Properties of parabolas

Equation• vertical directrix $y^2 = 4px$ if vertex at origin• horizontal directrix $x^2 = 4py$ if vertex at origin• use transformations to shift equation by co-ordinates of vertex if not at originDistance• distance from any point on parabola to focus = (perpendicular) distance from point to directrix Properties of ellipses Axes of symmetry• major axis perpendicular to major axis, passes through centerVertices• endopoints of major axisFoci• along major axiseloser to center than vertices areCenter• intersection of major and minor axes• midpoint of bott major and minor axes• midpoint of origin• use transformations to shift equation by co-ordinates of center if not at originIdentity• (semi-major axis) ² = (semi-mion axis) ² + ("semi-"pical length)• use transformations to shift equation by co-ordinates of center if not at originIdentity• (semi-major axis)rest rest of distance between foci = distance from center to focusDistance• sum of distances from any point on ellipse to foci = major axisProperties of hyperbolasAxes of symmetry• transverse axis• farther from center than vertices are• endpoints of transverse axis• farther from center than vertices are• endpoints of transverse axis• farther from center than vertices are• intersection of asymptotes• passes through center• sum of distance from any point and ellipse to foci = major axisProperties of hyperbolas<	Axis of symmetry Vertex	 passes through focus and vertex perpendicular to directrix midpoint between focus and directrix along axis of symmetry 			
• horizontal directrix $x^2 = 4py$ if vertex at origin• use transformations to shift equation by co-ordinates of vertex if not at originDistance Properties of ellipses Axes of symmetry• major axis passes through center, foci and vertices• ininor axis perpendicular to major axis, passes through centerVertices• inior axis perpendicular to major axis, passes through centerVertices• inior axis perpendicular to major axis, passes through centerVertices• closer to center than vertices are• indpoint of both major and minor axes• midpoint of both major and minor axes• midpoint of both major and minor axes• midpoint of verticesEquation• $\frac{x^2}{("semi-horizontal" axis)^2} + \frac{y^2}{("semi-vertical" axis)^2} = 1$ • use transformations to shift equation by co-ordinates of center if not at originIdentity• (semi-migor axis) = (semi-minor axis) + ("semi-"focal length) =• y distance between foci - distance from center to focusDistance• sum of distances from any point on ellipse to foci = major axis Properties of hyperholasProperties of hyperholas Properties of and transverse axis passes through center• onjagate axis passes through center• vertical axis• endpoint of tori• use transformations to shift equation by co-ordinates of center• onjagate axis passes through center• transverse axis passes through center foci and vertices• conjagate axis perpendicular to major axis, passes through center	-	• directed distance from vertex to focus • vertical directrix $y^2 = 4 p x$ if vertex at origin			
Ustance• use transformations to shift equation by co-ordinates of vertex if not at origin • distance from any point on parabola to focus = (perpendicular) distance from point to directrixProperties of ellipsetAxes of symmetry• major axis passes through center, foci and vertices • mimor axis perpendicular to major axis, passes through center • endpoints of major axis • closer to center than vertices are • indpoint of foci • midpoint of foci 	Equation				
Distance • distance from any point on parabola to focus = (perpendicular) distance from point to directrix Properties of ellipses Axes of symmetry • major axis passes through center, foci and vertices • minor axis perpendicular to major axis, passes through center • endpoints of major axis • closer to center than vertices are • intersection of major and minor axes • midpoint of boti major and minor axes • midpoint of roci • midpoint of vertices • indipoint of vertices • vertices from center if not at origin • (semi-major axis) ² = (semi-minor axis) ² + ("semi-" focal length) ² • where "semi-" focal length = // distance between foci = distance from center to focus Distance Properties of hyperbolas Axes of symmetry • transverse axis passes through center, foci and vertices • conjugate axis perpendicular to major axis, passes through center • endpoints of transverse axis farther from center than vertices are • intersection of transverse axis • farther from center than vertices are • intersection of transverse axis • along transverse axis • slope = $\pm \frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Fequation • opens up & down • opens up & down • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordi					
Axes of symmetry• major axis passes through center, foci and vertices • minor axis perpendicular to major axis, passes through center • endpoints of major axis closer to center than vertices are • midpoint of both major and minor axes • midpoint of both major and minor axes • midpoint of both major and minor axes • midpoint of verticesEquation $\frac{x^2}{("semi-horizontal" axis)^2} + \frac{y^2}{("semi-vertical" axis)^2} = 1$ • use transformations to shill equation by co-ordinates of center if not at origin • $\frac{y^2}{("semi-norizontal" axis)^2} + ("semi-"focal length)^2$ where "semi-"focal length • $\frac{y}{("semi-norizontal" axis)^2} + ("semi-nior axis)^2 + ("semi-"focal length)^2$ where "semi-"focal length • $\frac{y}{("semi-nior axis)^2} = (semi-minor axis)^2 + ("semi-"focal length)^2$ where "semi-"focal length • $\frac{y}{("semi-nior axis)^2} + ("semi-"focal length)^2$ where "semi-"focal length • $\frac{y}{("semi-nior axis)^2} + ("semi-"focal length)^2$ where "semi-"focal length • $\frac{y}{("semi-nior axis)^2} + ("semi-"focal length)^2$ where "semi-"focal length $\frac{y}{("semi-nior axis)^2} + ("semi-"focal length)^2$ where "semi-"focal length $\frac{y}{("semi-nior axis)^2} + ("semi-nior axis)^2 + ("semi-nior axis)^$	Distance				
• minor axis perpendicular to major axis, passes through center• Vertices• endpoints of major axisFoci• along major axis• Center• intersection of major and minor axes• midpoint of both major and minor axes• midpoint of foci• midpoint of vertices• $\frac{x^2}{("semi-horizontal" axis)^2} + (\frac{y^2}{("semi-vertical" axis)^2} = 1$ • use transformations to shift equation by co-ordinates of center if not at originIdentity• $(semi-major axis)^2 = (semi-minor axis)^2 + ("semi-"focal length)^2• where "semi-"focal length= ½ distance between foci = distance from center to focusDistance• sum of distances from any point on ellipse to foci = major axisProperties of hyperbolasAxes of symmetry• transverse axis passes through center, foci and vertices• conjugate axis perpendicular to major axis, passes through centerVertices• conjugate axis perpendicular to major axis, passes through centerVertices• larther from center than vertices are• indipoint of both transverse and conjugate axes• midpoint of both transverse and conjugate axes• indipoint of both transverse and conjugate axes• midpoint of both transverse and conjugate axes• midpoint of both transverse and conjugate axes• midpoint of both transverse and conjugate axes• mid$	Properties of ellipses				
Vertices Foci F	Axes of symmetry				
Center eloser to center than vertices are intersection of major and minor axes midpoint of both major and minor axes midpoint of both major and minor axes midpoint of both major and minor axes midpoint of vertices Equation $\frac{x^2}{("semi - horizontal" axis)^2} + \frac{y^2}{("semi - vertical" axis)^2} = 1$ use transformations to shift equation by co-ordinates of center if not at origin (semi-major axis) ² = (semi-minor axis) ² + ("semi-"focal length) ² where "semi-"focal length = ½ distance between foci = distance from center to focus Distance sum of distances from any point on ellipse to foci = major axis Properties of hyperbolas Axes of symmetry transverse axis passes through center, foci and vertices conjugate axis perpendicular to major axis, passes through center Vertices endpoints of transverse axis Foci along transverse axis Foci bit perbolas Axes of symmetry transverse axis passes through center, foci and vertices Center intersection of transverse and conjugate axes midpoint of both transverse and conjugate axes midpoint of foci midpoint of foci midpoint of vertices intersection of asymptotes Asymptotes opens left & right $\frac{x^2}{("semi - vertical axis}$ Equation $\frac{y^2}{("semi - vertical" axis)^2} - \frac{y^2}{("semi - vertical" axis)^2}$ Equation $\frac{y^2}{("semi - vertical" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2}$ if center at origin use transformations to shift equation by co-ordinates of center if not at origin use transformations to shift equation by co-ordinates of center if not at origin use transformations to shift equation by co-ordinates of center if not at origin ("semi-"focal length) ² = (semi-"rical" axis) ² + (semi-conjugate axis) ² + (semi-focal length)	Vertices				
Center intersection of major and minor axes midpoint of foci midpoint of foci midpoint of vertices Equation $\frac{x^2}{("semi-horizontal" axis)^2} + \frac{y^2}{("semi-vertical" axis)^2} = 1$ use transformations to shift equation by co-ordinates of center if not at origin (semi-major axis) ² = (semi-minor axis) ² + ("semi-" focal length) ² where "semi-" focal length = ½ distance between foci = distance from center to focus Distance sum of distances from any point on ellipse to foci = major axis Properties of hyperbolas Axes of symmetry transverse axis passes through center, foci and vertices conjugate axis perpendicular to major axis, passes through center Vertices endpoints of transverse axis Faci farther from center than vertices are Center intersection of usarverse and conjugate axes midpoint of foci midpoint of vertices Equation opens left & right $\frac{x^2}{("semi-horizontal" axis)^2} - \frac{y^2}{("semi-vertical" axis)^2} - \frac{y^2}{("semi-vertical" axis)^2}$ Equation to poens up & down $\frac{y^2}{("semi-vertical" axis)^2} - \frac{x^2}{("semi-horizontal" axis)^2}$ use transformations to shift equation by co-ordinates of center if not at origin use transformations to shift equation by co-ordinates axis) ² + (semi-conjugate axis) ² where "semi-" focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ²	Foci				
$\begin{array}{llllllllllllllllllllllllllllllllllll$	Contor				
$\begin{array}{llllllllllllllllllllllllllllllllllll$	Center				
• midpoint of vertices Equation • $\frac{x^2}{("semi - horizontal" axis)^2} + \frac{y^2}{("semi - vertical" axis)^2} = 1$ • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • (semi-major axis)^2 = (semi-minor axis)^2 + ("semi-"focal length)^2 where "semi-"focal length = ½ distance between foci = distance from center to focus • sum of distances from any point on ellipse to foci = major axis Properties of hyperbolas Axes of symmetry • transverse axis passes through center, foci and vertices • conjugate axis perpendicular to major axis, passes through center • conjugate axis perpendicular to major axis, passes through center • conjugate axis perpendicular to major axis, passes through center • conjugate axis perpendicular to major axis, passes through center • vertices • endpoints of transverse axis • along transverse axis • along transverse and conjugate axes • midpoint of toth transverse and conjugate axes • midpoint of toti • intersection of transverse and conjugate axes • indepoint of transverse is end conjugate axes • indepoint of transverse and conjugate axes • indepoint of transverse is end conjugate axis • slope = $\pm \frac{vertical axis}{vertical axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation • opens up & down • opens up & down • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin					
• use transformations to shift equation by co-ordinates of center if not at originIdentity• $(semi-major axis)^2 = (semi-minor axis)^2 + ("semi-" focal length)^2$ where "semi-" focal length $= \frac{1}{2}$ distance length $= \frac{1}{2}$ distance the ween foci = distance from center to focus e sum of distances from any point on ellipse to foci = major axis Properties of hyperbolas Axes of symmetry• transverse axis passes through center, foci and vertices • conjugate axis perpendicular to major axis, passes through center • endpoints of transverse axis along transverse axis • along transverse axis • along transverse axis • along transverse axis • intersection of transverse and conjugate axes • midpoint of foci • midpoint of foci • midpoint of foci • midpoint of foci • pass through centerAsymptotes• opens left & right • opens left & right • opens up & down • $\frac{y^2}{("semi - horizontal" axis)^2} - \frac{y^2}{("semi - vertical" axis)}$ Equation• opens up & down • $\frac{y^2}{("semi - vertical" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2}$ Identity• ("semi-"focal length)^2 • (use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin					
• use transformations to shift equation by co-ordinates of center if not at originIdentity• $(semi-major axis)^2 = (semi-minor axis)^2 + ("semi-" focal length)^2$ where "semi-" focal length $= \frac{1}{2}$ distance there if not at originDistance• sum of distances from any point on ellipse to foci = major axis Properties of hyperbolas Axes of symmetry• transverse axis passes through center, foci and vertices • conjugate axis perpendicular to major axis, passes through center • endpoints of transverse axis • along transverse axis • intersection of transverse and conjugate axes • midpoint of foci • midpoint of foci • midpoint of foci • midpoint of foci • midpoint of vertices • pass through center • slope = $\pm \frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation• opens left & right • opens up & down • $\frac{y^2}{("semi - horizontal" axis)^2} - \frac{y^2}{("semi - vertical" axis)}$ Identity• use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin	_ ·	x^2	v^2	1	
Identity ident	∃quation				
where "semi-" focal length = ½ distance between foci = distance from center to focus Sum of distances from any point on ellipse to foci = major axis Properties of hyperbolas Axes of symmetry • transverse axis passes through center, foci and vertices • conjugate axis perpendicular to major axis, passes through center • endpoints of transverse axis Foci • along transverse axis Foci • along transverse axis • farther from center than vertices are Center • intersection of transverse and conjugate axes • midpoint of both transverse and conjugate axes • midpoint of both transverse and conjugate axes • midpoint of vertices • intersection of fasymptotes • pass through center • slope = $\pm \frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation • opens left & right • opens up & down • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-" focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ² where "semi-" focal length					
$= \frac{1}{4} \text{ distance between foci = distance from center to focus}$ $= \frac{1}{4} \text{ distances from any point on ellipse to foci = major axis}$ Properties of hyperbolas Axes of symmetry $= \frac{1}{4} \text{ distances from any point on ellipse to foci = major axis}$ Axes of symmetry $= \frac{1}{4} \text{ distances from any point on ellipse to foci = major axis}$ Axes of symmetry $= \frac{1}{4} \text{ distances from any point on ellipse to foci = major axis}$ Axes of symmetry $= \frac{1}{4} \text{ distances from any point on ellipse to foci = major axis}$ $= \frac{1}{4} \text{ distance from center, foci and vertices}$ $= \frac{1}{4} \text{ conjugate axis perpendicular to major axis, passes through center}$ $= \frac{1}{4} \text{ distance from center than vertices are}$ $= \frac{1}{4} \text{ distance from center than vertices are}$ $= \frac{1}{4} \text{ distance from center than vertices are}$ $= \frac{1}{4} \text{ distance from center than vertices are}$ $= \frac{1}{4} \text{ distance from center than vertices are}$ $= \frac{1}{4} \text{ distance from center than vertices}$ $= \frac{1}{4} \text{ distance from center}$ $= \frac{1}{4} \frac{1}{4} \text{ distance from from center}$ $= \frac{1}{4} \frac{1}{4} \frac{1}{4} \text{ distance from from center}$ $= \frac{1}{4} \frac{1}{4} \text{ distance from from center}$ $= \frac{1}{4} \frac{1}{4} \frac{1}{4} \text{ distance from from center}$ $= \frac{1}{4} \frac$	Identity				
Distance • sum of distances from any point on ellipse to foci = major axis Properties of hyperbolas Axes of symmetry • transverse axis passes through center, foci and vertices conjugate axis perpendicular to major axis, passes through center vertices • endpoints of transverse axis Foci • endpoints of transverse axis Foci • farther from center than vertices are intersection of transverse and conjugate axes midpoint of both transverse and conjugate axes midpoint of tool transverse and conjugate axes midpoint of of vertices intersection of asymptotes Asymptotes • pass through center • slope = $\pm \frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation • opens left & right • $\frac{x^2}{("semi - horizontal" axis)^2} - \frac{y^2}{("semi - horizontal" axis)^2}$ if center at origin • opens up & down • $\frac{y^2}{("semi - vertical" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2}$ Identity • ("semi-"focial length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ²					
Properties of hyperbolasAxes of symmetry• transverse axis passes through center, foci and vertices • conjugate axis perpendicular to major axis, passes through center • endpoints of transverse axis • along transverse axis • farther from center than vertices are • intersection of transverse and conjugate axes • midpoint of both transverse and conjugate axes • midpoint of of vertices • intersection of asymptotesAsymptotes• pass through center • intersection of asymptotes • pass through center • opens left & rightEquation• opens left & right • opens up & down • $\frac{y^2}{("semi - horizontal" axis)^2} - \frac{y^2}{("semi - horizontal" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2}$ Identity• use transformations to shift equation by co-ordinates of center if not at origin • where "semi-"focal length)^2 = (semi-transverse axis)^2 + (semi-conjugate axis)^2					
Axes of symmetry • transverse axis passes through center, foci and vertices • conjugate axis perpendicular to major axis, passes through center • endpoints of transverse axis • along transverse axis • along transverse axis • farther from center than vertices are • intersection of transverse and conjugate axes • midpoint of both transverse and conjugate axes • midpoint of vertices • intersection of asymptotes • pass through center • slope = $\pm \frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation • opens left & right • opens up & down • opens up & down • opens up & down • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-"focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ² where "semi-"focal length	Distance	• sum of distances from any point on ellipse to foci = major axis			
• conjugate axis perpendicular to major axis, passes through centerVertices• endpoints of transverse axisFoci• along transverse axisFoci• along transverse axis• farther from center than vertices are• intersection of transverse and conjugate axes• midpoint of both transverse and conjugate axes• midpoint of both transverse and conjugate axes• midpoint of foci• midpoint of vertices• intersection of asymptotes• pass through center• slope = $\pm \frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation• opens left & right• opens up & down• $\frac{y^2}{("semi - horizontal" axis)^2} - \frac{y^2}{("semi - horizontal" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2}$ Identity• ("semi-"focal length)^2 = (semi-transverse axis)^2 + (semi-conjugate axis)^2	Properties of hyperbo	as			
• conjugate axis perpendicular to major axis, passes through center• Vertices• endpoints of transverse axisFoci• along transverse axis• farther from center than vertices are• intersection of transverse and conjugate axes• midpoint of both transverse and conjugate axes• midpoint of foci• midpoint of vertices• intersection of asymptotes• pass through center• slope = $\pm \frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation• opens left & right• opens up & down• $\frac{y^2}{("semi - horizontal" axis)^2} - \frac{y^2}{("semi - horizontal" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2}$ Identity• ("semi-"focal length)^2 = (semi-transverse axis)^2 + (semi-conjugate axis)^2	Axes of symmetry	• transverse axis passes through cer	nter foci and vertices		
Foci along transverse axis farther from center than vertices are intersection of transverse and conjugate axes midpoint of both transverse and conjugate axes midpoint of vertices intersection of asymptotes pass through center slope $= \pm \frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation opens left & right opens up & down opens up & down use transformations to shift equation by co-ordinates of center if not at origin use transformations to shift equation by co-ordinates of center if not at origin ("semi-"focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ²					
Center • farther from center than vertices are • intersection of transverse and conjugate axes • midpoint of both transverse axis $)^2 - \frac{y^2}{("semi - vertical" axis)^2} - \frac{y^2}{("semi - vertical" axis)^2} - \frac{y^2}{("semi - horizontal" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2}$ Equation • opens up & down • opens up & down • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-"focal length)^2 = (semi-transverse axis)^2 + (semi-conjugate axis)^2 where "semi-"focal length	Vertices	• endpoints of transverse axis			
Center intersection of transverse and conjugate axes midpoint of both transverse and conjugate axes midpoint of foci midpoint of vertices intersection of asymptotes pass through center slope $= \pm \frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation opens left & right opens up & down opens up & down use transformations to shift equation by co-ordinates of center if not at origin use transformations to shift equation by co-ordinates of center if not at origin ("semi-"focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ² where "semi-" focal length	Foci				
Hentity • midpoint of both transverse and conjugate axes • midpoint of both transverse and conjugate axes • midpoint of foci • midpoint of vertices • intersection of asymptotes • pass through center • slope = ± $\frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation • opens left & right • opens up & down • $\frac{y^2}{("semi - horizontal" axis)^2} - \frac{y^2}{("semi - horizontal" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2}$ Identity • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-"focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ² • where "semi-"focal length	Cantan				
$\begin{array}{llllllllllllllllllllllllllllllllllll$	Center				
Asymptotes• midpoint of vertices • intersection of asymptotesAsymptotes• pass through center • pass through center• slope = $\pm \frac{vertical axis}{horizontal axis} = \pm \frac{semi - vertical axis}{semi - horizontal axis}$ Equation• opens left & right• opens left & right• $\frac{x^2}{("semi - horizontal" axis)^2} - \frac{y^2}{("semi - vertical" axis)^2}$ • opens up & down• $\frac{y^2}{("semi - vertical" axis)^2} - \frac{x^2}{("semi - horizontal" axis)^2}$ • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-"focal length)^2 = (semi-transverse axis)^2 + (semi-conjugate axis)^2 where "semi-"focal length					
Asymptotes • intersection of asymptotes • pass through center • slope $= \pm \frac{vertical \ axis}{horizontal \ axis} = \pm \frac{semi - vertical \ axis}{semi - horizontal \ axis}$ Equation • opens left & right • opens up & down • opens up & do					
$\bullet \text{ slope } = \pm \frac{\text{vertical axis}}{\text{horizontal axis}} = \pm \frac{\text{semi-vertical axis}}{\text{semi-horizontal axis}}$ Equation $\bullet \text{ opens left & right} \bullet \frac{x^2}{("\text{semi-horizontal" axis})^2} - \frac{y^2}{("\text{semi-vertical" axis})^2} - \frac{y^2}{("\text{semi-vertical" axis})^2} - \frac{y^2}{("\text{semi-vertical" axis})^2} - \frac{y^2}{("\text{semi-horizontal" axis})^2} - \frac{x^2}{("\text{semi-horizontal" axis})^2} - \frac{x^2}{("semi-h$		 intersection of asymptotes 			
Equation • opens left & right • opens up & down • opens up & down Hentity Hentity • opens left & right • opens up & down • opens up & dow	Asymptotes				
Equation • opens left & right • opens up & down • use transformations to shift equation by co-ordinates of center if not at origin • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-"focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ² where "semi-" focal length		• slope = $+ \frac{vertical axis}{vertical axis}$	+ <u>semi – vertical axis</u>		
• opens up & down • opens up & down • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-" focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ² where "semi-" focal length		horizontal axis	semi – horizontal axis		
• opens up & down • opens up & down • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-"focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ² where "semi-"focal length			\mathbf{x}^2	v^2	
$\bullet \text{ opens up \& down} \bullet \frac{y^2}{("semi - vertical" axis)^2} - \frac{x^2}{("semi - horizontal" axis)}$ $\bullet \text{ use transformations to shift equation by co-ordinates of center if not at origin}$ $\bullet ("semi-"focal length)^2 = (semi-transverse axis)^2 + (semi-conjugate axis)^2$ where "semi-"focal length	Equation	• opens left & right	$\frac{1}{(g_{amai} _{bari=ami=1}^{2})^{2}}$	$-\frac{y}{(!!acmi_{i}, violation i!!, violation i!, violation i!, violatione$	
 opens up & down y²/("semi - vertical" axis)² - x²/("semi - horizontal" axis if center at origin use transformations to shift equation by co-ordinates of center if not at origin ("semi-"focal length)² = (semi-transverse axis)² + (semi-conjugate axis)² where "semi-"focal length 				(semi – veriicai axis)	
if center at origin • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-" focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ² where "semi-" focal length				2	
if center at origin • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-" focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ² where "semi-" focal length		• opens up & down	Y ²	$x^2 - 1$	
if center at origin • use transformations to shift equation by co-ordinates of center if not at origin • ("semi-" focal length) ² = (semi-transverse axis) ² + (semi-conjugate axis) ² where "semi-" focal length			$("semi-vertical" axis)^2 = \overline{(}$	"semi – horizontal" \overline{axis}) ² – 1	
 use transformations to shift equation by co-ordinates of center if not at origin ("semi-" focal length)² = (semi-transverse axis)² + (semi-conjugate axis)² where "semi-" focal length 				,	
Identity • $("semi-"focal length)^2 = (semi-transverse axis)^2 + (semi-conjugate axis)^2$ where "semi-"focal length				at origin	
where "semi-" focal length	Identity				
- 2 distance between loci – distance from center to focus		= $\frac{1}{2}$ distance between foci = distance from center to focus			
 Distance difference of distances from any point on hyperbola to foci = transverse axis 	Distance				
NOTE: All properties above are true even if the conic is rotated, except those marked with a					