## Assignment \#4: On-Line Scavenger Hunt!

## Questions

1. What is the General Form of a Conic Section?
2. Why are quadratic relations sometimes called "conic sections"?
3. What is the result of a planar slice through a cone parallel to an edge of the cone?
4. Which conic section has an eccentricity of 1.5 and why?
5. What are the general forms of a circle, parabola, ellipse, and hyperbola?
6. True/False. In general graphing form, ellipses have different denominators and equal 1, but there is a negative sign in between the fractions.
7. Fill in the blanks.
a. A $\qquad$ is a point from which distances are measured in forming a conic section.
b. A $\qquad$ is a line from which distances are measured in forming a conic section.
c. The set of points satisfying some condition or set of conditions is called the $\qquad$ .
d. The $\qquad$ is the point ( $\mathrm{h}, \mathrm{k}$ ) of a circle, an ellipse, or a hyperbola
8. Classify the following equations according to the type of conic each represents.
a. $3 x^{2}+3 y^{2}-6 x+9 y-14=0$
b. $6 x^{2}+12 x-y+15=0$
c. $x^{2}+2 y^{2}+4 x+2 y-27=0$
d. $x^{2}-y^{2}+3 x-2 y-43=0$
9. Define the eccentricity of a conic section.
10. Convert the equation of a parabola $x^{2}-4 x-8 y+12=0$ into standard graphing form.

## Answers

1. $A x^{2}+B x y+C y^{2}+D x+E y+F=0$
2. A conic section is results of the intersection of a plane and a double, right cone joined at the vertex.
3. A parabola.
4. A hyperbola. Since the eccentricity of a conic section is greater than 1 , it must be a hyperbola.
5. Circle: $(x-h)^{2}+(y-k)^{2}=r^{2}$

Parabola: vertical: $y=a(x-h)^{2}+k \quad$ horizonal: $x=a(y-k)^{2}+h$
Ellipse: horizontal: $\frac{(x-h)^{2}}{a^{2}}+\frac{(y-k)^{2}}{b^{2}}=1 \quad$ vertical: $\frac{(x-h)^{2}}{b^{2}}+\frac{(y-k)^{2}}{a^{2}}=1$
Hyperbola: horizontal: $\frac{(x-h)^{2}}{a^{2}}-\frac{(y-k)^{2}}{b^{2}}=1 \quad$ vertical: $\frac{(y-k)^{2}}{a^{2}}-\frac{(x-h)^{2}}{b^{2}}=1$
6. False, this is for hyperbolas not ellipses.
7. a) focus; b) directrix; c) locus; d) center
8. a) circle; b) parabola: c) ellipse; d) hyperbola
9. All points whose distance to the focus is equal to the eccentricity times the distance to the directrix. Therefore, the eccentricity of a conic sections is the quotient of the distance to the focus divided by the distance to the directrix.
10. $y=1 / 8(x-2)^{2}+1$

## Websites

> https://www.mathsisfun.com/geometry/conic-sections.html

- Mathisfun is a website that provides the terminology, definitions, and examples of the different types of conic sections. It is interactive and includes links that can help students learn the concepts at a deeper level.
> https://www.mathplanet.com/education/algebra-2/conic-sections
- Mathplanet is a free website sponsored by Mattecentrum. The material is well-organized and shows students how to use appropriate formulas to determine key quantities for conic sections.
> https://www.purplemath.com/modules/conics.htm
- Purple math is an excellent website for those students who garner a more advanced understanding of conic sections and how they relate to other topics of Algebra 2.
> https://www.shmoop.com/conics/resources.html
- Shmoop is an informative website that contains links to various sites. This site has problems, different ways to graph hyperbolas and ellipses, and interactive games to reinforce the topics of conic sections.
> https://www.onlinemathlearning.com/conic-parabolas.html
- Onlinemathlearning provides free lessons and videos on conic sections. These lessons help students graph parabolas, graph circles, and graph ellipses in standard and general form.
> https://www.softschools.com/math/calculus/distinguishing conic sections from graphing format/
- Softschools is a website that provides free online games, worksheets, and quizzes on conic sections. This site directs students how to distinguish conic sections from their graphing forms.
> https://math.libretexts.org/Bookshelves/Calculus/Book\%3A Calculus (OpenStax ,/11\%3A Parametric Equations and Polar Coordinates/11.05\%3A Conic Sect ions
- MathLibretexts provides a history of conics and a deeper dive into the material. This website is appropriate for Honor and Accelerated classes to explore foci, directrix, and eccentricity of conic sections.

