Gizmos - Logarithmic Functions: Translating and Scaling

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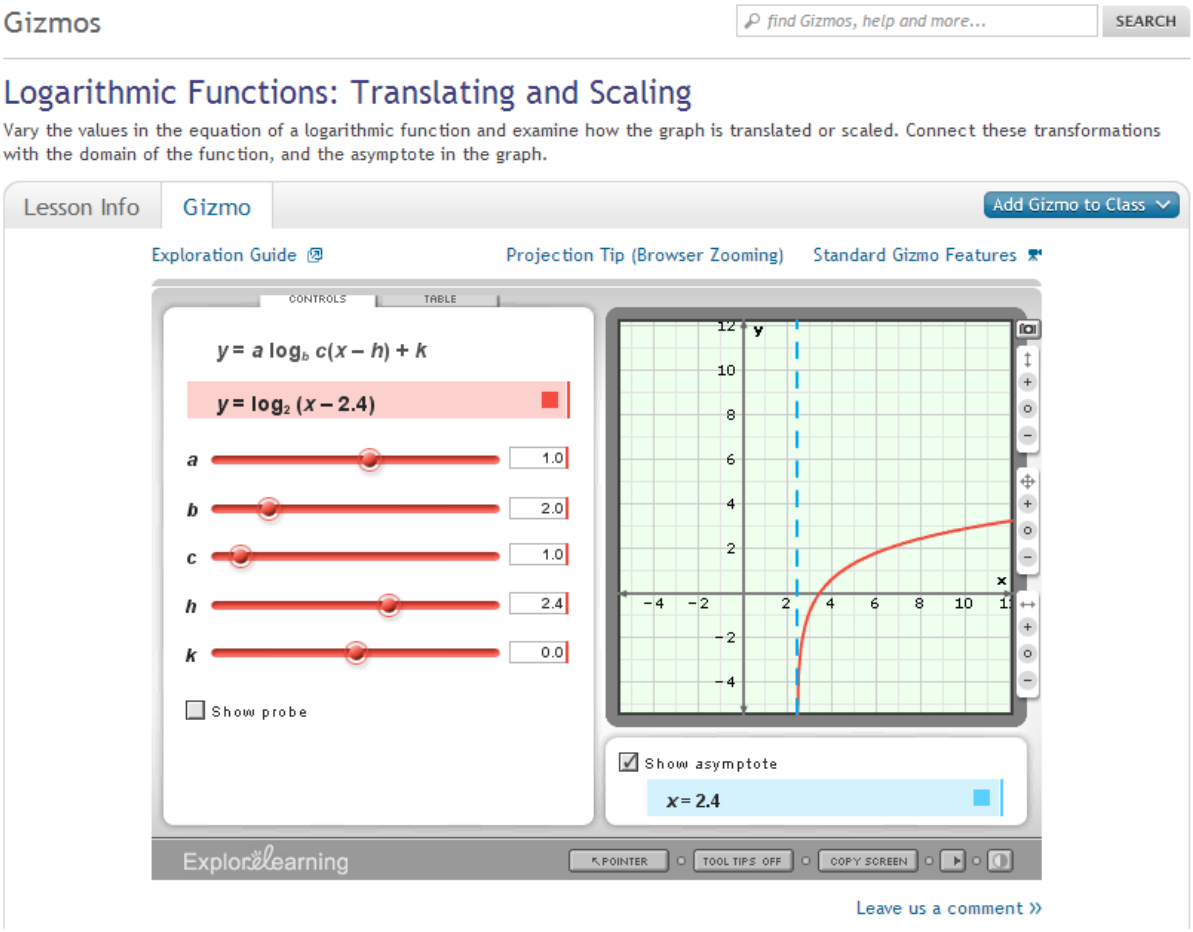

Gizmos! Online simulations that power inquiry and understanding!

Users are able to vary the values in the equation of a logarithmic function and examine how the graph is translated or scaled. They can connect these transformations with the domain of the function, and the asymptote in the graph.

Grade Level: 9-12
PSSM Content Standard: Algebra
CCSSM Content Standard: **Mathematics » High School: Functions » Linear, Quadratic, & Exponential Models***
Math Content: Logarithmic Functions, Transformation of Graphs

Evaluation

What is being learned? What mathematics is the focus of the activity/technology? Is relational or instrumental understanding emphasized?

Students are learning how to transform (translate and scale) a logarithmic function. A relational understanding is being emphasized.

How does learning take place? What are the underlying assumptions (explicit or implicit) about the nature of learning?

Students learn by doing. The learning is implicit because students can change the settings and make conjectures about their alterations. Students are given the equation $y = a \log c(x-h) + k$, where they are allowed to change any of the parameters, including the base of the logarithmic function. While they are changing the parameters they can see the changes that happen on the graph. They can also see a table of values for their give parameter changes.

What role does technology play? What advantages or disadvantages does the technology hold for this role? What unique contribution does the technology make in facilitating learning?

Technology lets students see immediately the effect of changing various parameters. When they drag the slider for h they can see the graph move to the left or to the right in real time. Using a graphing calculator does not have the same effect because they type in an equation and then it graphs it; whereas gizmos allows the students to watch the graph move as they move their slider to the right or left.

How does it fit within existing school curriculum? (e.g., is it intended to supplement or supplant existing curriculum? Is it intended to enhance the learning of something already central to the curriculum or some new set of understandings or competencies?)

This activity would be a great supplement to an algebra 2 course or an integrated math course. Students look at translating and scaling graphs, this website lets them see the changes happening in real time. What they learn with this activity could be applied to other functions, such as parabolas, cubics, and sine and cosine waves.

How does the technology fit or interact with the social context of learning? (e.g., Are computers used by individuals or groups? Does the technology/activity support collaboration or individual work? What sorts of interaction does the technology facilitate or hinder?)

The most ideal way to use this activity would be individually. Students can make changes and alter the settings at their own pace, leading them to discovering on their own. The most important reason to use this activity individually would be because of the quiz at the end. Each student gets a different 5 question quiz where the results are uploaded to your class. It could be used an introductory lesson for student to learn by discovery, it could be used to wrap up the lesson at the end of the hour, or it could be used as part of a homework assignment.

How are important differences among learners taken into account?

The activity itself allows differences among learners to be addressed. Students that need to spend more time and see more examples on a specific topic (translating and scaling logarithmic functions in this case) have the ability to do so.

What do teachers and learners need to know? What demands are placed on teachers and other "users"? What knowledge is needed? What knowledge supports does the innovation provide (e.g., skills in using particular kinds of technology)?

Teachers have to set up an account to use gizmos (it can be a free 30 day trial, one per email address) and students must join your class. Once a teacher has a class each gizmos activity can be added and a roster can be made. Students can complete different activities and take quizzes where their results are uploaded. If a teacher wanted to just use this in the classroom with a projector or Smartboard, the graph can be made bold (it can be put into projector mode) so that students have an easier time seeing the grid, equation, and graph. Gizmos is very user-friendly and easy to set up a free trial account (which is what I did to explore this technology -- and I'm sold!)