EXPLORATORY TASKS STUDENT SAMPLES

CLUSTER: Science, Technology, Engineering and Mathematics

PATHWAY: Engineering and Technology Concepts Pathway

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.

OBJECTIVE: Introduce students to the development of products from invention through later developments and refinements.

TEACHER SUPPORT:

- Collaborate with an engineering professional or a CTE teacher e.g. STEM, construction, manufacturing, computer science.

STUDENT SUPPORT:

- Provide links, examples, checklist and/or a template for students to use.

LEARNING EXTENSIONS:

- Invite an engineering professional or a CTE teacher e.g. STEM, construction, manufacturing, computer science, to discuss development of products related to their industry.
- Lead a discussion connecting school subjects and this pathway.
- Lead a discussion about personal qualities of an engineering professional.
- Identify and research a career within this pathway.

CONNECTIONS TO KENTUCKY ACADEMIC STANDARDS

- Career Studies: ES.M.8, ES.M.9, C.M.5
- Reading and Writing: RI6.4

NOTE:

- These samples represent students' first introduction to authentic topics and skills related to a career cluster.
- A range of student performance is included within the complete body of work.

Iphone Timeline

The phone was made in 1876 by Antonio Meucci

1876

The first wireless phone was made.

1973

Flip phone was made

The first Iphone was released by Apple.

2008

First Iphone with no home button was created by apple.

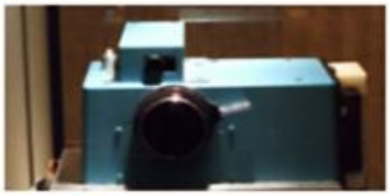
2018

We have the Iphone 13 now and it has no button

2021

Camera Timeline

This camera was made in 1888. Invented and marketed by George Eastman.



This camera was made in 1975. Invented and marketed by Steven Sasson.

This camera was made in 1910 to 1913. Invented and marketed by Eastman Kodak.

This camera was made in 2020. Invented and marketed by Kodak Pixpro.

Car Timeline

Created by many different people.

January 29 1886

enrys ford was the one who made it easy to make cars.

1920s

More advanced cars were made at this point and many more companies such a Hornet, and Maverick

1970s

Cars at this point got way more expensive and way more advanced.

2010s

1900s

These cars were made by henry ford.

1940s

At this point there were many car companies such as Cadillac and chevrolet.

2000s

Many sports cars had been created now.

2021s

Cars are the coolest they have ever been. There are millions of car companies now.

EXPLORATORY TASKS STUDENT SAMPLES

CLUSTER: Science, Technology, Engineering and Mathematics

PATHWAY: Producting and Using Technology Pathway

Although STEM is listed as a separate career cluster, engineers work to solve problems and create products used across all the clusters. This task connects the engineering process to the transportation industry.

EXPLORATORY TASK: TRANSPORTATION TECHNOLOGY 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?

OBJECTIVE: Introduce students to the design, testing and revision phases of the engineering process.

TEACHER SUPPORT:

- Collaborate with an engineering professional or a CTE STEM teacher.

STUDENT SUPPORT:

- Provide links, examples, checklist and/or a template for students to use.

LEARNING EXTENSIONS:

- Invite an engineering professional or a CTE STEM teacher.
- Lead a discussion connecting school subjects and this pathway.
- Lead a discussion about personal qualities of an engineering professional.
- Identify and research a career within this pathway.

CONNECTIONS TO KENTUCKY ACADEMIC STANDARDS

- Career Studies: ES.M.8, ES.M.9, C.M.5
- Reading and Writing: RI6.4

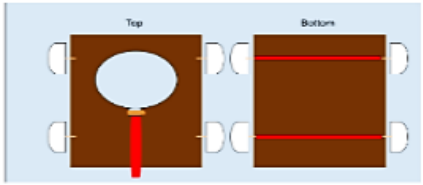
NOTE:

- These samples represent students' first introduction to authentic topics and skills related to a career cluster.
- A range of student performance is included within the complete body of work.

Balloon Car

Engineering Data Log

(double click on this square to add a sketch of your initial design - OR insert a photo of your paper design)



TRIAL #1:

Distance traveled

63 "

What modifications do you think would make the car travel further? List/sketch your ideas here:

I could change the place of the wheels. They keep sliding around on the axils rubbing and creating friction. With less friction, the car will go further. I will add hot glue to block the wheels from rubbing the axils.

TRIAL #2:

Distance traveled

32"

What modifications do you think would make the car travel further? List/sketch your ideas here:

I am going to remove the hot glue I added onto the axils so they wouldn't move around because it seems to be creating more friction. I will also add a bigger straw to have more propulsion. When the balloon blows out the straw isn't pushing enough air out so a bigger straw will make the car go faster.

TRIAL #3:

Distance traveled

0"

What modifications do you think would make the car travel further? List/sketch your ideas here:

I didn't have the materials to increase the propulsion so I made-shifted a bottle cap to hold the balloon in place. The modifications I would do would be to actually get the bigger straw. I think I could also have made less weight by making the car with less cardboard. This would also make the car more aerodynamic and faster, so it could go further.

Reflection: (please write short paragraphs)

What problems were you trying to solve during this project? What were the contributing factors to these problems?

I was trying to solve speed problems. I thought if I put hot glue to stop the axils from sliding I could create less friction. Instead, I created more friction. I also didn't have enough propulsion to make the car, go as far as I wanted. Some contributing factors to these problems were speed, the car couldn't get enough speed to start cruising along.

If you had NO constraints on this project, how would you have designed it differently?

If I had no constraints on this project I would make the car with more balloons. With more balloons, there could be more propulsion, so it could go further. I would also make it longer to add more arow-dynamics to the car. With more propulsion moving a block would not be as practical as a smooth, fast, sports car.

Describe how you normally tackle problem-solving – what steps do you use? What is your thought process? **Make up a sample problem to help you explain.**

I have trouble practicing piano. With this problem, I use the steps imagine, test, and improve. The problem is focusing on what parts of a song I need to work on. When I constantly play the whole song over, and over again, I get better at the parts I'm already good at; so the parts I'm not good at are just kind of being thrown to the side. I imagine how I can solve this problem, working on the measures that I need help on. I test this by just working on these measures and adding the measures together. I also figure out how to improve this. With most of my problems, I don't need to create anything so, my thought process is to imagine, plan, test, and improve.

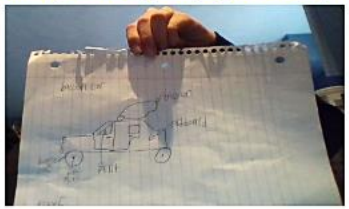
Insert a photo of your balloon car on this page

Click below the gray line (below) - you should see your blinking cursor

Choose INSERT above, then choose IMAGE, then choose CAMERA.....choose ALLOW to access your camera, then hold up your car and take your picture - choose INSERT and you're done!

Balloon Car
Engineering Data Log

(double click on this square to add a sketch of your initial design - OR insert a photo of your paper design)



TRIAL #1:

Distance traveled

104 inches

What modifications do you think would make the car travel further? List/sketch your ideas here:

I think a little more air because I have a big straw, it can give my car a little more power. Another way I could improve my balloon car to make it go farther is by adjusting the wheels. By doing this it could give the car a straighter path and a little more down force. My final adjustment I could do is take out 4 balloons as a load, this could make it go further and in a straight line.

TRIAL #2:

Distance traveled

128 inches

What modifications do you think would make the car travel further? List/sketch your ideas here:

How I would modify this to make my balloon car even better is by putting more friction on the wheels. This will keep the car in a straighter line and give it a little more downforce. Another way I could make my car go farther is by making straighter edges, this can make it turn to the side a little less.

TRIAL #3:

Distance traveled

134 inches

What modifications do you think would make the car travel further? List/sketch your ideas here:

I think I could put more air in and line the car up at the start sign. I could also use bottle caps instead of balloons for a load because bottle caps are a little more heavy than balloons, this will give the car a little more weight but it could keep it from turning.

Reflection: (please write short paragraphs)

What problems were you trying to solve during this project? What were the contributing factors to these problems?

I am trying to make my balloon car go over 140 inches of straight line. The teacher wanted us to make balloon cars, almost everyone made their car from water bottles. I wanted to be out of the ordinary and make a cardboard balloon car.

If you had NO constraints on this project, how would you have designed it differently?

I actually would not change anything. This is because it's the perfect size and length, and I like the design. Another reason why I would not change anything on this is because if it was bigger and longer, then I would need more big sized straws. My final reason why I would not change the design is the wheels are the perfect size and give the car equilibrium.

Describe how you normally tackle problem solving – what steps do you use? What is your thought process? **Make up a sample problem to help you explain.**

How I normally tackle a problem is by just doing it, an example is when my mom tells me to clean my room. My first step I use is a Plan, this tells me where to put things and where they go. My second part of my problem is to start picking things up that are in the wrong place. My third way to tackle a problem is by improving my plan, this will make my room even more clean. My Final step I would use is share. This is when I tell my mom that I'm finished cleaning my room, she will either say it's good or it needs a little more cleaning. As you can see, these are my steps of how I tackle a problem.

Insert a photo of your balloon car on this page

Click below the gray line (below) - you should see your blinking cursor

Is a Career in Science, Technology, Engineering & Mathematics for Me?

Would you be interested in a career in Science, Technology, Engineering & Mathematics? Below are knowledge and skill statements related to the careers in this cluster. Read each statement. Decide if this describes you by checking the Yes, No or Maybe box.

THINGS I LIKE TO DO	YES	NO	MAYBE
Interpret formulas			
Find the answers to questions			
Work in a laboratory			
Figure out how things work and investigate new things			
Explore new technology			
Experiment to find the best way to do something			
Pay attention to details and help things be precise			
PERSONAL QUALITIES THAT DESCRIBE ME	**YES**	**NO**	**MAYBE**
Detail oriented			
Inquisitive ask questions			
Objective not biased			
Methodical follow directions			
Mechanically inclined good with hands			
SCHOOL SUBJECTS THAT INTEREST ME	**YES**	**NO**	**MAYBE**
Math			
Science			
Drafting or computer aided drafting (CAD) drawing			
Electronics or computer networking			
Technical classes or technology education			

Did you check YES most often? If so, continue to explore careers and opportunities in this cluster. And don't forget to focus on your math, science and computer classes to build the academic skills you need for these careers.

Did you check NO most often? If so, don't worry. There are hundreds of jobs to explore in the other 15 career clusters.

Did you check MAYBE most often? If so, continue to explore in this cluster as well as investigating how your skills and interests may be a good match in other clusters.

Is a Career in Science, Technology, Engineering & Mathematics for Me?

Would you be interested in a career in Science, Technology, Engineering & Mathematics? Below are knowledge and skill statements related to the careers in this cluster. Read each statement. Decide if this describes you by checking the Yes, No or Maybe box.

THINGS I LIKE TO DO	YES	NO	MAYBE
Interpret formulas			
Find the answers to questions			
Work in a laboratory			
Figure out how things work and investigate new things			
Explore new technology			
Experiment to find the best way to do something			
Pay attention to details and help things be precise			
PERSONAL QUALITIES THAT DESCRIBE ME	**YES**	**NO**	**MAYBE**
Detail oriented			
Inquisitive			
Objective			
Methodical			
Mechanically inclined			
SCHOOL SUBJECTS THAT INTEREST ME	**YES**	**NO**	**MAYBE**
Math			
Science			
Drafting or computer aided drafting (CAD)			
Electronics or computer networking			
Technical classes or technology education			

Did you check YES most often? If so, continue to explore careers and opportunities in this cluster. And don't forget to focus on your math, science and computer classes to build the academic skills you need for these careers.

Did you check NO most often? If so, don't worry. There are hundreds of jobs to explore in the other 15 career clusters.

Did you check MAYBE most often? If so, continue to explore in this cluster as well as investigating how your skills and interests may be a good match in other clusters.