

Unit 25 “Movement Poster”

Text: Cord Applied Math

Volume: 1994 **Chapter:** Quadratics

Unit number: 25 **Title of unit:** Quadratics

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Attach the Following Documents:

1. Lab Instructions
2. Student Handout(s)
3. Rubric and/or Assessment Tool

Short Description (Be sure to include where in your unit this lab takes place):

Using the Quadratic Formula requires the equation to be written in the Standard Form so inputs are known for substitution into the Formula. Evaluation of the quadratic term reveals information about the shape (broad, tight, U shaped or flipped), location of the y intercept, but no direct hint of the number of solutions (x intercepts) or the location of the vertex.

The Vertex Form of the equation defines the location of the vertex and also the same information about the shape interpreted from the standard form. Knowledge of the direction of the parabola (U shaped or flipped) and the vertex enables one to determine the number of solutions (one, two or none).

This Lab allows the student to be creative and produce a useful summary about the movement of the quadratic function and the how it is represented in different forms (rule, table of values, and graph).

Unit 25 "Poster - Movement of Quadratic Function"

LAB PLAN

TEACHER: *(Teacher Prep/Lab Plan)*

▲ **Lab Objective**

Allow hands on practice with quadratic equations and the multiple representations of the equations in tables and graphs. Calculators can be used to visualize the movement of the function on a graph when certain parts of the equation are modified. Preparing a poster explaining the relationships should help solidify student understanding.

▲ **Statement of prerequisite skills needed** *(Vocabulary, Measurement Techniques, Formulas, etc.)*

Using TI-84 Graphing Calculator to graph equations and see movement.

Understanding Vertex and Standard form of the quadratic equation.

⤴ **Vocabulary**

Quadratic equations; Completing the square; Zero factor property; Solution of equation; parabola; standard form; vertex form; quadratic formula; and determinant.

⤴ **State Standards addressed:** (*Highlight "Green" Standards, you may use your District's Power Standards if applicable*)

⤴ **Math:**

A1.5.A Represent a quadratic function with a symbolic expression, as a graph, in a table, and with a description, and make connections among the representations.

A1.5.D Solve quadratic equations that have real roots by completing the square and by using the quadratic formula.

A1.5.B Sketch the graph of a quadratic function, describe the effects that changes in the in the parameters have on the graph, and interpret the x-intercepts as solutions to a quadratic equation.

⤴ **Reading:**

WA State EALRS: 3.2

⤴ **Writing:**

WA State EALRS: 3.3

⤴ **Leadership:**

Outline of Qualities from 21st Century Skill-Leadership

Critical Thinking and Problem Solving

Reason Effectively

Use Systems Thinking

Make Judgments and Decisions

Solve Problems

Communication and Collaboration

Communicate Clearly

Collaborate with Others

Flexibility and Adaptability

Adapt to Change

Be Flexible

Manage Goals and Time

Work Independently

Be Self-Directed Learners

Social and Cross-Cultural

Interact Effectively with Others

Work Effectively in Teams

Productivity and Accountability

Manage Projects

Produce Results

Leadership and Responsibility

Guide and Lead Others

Be Responsible to Others

⤴ **SCAN Skills/Workplace Skills:**

⤴ **Basic Skills**

Writing

Arithmetic

Mathematics

Listening

Speaking

⤴ **Thinking Skills**

Creative Thinking

Decision Making

Problem Solving

Reasoning

Seeing Things in the Mind's Eye

Knowing How to Learn

⤴ **Personal Qualities**

Responsibility

Self Esteem

Sociability

Self-Management

Integrity/Honesty

- ▲ **Teacher Preparation:** *(What materials and set-up are required for this lesson?)*
 - ▲ Materials:
 - Individual Handout and grading Rubric (each student)
 - Poster Paper, graph paper, scissors and glue sticks
 - Rulers and colored pencils or markers
 - TI-84 Calculator
 - ▲ Set-Up Required:
 - Mimimal

- ▲ **Lab Organizational Strategies:**
 - ▲ Grouping/Leadership/Presentation Opportunities:
 - Use as a group project requiring teamwork and discussion of best ideas for presentation.
 - ▲ Cooperative Learning:
 - ▲ Expectations:
 - Specific ideas listed in scoring rubric and instructions
 - ▲ Time-line:
 - Draft should be produced and approved in 1-2 periods with an additional 1-2 periods to produce a polished product.

- ▲ **Post Lab Follow-Up/Conclusions** *(to be covered after student completes lab)*
 - ▲ Discuss real world application of learning from lab:
 - Providing a summary to train others how to understand movement of functions
 - ▲ Optional or Extension Activities:
 - Discuss movement based on Standard Form versus Vertex Form parameters
 - ▲ Career Applications:
 - Working as a team to gather information and produce a training product..

Rubric and Instructions provided below:

Movement of Functions Poster

In this unit, we have been studying quadratic functions and their graphs.

You are trying to show off everything you have learned about functions and what causes movement for the graphs. Use quadratic functions.

Your poster will:

- Have a unique title,
- Show rule for the parent function and provide a table of values and graph.
- Compare the parent function to a function moving vertically up and down; define what in the rule causes the movement.
- Compare the parent function to a function moving horizontally left and right; define what in the rule causes the movement.
- Compare the parent function to a function flipping; define what in the rule causes the movement.
- Explains how to write an equation for a parabola that has moved any combination of 2 movements vertically, horizontally and/or flipped.

Explain:

- What causes the movement for each direction – use mathematical terms
- What happens when you add or subtract a number outside the function
- What happens when you add or subtract a number inside the function.
- How a negative on the “outside” will change the graph.

Make your explanations complete enough to educate a friend who hasn't taken this class.

✓ This poster is approximately 4 – 8½ by 11 sheets. Do not make your graphs smaller than ½ page graph paper for each section explaining. Work to make different sections “pop” and use color to make the poster attractive.

✓ Technical writing tools can make your explanations easier to understand. These include:

- | | | |
|----------------------|----------------------------|---------------|
| • Arrows | color-coding | Labels |
| • Clear organization | different sizes of letters | examples |
| • Diagrams | small t-tables | sketch graphs |
| • math vocabulary | spacing | |

MOVEMENT POSTER GRADING RUBRIC

Teacher Assessment:			
A+ (4 pts)	B (3 pts)	C(2 pts)/D (1pt)	Comments
<p>The poster includes a UNIQUE TITLE.</p> <p>The poster is neat and well-organized.</p> <p><i>THE POSTER IS 100% COMPLETE:</i></p> <p>The poster tells how to identify movement of a PARABOLA by it's rule.</p> <p>The poster uses examples to show (4 of 4) for each movement:</p> <p><input type="checkbox"/> COMPARE MOVEMENT TO PARENT.</p> <p><input type="checkbox"/> SHOWS TABLE OF VALUES ON BOTH SIDES OF VERTEX</p> <p><input type="checkbox"/> POSTER IS COLOR CODED</p> <p><input type="checkbox"/> VERTEX IDENTIFIED ON TABLE</p>	<p>The poster includes a TITLE.</p> <p>The poster is <i>somewhat</i> neat and well-organized.</p> <p><i>THE POSTER IS ALMOST COMPLETE:</i></p> <p>The poster tells how to identify movement of a PARABOLA by it's rule.</p> <p>The poster uses examples to show (2-3 of 4) for each movement:</p> <p><input type="checkbox"/> COMPARE MOVEMENT TO PARENT.</p> <p><input type="checkbox"/> SHOWS TABLE OF VALUES ON BOTH SIDES OF VERTEX</p> <p><input type="checkbox"/> POSTER IS COLOR CODED</p> <p><input type="checkbox"/> VERTEX IDENTIFIED ON TABLE</p>	<p>The poster includes a TITLE.</p> <p>The poster is not neat and well-organized.</p> <p><i>THE POSTER IS NOT COMPLETE, BUT SHOWS ENOUGH THAT THE AUTHOR'S LEARNING IS CLEAR:</i></p> <p>The poster tells how to identify movement of a PARABOLA by it's rule.</p> <p>The poster uses examples to show (1-2 of 4) for each movement:</p> <p><input type="checkbox"/> COMPARE MOVEMENT TO PARENT.</p> <p><input type="checkbox"/> SHOWS TABLE OF VALUES ON BOTH SIDES OF VERTEX</p> <p><input type="checkbox"/> POSTER IS COLOR CODED</p> <p><input type="checkbox"/> VERTEX IDENTIFIED ON TABLE</p>	
<p>The poster shows how to determine the rule from a graph with multiple movements on a graph</p> <p><input type="checkbox"/> WRITE THE EQUATION IN VERTEX FORM $y = \dots$</p> <p>TECHNICAL WRITING TOOLS are used to show and explain summary statements clearly. These are included:</p> <ul style="list-style-type: none"> • arrows • color • labels • examples • math vocabulary • diagrams • small T-tables • small graphs • spacing • clear organization • different types and sizes of letters 	<p>The poster mostly shows how to determine the rule from a graph with multiple movements on a graph</p> <p><input type="checkbox"/> WRITE THE EQUATION IN VERTEX FORM $y = \dots$</p> <p>Some TECHNICAL WRITING TOOLS are used, but more would help show and explain. These would help:</p> <ul style="list-style-type: none"> • math vocabulary • arrows • color • labels • clear organization • examples • different types and sizes of letters 	<p>The poster does not clearly show how to determine the rule from a graph with multiple movements on a graph</p> <p><input type="checkbox"/> WRITE THE EQUATION IN VERTEX FORM $y = \dots$</p> <p>The explanations are complete, but not enough TECHNICAL WRITING TOOLS are used.</p> <p>This makes the poster hard to understand in many places.</p>	