

Unit 7 Polynomials

EDLD 5318

Overview/Background:

Polynomials is one of the most important units of Algebra 1, but often due to its complexity and timing in the school year, the deeper understanding alludes students in this course. Blended learning can provide students with the opportunity to work through the content at their own and at their level while ensuring they are getting the support they need along the way. My district is very strict with the sequence/pacing that we cover the content in. All assessments are given on a program called LinkIt that allows the district to track data more accurately for class to call and student to student. For this reason, it is difficult to stray away from the curriculum, however, blended learning will provide an alternate approach to students moving towards mastery of these concepts.

My district's LMS is Schoology and we are tied to the Microsoft suite, both of which 9th/10th grade students are proficient in navigating and utilizing as needed. My school's schedule is abnormal, each "cycle" we see our classes for three 58-minute classes and for one 78-minute block. Rather than planning the unit based on weeks/days, I will plan based on cycles/meetings. Since all materials will be housed on Schoology, there will be a folder on there for each class period so students can find everything they need there.

Concepts to Cover:

- Naming Polynomials
- Adding and Subtracting Polynomials
- Multiplying Polynomials
- Factoring Quadratic Trinomials/Binomials (DOTS)
- Graphing Quadratics
- Modeling with Quadratics

Cycle 1

Meeting 1: Naming Polynomials

- Introduction with discussion board
 - Prompt will be based around prefixes, since they play a big role in naming polynomials
- All students will be given a graphic organizer (chart) to fill out while watching the video I recorded and uploaded to Schoology
 - Lesson will be broken up into two parts, one will be naming based on numbers of terms, one will be on degree
 - Big Ideas online textbook can be used as a supplemental resource (links will be provided on Schoology)
 - Practice will be built into videos
- DIY Problems
 - Students will create their own 5 problems on Microsoft Forms and uploaded the link to a Schoology discussion board
 - Students will have to solve a peer's problems on Microsoft Forms and grade those who answered their questions leaving feedback

Meeting 2: Adding/Subtracting Polynomials

- Pre-Assessment on Schoology
 - This section is essentially combining like terms, something most students are familiar and proficient with

- o Problems will be presented from easiest to hardest. The first question they get incorrect will determine where they start watching the video for this lesson
- Khan Academy
 - o Khan Academy video will run through the whole lesson, if a student scored below a certain score, they will watch the whole video. If they received a perfect score, they will be able to skip the video and go directly to the practice. If they were somewhere in between (TBD), they will start the video at a specific time.
 - o Students will complete the practice questions on the Khan Academy website
- Reflection
 - o Those who did not get a perfect score on their pre-assessment will then go back and identify their mistakes and provide an explanation on the correct way to solve them.
- Post-Assessment on Schoology
 - o Like pre-assessment, but will also add in questions from the first lesson of the unit, naming polynomials
 - o If students still did not show mastery of the content, teacher/co-teacher will meet with students in small groups or individually as they see fit

Meeting 3: Multiplying Polynomials

- Tiered Lesson (built in Schoology)
 - o There will be a pre-assessment in each folder on Schoology
 - Tier 1: Monomial x Monomial
 - Tier 2: Monomial x Binomial
 - Tier 3: Binomial x Binomial
 - Tier 4: Binomial x Trinomial
 - CHALLENGE: Trinomial x Trinomial
 - o Students will move around the room based on what “tier” they are working on so teachers can assist as needed
- Practice WS
 - o After students complete Tier 4 lesson with a partner, students will be grouped heterogeneously. Answer key will be posted on Schoology for students to check their own work.
- Exit Ticket
 - o On Schoology
 - o Although focused on multiplication, it will also spiral back to two preview concepts.

Block: Review and Quiz 1

- Virtual escape room as review after checking homework
 - o If students were not proficient when reviewing homework, teachers will meet with small groups to answer questions
- Quiz 1
 - o Paper/pencil
 - o Audio feedback will be provided with each grade on Schoology

Cycle 2

Meeting 1/2: Factoring Quadratic Trinomials

- This lesson will be introduced live in a whole group setting and then transition into an investigation format
 - o Students will complete diamond problems to try to find the pattern/rule
- Since this is one of the more important concepts for students’ math careers, there will be many supports in place, to gauge understanding, students will complete a formative assessment on Quizizz

- o Khan Academy and teacher-recorded videos will be posted
- Teacher and co-teacher will have scheduled meetings with small groups of students throughout the two class periods for check-ins and mini lessons

Meeting 3: Quadratic Binomials (DOTS) and Practice

- Warm-Up
 - o Quadratic binomials will be introduced in the warm-up without any introduction intentionally to begin discussion
- Discussion
 - o Will take place on Schoology, students will be expected to post and respond to two peers
- Practice quiz will be taken on Schoology with both binomials and trinomials only marking answers right/wrong
 - o Students will then be partnered up and must teach mini lessons to their peers explaining the questions they got wrong

Block: Practice and Factoring Quiz

- Warm-Up
 - o Students will be given a 3x5 card and asked to write out a hypothetical cheat sheet as if they could use it on the quiz, they will then make up 3 questions of their own and turn them in
- Quiz 2
 - o Will be made up of questions made by students
 - o While teacher is putting this quiz together from student made questions, co-teacher will answer questions

Cycle 3

Meeting 1/2: Graphing Quadratics (Day 1) - Investigation

- Desmos Investigation
 - o Students will first watch a video explaining how to use Desmos
 - o Students will work then through a discovery lesson on Demos using sliders based on the transformation equations for quadratic functions
 - o Open-ended discussion questions will be posed throughout, and responses will be shared live with classmates
- In class discussion
 - o Students will be broken up into three groups, one for each variable (a, h, k)
 - o Students will collaborate to come up with the *job* for their variable
 - Each group will have to ask two questions to the groups presenting
- Graphing WS
 - o As exit ticket or as homework, done by hand

Meeting 2: Graphing Quadratics (Day 2) – Practice and Reinforcing

- Scavenger Hunt
 - o Students will move around the room in pairs (grouped homogeneously) answering questions related to quadratics
 - Vertex, graphing, describe transformation
 - o Students will intentionally be grouped homogeneously so teachers can work with students struggling individually
- PP Voice Over
 - o Students will create PP presentation where they will teach a lesson on quadratic to a student who has hypothetically been absent for the last several classes

- o They will be expected to voice over the PP displaying their deeper understanding of the content
- Exit Ticket (Mini Quiz)
 - o On Schoology describing the transformations, graphing, and writing equations from graphs

Meeting 3: Modeling with Quadratics

- Padlet Brainstorm Activity
 - o How can quadratics be used in real life? Where are they seen?
- Video on projectile motion
 - o Video will highlight key components (vertex, intercepts)
- Class lesson
 - o Due to the complexity of this topic, we will run through several examples as a class
- Practice
 - o Red, yellow, green light
 - Students will complete tiered practice based on their understanding, they will all start on red and progress forward
 - To move to the next level, they must get three questions correct in a row

Block: Catapult Lab

- Lab Introduction will be video based, showing examples of past catapult creations
 - o Students will choose their own groups, but must submit them and have them approved
 - Each member will be responsible for submitting a lab report
 - o Students will be allowed to choose their supplies, but will be limited to three items
- This class period will be spent collecting data on the student catapults and trying to control variables

Cycle 4

Meeting 1-2: Catapult Lab Time

- Students will reflect using a discussion board their findings, when ready, about their catapult
 - o Most importantly, they will come up with their equation from their catapult in preparation for the competition
- Students will submit all pre-competition lab work via Microsoft Forms

Meeting 3/Block: Competition and Discussion/Reflection

- Goal given for competition
 - o Groups will be given the height of the “goal” upon entering the class
 - o They will be given 20 minutes to prepare and determine the *exact* location that they want to set up their catapult
 - No trial runs
- Each group will be given three attempts
 - o Groups not going at that time will be recording observations that they are witnessing about each group in preparation for the discussion component
 - Identifying possible confounding variables
 - Potential biases
- Winning group will lead the wrap up discussion
 - o They will serve as the teachers (facilitators) and guide
- Part of conclusion paragraph will require students to come up with similar projectile motion labs that could be done similar to this

PACING MAY VARY FROM CLASS TO CLASS, BUT A DISTRICT-ISSUED SUMMATIVE ASSESSMENT WILL FOLLOW, POTENTIALLY PRIOR TO THE LAB, POTENTIALLY AFTER.