

STRAND 7: CONIC SECTIONS**TOPIC 7.3: GRAPHING CONICS****Topic Notes****Mathematical focus**

The mathematical focus of this topic is to examine the effects of parameter changes on conic equations and develop ways to graph the general and rotated conics. Recognizing the type of conic given its general equation is also addressed.

Topic overview

This topic includes four tasks:

Task 7.3.1: Graphing Conics $Ax^2 + Cy^2 + Dx + Ey + F = 0$

Task 7.3.2: Graphing Conics $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$

Task 7.3.3: Changing Parameters

Task 7.3.4: Conics in general form $Ax^2 + Cy^2 + Dx + Ey + F = 0$

The goal of this topic is for participants and students to thoroughly study the graphs of the conic sections and be able to recognize the type of conic represented by an equation no matter whether the equation is given in general or standard form. By the end of the tasks, the participants should be able to change from general form to standard form by the method of completing the square. They will use available technology to examine parameter changes on equations given in both standard form and general form.

TexES standards focus

TexES Standard II.005 Patterns and algebra. The teacher understands attributes of functions, relations, and their graphs. The beginning teacher:

(A) Understands when a relation is a function

(B) Identifies the mathematical domain and range of functions and relations and determines reasonable domains for given situations.

TexES Standard II.006 Patterns and algebra. The teacher understands linear and quadratic functions, analyzes their algebraic and graphical properties, and uses them to model and solve problems. The beginning teacher:

(F) Solves problems involving quadratic functions using a variety of methods (e.g., factoring, completing the square, using the quadratic formula, using a graphing calculator).

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).

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:

- (B) sketch graphs of conic sections to relate simple parameter changes in the equation to corresponding changes in the graph;
- (D) identify the conic section from a given equation; and
- (E) use the method of completing the square.

Materials

Materials needed	Task 7.3.1	Task 7.3.2	Task 7.3.3	Task 7.3.4
Graphing calculator	x	x	x	x
Chart sized grid paper	x	x	x	x
Blank transparencies	x		x	
Poster markers	x	x	x	x
Transparency markers	x		x	
Transparencies #1 and #2	x			
Transparencies #3 and #4		x		
Transparency of program <i>CONIC</i>		x		
Transparency of program <i>CONICSTU</i>	x			x
Program <i>CONIC</i> for TI-83 Plus		x		
Program <i>CONICSTU</i> for TI-83 Plus	x			x
<i>Conics APP</i> for TI-83 Plus			x	

Procedure

Facilitators may choose to do only Task 7.3.1, Task 7.3.2, and Task 7.3.3. Task 7.3.4 is almost identical to Task 7.3.1 except that it provides more practice with completing the square. Task 7.3.4 might be completed outside of class or as an assessment.

Summary

At the end of the topic, participants should know how to recognize the type of conic given its general equation. They should know how parameter changes affect the shape of a conic given its standard form. In addition, participants should be able to change from general form to standard form by completing the square.

Participants should also be prepared to use graphing technology to investigate relationships with their students.

Assessments

Have participants complete a Teacher Journal for Task 7.3.1 and Task 7.3.2.

Have participants complete a Student Journal for Task 7.3.3 and Task 7.3.4.

Task 7.3.4 can be used as an assessment of Task 7.3.1.

	Teacher use only	Modify for students	Ready for students
Task 7.3.1	x		

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Task 7.3.2		x	
Task 7.3.3			x
Task 7.3.4			x