Let’s Do Math with KCM
High School Algebra II
Function Simulations
Welcome!

Your host

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Kentucky Center for Mathematics

- KCM seeks to advance the knowledge and practice of effective mathematics teaching and learning, encompassing early childhood through adult education.
- KCM provides and develops statewide leadership, facilitate professional learning experiences, and cultivate innovation with the aim of improving mathematics education, practice and policy.

KCM Yearly Numbers

- 29 math courses taught
- 73 cohorts of teachers
- Over 1000 KY teachers attending
- Over 182 days of math professional learning
- Over $150,000 of math materials directly in the hands of teachers
- 109 school districts
- 300 KY schools
- 100 principals trained
- >5000 students impacted
- KCM Annual Math Conference national prominence

Closing the achievement gap for our KY math students.

Math Achievement Fund intervention students (3000) had an average of 10 percentile points gained as a direct result of KCM trained math interventionists.
Visit Our Website

www.kentuckymathematics.org
Today’s Session

- Research
- Standard
- Let’s Do the Math Rich Tasks Exploring Transformations of Functions
- Phet Simulations: Function Basics, Graphing Lines, Graphing Quadratics
- Conclusions and Generalizations
- Virtual Manipulatives
Research

Kebritchi, Hirumi, and Bai (2010) found computer mathematics games to have a positive significant effect on high school students' motivation and achievement in mathematics class.

Standards

KY.HS.F.8 Understand the effects of transformations on the graph of a function. MP.3, MP.5

a. Identify the effect on the graph of replacing \( f(x) \) by \( f(x) + k \), \( kf(x) \), \( f(kx) \) and \( f(x + k) \) for specific values of \( k \) (both positive and negative); find the value of \( k \) given the graphs.

b. Experiment with cases and illustrate an explanation of the effects on the graph using technology.
Let’s Do the Math...

**Task: Exploring Transformation of Functions**

Consider the function

\[ f(x) = x^5 + 2x^4 - 7x^3 - 8x^2 + 12x \]

How do the graphs of each of these modified versions of the function \( f(x) \) compare with the original?

\[
\begin{align*}
&f(x) + c \\
&f(x + c) \\
&f(cx) \\
&c \cdot f(x)
\end{align*}
\]
Function Simulations

Function Basics

How do the graphs of modified versions of any function compare with the original?

Graphing Lines

\[ h(x) = mx + b \]

Graphing Quadratics

\[ g(x) = ax^2 + bx + c \]
Conclusion & Generalizations

What can you conclude about their relationships to the graphs?

Is this true all functions?

What other digital representations of parabolas may we consider?

Fig. 1 The parabolic trajectory of the Angry Bird is highlighted during the launch.

Fig. 2 The diameter of an Angry Bird is the unit of measure on both axes.
Virtual Manipulatives

Geogebra

Phet Interactive Simulations

Desmos

Didax Math Virtual Manipulatives
KCM Support for Educators

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Upcoming Professional Learning

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**Apr 16**

**Statistics & Probability with Virtual Manipulatives**

Facilitated by: Leah Dix

Downloads: TBD