

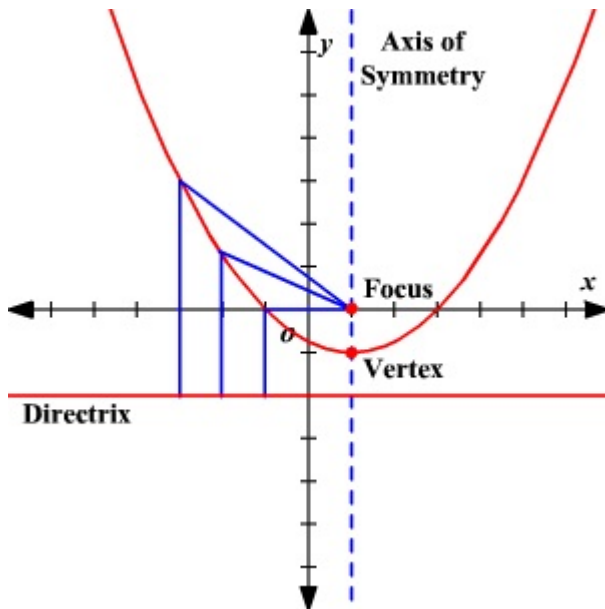
MATH 7
HOMEWORK 15:
JAN 20, 2019

Announcement: Registration is now open for AMC 10 to students up to 10th grade. Registration is free. The test will be given in the afternoon on February 13, 2019. Check our website for the registration link.

GRAPH OF A PARABOLA

A parabola is the set of all points in a plane that are equally distant away from a given point and a given line. This given point is called the **focus** of the parabola and the line is called the **directrix**.

If the parabola is of the form $(x-h)^2 = 4p(y-k)$, the vertex is (h,k) , the focus is $(h, k+p)$ and directrix is $y = k - p$



We also started discussing Plane Geometry. I recommend the purchase of the book E-Z Geometry by Lawrence Leff if for additional practice and explanations.

HOMEWORK

1. Simplify $\frac{(3^{2008})^2 - (3^{2006})^2}{(3^{2007})^2 - (3^{2005})^2}$ (AMC)
2. Points A,B,C,D have coordinates $(0,0), (7,0), (9,5), (2,5)$. Show that $AB = DC$, $AD = BC$ What can you say about ABCD?
3. What is the equation of a circle centered in $O(-3,1)$ and of radius 2.
4. What are the coordinates of the center of the circle defined by $(x+7)^2 + (y-3)^2 = 2$?
5. A circle with center $(3,5)$ intersects the y-axis at $(0,1)$.
 - Find the radius of the circle
 - Find the coordinates of the other point of intersection on the y-axis

- What are the coordinates of the intersection points of the circle with the x-axis?
6. What is the equation of a sphere of radius 1 centered at the origin?
 7. Write down the equation of a sphere centered at $O(-2, -1, -3)$ and radius 2.
 8. Show that $(3, 5)$ is equidistant from $(-1, 2)$ and $(3, 0)$.
 9. Find k so that the distance from $(-1, 1)$ to $(2, k)$ is 5.
 10. Find the distance between $A(3, 1, 5)$ and $B(1, -2, 3)$.
 11. Graph $x^2 = 4y$. What is the focus, directrix and vertex of the parabola?
 12. A right triangle has area 20 and perimeter 32. What is the length of its hypotenuse? (AMC)
 13. In triangle CAT, $\angle ACT = \angle ATC$, and $\angle CAT = 36$. If TR bisects $\angle ATC$, what is $\angle CRT$? (AMC)
 14. Graph $y = (\sqrt{x})^2$. Note $x \geq 0$
 15. A triangle ABC, has corners $A(-3, 0)$, $B(0, 3)$ and $(3, 0)$. The line $y = \frac{1}{3}x + 1$ separates the triangle in 2. What is the area of the piece lying below the line?
 16. If $x^2 + y^2 = 40$ and $xy = -12$, what is $(x - y)^2$?