



## Exploratory Tasks:

*Where will your journey take you?*

# SCIENCE, TECHNOLOGY, ENGINEERING & MATH

Do you like to create things? Are you a problem solver? If so, a career in the Science, Technology, Engineering & Math (STEM) pathway may be for you. These professionals have a deep understanding of one or more branches of science, e.g., life, physical, earth or space. Math serves as a tool to analyze data, model and make predictions about real-world phenomena. This knowledge is combined with the principles of engineering and technology to create new products and/or improve existing ones that satisfy human wants and needs.

**NOTE:** Because STEM concepts impact all career clusters, the following are not organized by pathways.

### ENGINEERING & TECHNOLOGY CONCEPTS

Engineering can be defined as the process of creating and building structures, products and systems such as roads, cars, machines, computers, etc. Technology can be defined as the tools and machines used to solve real-world problems.

**EXPLORATORY TASK:** Research the history of a technical item from its beginning to its current state, e.g., camera, telephone, microwave, video game, computer, etc. Are there changes that might make the item even better? Create a timeline that shows the major changes and improvements.

### ENGINEERING DESIGN & DEVELOPMENT

The engineering design process is a series of steps that engineers use to solve a problem. There are many versions of this process, but all serve to help engineers find a workable solution.

**EXPLORATORY TASK:** Search the internet for *engineering design process*. Find two different descriptions or images of the process. Create a Venn diagram to identify the similarities and differences. Discuss why an engineer might use one instead of the other.

**EXTENSION:** Creating the perfect product or solution usually takes more than one try. Engineers test and analyze their product to uncover flaws and make improvements. Try that with your own design of a paper airplane. How far can you make it fly? Experiment with different styles and types of paper. Keep a written record of the design changes and distances.

**EXTENSION:** Engineers often work backward to find flaws in design and make improvements. This process is called *reverse engineering*. Try it yourself with an old retractable ink pen.

- Before you begin, create a sketch of the pen.
- As you take the pen apart, sketch each part. What would you name each part? Create a name, e.g., top outside cover, etc.



### *What Is a Career Cluster?*

Career Clusters are a way to organize career options. There are **16 Career Clusters** in the National Career Cluster Framework. They are further divided into specific pathways that can lead you to a successful future.

### *What Are Career Pathways?*

Each of the 16 Career Clusters are divided into approximately 80 Career Pathways. The pathways are further divided into specific careers that share similar skills.

A Career Pathway offers a range of entry options, from entry-level positions that require a high school diploma or industry certificate to those that require a professional degree.

- What is the purpose of each part? Beside each sketch, add a short description of what you think is its purpose.
- Put the pen back together. Does it still work? Why or why not?

## PRODUCING & USING TECHNOLOGY

Although listed as a separate career cluster, engineers work to solve problems and create products used across all the clusters.

### TRANSPORTATION TECHNOLOGY

The automobiles of today look very different than those of years ago. Were the changes made simply for style or were there benefits for drivers? What innovations do you see in the future? Search **automobile history** to uncover major changes and improvements. Create a timeline to document your findings.

**EXTENSION:** Can you build a **balloon-powered car**? Find examples on the internet. Use common objects, e.g., empty water bottles, paper towel rolls, etc., to create your own car. How far can it go? What changes can make it go farther?

### CONSTRUCTION TECHNOLOGY

Why are there so many different styles of bridges? Search **bridge designs** to find an answer. Use the information to create an infographic that shows the different types of bridges and the benefits and limitations of each.

**EXTENSION:** Create your own bridge between two stacks of books. Use objects such as paper, toothpicks, pipe cleaners, etc. What type of design can hold the most weight?

### MANUFACTURING TECHNOLOGY

According to the International Federation of Robotics, there are more than 3 million robots used in manufacturing worldwide. Where are they? What do they do? Search **robots in manufacturing** to discover jobs robots can do and where they may be found. Use the information to create a visual presentation to share with others.

**EXTENSION:** What is the **difference between a robot and an android**? Is it their appearance, how they are used or where they are found? Research and create a graphic to share your findings.

### BIOMEDICAL TECHNOLOGY

Thanks to biomedical technology, human beings now live long lives with diseases that were once fatal. Type 1 diabetes is one such disease. Research the **history of Type 1 diabetes** and write an investigative report to share your findings.

**EXTENSION:** Is a cure for Type 1 diabetes in the near future? Search the **future treatment of diabetes** to discover the possibilities. Add the information to your investigative report.

### *How Can I use Career Pathways?*

Career Pathways are planning tools to help you prepare for your future career goal. They provide a map of required courses at both the high school and college level.

A pathway also lists opportunities to earn college credit, industry certificates or gain real-world experience while in high school.

### *What Is an Industry Certificate?*

Industry certifications are credentials recognized by business and industry that demonstrate mastery of necessary knowledge and/or skills.

### *Discover More*

Choose a career in one of the pathways to discover:

- Demand for this career
- Location of jobs
- Starting wage
- Education requirements
- High school pathway
  - Classes
  - Dual/articulated credit
  - Industry certificates
  - Work-based learning
- Related careers