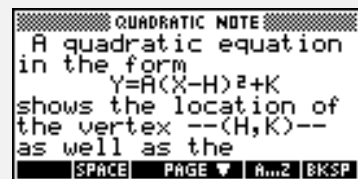


Objectives:

Using the **QUADRATIC** applet, the student will investigate the effects of changing **A**, **H**, and **K** in the quadratic equation $Y = A(X - H)^2 + K$. The student will be able to analyze the effect of these parameters symbolically and graphically.

Functionality:

When the student selects **START**, the **QUADRATIC NOTE** will be displayed.



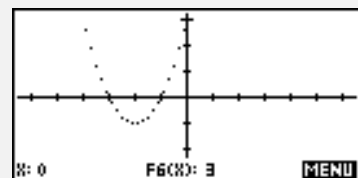
The student should then view the **SKETCH** for further explanation.



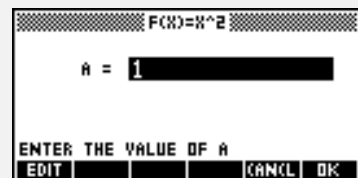
After viewing the note and the sketch, the student should press the **VIEWS** key to adjust the parameters **A**, **H**, and **K**. The basic function $y = x^2$ will appear in dot mode for comparison to the new function.



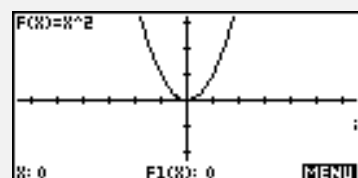
After the parameters have been fully explored, the student should select **TARGET**. The calculator will display a quadratic graph for the student to match by using the adjust commands.



The student may also enter any value for the parameters **A**, **H**, and **K**, by selecting **Enter A, H, K** from the views menu.



Reset in the choose box in the views window will reset the parameters back to the default values ($A=1$, $H=0$, and $K=0$) and plot the function.



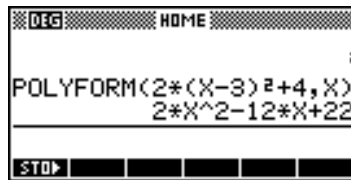
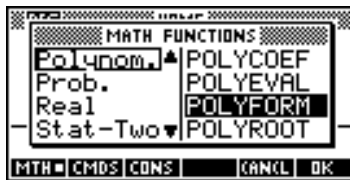
Exploring Quadratic Functions

For the Teacher

Additional Exploration:

At the HOME screen, use POLYFORM to expand. POLYFORM can be typed in the edit line or can be found by pressing **MATH** , **P** . The syntax for this command is `POLYFORM(expression, variable)`. An example would be:

Write the quadratic function $y=2(x-3)^2+4$ in standard form.



Use the standard form to verify that the x-coordinate of the vertex of the parabola is $-\frac{B}{2A}$.

Ideas can be applied to:

Algebra I, Algebra II, Precalculus

Programs associated with this applet:

.Q.A, .Q.H, .Q.K, .Q.T, .Q.E, .Q.R, .Q.S, .Q.P, .Q.SV

Exploring Quadratic Functions

$$Y = A(x - H)^2 + K$$

Name _____

Date _____

Directions: Using the **QUADRATIC** applet, press **VIEWS** to adjust the parameters as indicated.

- Using **VIEWS**, adjust **H** as indicated in the table below. Record the function and the vertex of each parabola.

Adjust H	$Y = A(X - H)^2 + K$	Vertex
0	$Y = X^2$	(0, 0)
-2		
-1		
1		
2		

- RESET**. Adjust **K** as indicated in the table below. Record the function and the vertex of each parabola.

Adjust K	$Y = A(X - H)^2 + K$	Vertex
0	$Y = X^2$	(0, 0)
-2		
-1		
1		
2		

- RESET**. Adjust **A** as indicated in the table below. Record the function, the direction of the parabola, and whether the parabola experienced a stretch or a shrink.

Adjust A	$Y = A(X - H)^2 + K$	Up/Down	Shrink/Stretch
1	$Y = X^2$		
-2			
-1/2			
5/2			

- Describe the parabola $Y = \frac{2}{3}(X + \frac{7}{2})^2 - \frac{5}{2}$.

- Fill in the missing information in the table below. Equations should be written in the form $Y = A(X - H)^2 + K$. Please label the vertex and one other point on the graph. Include a description of the shift of the vertex and any other pertinent information in the details column.

Function	Graph	Details
5. $y = -3(x - 2)^2 + 3$		
6.		
7.		From (0, 0) the vertex is shifted to the left one unit and down two units. One of the x-intercepts is 0.
8. $y = \frac{2}{3}(x + 2)^2 - 2$		
9.		
10.		From (0, 0) the vertex is shifted up three units and to the right two units. (1, 2) is a point on this parabola.

