

Adding and Subtracting Polynomials

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Adding Polynomials

Two Steps:

- Place **like terms** together
- Add the like terms

Example: Add $2x^2 + 6x + 5$ and $3x^2 - 2x - 1$

Start with: $2x^2 + 6x + 5 + 3x^2 - 2x - 1$

Place like terms together: $2x^2 + 3x^2 + 6x - 2x + 5 - 1$

Add the like terms: $(2+3)x^2 + (6-2)x + (5-1)$

$= 5x^2 + 4x + 4$

This application allows for students to receive instruction on adding and subtracting polynomials by providing an explanation of like terms while showing interactive examples of the mathematics being learned. Students can engage in an entire lesson on adding and subtracting polynomials and then showcase what they have learned by clicking on the ten practice problems presented at the bottom of the page.

Grade Level: Grades 8/9

PSSM Content Standard: Algebra

CCSSM Content Standard: [CCSS.Math.Content.HSA-APR.A.1](#)

Math Content: adding polynomials, subtracting polynomials, combining like terms, degrees

Evaluation

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

The mathematics being learned in this application is that of combining like terms in order to add or subtract polynomials of varying degrees. The focus of the activity is to teach students what a like term is and then to apply that to adding or subtracting polynomial functions. The technology requires students to put their final answer into standard form. Students would be gaining an instrumental understanding by using this particular technology. They would be practicing problems like the ones presented to them on the instructional page. This concept is essentially computation based and builds upon their abilities to add and subtract, but now with variables of varying degrees.

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

Learning takes place for students by allowing them to read the content presented on the page and then see examples in real time by watching the instructional examples present on the page. Students showcase their understanding of what they have seen by demonstrating their understanding in the practice questions at the bottom of the activity page. The underlying assumptions about the nature of learning are implicit if they do not engage in the practice problems. One can only assume that they have learned what a like term is and how to combine it. Otherwise, learning is explicit when students engage in independent practice by performing the practice problems. One can see if they perform the task correctly or incorrectly, gauging their success in learning the concept.

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 acts as the facilitator of content and the basis for assessing student learning. The advantages of using this technology is that instruction and independent practice are housed in the same forum. Students get a mix of instruction, written, video, and real-time examples. The disadvantages to this technology are that there is not a notepad for students to display their work on when they engage in practice problems. The practice problems are also in the form of multiple choice questions so students could guess instead of actually practicing the mathematics. The unique contribution that the technology makes in facilitating learning is that students can start and stop a video example at any time to slow down or speed up their understanding of the mathematics. They can also replay the instruction if they need a better understanding.

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 application can be used in the Algebra I unit on quadratic functions, because polynomials are introduced. This particular activity could be used to supplant existing curriculum instruction because of the layout and demonstration of concepts and independent practice. It is intended to enhance the learning of combining like terms and to introduce the idea of polynomial functions to students.

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?)

This application would be used as a way to instruct individual students. They can view the lesson and then work independently to complete the questions at the end of the activity. Upon completion of the questions students could compare answers and have a discussion on the choices they made. The technology would facilitate student's individual abilities to navigate on the computer and internet.

How are important differences among learners taken into account?

Students who pick up material quickly could simply read the written instructions and go promptly to the practice problems while students who need more guided instruction have the ability to view dynamic examples that have embedded instruction. Students can move at individual speeds and still gain a good understanding of the content.

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)?

This particular activity does not place a very high demand on teachers. Students can view the lesson and then if extra assistance or explanation was needed rely on their teacher for help. Students need to have some understanding of coefficients, variables, and properties of exponents to perform the tasks in the activity. The knowledge gained in using this program is that of being able to navigate a website and to engage in a lesson entirely online.