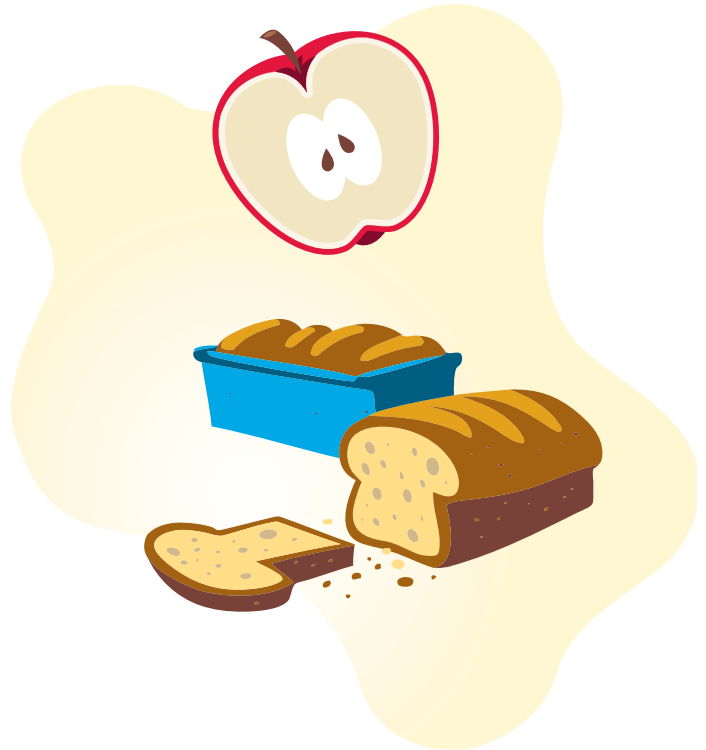
Can you complete the challenge?

Take on the role of **mechanical engineer** and create a machine or system that helps solve a problem. Think about an activity, like playing a sport or instrument, using technology, or carrying a heavy backpack. Brainstorm a machine to help make the task easier or minimize any negative health impact it may have. Sketch your idea or build a prototype if you have the materials. Share your design with someone else for feedback. How can your model be improved?

STEM Field: Food & Agriculture

Change the World with a Career in Food & Agriculture:

- **Cook and bake:** *Chefs* and *bakers* have the important job of making delicious food. Thet make tasty food using algorithms (recipes!) and the science of mixing different ingredients together. *Research chefs* create and test new recipes and menus for places like restaurants and hotels.

- **Farm in a city:** *Urban farmers* create green space in vacant lots, backyards, and even rooftops to create gardens and farms in city settings.

- **Design new recipes:** *Food scientists* create new flavors and food combinations to make a new dish or product to be made in a factory.

- **Grow more food:** *Agricultural engineers* develop automated machinery for efficient seeding, irrigation, and harvesting of crops. *Soil and plant scientists* research and test different soils and nutrient combinations to provide plants with the most ideal growing conditions.

- **Innovate agriculture:** *Agricultural scientists* study how plants, land, and animals are used to grow food. They look for ways to improve the quality of the food they grow and the output of farming efforts, while lessening the impact on the environment.

Can you complete the challenge?

Take on the role of **research chef** and experience food in a whole new way! Pair up with a friend who can combine a few ingredients for you to try. Taste a sample with an eye mask on, and while also holding your nose. Describe the flavors. Are there hints of sweet, sour, bitter, or savory? Can you figure out what the combination is? Now, try it again, but smell it before tasting. How does the flavor compare? How has the experience changed?

STEM Field: Health & Wellness

Change the World with a Career in Health & Wellness:

- **Help others to be healthy and safe:** You might first think of a *doctor* or *nurse*, but there are tons of other jobs in medicine! *Sports conditioning specialists* train athletes to be game-ready and stay safe on and off the field. *Paramedics* and *emergency medical technicians* (EMTs) are trained in CPR, administering medicines, and more.

- **Practice a specialty:** Medical professionals work in all different fields of medicine. For example, *phlebotomists* are skilled in taking blood samples for testing; *speech-language pathologists* focus on speech, language, and swallowing; *radiologists* and *x-ray technicians* are licensed to take x-rays, *oncologists* provide care for patients with cancer, and *genetic counselors* help people identify whether they are at risk for certain diseases based on their health histories.

- **Cure diseases:** *Medical scientists* conduct research to investigate how to prevent and treat human diseases. They publish their findings for other scientists and medical professionals to learn from and use their research.

- **Invent medical devices:** *Biomedical engineers* solve health-care problems by designing things like prosthetics and artificial organs.

- **Innovate healthcare:** *Medical robot designers* build robots that can be used for everything from patient care to surgery. Robots can help make a hospital more productive, reduce the cost of healthcare, and most importantly, help the patient.

Can you complete the challenge?

Be prepared like a **paramedic**. Design a first aid/emergency kit for yourself. List all the materials you will need in the event of each emergency:

- Extreme heat and cold
- Fire
- Allergic reactions to plants or insects
- Broken bones or sprains
- Deep cuts or puncture wounds
- Head trauma

STEM Field: Nature & the Environment

Change the World with a Career in Nature & the Environment:

- **Study earth and climate:** *Meteorologists* and *climatologists* predict weather and learn how it affects the earth and people. They use data from satellites, maps, and the atmosphere to predict weather patterns and study climate change. *Hydrologists* do research to understand how water moves across the Earth and solve problems related to accessing clean water.

- **Care for animals:** *Veterinarians* mostly treat smaller household animals like cats and dogs, but can often focus on livestock animals like sheep, cows, and horses as well. *Zoologists* study bigger animals like elephants, and a *marine biologist* looks at aquatic animals like fish and dolphins. *Wildlife rehabilitators* rescue and treat wild animals that are hurt. They care for them until they are healthy enough to be released back into the wild.

- **Protect nature:** *Population ecologists* study organisms and the environment to help keep ecosystems healthy and balanced. *Conservation scientists* are experts on how best to use land without hurting the soil and water. They work at parks and forests to help communities have enough water, minerals, trees, and other resources for today and tomorrow.

- **Prevent pollution:** *Environmental scientists* study problems like pollution and how they affect nature and human health.

- **Focus on renewable energy:** *Solar photovoltaic installers* assemble and maintain solar panel systems. *Wind turbine technicians* install and maintain wind turbines.

Can you complete the challenge?

Imagine you are a **population ecologist** that is focused on local tree populations. Healthy ecosystems can be measured by tree height, and larger trees also remove and store more CO_2 from the atmosphere, slowing climate change. For this challenge, plant a tree or become a citizen scientist. It's easy!