

Mathematics Cluster

Quantitative Reasoning: Use college-level mathematical concepts and methods to understand, analyze, and explain issues in quantitative terms.

Course used for Measurement: MAC 2205 – College Algebra

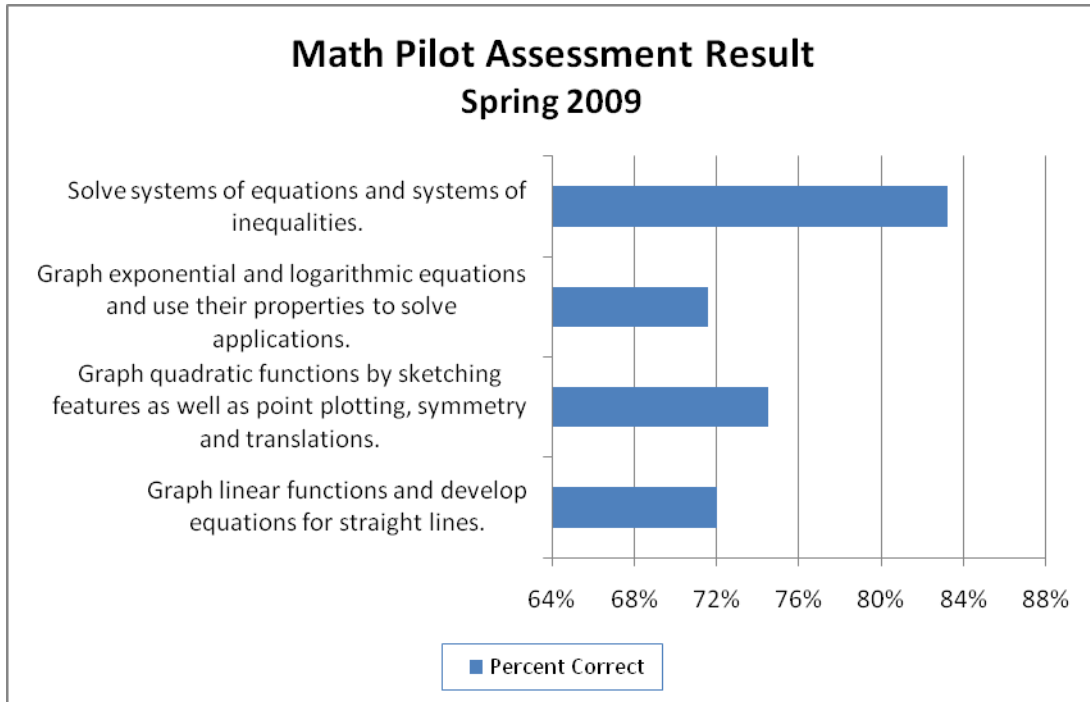
Course learning outcomes

- Understand the concept and be able to graph and interpret graphs in the Cartesian Coordinate system.
- Understand the concept of function and be able to perform ordinary operations in the algebra of functions.
- Be able to graph linear functions and develop equations for straight lines.
- Be able to graph quadratic functions by sketching features as well as point plotting, symmetry and translations.
- Be able to sketch graphs of factored polynomials of third degree and higher.
- Be able to discuss and sketch rational functions.
- Understand the concepts and relationships of exponential and logarithmic functions and be able to use the basic properties of these functions to solve equations and applications.
- Be able to solve systems of equations algebraically and systems of inequalities graphically.

Course Learning Outcomes Measured

- Be able to graph linear functions and develop equations for straight lines.
- Be able to graph quadratic functions by sketching features as well as point plotting, symmetry and translations.
- Understand the concepts and relationships of exponential and logarithmic functions and be able to use the basic properties of these functions to solve equations and applications.

- Be able to solve systems of equations algebraically and systems of inequalities graphically.



Course learning outcome Components targeted for improvement

- Be able to graph quadratic functions by sketching features as well as point plotting, symmetry and translations

Strategy for improvement

For most students, quadratic functions offer the first true step into the study of functions, which is the core of the College Algebra course. They have had linear equations in lower level algebra courses; linear functions aren't much different from the slope-intercept forms of linear equations. They are lectured about the general concept of functions; even with multiple examples, that is too abstract for most. With quadratic functions, instructors can emphasize the relationship between the form of the function, the solutions of the corresponding equation, and the points on the graph. The graphs of quadratics, parabolas, are wonderful for illustrating symmetry, vertical and horizontal translations, reflections across lines, stretching and shrinking of graphs. This unit forms

the basis for the functions to follow – higher order polynomial, rational, exponential, logarithmic, and others. There are real-world applications of quadratic functions, many involving finding the minimum or maximum value. Without understanding this material, few students will succeed in the course.

Quadratic functions are in the middle of the second unit of the course. In order to encourage students to focus on this material at the time it is presented (instead of waiting for the day before or the day of the test), a decision was made to create a worksheet as an activity. As class time allowed, this could be used for group work in the class or assigned to be turned in.

Strategy Worksheet - College Algebra Exercises on Graphing Quadratic Functions

1. For the function: $f(x) = -\frac{1}{3}(x - 2)^2 + 3$

a) Find the vertex. _____

b) Give the domain: _____ and the range: _____

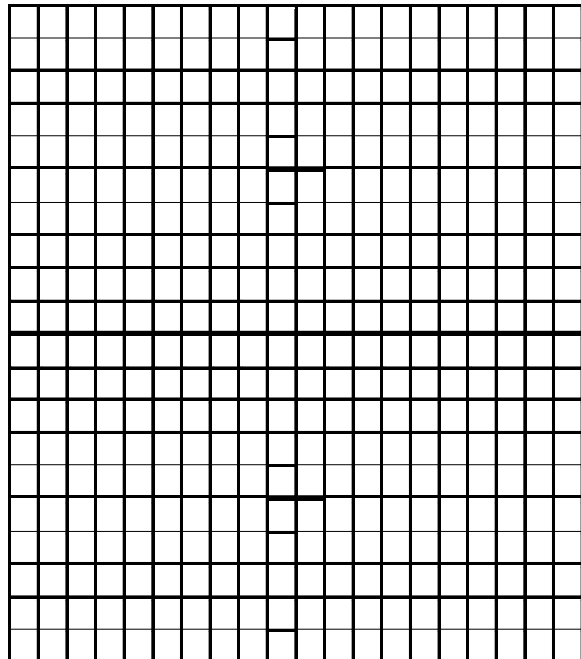
c) Write the equation of the axis of symmetry. _____

d) How does the parabola open? ____ Up or ____ Down

e) Compared to $y = x^2$, is this parabola: ____ Narrower or ____ Wider ?

f) Find the y-intercept: _____ and any x-intercepts: _____ - _____

g) Graph the parabola.
List at least 3 points.



2. For the function: $f(x) = 2x^2 + 8x + 5$

a) Find the vertex. _____
Show your work.

b) Give the domain: _____ and the range: _____

c) Write the equation of the axis of symmetry. _____

d) How does the parabola open? ____ Up or ____ Down

e) Compared to $y = x^2$, is this parabola: ____ Narrower or ____ Wider ?

f) Find the y-intercept: _____ and any x-intercepts: _____ - _____

g) Graph the parabola.
List at least 3 points.

