Activities for Algebra II and Pre Calculus

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Activities

Student engagement

Increase student understanding

Useful and meaningful

Exploration of Conic Sections

Conics

Clay Double-Napped Cones

Each table will divide into 2 groups

Groups will need:

- PlayDo or Clay
- String
- Note card
- Response sheet

Conics

- Each group forms a cone with their clay
- Using the blue nylon thread, slice the cone in order to create the conic section
  - Circle
  - Ellipse
  - Parabola
- On the response sheet, sketch the intersection and write a tweet (140 characters)

Suggestions:

- Use the note card to represent the plane
- Students may need to draw the outline of the clay onto the note card at the “slice”

Conics

Two groups put their cones together, touching at the apex of each, creating a double-napped cone

Cut the double-napped cone creating a hyperbola

Conics

Degenerate conic sections

occurs when the plane passes through vertex

Conics

Degenerate conic sections

occurs when the plane passes through vertex

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

Conics

Real World

Ellipses:

- Lithotripte
- Whisper gallery

Parabola

- Satellite dishes
- Parabolic Reflectors (headlights)

Hyperbola

- Lenses
- Radio Signals

Patty Paper Parabola

Conics

Patty Paper Parabola

Conic Parabolas in the Algebra II TEKS

Each person

- patty paper
- pencil or marker

Conics

Patty Paper Parabola:

- Fold a line about 1 inch from side (called the directrix)
- Draw a point above the line (called the focus)
- Fold and crease the paper so that the line passes through the point
- Continue folding and creasing (there should be a minimum of 20 folds)
- Open the paper

Rational Functions

Rational Functions

Adapted from Illuminations (NCTM)

Three part activity developing the idea of vertical and horizontal asymptotes in real world context

Rational Functions

Adapted from Light It Up Activity

Interactive activity – too many places to get bad data

Light Bounce (NCTM)

Linear Equations in 3-Dimension

Graphing Linear Equation in 3-Dimensions

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

Graphing Linear Equation in 3-Dimensions

teacher:

- x-y plane is the horizontal plane (such as the floor)
- z-axis brings the figure ”up” into space
- Game Designers use this orientation when creating their games
- Ordered triple (x, y, z)

Graphing Linear Equation in 3-Dimensions

Model graphing ordered triple

A (3, 2, -1)

B (-4, 3, 2)

Graphing Linear Equation in 3-Dimensions

When graphing linear equation in 2 variables:

$$2x - 3y = 12$$

x-intercept, let y = 0	x-intercept: (6, 0)
y-intercept, let x = 0	y-intercept: (0, -4)

Graphing Linear Equation in 3-Dimensions

teacher:

- Have students find the x, y and z intercepts
- Using yarn (or string), students will wrap the intercept of each axis, connecting all the intercepts to each other
- the graph is sometimes called a trace

Graphing Linear Equation in 3-Dimensions

Graph in the 3-Dimentions space

$$3x - 4y + 6z = 12$$

Graphing Linear Equation in 3-Dimensions

Graph in the 3-Dimentions space

$$3x - 4y + 6z = 12$$

x-intercept, let y & z = 0	x-intercept: (4, 0, 0)
y-intercept, let x & z = 0	y-intercept: (0, -3, 0)
z-intercept, let x & y = 0	z-intercept: (0, 0, 2)

Inverse Functions

Inverse

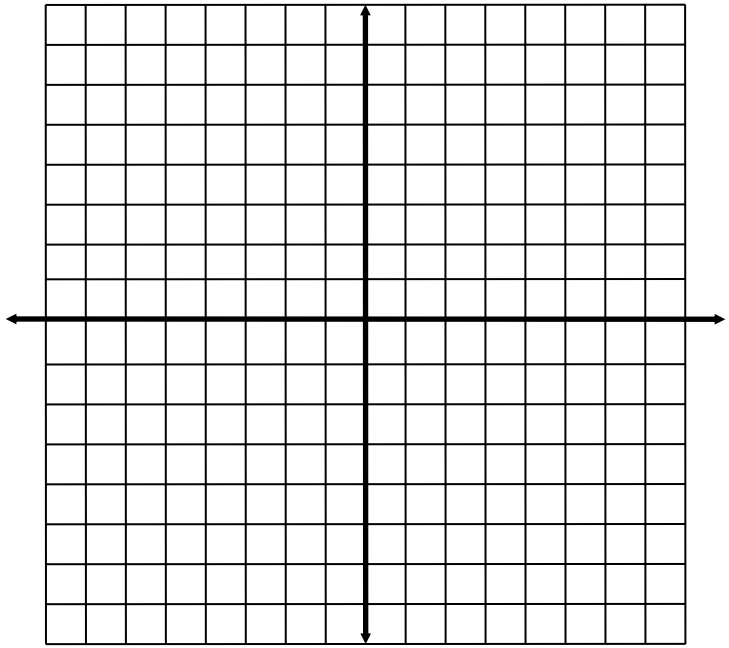
Finding Inverses Graphically

- using a crayon, graph the equation and 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

Inverse

$f(x)=2x+4$

Points: _____, _____, _____



Inverse Points: _____, _____, _____

$f^{-1}(x)$ = _____

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