

## STRAND 7: CONIC SECTIONS

### TOPIC 7.2: LOCUS DEFINITIONS OF CONIC SECTIONS

#### Topic Notes

##### **Mathematical focus**

The mathematical focus of this topic is the locus definitions of the conic sections: how the conics are generated from the definitions and how the definitions are related to the parameters of the standard form equations of the conics.

##### **Topic overview**

This topic includes two tasks:

Task 7.2.1: Locus Definitions of Conic Sections

Task 7.2.2: Verifying Equations of Conic Sections with Technology

One of the goals of this topic is for participants to be able to write the equation of a conic given information about the locus of the conic. Another goal is to have participants make connections to earlier topics on transformations. Participants use templates to generate three conics of each type from locus conditions and then are asked to formulate a locus definition for each type of conic. For the ellipse and the parabola, participants derive the standard form equation. For each conic, participants are asked to investigate the effects of the parameters on the conic. Participants are asked to use appropriate graphing software to verify their work.

Since many useful applications of the conic sections are tied to the locus definitions of the conics, it is helpful if participants see how its locus definition generates each conic and how the key parameters of the standard form equations are found in the definition.

##### **TEXES standards focus**

**TEXES Standard III.014 Geometry and measurement.** The teacher understands coordinate, transformational, and vector geometry and their connections. The beginning teacher:

(F) Uses coordinate geometry to derive and explore the equations, properties, and applications of conic sections (i.e., lines, circles, hyperbolas, ellipses, parabolas).

**TEXES Standard V.019 Mathematical processes and perspectives.** The teacher understands mathematical connections both within and outside of mathematics and how to communicate mathematical ideas and concepts.

(C) Translates mathematical ideas between verbal and symbolic forms.

##### **TEKS/TAKS focus**

**TEKS 2A.5 Algebra and geometry.** The student knows the relationship between the geometric and algebraic descriptions of conic sections. The student is expected to:  
(C) identify symmetries from graphs of conic sections.

### Materials

Materials needed	Task 7.2.1	Task 7.2.2
Colored pencils	*	*
Graphing calculator	*	*
<i>Conics APP</i> for TI-83 Plus		*
Chart paper	*	
Transparencies of Templates	*	*

### Procedure

The tasks in this section use a modified discovery learning approach. They are best used by letting participants work in small groups or pairs. There are several points during the facilitation of the tasks in which summary discussions are appropriate—see the teaching notes for each task. In general, conics are presented using a direct-teaching approach and students often do not get a chance to make sense of the various terms (e.g. major axis, minor axis, foci, center, etc.). These tasks are designed to provide opportunities for participants to reflect upon the relationships that arise from the locus definitions and to make sense of the various terms used in describing conic sections. It is essential to allow participants sufficient time to discuss and reflect while working on these tasks. It will be necessary to model how to use the templates provided and also how to use the Conics App for TI-83 calculators.

### Summary

At the end of the activity, participants should know the locus definitions of the conics, how the conics are generated from them and the standard form equation of each conic.

### Assessments

Ask participants to complete a Teacher Journal for Task 7.2.1.

The best assessment of what participants learned in this topic will be their ability to do the application problems from Topic 4 of this strand.

	Teacher use only	Modify for students	Ready for students
<b>Task 7.2.1</b>		*	
<b>Task 7.2.2</b>		*	