

Backwards Design Unit Planning

Martha De Oliveira/ Q237 - The Magnet School for the Arts

Topical Question: Does order, value, and degree of the variable have meaning in polynomial?

| Mini-Unit Title | Big ideas of the mini-unit / concept statement (macro) | Knowledge (Important Content to Know about Mini-Unit) (Micro) | Skills What should the students be able to do? (rule of thumb - skills are verbs – knowledge is a noun) | How does this connect to the theme of your school | Possible List of Topical Essential Questions / Focusing Questions | Mini-Unit Assessment | Benchmarks / Scaffolding towards culminating project |
|--|--|---|---|---|---|---|--|
| Identifying and Evaluating | | Vocabulary: mono, bi, tri, so on types: Coefficient: Exponent: Combine like terms: Degree: Constant. | Know the difference between the various types of polynomials | <i>Community Studies: Mural shows the 'neighborhood'.</i> | What is the difference between the polynomials? | Quiz #1: 5 Multiple choice questions and 1 open, show all work question. | Draft Poster: Research neighborhood for ideas to create the mural. |
| Adding and Subtracting | | Multi-step problem solving: Adding and subtracting | Evaluate expression | <i>Community Studies: Mural shows the 'neighborhood'</i> | What are the steps? | Quiz #2: 5 constructive response questions. | Draft Poster: Divide area per students specific need |
| Using an area model and writing a polynomials as a product | | Multi-step problem solving: Product: Quotient: Factors | Multiply different types of monomials and polynomials | <i>Community Studies: Mural shows the 'neighborhood'</i> | How do we solve for the area of an unknown? | Activity: Surface area of a rectangular prism that needs to be gift wrapped. | Sketch the mural |
| Using multiple strategies (i.e., Distributive Property) | | FOIL | Use multiple strategies | <i>Community Studies: Mural shows the 'neighborhood'</i> | How do we apply FOIL? | Test (cumulative) of 15 multiple choice questions and 3 constructive response questions | Actual scale model of the mural with oral presentation. |

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A Week at a Glance – Copy as Necessary

| WHERE is the student going and what is expected HOOK with needed skills to experience and explore Opportunity to REVISE and RETHINK their understanding | | Allow students to EVALUATE work and implications TAILOR work to student needs Be ORGANIZED to maximize engagement | | |
|---|---|--|--|--|
| Monday | Tuesday | Wednesday | Thursday | Friday |
| <p>Content Focus: Identify monomials and binomials</p> <p>Hook: Show them a video of fireworks as an example of polynomials. P. 705 of Pre-Algebra book</p> <p>Daily Assessment: Write in their journal how monomials and binomials are similar and different.</p> | <p>Content Focus: Identify trinomials (polynomials)</p> <p>Hook: Have students write their own definition of monomial and binomial.</p> <p>Daily Assessment: Ask questions during the guided practice session.</p> | <p>Content Focus: Evaluating monomials and binomials</p> <p>Hook: Have students write their own definition of polynomial with different degrees.</p> <p>Daily Assessment: On a poster, write an example of monomial, binomial, and trinomial with explanation of why each type.</p> | <p>Content Focus: Evaluating trinomials (polynomials)</p> <p>Hook: Show them a video (same or different) of fireworks and ask them to relate to polynomials.</p> <p>Daily Assessment: Name other words with prefix mono, bi, tri, and poly. How does the prefix help you understand the meaning of the word? What would you call a polynomial with four terms</p> | <p>Content Focus: Quiz #1 – Identifying and evaluating polynomials with one constructive response to show how fireworks and polynomials are connected.</p> <p>Hook: After the quiz, 15 minutes, we will take a field trip around neighborhood</p> <p>Daily Assessment: Are students photographing interesting, historical, or meaningful sites?</p> |

Weekly Assessment:
Quiz #1

What have the students produced that scaffolds towards the units culminating assessment?
(for example if the unit's culminating assessment is a newspaper – perhaps the students have written an article)

Research neighborhood for ideas to create the mural. Students will bring in their own camera to take the pictures.

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| Monday | Tuesday | Wednesday | Thursday | Friday |
| <p>Content Focus: Adding Monomials and Binomials</p> <p>Hook: Project algebra tiles to identify the different colors.</p> <p>Daily Assessment: Give students an addition expression that they must show using the tiles.</p> | <p>Content Focus: Subtracting Monomials and Binomials</p> <p>Hook: Introduce the red colored tile as a negative algebra tile.</p> <p>Daily Assessment: Give students a subtraction expression that they must show using the tiles.</p> | <p>Content Focus: Adding Two or more Polynomials</p> <p>Hook: Using algebra tiles, show what is the result of adding negative polynomials.</p> <p>Daily Assessment: Write an expression for the sum of three consecutive numbers.</p> | <p>Content Focus: Subtracting Two or more Polynomials</p> <p>Hook: Using algebra tiles, show what is the result of subtracting negative monomial from itself.</p> <p>Daily Assessment: How is the process for adding two polynomials like the process for adding two integers? How is it different?</p> | <p>Content Focus: Quiz #2: Adding and subtracting</p> <p>Hook: After the quiz, 15 minutes, we will correlate the idea of adding and subtracting to divide the mural to have sufficient spacing</p> <p>Daily Assessment: Divide mural's area per student's specific need.</p> |
| <p>Weekly Assessment: Quiz #2</p> <p>What have the students produced that scaffolds towards the units culminating assessment? (for example if the unit's culminating assessment is a newspaper – perhaps the students have written an article) Divide area per students specific need</p> | | | | |

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| Monday | Tuesday | Wednesday | Thursday | Friday |
| <p>Content Focus: Multiplying Monomials and monomials</p> <p>Hook: Show a video from the internet of Thailand's lantern lighting and how it relates to polynomials.</p> <p>Daily Assessment: How do the fireworks and Thailand lantern videos relate with polynomials?</p> | <p>Content Focus: Multiplying Monomials and polynomials</p> <p>Hook: Demonstrate multiplication of polynomials using algebra tiles.</p> <p>Daily Assessment: Write a polynomial as the product of two factors.</p> | <p>Content Focus: Review of Perimeter and Area formula for a rectangle</p> <p>Hook: Find the perimeter and area of the school basketball court?</p> <p>Daily Assessment: In the journal – write how did you apply polynomials to perimeter and area formulas</p> | <p>Content Focus: Problem Solving of Perimeter and area</p> <p>Hook: Create a four fold paper or poster for each operation (show steps) add, subtract, multiply and divide polynomials</p> <p>Daily Assessment: Exit Slip hand-in to the teacher (What did I learn today?)</p> | <p>Content Focus: Surface area of a rectangular prism that needs to be gift wrapped.</p> <p>Hook: Sketch the mural</p> <p>Daily Assessment: Review the mural sketch introducing the rubric of the culminating project</p> |
| <p>Weekly Assessment: Surface area of a rectangular prism that needs to be gift wrapped.</p> <p>What have the students produced that scaffolds towards the units culminating assessment? (for example if the unit's culminating assessment is a newspaper – perhaps the students have written an article) Sketch the mural</p> | | | | |
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| Monday | Tuesday | Wednesday | Thursday | Friday |
| <p>Content Focus: Dividing monomials and monomials</p> <p>Hook: In pairs, find the answer. A diagonal of a rectangle is 25 cm more than its width. The length of the rectangle is 17 cm more than its width. What are the dimensions of the rectangle?</p> <p>Daily Assessment: In your journal describe the difference between dividing and multiplying polynomials.</p> | <p>Content Focus: Dividing monomials and polynomials</p> <p>Hook: Play the game “Conceptual Bingo™ – Polynomials” – 6 questions on each calling card cover naming polynomials, combining like terms, multiplying monomials, using the distributive property, multiplying binomials, factoring and dividing polynomials, and working with polynomial fractions. The bingo cards contain a variety of</p> | <p>Content Focus: Using multiple strategies to solve problems(Distributive property)</p> <p>Hook: Identify a polynomial expression to measure your desk.</p> <p>Daily Assessment: Error Analysis – A problem is worked-out incorrectly and students are asked to identify the mistake.</p> | <p>Content Focus: Review multiplying Two binomials using distributive property</p> <p>Hook: “Jeopardy” game of various polynomial rules and definitions</p> <p>Daily Assessment: Explain the similarities between multiplying two binomials and multiplying a polynomial by a monomial.</p> | <p>Content Focus: Using perimeter and area formulas to space out the design onto the mural.</p> <p>Hook: Continue sketching the mural</p> <p>Daily Assessment: Review the mural sketch introducing the rubric of the culminating project</p> |

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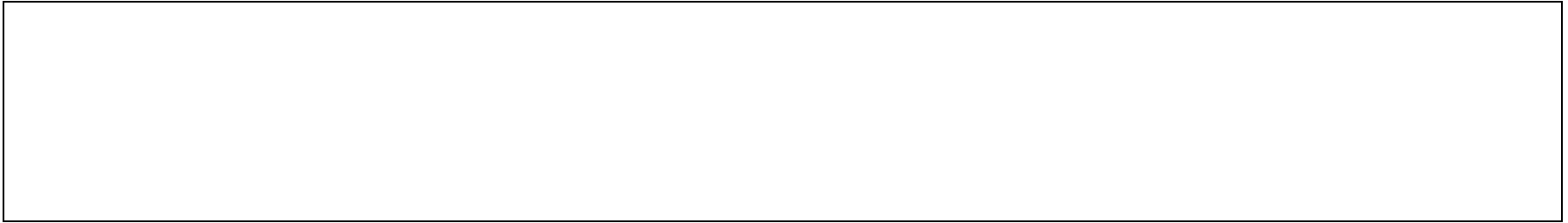
| | | | | |
|--|---|--|--|--|
| | mono, bi, and trinomials. Daily Assessment: Give an example of a division problem using a real life situation on an index card to be handed in. | | | |
| <p>Weekly Assessment: Test (cumulative) of 15 multiple choice questions and 3 constructive response questions</p> <p>What have the students produced that scaffolds towards the units culminating assessment? (for example if the unit's culminating assessment is a newspaper – perhaps the students have written an article) Actual scale model of the mural</p> | | | | |

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|--|--|--|---|---|
| Monday | Tuesday | Wednesday | Thursday | Friday |
| <p>Content Focus: Using the area formula to space out the design onto the mural.</p> <p>Hook: Continue sketching the mural</p> <p>Daily Assessment: Review the mural sketch in compliance to the rubric of the culminating project</p> | <p>Content Focus: Using the area formula to space out the design onto the mural.</p> <p>Hook: Continue sketching the mural</p> <p>Daily Assessment: Review the mural sketch in compliance to the rubric of the culminating project</p> | <p>Content Focus: Using the knowledge of polynomials, write a draft for an oral presentation that explains the use of the polynomial in your mural.</p> <p>Hook: Continue sketching the mural</p> <p>Daily Assessment: Review the mural sketch in compliance to the rubric of the culminating project.</p> | <p>Content Focus: Finalize your oral presentation.</p> <p>Hook: Continue sketching the mural</p> <p>Daily Assessment: Finalize your mural project</p> | <p>Content Focus: Present your mural.</p> <p>Hook: Present to the class your mural idea.</p> <p>Daily Assessment: Final grade of mural and oral presentation.</p> |
| <p>Weekly Assessment: Mural and oral presentation.</p> <p>What have the students produced that scaffolds towards the units culminating assessment? (for example if the unit's culminating assessment is a newspaper – perhaps the students have written an article) Actual scale model of the mural</p> | | | | |

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Unit Resources

Books:

Pre-Algebra, *Prentice Hall*
Impact Mathematics, Course Two, *Glencoe*
Intervention Skills, Course Two, *Glencoe*
HotTopics, Course Two, *Glencoe*
New York Review Series, Grade Seven Mathematics, *Glencoe*

Websites:

www.edhelper.com
www.aaamath.com
www.jpeg.com
www.glencoe.com
www.phschool.com
www.teachertube.com
www.youtube.com
www.purplemath.com

Teacher Materials:

www.skylightedu.com for videocassette
Camera to take pictures of interesting sites around neighborhood
Projector / transparencies

Other:

Sample of art works that uses various mural designs and templates
Field trip: walk around the neighborhood

N.B. This unit represents an excellent opportunity for a cross-curricula collaboration between a mathematics class and an arts class. Instructors may consider planning a mural (instead of actually making one) as an alternative approach.