Gizmos - Arithmetic and Geometric Sequences

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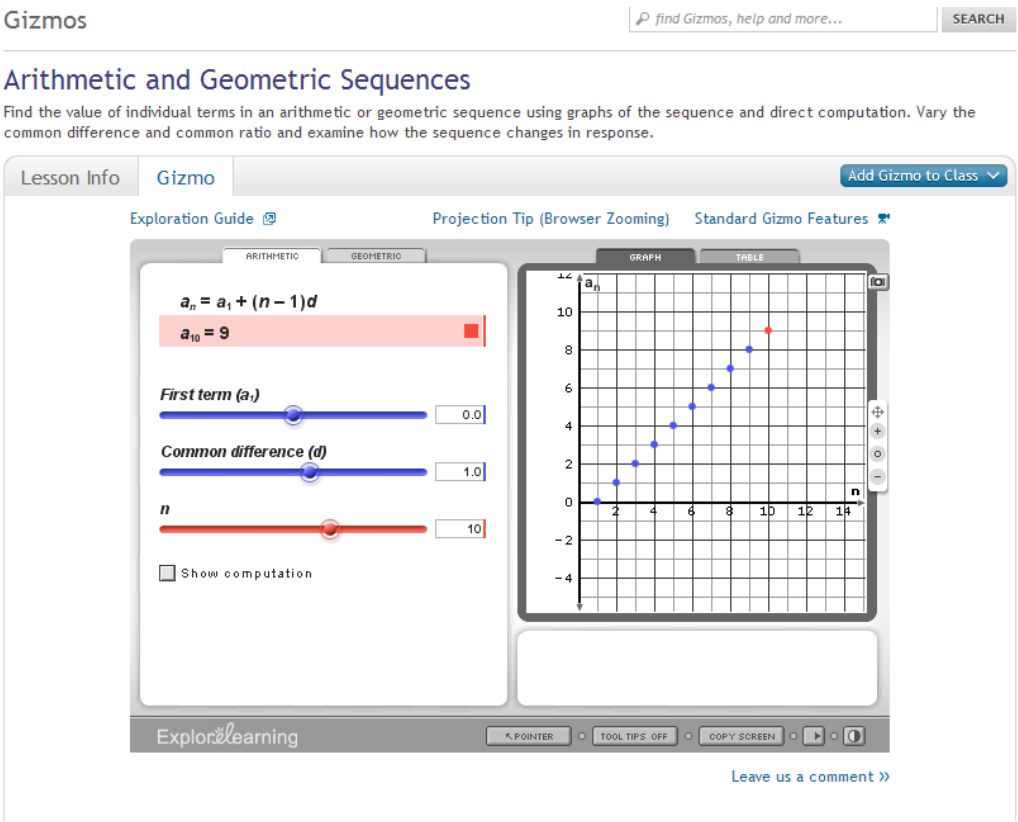

Gizmos! Online simulations that power inquiry and understanding!

Users can find the value of individual terms in an arithmetic or geometric sequence using graphs of the sequence and direct computation. They can vary the common difference and common ratio and examine how the sequence changes in response.

Grade Level: 7-12
PSSM Content Standard: n/a
CCSSM Content Standard: n/a
Math Content: Arithmetic and Geometric Sequences, Limit, Calculus

Evaluation

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

Students are learning about arithmetic and geometric sequences. They are able to view a graph, table, and the equations of either arithmetic or geometric sequences. The focus is to tie together those three pieces (graph, table, and equation). An instrumental understanding is 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 can change the number of terms, the first term, and either the common difference or common ratio. From looking at the sequences students can start to make conjectures about limits, eventually leading them into calculus.

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 relationship between a sequence and it's graph. I think it is very helpful when looking at the number of terms. I have students do a similar activity on paper, however, the students usually spend so much time writing down and plotting points that we have less time to spend focused on the actual content of sequences and series. I wish that there was another tab for series (adding up the terms in a sequence). It wouldn't be too hard to make an extension though to look at the sum when looking at either the table or the graph.

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 our integrated math course for 9th and 10th graders (math 3). It would enhance the learning of a topic, arithmetic and geometric sequences, that is already taught.

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 (arithmetic and geometric sequences 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)?

Teacher 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 and points. 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!)