

CAPSTONE ACTION/LEARNING LOG

NAME: Hardy Huang

MY ESSENTIAL QUESTION: How do people use math in real life?

DATE: November 26, 2020

HOURS SPENT RESEARCHING: 6 hours

MY PROCESS: Investigate and Report

QUESTION(S) OR GOALS I HAVE



- What are some math concepts or theories that people have used in real life?
- Why do people use these theories? And what are some benefits or impacts?
- How do people use those math theories in daily life? What are some inventions that people apply the theories to them?
- What are some other things that use the same or similar theories?

(Specifically for conic sections)

RESOURCES I HAVE USED TO ANSWER THE QUESTION(S)



Must be properly cited. Sources could include: books, news articles, podcasts, artwork, people, songs/poetry, recorded conversations, films/documentaries, academic articles, stories, data...

- Laustinrivar. "Application of Conic Sections". YouTube, <https://www.youtube.com/watch?v=0OmANWjWLF0>. Accessed 14 November 2020
- Liu, Shaoxue. *High School Math Elective 2-1*. Beijing. People's Education Press. 2015. pp. 33-82. Print.
- MissRiceMath. "Applications of Conics". YouTube, <https://www.youtube.com/watch?v=ig8NS1sudo0>. Accessed 26 November 2020
- Pierce, Rod. "Conic Sections". Math Is Fun, <https://www.mathsisfun.com/geometry/conic-sections.html>. Accessed 14 November 2020
- Taisbak, Christian. "Conic Section". Britannica, <https://www.britannica.com/biography/Girard-Desargues>. Accessed 14 November 2020

List individuals that have helped you with your project and explain who they are and why you are consulting with them.

- Mr. Marr
 - My current AP Calculus teacher
 - He provided some notes about Conics, as well as their equations to me.

WHAT HAVE I LEARNED SO FAR?



Reflecting on my **LEARNING**: *What have I learned since my last learning log (if this isn't the first) that helps me answer my essential questions?*

- Conic section, also called conic, in geometry, any curve produced by the intersection of a plane and a right circular cone. Depending on the angle of the plane relative to the cone, the intersection is a circle, an ellipse, a hyperbola, or a parabola. Special cases of intersection occur when the plane passes through only the apex which produces a single point or through the apex and another point on the cone which produces one straight line or two intersecting straight lines. In brief, conic section is a section or slice through a cone. There are plentiful real life applications of conic sections in our world today. From a macro perspective, the paths of the planets around the sun are ellipses with the sun at one focus. It sounds too far away from us despite it seems relatable to us. Nevertheless, conic sections can actually be found everywhere around us. For instance, when you throw or shoot an object near the earth's surface, in other words, on the earth, the trajectory of it will follow a parabolic path. Another commonly used example of parabola is parabolic mirrors, and they are used to converge and diverge light beams at the real or virtual focus of the parabola. Thus, they're used in the design of car headlights and in spotlights because it aids in concentrating the light beam. You can not only see them on your car and on the street as rear view mirrors, but also in the light bulbs on the street lamp and in the flashlight at home. Additionally, solar ovens use parabolic mirrors to converge light beams to use for heating; parabolic microphones perform a similar function with sound waves.

WHAT HAVE I LEARNED SO FAR?



Reflecting on **SELF** → *What am I learning about myself? (learning style, personality, skills, feelings, work ethic...)*

- Learning style: Visual - Pause, and try to create a mental image in my mind, or pause, and draw a visual presentation. Turn concepts into charts and diagrams. Numerical information is easier for me to remember. This learning style fits my essential question perfectly as I always need to draw the conic sections down on the papers and combine them with their equations to better understand their graphs.
- Learning methods: Repeat information with my eyes closed. (This might help me to be successful in the future because closing the eyes can help me think more carefully before I make important choices) . Underline or highlight key ideas in my notes. (This might help me to be successful in the future because highlighting the notes reminds me where the focal points are and helps me study effectively) . Watching videos may be another way for me to seek out information I need. For this time, I use this learning

Sometimes, parabolas are used in astronomy to determine the distance of the rocket ship traveling up in the sky. The Eiffel Tower is known worldwide to be in the form of a parabola. Thousands of people see the Eiffel Tower every day, and yet they don't notice the significance of how the tower is formed. They do not realize that the parabola is actually really important in the structure of the tower. The middle of the tower can be seen as the "Axis of Symmetry" because that is where the middle of the tower is. The bottom part of the Eiffel Tower seems as if it is showing a "negative parabola". The Eiffel Tower was built and designed this way so it could support the wind and so it would be more stable. There are also some applications of hyperbola. Hyperbolas are used in a navigation system known as LORAN (long range navigation). Hyperbolic as well as parabolic mirrors and lenses are used in systems of telescopes, which enable people to see things clearly from a distance. Likewise, the lenses in cameras, in magnifiers, in microscopes, and even in people's eyes work similarly and help people view and record things better. In summary, although conic sections aren't usually noticed by people, they are everywhere around us, and verily provide lots of convenience for people and undoubtedly make our life more efficient. We can't live without conic sections.

- Since the new curriculum remove Conics from pre-calculus 12, I haven't learned it until I started taking AP calculus this quarter. Therefore, conics sections are brand new concepts for me, and I've studied most of them at home by myself. I've spent a lot of time on understanding their origins, their natures, their properties, their graphs, focuses, eccentricity, and their equations, so my research on the applications of Conics might not be as much compared to my past logs

Reflecting on the PROCESS → *What's working? What's not?*

Working:

- Extra Study
In order to better understand what Conics is, I've spent much time

method a lot since Conics is not only about algebra, but also graphs, which requires some imagination.

- Personality: The Inspector. That means I prefer to work independently and tend to feel more at ease when alone or in a small group. I generally prefer to avoid the spotlight as well as small talk, and may prefer written communication over verbal. I also more likely to think before speaking and have good impulse control. I tend to be organized, to plan-ahead, and to prefer routine. When dealing with information, ISTJs tends to collect and present information in a clear and orderly way that is easy to understand. Thus, I need to collect a little bit more information and then organize it to draw conclusions. In addition, I study Conics at home mainly by myself as I said.
- Skills: collect and analyze information. Computer skills, organization skills, problem-solving skills and thinking skills. Communication skills (the people I consult with). These skills will be shown later and help with my project when I analyze my information and make conclusions.

browsing through websites and books. Then I found that is also very helpful for me when researching its impact on us and the reasons for people to use it.

- **Formulate an inquiry question to investigate**
I have developed an essential question that addresses my curiosity about mathematics.
- **Plan and investigate**
I have collected some information about math theories and their applications, as well as their impacts on our life.
Also, I have used a variety of resources this time, including books, websites, videos, teacher, friends and family.

Not working:

- **A bit more information and draw conclusions (still in progress...)**
I still need to do more research and get more information for my topic in order to develop deeper understanding about how people apply math theories in daily life. Hopefully I'm able to draw some conclusions soon using the information I've got.
- **Sometimes it's difficult for me to find the applications in areas like cooking, sewing, sports, and music since math is abstract. Most math concepts or theorems can't directly be applied, and they always appear in our life along with other knowledge from different areas like physics and chemistry. Thus, I need to have a wider knowledge background in order to discover the applications of math in different areas.**

FURTHER QUESTIONS I THOUGHT OF AS A RESULT OF MY RESEARCH...

- **How is Conics applied in other areas in our daily life?**
- **Can I also use Conics and apply them or solve problem in real life? And how?**

- How math is helping with COVID policy making and management?
- Math is an intriguing and fundamental course. Being good at math will definitely contribute to my future career.

NEXT STEPS:

- Analyze information, construct visual supports and draw conclusion and thoughts

WHEN WILL I COMPLETE THIS WORK:

- **December 15th, 2020**

CAPSTONE LOG HOLISTIC RUBRIC

LEARNING LOG #: **4**

Date: **November 26, 2020**

EXTENDING

Thinking is METACOGNITIVE

- Student Learning Log is mindfully completed.
- Demonstrates examination of the learning process, showing what learning occurred
- Includes properly documented evidence/sources
- Demonstrates that student has reconsidered what they already knew
- Provides thorough and meaningful examples of critical thinking
- Creates clear, meaningful and manageable objectives as well as a timeline for learning
- Communication is clear and coherent

PROFICIENT

Thinking is ANALYTIC

- Student Learning Log is complete.
- Demonstrates that student has applied learning to a broader context of personal and professional life.
- Includes evidence/sources
- Provides examples of critical thinking
- Creates clear and meaningful objectives as well as a timeline for learning
- Communication is clear and coherent

DEVELOPING

Thinking is DESCRIPTIVE

- Student Learning Log is simple yet complete
- Shows an understanding of how learning could be used
- Shows evidence of research; may not include documentation
- Provides some limited examples of critical thinking

- Creates simple objectives and may not have a clear timeline for learning
- Communication although flawed at times, does not impact meaning

EMERGING

Thinking is SUPERFICIAL

- Student Learning Log is incomplete
- Demonstrates acquisition of minimal new content and is limited to a description of general unfounded opinions and behaviors
- Shows no evidence to support thinking and is limited to personal, prior knowledge
- Student has not set any learning objectives and has no clear timeline for learning
- Communication is flawed and often impacts meaning

DID NOT SUBMIT

- Student did not submit this assignment for assessment.