Unit: 1 Day : 4  Graphing Quadratic Functions using Transformations

Math Learning Goals

Students will:
- determine, through investigation using technology, the roles of
  $a$, $h$, and $k$ in quadratic functions of the form $f(x) = a(x - h)^2 + k$, and describe
  these roles in terms of transformations on the graph of $f(x) = x^2$ (i.e., translations;
  reflections in the $x$-axis; vertical stretches and compressions to and from the $x$-axis)

- describe the information (e.g., maximum, intercepts) that can be obtained by
  inspecting the standard form $f(x) = ax^2 + bx + c$, the vertex form $f(x) = a(x - h)^2 + k$, and the factored form
  $f(x) = a(x - r)(x - s)$ of a quadratic function

- sketch graphs of
  $g(x) = a(x - h)^2 + k$ by applying one or more transformations to the graph of
  $f(x) = x^2$

Materials

- Graphing Quadratics.ppt

- Graphing Quadratic Equations Worksheet

- Computer/Projector

- Smartboard if Possible

- Nelson Functions and Applications textbook

Whole Class Investigation

Work together as a class through Graphing Quadratics.ppt
It is very important to stop and involve students from step to step. Let
students predict what the graph will do under different translations
and address any misconceptions or common errors. Working this
way will let students get the "big picture" of translations without
being bogged down by repetitive graphing themselves.

There is a video of this PowerPoint to help teachers with preparation
or to use as a review for students who missed the lesson or need to
work through it again.
The video can be found at: http://www.screencast.com/t/ml0fqiC

Action!

Group Practice

Work in pairs on "Graphing Quadratic Equations Worksheet to
practice skills learned through whole class investigation.

Quickly share in groups of 4 (2 sets of pairs) to compare answers.

Debrief

Whole Class Discussion

Discuss and summarize:

- Review discoveries of simple translations
- Take up worksheet on Smartboard by having students write
  up their results

Home Activity or Further Classroom Consolidation
**Concept Practice** Complete questions 1 - 4, 9 & 10 on page 47 in their textbook. The Powerpoint can be made available through a class website for students to review on their own time.

There are some extra videos available from "University of Ontario Institute of Technology" UOIT:

- [43 Vertical Stretch Compression](http://faculty.uoit.ca/kay/G11_FunctionsApp/1_Quadratics/43_Vertical_Stretch_Compression.html)
- [44 Reflection Vertical Stretch Compression](http://faculty.uoit.ca/kay/G11_FunctionsApp/1_Quadratics/44_Reflection_Vertical_Stretch_Compression.html)
- [45 Horizontal Translation](http://faculty.uoit.ca/kay/G11_FunctionsApp/1_Quadratics/45_Horizontal_Translation.html)
- [46 Vertical Translation](http://faculty.uoit.ca/kay/G11_FunctionsApp/1_Quadratics/46_Vertical_Translation.html)