1. **Degenerate Conic Sections**

- Hyperbola degenerates into two intersecting lines
- Parabola degenerates into a single line
- Circle and ellipse will degenerate into a point

Degenerate conic sections happen when the plane crosses through the vertex point the two cones share

2. Explore Conic Sections

- Hyperbola does not need to be cut parallel to the axes.

  (easier to cut if held on its side)

  Two groups will put their cones together to create a double-napped cone; this will be used to cut a hyperbola.

3. Parabola - Intersecting the side of the cone and the base, parallel to a generator

4. Ellipse - Intersecting the side of the cone, not parallel to base, not parallel to a generator

5. Circle - Plane is parallel to base, perpendicular to the axes

6. Things students should be discussing:

   - Teacher should walk around and have students explain how they cut or read the tweet
   - Using the cone and cross sections, slice the cone to create. The index card may be used to illustrate the plane.

   - Each group is given a playdo (or clay), index card, and piece of hose

   - Separate students into groups of 2-3
<table>
<thead>
<tr>
<th>Hyperbola</th>
<th>Parabola</th>
<th>Ellipse</th>
<th>Circle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tweet an explanation of the intersection of a plane with a double-napped cone.</td>
<td>Draw the intersection of a plane with a double-napped cone.</td>
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<tr>
<td>Intersection Lines</td>
<td>Intersection Lines</td>
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<td>Line</td>
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<td>Point</td>
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</table>

Tweet an explanation of the intersection of plane with a double-napped cone degenerate conic section.
The curve of the vertex and the room's elliptical shape; the sound waves reach the opposite end of the one focal point towards any direction, the sound waves travel in that direction. However, because of this geometry of the reflective properties of an ellipse and its focal points, when sound is produced at any concert, but are predominantly involving ellipses for the coolest effect. Why ellipses? This involves any concert, but are predominantly involving ellipses for the coolest effect. Why ellipses?

Whispering galleries are an interesting phenomenon of math and physics. Whispering galleries can

https://prezi.com/4cz7yrmvs394e/whispering-galleries/

Whisper Gallery:

Easily passed by the body, this process is known as lithotripsy.

Medically, a useful medical application, medical specialists have used the ellipse to create a shockwave and pass through the second focus. This characteristic, unique to the ellipse, has

https://mathcentral.uregina.ca/beyond/articles/Lithotripsy/Lithotripsy.html

Lithotripsy - Medical application of the ellipse

Ellipse:

Real world applications of conic sections:
the light from unseen objects to be focused in a way for you to view them. Using a telescope or microscope, you are placing your eye in a well-planned focal point that allows light into a single point. The design of these use hyperbolas to reflect light to the focal point. When or close up. To view such things as planets or bacteria, scientists have designed objects that focus light on it. Your eyes have a natural focus point that does not allow you to see things too far away. These objects include microscopes, telescopes and televisions. Before you can see a clear image of something, you need to focus the correct focal lengths for use with our eyes make heavy use of hyperbolas. These objects include:

Leases:

Important role in World War II. Signals from a station, TORAN allows people to locate objects over a wide area and played a significant role in the success of the war. In TORAN, signals are transmitted using hyperbolas. Scientists and engineers calculated the coordinates to identify geographical position using hyperbolas. One important radio system, TORAN, employed hyperbolic functions. One important radio system, TORAN,

Radio:

Satellites:

To make adjustments so that the satellite gets to its destination, initially launch in a straight path. Using hyperbolas, astronomers can predict the path of the satellite accurately. Influence of objects with heavy mass, the path of the satellite is skewed even though it may initially launch into space, they must first use mathematical equations to predict its path. Because of the satellite's systems make heavy use of hyperbolas and hyperbolic functions. When scientists launch a


Hyperbolas:
Give an intense concentrated beam of light rays will reflect from the mirror as rays parallel to the axis. This is used in auto headlights to reflect the light from the headlight to the road. This is known as the property of a parabolic reflector. A parabolic reflector has been deposited with bright aluminum. The smooth inner surface of the headlight is a glass reflector upon which the headlight is placed. The smooth inner surface of the headlight is a glass reflector upon which the headlight is placed. The smooth inner surface of the headlight is a glass reflector upon which the headlight is placed.

An automobile headlight is another example of a paraboloid of revolution, rotating a parabola about its axis of symmetry. The smooth inner surface of the headlight is a glass reflector upon which the headlight is placed. The smooth inner surface of the headlight is a glass reflector upon which the headlight is placed. The smooth inner surface of the headlight is a glass reflector upon which the headlight is placed.


Car Headlights:

Satellite dishes:

This property is used by astronomers to design telescopes, and by radio engineers to design the paraboloid parallel to its axis are reflected from the parabolic curve and intersect the focus. A very beautiful property of parabolas is that at a point called the focus, all of the lines entering the parabola dish.
Patty Paper Parabola

Student:
1. fold a line about 1 inch from side (called the directrix)
2. draw a point above the line (called the focus)
3. fold and crease the paper so that the line passes through the point
4. there should be a minimum of 20 folds
5. open the paper, the shape created is a parabola
6. make a new fold perpendicular to the directrix and through the focus (axis of symmetry)
7. identify the vertex of the parabola

teacher:
1. point out that the distance between the focus and vertex is equivalent to the perpendicular distance between the vertex and directrix
2. reinforce that the distance from the focus to any point on the parabola is equivalent to the perpendicular distance from that point to the directrix
3. Students may measure the distance with a ruler or use that fact that folding the paper implies equidistance
Finding Inverses Graphically

Directions:
- using a crayon, graph the equation and then list 3 points on the graph
- sketch the identity function \((y = x)\) using a pen
- fold on the identity function and scrape the paper to make a “reflection” of the original equation
- determine if the inverse of the three points you first found appear on the inverse graph
- write the equation of the inverse graph

1. \(f(x) = 2x + 4\)
   Points: _____, _____, _____
   Inverse Points: _____, _____, _____
   \(f^3(x) = \) ______________

2. \(f(x) = -\frac{2}{3}x - 1\)
   Points: _____, _____, _____
   Inverse Points: _____, _____, _____
   \(f^3(x) = \) ______________

3. \(f(x) = -3x + 3\)
   Points: _____, _____, _____
   Inverse Points: _____, _____, _____
   \(f^3(x) = \) ______________

4. \(f(x) = -\frac{1}{2}x - 3\)
   Points: _____, _____, _____
   Inverse Points: _____, _____, _____
   \(f^3(x) = \) ______________
Graphing Linear Equation in 3-Dimensions

Student:
1. Students should be in groups of 2-3
2. Provide each group PlayDo (or clay), 6 craft sticks, and a piece of yarn (or string)
3. Create a “satellite” with 3 axes
   x-axis – forward (positive) and back (negative)
   y-axis – right (positive) and left (negative)
   z-axis – up (positive) and down negative

Teacher:
1. the x-y plane is the horizontal plane (such as the floor)
   the z-axis brings the figure into space
2. have students ordered triples in the form (x, y, z)
3. using yarn (or string), have students graph a linear equation in 3 variables using the intercepts
   the graph is sometimes called a trace
The science team wants to take students on a field trip to the Museum of Natural Science, which will cost $600 for a group. A child’s cost depends on how many students are going.

1. a) Complete the table to determine how much each student must pay to cover the expenses.

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>Cost per Student</th>
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<tbody>
<tr>
<td>0</td>
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<td>120</td>
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</table>

b) Determine an equation that describes the table.

c) Graph your equation, extending your graph to include negative values in the domain.

The team decided to take the students into a special attraction for an additional $5 per student.

2. a) Complete the table below to reflect this new information

<table>
<thead>
<tr>
<th>Number of Students</th>
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<tbody>
<tr>
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</tbody>
</table>

b) Determine an equation that describes the table.

c) Some rational functions can be written in the form

\[ y = \frac{a}{x} + c \]

where a, b and c are constants. Write your equation in this form.

d) Sketch a graph of your equation on the axes, including negative values in the domain.
3. The Science team realized they must include 10 chaperones for the group. The chaperones will not have to pay for their admission, the students will cover the expenses of the chaperones.

a) Complete the table below

b) Write an equation in Rational Function form, $y = \frac{a}{x-b} + c$

c) Sketch the graph of your equation