

The Conic Section Teacher Manual contains 162 pages of descriptions of how to use the decks in a variety of classroom settings. These three sample pages from the Lesson Enhancer section illustrate the formats for (1) Cooperative Group Learning Activities, (2) student response sheets for groups of students or the entire classroom, and (3) literacy are represented.

Black line masters appear throughout the manual for teachers to make transparencies for the overhead or for making copies for individual response sheets for students. Many of the student response sheets can also serve as assessments sheets.

Whole Class Activity

Competitive Teams: All of the *Lesson Enhancers* describe a topic **Bee**, a competition for teams, and other competitive class arrangements so that students have an opportunity to test, challenge, and encourage each other.

Walkabouts: The Walkabout activities in each of the *Lesson Enhancers* describe a method for students to actively participate in matching pairs or groups of prearranged conic section patterns. Selection of the cards is more interesting to students if you put the cards in a deck and tell them to “draw a card,” or let students pick a card from a hat as you walk about the room. Some teachers prefer to have the students take the card as they enter the room for class.

Masters: The activity masters that follow the Whole Class activity descriptions are appropriate for whole classroom settings and cooperative learning activities. The masters focus on patterns within the lesson topic and include example cards from the decks.

Cooperative Learning Groups

To use these decks in cooperative learning settings, arrange the students in groups with four or five students in each group. The groups have a designated **Materials Manager, Facilitator, Scribe, and Speaker**. Other titles may be assigned if the group membership exceeds four members.

Questioner and **Encourager** are other possible choices. The directions on the activity cards designate students to perform specific tasks for the group. Students should be allowed to take turns with the role assignments at different times. The groups can be organized by the types of conics (parabola, circle, ellipse, or hyperbola) or by combinations of conic characteristics (graphs and equations, equations and eccentricity, graphs and foci, etc.). After the students complete the discussion questions, teachers need to provide classroom time so that the groups to share their responses.

Learning Stations

Teachers use different options with a learning station format in the classroom. One option defines four or five different stations in the classroom and students move between the stations performing a task at each station. This option works well for one class period, for multiple class periods, or in the longer class periods in block schedules. For this option, each station features a different Pattern Array. Another option is a single station set up for a pre-defined amount on time (weekly, monthly). One student or a small group of students can work at the station while the rest of the class is involved in a different classroom assignment. A third option uses the learning station format to have one or two practice stations for students to practice or review lesson material.

Cooperative Learning Group Activities

These activities are written for cooperative learning groups; each group has a designated **Materials Manager, Facilitator, Scribe, and Speaker**. Other titles may be assigned if the group membership exceeds 4 members. **Questioner** and **Encourager** are other possible choices. The tasks in these activities name the designated person to perform specific tasks for the group.

Materials for each group:

Activity Card

Discussion Questions

All four decks of cards

Optional: calculators

Activity Card Matching Conic Section Graphs

Materials Manager. Deal the cards to all group members.

All group members sort the cards into five separate groups: Graph, Eccentricity, Equation, Point Pairs, and Foci.

Facilitator: Put aside the Eccentricity, Foci, and Point Pair cards. Temporarily put aside the Graph cards. Place the Equation cards on the table for all members of the group to be able to see.

Materials Manager. Deal the Graph cards to all group members.

Task: All members are to match the Graph cards in hand to the correct Equations cards on the table.

Facilitator: After all group members have matched Equation cards and Graph cards, deal the Point Pair cards to all group members.

Task: All members are to match the Point Pair cards in hand to the correct Equation and Graph card combinations on the table.

Scribe. After all cards are matched, the Scribe reads the discussion questions to the group and writes the responses.

Speaker. Report the group's responses to the class.

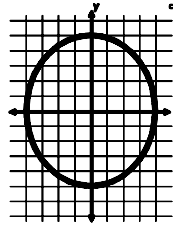
[All Cooperative Learning activity cards have a related sheet of discussion questions for the group of students to use to write their observations. The sheets also provide a strategy for groups reporting out to the whole classroom.]

Ellipse Graph Match Master

Write the letter for the correct equation to match the graph.

1. $1 = \frac{x^2}{16} + \frac{y^2}{2}$

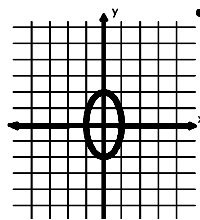
a.



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2. $1 = \frac{x^2}{18} + \frac{y^2}{9}$

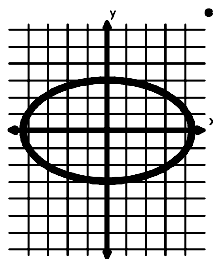
b.



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3. $1 = \frac{x^2}{16} + \frac{y^2}{25}$

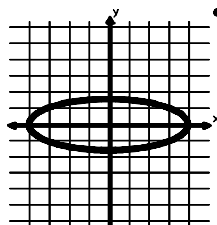
c.



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4. $1 = \frac{x^2}{1} + \frac{y^2}{4}$

d.



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Justify your matches.

Name: _____

Date: _____

Class: _____

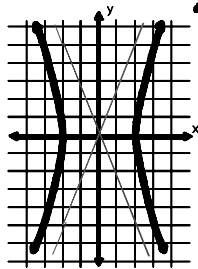
Period: _____

Hyperbola Graph Match Master

The equations match the hyperbola graphs.

1. $1 = \frac{x^2}{4} - \frac{y^2}{25}$

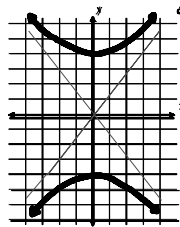
a.



Notes

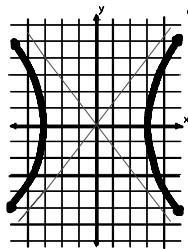
2. $1 = \frac{y^2}{16} - \frac{x^2}{8}$

b.



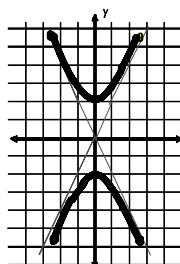
3. $1 = \frac{x^2}{9} - \frac{y^2}{16}$

c.



4. $1 = \frac{y^2}{4} - \frac{x^2}{1}$

d.



Describe all the patterns you can find.

Name: _____

Date: _____

Class: _____

Period: _____