
***Performance Tasks* for Part 4: Loci and Conics**

“Big Ideas” Addressed by the Tasks

The *Performance Tasks* in this section provide opportunities for students to

- construct and describe models to represent a described locus of points
- investigate and determine the key features of conics
- determine the equation of a conic in standard form or in general form
- sketch graphs of conics
- pose and solve problems about conics
- use technology as an aid in problem solving
- solve multi-step problems
- report the solution to a problem clearly, using appropriate mathematical forms
- communicate and justify their reasoning

Curriculum Expectations

The *Performance Tasks* address the following Curriculum Expectations from the Investigations of Loci and Conics strand of the Functions and Relations course.

Overall Expectations Addressed by the Performance Tasks

- LCV.01 represent loci, using various models (e.g., a verbal description, a diagram, a dynamic model, an equation)
- LCV.02 determine the equation and the key features of a conic
- LCV.03 solve problems involving applications of the conics

Specific Expectations

Representing Loci

- LC1.01 construct a geometric model (e.g., a diagram created by hand, a diagram created by using dynamic geometry software) to represent a described locus of points; determine the properties of the geometric model; and use the properties to interpret the locus (e.g., the locus of points equidistant from two fixed points is the right bisector of the line segment joining the two fixed points)
- LC1.02 explain the process used in constructing a geometric model of a described locus
- LC1.03 determine an equation to represent a described locus [e.g., determine the equation of the locus of points equidistant from $(-2, 7)$ and $(5, 4)$]
- LC1.04 construct geometric models to represent the locus definitions of the conics
- LC1.05 determine equations for conics from their locus definitions, by hand for simple particular cases [e.g., determine the equation of the locus of points the sum of whose distances from $(-3, 0)$ and $(3, 0)$ is 10]

Determining the Equation and the Key Features of a Conic

- LC2.01 identify the standard forms for the equations of parabolas, circles, ellipses, and hyperbolas having centres at $(0, 0)$ and at (h, k)
- LC2.03 determine the key features (e.g., the centre or the vertex, the focus or foci, the asymptotes, the lengths of the axes) of a conic whose equation is given in the form $ax^2 + by^2 + 2gx + 2fy + c = 0$, by hand in simple cases (e.g., $x^2 + 9y^2 - 6x + 36y - 36 = 0$)
- LC2.04 sketch the graph of a conic whose equation is given in the form $ax^2 + by^2 + 2gx + 2fy + c = 0$

Solving Problems Involving Applications of the Conics

- LC3.01 describe the importance, within applications, of the focus of a parabola, an ellipse, or a hyperbola (e.g., all incoming rays parallel to the axis of a parabolic antenna are reflected through the focus; the planets move in elliptical orbits with the sun at one of the foci)
- LC3.02 pose and solve problems drawn from various applications involving conics, and communicate the solutions with clarity and justification (Sample problem: A parabolic antenna is 320 m wide at a distance of 50 m above its vertex. Determine the distance above the vertex of the focus of the antenna)
- LC3.03 solve problems involving the intersections of lines and conics

Tools for Operating and Communicating with Functions

Overall Expectations Addressed by the Performance Tasks

- OCV.03 communicate mathematical reasoning with precision and clarity throughout the course

Specific Expectations

Communicating Mathematical Reasoning

- OC3.01 explain mathematical processes, methods of solution, and concepts clearly to others
- OC3.02 present problems and their solutions to a group, and answer questions about the problems and the solutions
- OC3.03 communicate solutions to problems and to findings of investigations clearly and concisely, orally and in writing, using an effective integration of essay and mathematical forms
- OC3.04 demonstrate the correct use of mathematical language, symbols, visuals (e.g., diagrams, graphs), and conventions
- OC3.05 use graphing technology effectively (e.g., use appropriate menus and algorithms; set the graph window to display the appropriate section of a curve)

Unless noted otherwise, all expectations are common to both the Functions course and the Functions and Relations course.

Expectations	Task					
	Task #1, text p. 640 Orbiting the Earth (45–60 min)	Task #2, text p. 640 Conics and Foci (45–60 min)	Task #3, text p. 640 What Are the Equations?	Task #4, text p. 641 What Are the Solutions? (50–70 min)	Task #5, text p. 641 Blaise Pascal (60–120 min)	Task #6, text p. 642 Constructing an Ellipse (60–120 min)
LC1.01					X	X
LC1.02					X	X
LC1.03					X	
LC1.04					X	X
LC1.05				X		X
LC2.01	X	X	X	X		X
LC2.03				X		
LC2.04			X	X	X	
LC2.05						
LC3.01	X					
LC3.02		X			X	X
LC3.03			X			
LC3.04						
LC3.05						
OC3.01		X				
OC3.02						
OC3.03				X	X	X
OC3.04	X	X	X	X	X	X
OC3.05			X			

Use of Technology

Students should have access to technology as they work on these tasks. Access to *The Geometer's Sketchpad* and graphing calculators or graphing software is highly recommended. The appropriate technology is discussed in each *Performance Task*.