

8.1 Circles & Parabolas

Target 4A: Investigate the geometric properties of parabolas (vertex, focus, and directrix)

Target 4B: Derive the standard equation of a parabola and graph given two or three criteria

Review of Prior Concepts<https://youtu.be/yaSpxDdKEAs>

What do you know about Conic Sections?

**More Practice****Introduction to Conics**<https://www.khanacademy.org/math/algebra2/intro-to-conics-alg2><http://www.coolmath.com/algebra/25-conic-sections/01-introduction-circles-01><https://www.mathsisfun.com/geometry/conic-sections.html><https://www.youtube.com/watch?v=ky5Q6hEtjKk><https://www.youtube.com/watch?v=GDHNoQHQtQ><https://www.youtube.com/watch?v=SKNybVUuPXA>**SAT Connection****Passport to Advanced Math****12.** Understand a nonlinear relationship between two variables

Example: Which of the following is an equation of a circle in

the xy -plane with center $(0, 4)$ and a radius withendpoint $\left(\frac{4}{3}, 5\right)$?

A) $x^2 + (y - 4)^2 = \frac{25}{9}$

B) $x^2 + (y + 4)^2 = \frac{25}{9}$

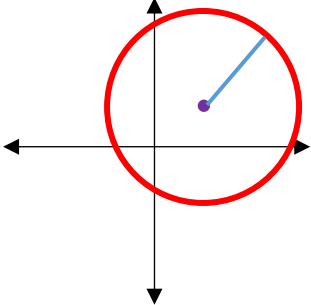
C) $x^2 + (y - 4)^2 = \frac{5}{3}$

D) $x^2 + (y + 4)^2 = \frac{3}{5}$

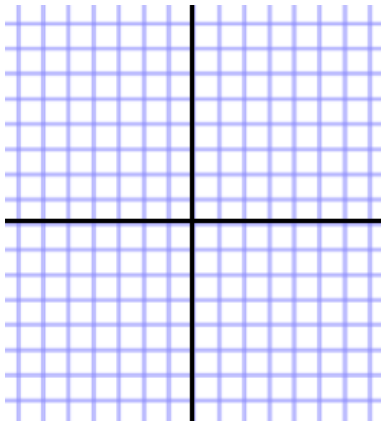
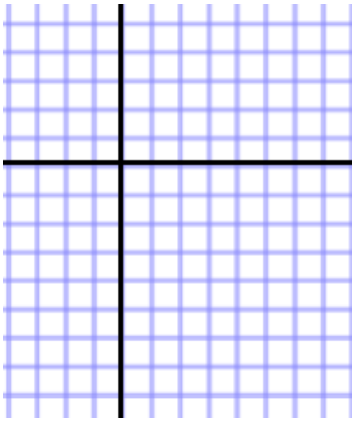
Solution

Circle

Definition (in your own words)

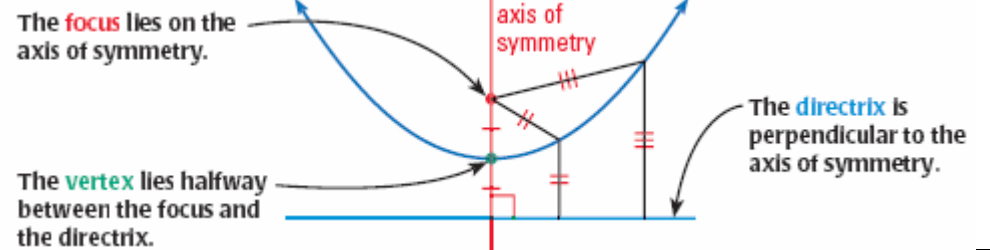
Standard Form of Equation	$(x - h)^2 + (y - k)^2 = r^2$	<i>Sketch</i> 
Center		
Radius		
Eccentricity		

Examples

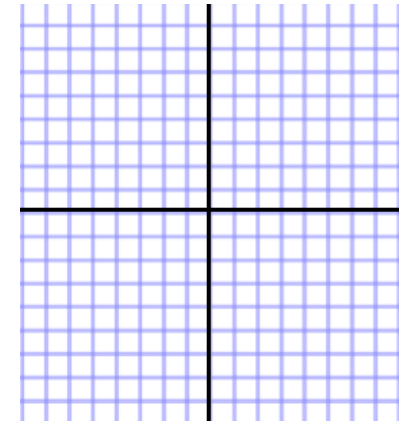
Standard Form of Equation	$x^2 + y^2 = 36$	$(x - 3)^2 + (y + 1)^2 = 16$
Center		
Radius		
Eccentricity		
Sketch		

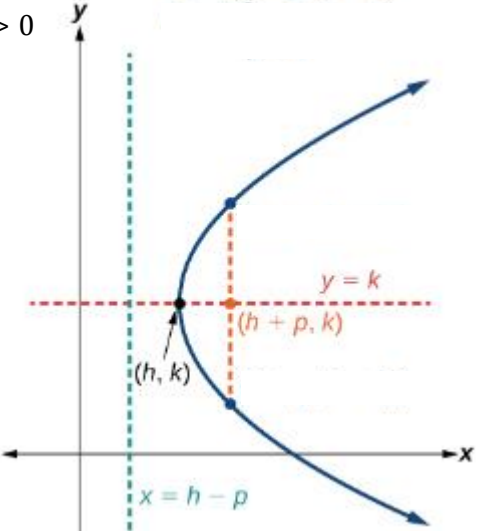
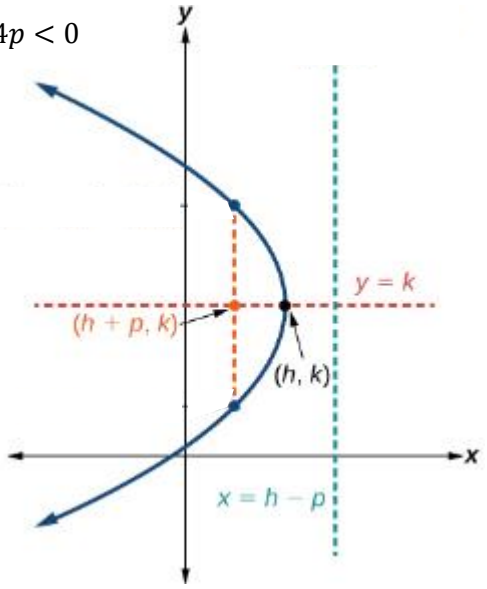
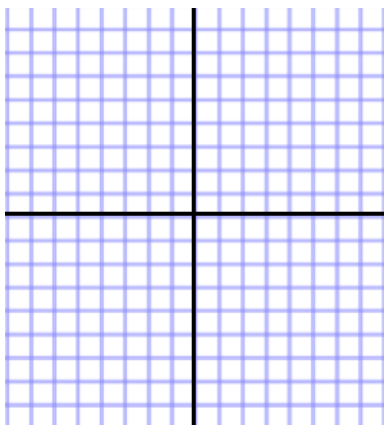
Parabola

Definition (in your own words)



Vertical Axis (of Symmetry)		Sample Sketch	Example
Standard Form of Equation	$(x - h)^2 = 4p(y - k)$	$4p > 0$ 	$x^2 = -8(y - 2)$
Opening			
Vertex			
Focus			
Directrix			
Axis of Symmetry			
Focal Length		$4p < 0$ 	
Focal Width			
Eccentricity			



Horizontal Axis (of Symmetry)		Sketch	Example
Standard Form of Equation	$(y - k)^2 = 4p(x - h)$	<p>$4p > 0$</p> 	$y^2 = 12(x - 2)$
Opening			
Vertex		<p>$4p < 0$</p> 	
Focus			
Directrix			
Axis of Symmetry			
Focal Length			
Focal Width			
Eccentricity			

Unit 4 (Chapter 8): Conic Sections*Examples:*

1. Find the vertex, focus, directrix, and focal width of the parabola: $(y + 4)^2 = 6x - 12$

2. Find an equation in standard form for the parabola that satisfies the given conditions:
vertex $(0,0)$, focus $(0,2)$

3. Find an equation in standard form for the parabola that satisfies the given conditions:
focus $(-4,0)$, directrix $x = 4$

4. Find an equation in standard form for the parabola that satisfies the given conditions:
vertex $(3,5)$, directrix $y = 7$

5. What is the relationship between the vertex, focus, and directrix in the parabola?

More Practice**Circles**

<http://www.regentsprep.org/regents/math/algtrig/atc1/circlelesson.htm>

<http://www.mathsisfun.com/algebra/circle-equations.html>

<http://www.mathwarehouse.com/geometry/circle/equation-of-a-circle.php>

<https://www.youtube.com/watch?v=FLM3xlqw3WY>

<https://www.youtube.com/watch?v=6r1GQCxyMKI>

Parabolas

<http://www.purplemath.com/modules/parabola3.htm>

<http://www.protutorcompany.com/finding-the-vertex-focus-and-directrix-of-a-parabola-given-in-standard-form/>

<https://brainenie.ck12.org/skills/108316>

<https://www.youtube.com/watch?v=qxjs3NHI5T8>

<https://www.youtube.com/watch?v=a3qUuSqxzBk>

Homework Assignment

p.578 #1,3,7-10all,11,13,15

SAT Connection**Solution**

Choice A is correct. The equation of a circle can be written as $(x - h)^2 + (y - k)^2 = r^2$ where (h, k) are the coordinates of the center of the circle and r is the radius of the circle. Since the coordinates of the center of the circle are $(0, 4)$, the equation is $x^2 + (y - 4)^2 = r^2$, where r is the radius. The radius of the circle is the distance from the center, $(0, 4)$, to the given endpoint of a radius, $(\frac{4}{3}, 5)$. By the distance formula, $r^2 = \left(\frac{4}{3} - 0\right)^2 + (5 - 4)^2 = \frac{25}{9}$. Therefore, an equation of the given circle is $x^2 + (y - 4)^2 = \frac{25}{9}$.

Choice B is incorrect; it results from the incorrect equation $(x + h)^2 + (y + k)^2 = r^2$. Choice C is incorrect; it results from using r instead of r^2 in the equation for the circle. Choice D is incorrect; it results from using the incorrect equation $(x + h)^2 + (y + k)^2 = \frac{1}{r}$.