Pre Calc Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 WS Assessment

Target 8

Conic family

* Conic Sections: Parabolas
* Conic Sections: Ellipses
* Conic Sections: Hyperbolas
* Identifying Conic Sections

HW 8 Hand in your folding Parabola, Ellipse and Hyperbolas

What is conic family? what are they? (google it)

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Go to geogebra.org. Click on START GRAPHING. Click the set up (top right ) , click to turn Axes off.

On the left panel, click to choose tools

Choose Lines tool, construct a line on the low part of your screen, (not very horizontally)

Choose Basic Tools, construct a point **above the line**, then rename it to F (right click, setting, name); onstruct another point **on the line**, and name it P

Choose Lines tool, construct segment PF

Choose Construct tool, select segment PF, construct a perpendicular bisector to this segment

Right click on the perpendicular bisector line you have just constructed, choose Show Trace

Select point P, right click and play Animation. You can change color if you wish.

What do you have: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Right click on the screen and choose Clear all Traces

Move point F as well as the straight line PF to see difference shape

Call me for stamp \_\_\_\_\_\_\_\_\_

Now do the new file

Instead of point P move along the straight line, now you have it move along the circle

Construct the circle. Construct point F inside the circle (not at the center)

Construct point P **on the circle**. Construct segment PF

Construct the perpendicular bisector line for this segment PF.

Trace on the line, Animate on point P

What do you have: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Change color, move point F around and enjoy it

Now move point F outside the circle

What do you have: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Call me for stamp

What happen if point F is on the circle ? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now re-create what you make with a tangible material (the paper). Wait for my instruction.

Conic: Parabola

Definition: A parabola is the set of all points in a plane equidistant from the directrix line and a focus point in the plane.

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| **Standard equations** | (x – h)2 = 4p(y – k) | (y – k)2 = 4p(x – h) |
| **Opens** | Up/Down-ward | Right/Left  |
| **Focus** | (h, k + p) | (h + p, k) |
| **Directrix** | y = k – p | x = h – p  |
| **Vertex** | (h, k) | (h, k) |

1. Find the standard form of the equation for the parabola with vertex (3, 4) and focus (5, 4). Sketch graph Hint: All you need to do is find p = ?

2. Prove the graph of y2 - 6x + 2y + 12 = 0 is a parabola, and find its vertex, focus, and directrix. Graph it

3. Prove the graph of x2 + 2x – y + 3 = 0 is a parabola, and find its vertex, focus, and directrix. Graph

4. Find all information of the parabola and graph it

4x2− 24x − 40y − 4 = 0 y2 + 2x = 0

5. Write the equation of the parabola with (show me for stamp)

a. focus at (0, –2) directrix x = 2. b. vertex (3, 1) focus (3, 5) c. vertex (5, –2) directrix y = -5.

6. An arch in a memorial park, having a parabolic shape, has a height of 25 feet and a base width of 30 feet. Find an equation which models this shape, using the x-axis to represent the ground. State the focus and directrix.

7. A radio telescope has a parabolic dish with a diameter of 100 meters. The collected radio signals are reflected to one collection point, called the "focal" point, being the focus of the parabola. If the focal length is 45 meters, find the depth of the dish, rounded to one decimal place.

Conic: Ellipse

Definition: Set of all points in a plane whose distances from two fixed points is the constant **sum**.



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| --- | --- | --- |
| **Standard equations** | $\frac{(x-h)^{2}}{a^{2}}$+$\frac{(y-k)^{2}}{b^{2}}$ = 1 | $\frac{(y-h)^{2}}{a^{2}}$+$\frac{(x-k)^{2}}{b^{2}}$ = 1 |
| **Focal axis** | y = k | x = h |
| **Foci** | $$(h\pm c,k)$$ | $$(h,k\pm c)$$ |
| **Major axis (2a)** | horizontal; center (h, k) | vertical , center (h, k) |
| **Vertices** | $$(h\pm a,k)$$ | $$(h,k\pm a)$$ |
| **Minor axis (2b)** | 2b; $a^{2}=b^{2}+c^{2}$ | 2b; $a^{2}=b^{2}+c^{2}$ |

1. Find the standard form of the equation for the ellipse whose major axis has endpoints (-2, -1) and (8, -1), and whose minor axis has length 8

2. Find the standard form of the equation for the ellipse whose major axis has endpoints (1, -4) and (1, 8), and whose minor axis has length 8

3. Write an equation for the ellipse having one focus at (0, 3), a vertex at (0, 4), and its center at (0, 0). Hint vertex is always in major axis

4. Write an equation for the ellipse with vertices (4, 0) and (–2, 0) and foci (3, 0) and(–1, 0). Stamp

5. Find center, major length, minor length, vertices, foci and eccentricity $e=\frac{c}{a}=\frac{\sqrt{a^{2}-b^{2}}}{a} $of the following ellipse

 $\frac{(x+2)^{2}}{9}$+$\frac{(y-5)^{2}}{49}$ = 1 $\frac{(x+1)^{2}}{25}$+$\frac{(y-2)^{2}}{16}$ = 1

6. State the center, major, minor length, vertices, foci and eccentricity of the ellipse with general
equation 16x2+ 25y2= 400, and sketch the ellipse.

7. State the center, major, minor length, vertices, foci and eccentricity of the ellipse with general
equation 25x2 + 4y2 + 100x – 40y + 100 = 0. , and sketch the ellipse.

8. A "whispering room" is one with an elliptically-arched ceiling. If someone stands at one focus of the ellipse and whispers something to his friend, the dispersed sound waves are reflected by the ceiling and concentrated at the other focus, allowing people across the room to clearly hear what he said. Suppose such gallery has a ceiling reaching twenty feet above the five-foot-high vertical walls at its tallest point (so the cross-section is half an ellipse topping two vertical lines at either end), and suppose the foci of the ellipse are thirty feet apart. What is the height of the ceiling above each "whispering point"? Ans 21

Sketch the picture. This property is called Ellipsoid

Conic: Hyperbola

Definition: Set of all points in a plane whose distances from two fixed points is the constant **difference.** 

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| **Standard equations** | $\frac{(x-h)^{2}}{a^{2}}$ - $\frac{(y-k)^{2}}{b^{2}}$ = 1 | $\frac{(y-h)^{2}}{a^{2}}-\frac{(x-k)^{2}}{b^{2}}$ = 1 |
| **Focal axis** | y = k | x = h |
| **Foci** | $$(h\pm c,k)$$ | $$(h,k\pm c)$$ |
| **Transverse axis****(Major 2a)** | horizontal; center (h, k) | vertical; center (h, k) |
| **Vertices** | $$(h\pm a,k)$$ | $$(h,k\pm a)$$ |
| **Conjugate axis(Minor)** | 2b; $c^{2}=a^{2}+b^{2}$ | 2b; $c^{2}=a^{2}+b^{2}$ |
| **Asymtotes** | $$y=\pm \frac{b}{a}\left(x-h\right)+k$$ | $$y=\pm \frac{a}{b}\left(x-h\right)+k$$ |

1. Find the standard form of the equation of hyperbola whose transverse axis has endpoints (-2, -1) and (8, -1) and whose conjugate axis (minor) has a length of 8

2. Find the center, vertices, foci, eccentricity (e = c/a), asymptotes and sketch of the following hyperbola

 $\frac{x^{2}}{144}$ - $\frac{y^{2}}{25}$ = 1 $\frac{-(x+2)^{2}}{9}$ + $\frac{(y-5)^{2}}{49}$ = 1

3. Find an equation for the hyperbola with center (2, 3), vertex (0, 3), and focus (5, 3). Sketch

4. Find an equation for the hyperbola with center (0, 0), vertex (0, 5),and asymptotes y = ± (5/3)x. Sketch

5. Find an equation of the hyperbola with x-intercepts at x = –5 and x = 3, nd foci at (–6, 0) and (4, 0). Stamp

6. Find an equation for the hyperbola with vertices at (–2, 15) and (–2, –1), and

having eccentricity e = 17/8. Stamp

**Target 8 Assessment**

1. Write the equation of the parabola with vertex $\left(3, 4\right)$ and focus $\left(1, 4\right)$.
2. Write the equation of the circle with diameter endpoints $\left(-7, 2\right)$ and $\left(11, -20\right)$.
3. Write the equation of the ellipse with vertices $(3, 9)$ and $\left(-5, 9\right)$ and foci $\left(1, 9\right)$ and $\left(-3, 9\right).$
4. Write the equation of the hyperbola with vertices $\left(4, 8\right)$ and $\left(4, -4\right)$ and foci $\left(4, 10\right)$ and $\left(4, -6\right)$.

State the conic section, write the equation in standard form, and state the pertinent information relating to the graph as indicate

|  |  |  |  |
| --- | --- | --- | --- |
| Parabola | Circle | Ellipse | Hyperbola |
| VertexFocusDirectrixAxis of Symmetry | CenterRadius | CenterFociMajor Axis LengthMinor Axis Length | CenterFociSlopes of Asymptotes |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 1. $x^{2}-6x+y^{2}-32y=0$
 | 1. $y^{2}-6y-4x+5=0$
 | $$16y^{2}-32y-9x^{2}-18x=137$$ | 1. $9x^{2}-54x+25y^{2}-200y=-256$
 |
| Name |  |  |  |  |
| Equation |  |  |  |  |
| Key Info |  |  |  |  |