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How to Use This Addendum

Make sure you're ready to teach by noting the **Necessary Materials and Pre-Lesson Prep** you will need to gather or complete prior to the lesson

Find high-leverage instructional moves in the **Lesson Look Fors**. This is what leaders should see when observing your instruction

Note how your lesson objective ties to your state **Standards**

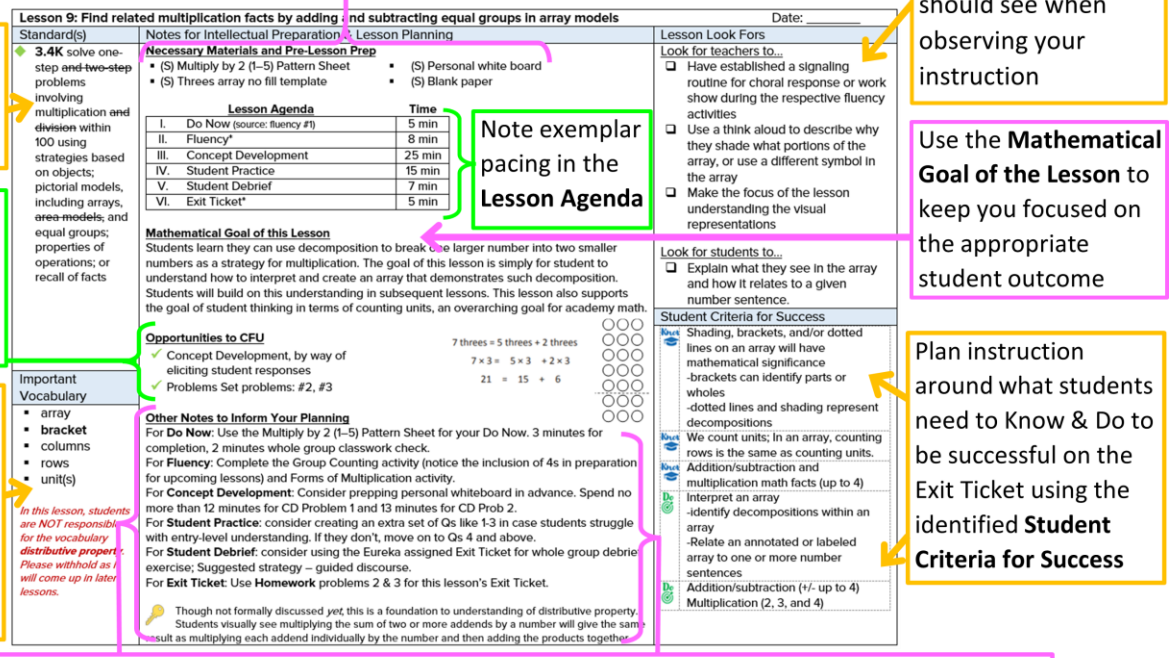
Note exemplar pacing in the **Lesson Agenda**

Use the **Mathematical Goal of the Lesson** to keep you focused on the appropriate student outcome

Plan purposeful questioning and responses using **Opportunities to CFU**

Plan instruction around what students need to Know & Do to be successful on the Exit Ticket using the identified **Student Criteria for Success**

Plan to stress **Important Vocabulary** in the lesson. New vocab for the unit is indicated in bold



Find recommended lesson modifications, content knowledge boosters, and/or high-leverage instructional moves that may not be in your Teacher Edition located in **Other Notes to Inform Your Planning**

UNIT SYNOPSIS

Students begin this unit by learning how to classify and identify elements of polynomials. In this first lesson, they're introduced to a LOT of new vocabulary words that they'll use throughout the unit. Students will also learn how to add, subtract, and multiply polynomials, revisiting major concepts like combining like terms (from Unit 1 of this course and from 6th and 7th grades), the Distributive Property, and applying properties of exponents (from Unit 7).

The second half of this unit will go over several different ways to factor polynomials, including using the greatest common factor, using special products, and using the tabular method.

CONTENT STANDARDS

Below are the standards addressed in this unit.

Readiness Standards	Supporting Standards
A.10(E) factor, if possible, trinomials with real factors in the form $ax^2 + bx + c$, including perfect square trinomials of degree two	**A.10(A)** add and subtract polynomials of degree one and degree two **A.10(B)** multiply polynomials of degree one and degree two **A.10(C)** determine the quotient of a polynomial of degree one and polynomial of degree two when divided by a polynomial of degree one and polynomial of degree two when the degree of the divisor does not exceed the degree of the dividend **A.10(D)** rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property **A.10(F)** decide if a binomial can be written as the difference of two squares and, if possible, use the structure of a difference of two squares to rewrite the binomial

Focus on Disciplinary Literacy	
	Mathematical Process Standard (F) – analyze mathematical relationships to connect and communicate mathematical ideas
	Mathematical Process Standard (G) – display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication

LEARNING SUPPORTS BY LESSON

There is a checkmark for the math support if the lesson	Lessons → Math Supports	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
makes a connection to prior content or from a previous unit or academic year	Access Prior Knowledge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
uses familiar contexts or experiences to make the learning relevant to students	Real-World Connections	✓	✓	✓							
makes use of graphic organizers	Graphic Organizers				✓	✓	✓	✓	✓	✓	✓
includes tools like rulers, protractors, patty paper, algebra tiles, etc.	Tools or Manipulatives	✓	✓					✓	✓	✓	✓
incorporates tables, reference charts, displays, pictures, or models, or color-coding	Visual Aids	✓	✓		✓	✓	✓	✓	✓	✓	✓
includes definitions, examples vs. nonexamples, cognates, etc.	Vocabulary Supports	✓				✓		✓	✓	✓	✓
includes strategies that support language development	Language Supports										
asks students to discuss with their partner to prepare for whole class discussion	- Turn and Talk	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
teacher facilitates a whole class discussion to debrief key learnings	- Guided Discussion	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
asks students to think independently, test their idea with a partner, and share whole group	- Think, Pair, Share										
includes sentence stems to support students with explanations	- Sentence Stems										
provides opportunities for students to work with a partner or a group	Peer Collaboration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
uses mnemonics such as SohCahToa	Mnemonics										
includes websites or equipment that enhances the lesson	Technological Support										
content can be presented in different forms	Different Modalities										
uses hands-on tools or manipulatives to represent the math	- Concrete	✓	✓					✓	✓	✓	✓
uses drawings to represent the math	- Pictorial	✓	✓		✓	✓	✓	✓	✓	✓	✓
uses numbers and number sentences to represent the math	- Abstract	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

The EFFL Model

Experience First, Formalize Later (EFFL) Model

Opening

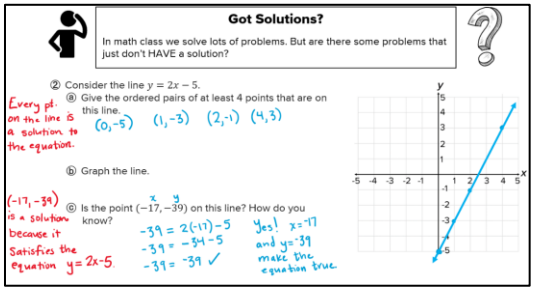
For every new lesson, the teacher begins by making the goals of the lesson crystal clear. The teacher does more than simply read the objective to the class. They make connections to previous learning, share how this learning fits into a bigger picture, or explain why this learning is important for future learning.

Activity / Interaction With New Material (INM)

For this part of the lesson, students work in pairs or groups of four to experience new content through an activity. Students might be discussing a proposed scenario, working with other groups, or doing a simulation. The student activity is designed for students to be able to do without the help of the teacher. Of course, the teacher is watching and listening in to conversations in order to formatively assess student understanding. The teacher provides questions, cues, and prompts (not answers!) to help push groups forward when they are stuck or have made a mistake. As students begin to finish the activity, the teacher identifies students to write their work on the board. Most often, the teacher selects student work that will easily allow them to connect the experience to formal learning. Students write their work on the whiteboard in a single-color marker.

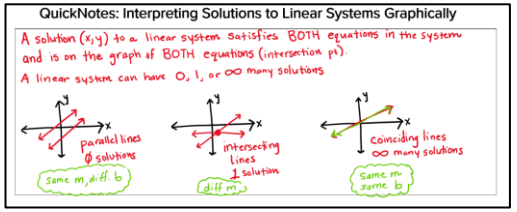
Debrief Activity

Once students have recorded their responses in their workbook (see blue writing to the right), the teacher calls the whole group back together for a debrief. It is in this discussion that the teacher will help students formalize the learning. The teacher connects the student activity experience to new vocabulary, definitions, formulas, and algorithms. The formal learning is attached specifically to the experiences of the activity so that students can enhance their constructed understanding of the new content. The teacher writes all of the formal learning in a different color in the margins of the activity **(see red writing to the right).** The students add these ideas in the margins on their activity page and often think of this as the formal "notes" of the lesson. In all of the answer keys we provide on Math Medic, the teacher formal learning points are provided in the margins in a **different color.**



QuickNotes

In this part of the lesson, the teacher uses the whole experience of the activity and the formalization in the debrief to summarize the learning from the lesson. Notice that we use the box to constrain the amount of formal "notes" that the teacher can provide.



Student Practice

Now that students have arrived at some new learning, they need to be able to apply it in new contexts. Most often we have students complete these questions in pairs and occasionally we select one question to use as an exit ticket. If we have time, we have students write solutions on the whiteboard.

Extra Practice

We typically give students around 3-5 "Extra Practice" problems for each lesson. We choose problems that are closely aligned with the Learning Objectives of the lesson. It is our belief that "less is more" here. We would rather students spend their Extra Practice time thinking deeply about just a few problems, rather than surface level thinking on many problems. When possible, we provide the answers at the bottom of the page, so they can immediately assess their understanding.

Slightly modified version of: https://www.calc-medic.com/post/experience-first-formalize-later#:~:text=%E2%80%9CExperience%20First%2C%20Formalize%20Later%E2%80%9D,at%20formal%20definitions%20and%20formulas.

Before You EFFL!

Here are helpful resources that you guide you in the right direction before your first EFFL lesson!

Why Should We EFFL?

The article advocates for the Experience First, Formalize Later (EFFL) teaching model, emphasizing its effectiveness in fostering deep understanding and flexible thinking in students. The author compares traditional teaching to a game of "Simon Says," where students merely mimic instructions without grasping underlying concepts. In contrast, EFFL encourages students to engage actively with problems, enhancing their ability to understand and apply calculus concepts creatively.

Tips for Lesson Planning

The article offers practical advice for effective lesson planning beyond the exhaustive and overly detailed approaches often emphasized during teacher training. It underscores the importance of thoughtful preparation but rejects the notion that teachers need to script every minute or detail of a class session.

Making the Most of Your EFFL Lesson Debrief

The article discusses the significance of the debriefing phase in the Experience First, Formalize Later (EFFL) lesson model, emphasizing its role in reinforcing learning and highlighting student contributions. The debrief session is seen as crucial for integrating academic vocabulary, emphasizing key lesson understandings, and valuing students' mathematical insights.

While You EFFL!

While each lesson may be unique in context and skills, all lessons benefit from the following practices:

Teacher Look Fors:

- ❑ Utilizing the Do Now to spark students' interest in the Activity.
- ❑ Use questioning to promote small group discussion and exploration, guided by monitoring questions.
- ❑ Connects Experience First to formal concepts using a colored pencil/pen to take notes along the margin during the Debrief.
- ❑ Facilitates whole-class discussions for students to reflect, share insights, and provides feedback that reinforces key concepts.
- ❑ Tracks time to adapt lesson pacing and support based on student response and engagement.

Students Look Fors:

- ❑ In the Activity, students engage in group work and discourse.
- ❑ Exploring the activity, testing hypotheses and approaches (trial & error).
- ❑ Take notes on key ideas and concepts using different colored pencil/pen to take notes along the margin.
- ❑ Share thoughts and ideas that demonstrate their approach to their work.

Other considerations

- During the **Experience First** phase, if most of your students seem stuck or disengaged, take a moment to pause, reset, and provide clear instructions. Some problems of the Activity are more suitable to do a whole-class discussion as a means to save some instructional time for Student Practice or the Exit Ticket. You are encouraged to adapt the EFFL (Experience First, Formalize Later) process to meet your students' needs while maintaining a focus on student-centered instruction.

ROADMAP

AT A GLANCE: Unit 8 – Polynomials and Factoring			
Day	Date	Lesson	Lesson Title
There are 2 flexible Success Days that you can use anywhere in the unit. • Consider using 1 day between Lessons 6 and 7 to administer optional Topic Quiz 8. • Consider using 1 day to review before the Unit 8 Exam.			
1		1	Classifying and Identifying Elements of Polynomials
2		2	Adding and Subtracting Polynomials (Day 1)
3		3	Adding and Subtracting Polynomials (Day 2)
4		4	Multiplying Monomials and Binomials
5		5	Special Products of Binomials
6		6	Multiply Binomials
7			Success Day (Ideal time to administer **optional** Unit 8 Topic Quiz)
8		7	Factoring by Greatest Common Factor (GCF)
9		8	Factoring Special Products
10		9	Factoring Trinomials
11		10	Factoring to Divide Polynomials
12			Success Day
13			Unit 8 Exam

Lesson 1: Classifying and Identifying Elements of Polynomials Date: _____

Standard(s)

◆ **A.10(A)** add and subtract polynomials of degree one and degree two

Important Vocabulary

- **binomial**
- **coefficient**
- **constant**
- **degree**
- **leading coefficient**
- **linear**
- **monomial**
- **polynomial**
- **quadratic**
- **standard from**
- **term**
- **trinomial**
- **variable**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Unit 8.1 Student Workbook pages
- Class set of red pens and colorful highlighters or colored pens

Lesson Structure:

- Do Now (7 min)
- INM (18 min)
- Debrief (5 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to identify and use elements of polynomials to classify them. This introductory lesson sets students up for the unit and is not necessarily tied to one specific TEKS in particular.

Opportunities to CFU

✓ INM: 5

✓ Student Practice: 1a, 1e, 1k

Other Notes to Inform Your Planning

For the **Do Now**: The Do Now looks wildly irrelevant, but it sets students up to visualize the degree of the polynomials and terms they'll examine in the INM.

For the **INM**: The INM is full of new vocabulary! After this lesson, consider posting an anchor chart so students can reference the new vocabulary words from this lesson. You can coach students to look for prefixes (ex. "mono-," "bi-," "tri-," "poly-," "quart-," and "quint-") so that they aren't just memorizing vocabulary.

In **General:** Even though many vocabulary terms are introduced in this lesson, it is not necessary for students to memorize every single one. As long as students understand the meanings of mono-, bi-, tri-, poly- and understand what a term is, they will have a great starting point for this unit and a great launchpad for verbally justifying their thinking.

Focus on Disciplinary Literacy

DEBRIEF

Lesson Look Fors

Look for teachers to…

- ❑ emphasize the prefixes in many of the new vocabulary words that will help students understand the meaning of those words

Look for students to…

- ❑ refer to the tables given on the first page of the INM as they work through problem sets until they have internalized the meaning of all of the new vocabulary words.
- ❑ explain what a "term," a "degree," and a "leading coefficient" are, and explain how polynomials are named.

Student Know/Do Chart

Do	Students can name and classify polynomials by identifying the number of terms they have.
Do	Students can rewrite a polynomial so that it is in standard form.
Know	A polynomial is in standard form when its terms are ordered from largest to smallest exponent.
Know	A "term" is a single number, variable, or combination of the product of several numbers or variables; terms are separated by + or – signs.
Know	A polynomial gets its term name based on the number of terms it has.

Lesson 2: Adding and Subtracting Polynomials (Day 1) Date: _____

Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors
◆ **A.10(A)** add and subtract polynomials of degree one and degree two	**Necessary Materials and Pre-Lesson Prep** ▪ Lesson 8.2 Student Workbook Pages ▪ highlighters or colored pencils ▪ Class set of red pens ▪ Optional but useful: algebra tiles (print | digital)	Look for teachers to… ❑ Model and encourage the use of highlighters to make like terms more obvious ❑ continuously connect what students are doing with the algebra tiles (whether you are using physical manipulatives or students are sketching) to abstract algebraic understanding of combining like terms Look for students to… ❑ connect what they already know about combining like terms to add and subtract polynomials. ❑ use highlighters or colored pencils to indicate like terms.
Important Vocabulary ▪ like terms ▪ polynomial	Lesson Structure: Do Now (7 min) INM (18 min) Debrief (5 min) Student Practice (15 min) Exit Ticket (10 min) 	Student Know/Do Chart Do: Students can add polynomials. Know: If two terms have the same variable and the same exponent, they are like terms and can be combined. Know: If two terms have a different variable or a different exponent, they CANNOT be combined.
	Mathematical Goal of this Lesson By the end of this lesson, students should be able to add or subtract polynomials that do not require the distributive property. When we add or subtract polynomials, we combine like terms. **Opportunities to CFU** ✓ INM: 2b, 3, 4c ✓ Student Practice: 1, 2, 11a **Other Notes to Inform Your Planning** For **Do Now**: This Do Now sets up the INM. It should not be skipped, as it reviews some basic ideas about combining like terms. On **Algebra tiles**: If you choose to print the template, you will need to cut/color them before class to minimize losing instructional time. If you have access to actual tiles, those are best because of their durability. On **INM 4c:** Students learned how to add and subtract negative values in 6th and 7th grade. Still, it is common for some students to struggle. One way to address this is to model, which is where algebra tiles come in! Even though the lesson doesn't direct students to model INM #4, they can still do so to help them make the problem more concrete if necessary. **Focus on Disciplinary Literacy** INM 2b	

Lesson 3: Adding and Subtracting Polynomials (Day 2) Date: _____

Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors

Standard(s)

◆ **A.10(A)** add and subtract polynomials of degree one and degree two

Important Vocabulary

- like terms
- polynomial

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 8.3 Student Workbook Pages
- highlighters or colored pencils
- Class set of red pens
- Optional but useful: algebra tiles (print | digital)

Lesson Structure:

- Do Now (7 min)
- INM (10 min)
- Debrief (5 min)
- Student Practice (23 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to add and subtract polynomials, including those for which a -1 must be distributed to each term in a set of parentheses. This lesson is very similar to what students learned in the previous one, except this time, they sometimes need to apply the distributive property to distribute an "invisible" negative one.

Opportunities to CFU

✓ INM: 2

✓ Student Practice: 1, 2, 3

Other Notes to Inform Your Planning

For **Do Now**: This Do Now *could* be skipped or replaced, but it is included to activate prior knowledge of the distributive property and prime students for distributing a -1 to several terms in a set of parentheses.

For **Twinning:** The Student Practice activity, TWINNING, is a powerful opportunity for students to work cooperatively. Students should work in pairs. Each student should work on their own paper, and neither student should move on until both are done with their problem. Notice that there are two problems for every number – that is because Part A should do 1a and partner B should do 1b. If they do not both get the SAME answer to their two different problems, they need to discuss and figure out what went wrong.

Focus on Disciplinary Literacy

TWINNING

Lesson Look Fors

Look for teachers to…

- ❑ model and encourage the use of highlighters to make like terms more obvious
- ❑ ensure students understand INM #2 before releasing students to the TWINNING activity.

Look for students to…

- ❑ connect what they already know about combining like terms AND the Distributive Property to add and subtract polynomials.
- ❑ use highlighters or colored pencils to indicate like terms.
- ❑ work together on TWINNING as opposed to getting ahead of each other.

Student Know/Do Chart

Do	Students can add and/or subtract polynomials.
Do	Students can identify when there is an "invisible" negative one and distribute it when appropriate.
Know	When a set of terms inside of parentheses is being subtracted from another set of terms, distribute the "invisible" -1 to each of the terms inside that second set of parentheses.
Know	If two terms have the same variable and the same exponent, they are like terms and can be combined.
Know	If two terms have a different variable or a different exponent, they CANNOT be combined.

Lesson 4: Multiplying Monomials and Binomials Date: _____

Standard(s)

- **A.10(B)** multiply polynomials of degree one and degree two
- **A.10(D)** rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property

Important Vocabulary

- binomial
- Distributive Property
- bonomial
- **Tabular Method**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 8.4 Student Workbook Pages
- Class set of red pens

Lesson Structure:

- Do Now (7 min)
- INM (20 min)
- Debrief (3 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to multiply monomials and binomials using the Tabular Method. Sometimes this requires students to recall the properties of exponents that they just learned with in the previous unit.

Opportunities to CFU

✓ INM: 4b, 5, 6b, 7

✓ Student Practice: 5, 8, 9

Other Notes to Inform Your Planning

For **Do Now**: This Do Now *could* be skipped or replaced, but it is included to activate prior knowledge of the area model students worked with in previous grades AND to review exponent rules. This Do Now exists to prime students for multiplying monomials AND for using the Tabular Method when binomials are involved.

About **Student Practice**: #s 1-4 require fluency with rules of exponents. For students that are still struggling with rules of exponents, ensure you coach them to keep referring to their reference sheet to identify what rule they need to apply and how.

On **INM #7:** It is important that students understand why the area model (Tabular Method) changed from a 1 by 2 to a 2 by 2. In later lessons, students will use a 2 by 3 or sometimes even a 3 by 3 because they'll be multiplying trinomials!

Focus on Disciplinary Literacy

INM #7

Lesson Look Fors

Look for teachers to…

- ❑ ensure students have access to the reference sheet so students can more easily recall properties of exponents
- ❑ connect the Tabular Method to the area model that students have worked with for several years.

Look for students to…

- ❑ use the Tabular Method (a.k.a. "area model") to multiply binomials.
- ❑ use the Distributive Property (which can also be modeled by the Tabular Method) to multiply a monomial by a binomial.
- ❑ apply their prior understanding of exponent properties to multiply monomials and binomials.

Student Know/Do Chart

Students can multiply a binomial by a monomial using the Distributive Property.

Students can use the Tabular Method to multiply two binomials.

The Distributive Property states that $a(b + c) = ab + ac$.

Lesson 5: Special Products of Binomials Date: _____

Standard(s)

- **A.10(B)** multiply polynomials of degree one and degree two
- **A.10(F)** decide if a binomial can be written as the difference of two squares and, if possible, use the structure of a difference of two squares to rewrite the binomial

Important Vocabulary

- **conjugates**
- **difference of two squares**
- **square of a binomial**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 8.5 Student Workbook pages
- Class set of red pens

Lesson Structure:

- Do Now (7 min)
- INM (11 min)
- Debrief (7 min)
- Student Practice (16 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to develop and use the "difference of two squares" and "square of a binomial" to find special products of binomials.

Opportunities to CFU

✓ INM: 2a, 3, 4a, 5

✓ Student Practice: 1, 2, 3, 4

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in the previous lesson on multiplying monomials and binomials. It can be skipped or replaced if necessary; however, it gives students the opportunity to review the Tabular Method before using it frequently in the INM.

For **INM 3 & 5:** As you circulate and monitor, let students know if their responses to 2 and 4 are incorrect. If they have many mistakes in #2 or #4, it will be hard for them to notice a pattern/shortcut.

Focus on Disciplinary Literacy

INM 3 & 5

For **Student Practice:** There are four pages provided, which is much more than usual. The first page is a traditional problem set, but the rest are "sprints," a common exercise that students in TX 3-5 mathematics use to build fluency. It is unlikely that you'll have time to do all three, but if you do choose to use them, please carefully read the pink TE box on p55. Please be aware that one risk of the "Sprint" protocol is that students could internalize an error by practicing the same thing wrong over and over again very quickly.

Lesson Look Fors

Look for teachers to…

- ❑ Actively monitor, providing quick feedback when students are incorrectly completing #2 or #4.
- ❑ **delegate mathematical authority to students** – rather than tell students today's shortcuts, let students share based on what they noticed about #2 and #4.

Look for students to…

- ❑ notice a pattern in 2a-c, and a different pattern in 4a-c.
- ❑ apply today's two "shortcuts" (difference of squares and square of a binomial) to multiply these special binomial pairs

Student Know/Do Chart

Students can identify equivalent expressions given the square of a binomial.

Students can multiply binomials.

The "square of a binomial" occurs when a binomial is squared, and this occurs one of two ways:
$(a+b)^2 = a^2 + 2ab + b^2$ and
$(a-b)^2 = a^2 - 2ab + b^2$

The "difference of two squares" is found when you multiply a binomial by its conjugate;
$(a+b)(a-b) = a^2 = b^2$

Lesson 6: Multiply Polynomials Date: _____

Standard(s)

◆ **A.10(B)** multiply polynomials of degree one and degree two

Important Vocabulary

- binomial
- monomial
- polynomial
- Tabular Method

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 8.6 Student Workbook pages
- Class set of red pens and colored pencils or highlighters

Lesson Structure:

- Do Now (7 min)
- INM (12 min)
- Debrief (6 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to multiply binomials and trinomials. Up to this point, students have worked with monomials and binomials and used the Tabular Method to keep their work organized. This lesson extends the Tabular Method from the 2x2 or 1x2 "grids" students previously used to 2x3 grids.

Opportunities to CFU

✓ INM: 4, 5

✓ Student Practice: 1, 2, 9, 11

Other Notes to Inform Your Planning

For **Do Now**: This Do Now spirals in previous lessons on multiplying binomials. It can be skipped or replaced, but it was created to prime students for the INM.

For **INM:** Students should be working through the INM with a partner or two as opposed to watching their teacher work out the INM problems. Students have worked with the Tabular Method for at least two days and should be able to build on what they already know to reason through the INM.

Focus on Disciplinary Literacy

Debrief

NOTE: There is an optional topic quiz on Edcite (Topic Quiz 8) to administer once you have made it through these first six lessons of the unit. The remaining lessons are on factoring polynomials.

Lesson Look Fors

Look for teachers to…

- ❑ actively circulate and monitor, listening in on conversations and preselecting students to share their thoughts during the Debrief.
- ❑ if students are stuck, try to help them get unstuck by a question from the green box on TE p66.

Look for students to…

- ❑ use highlighters or colored pencils to identify like terms in their Tabular Method cells.
- ❑ be particularly careful with negative signs that will impact polynomial multiplication and eventually addition.

Student Know/Do Chart

Do — Students can multiply polynomials.

Do — Students can identify when a word problem is asking them to multiply polynomials.

Lesson 7: Factoring by Greatest Common Factor (GCF) Date: _____

Standard(s)

◆ **A.10(D)** rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property

Important Vocabulary

- factor (noun)
- factor (verb)
- **Greatest Common Factor (GCF)**

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 8.7 Student Workbook pages
- Class set of red pens
- Optional but useful: algebra tiles (print | digital)

Lesson Structure:

- Do Now (7 min)
- INM (18 min)
- Debrief (5 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to identify and factor out the greatest common factor (GCF) from a polynomial.

Opportunities to CFU

✓ INM: 3, 4

✓ Student Practice: 1, 2, 9, 14

Other Notes to Inform Your Planning

For **Do Now**: This Do Now should NOT be skipped. It activates students' prior knowledge of GCF from elementary and 6th/7th grades. This is prerequisite knowledge for being able to factor the GCF from a polynomial. The good thing is, if students completely forgot HOW to find the GCF, your debrief of the Do Now should give them the just-in-time review that they may need.

On **Algebra Tiles:** Some students don't need them at all, but some students do! Please make sure students have access to them. If students struggle, encourage them to use the tiles to physically model the problems (as opposed to just sketching).

For **INM 2d:** This part of the lesson explains how a binomial can be broken down into factors using the algebra tiles. It is important that students can "translate" the visual representation (the algebra tiles) to the algebraic representation (the factored expression).

Focus on Disciplinary Literacy

INM 2d

Lesson Look Fors

Look for teachers to…

- ❑ use the provided monitoring questions in the green box on TE p49 to help students when they're stuck.
- ❑ support struggling students by encouraging them to use algebra tiles to better visualize the factors of a binomial.

Look for students to…

- ❑ be able to explain how they identified the GCF, justifying either with algebra tiles or using the Distributive Property
- ❑ check that they factored correctly by redistributing the GCF back to each term to see if they get the original expression.

Student Know/Do Chart

Do	Students can identify the greatest common factor of a polynomial.
Do	Students can "factor out" the GCF of a polynomial.
Know	To factor is to break down an expression into parts that can be multiplied together to get that expression.
Know	The GCF is the largest factor that all terms share.

Lesson 8: Factoring Special Products Date: _____

Standard(s)

- **A.10(E)** factor, if possible, trinomials with real factors in the form $ax^2 + bx + c$, including perfect square trinomials of degree two
- **A.10(D)** rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property
- **A.10(F)** decide if a binomial can be written as the difference of two squares and, if possible, use the structure of a difference of two squares to rewrite the binomial

Important Vocabulary

- factor (noun)
- factor (verb)
- Difference of Squares
- Square of a Binomial
- Perfect Square Trinomial

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 8.8 Student Workbook pages
- Class set of red pens and colored pencils
- Optional but useful: algebra tiles (print | digital)

Lesson Structure:

- Do Now (7 min)
- INM (18 min)
- Debrief (5 min)
- Student Practice (15 min)
- Exit Ticket (10 min)

Mathematical Goal of this Lesson

By the end of this lesson, students should be able to identify and factor out the greatest common factor (GCF) from a polynomial.

Opportunities to CFU

✓ INM: 2b, 2b, 4, 5

✓ Student Practice: 1, 2, 6, 7

Other Notes to Inform Your Planning

For **Do Now**: This Do Now should not be skipped or replaced. It activates students' prior knowledge of special products of binomials (Lesson 8.5) and primes students for "working backwards" in this lesson.

About the **Tabular Method:** Students that internalized the patterns for special products of binomials from Lesson 8.5 may not need algebra tiles or the Tabular Method at all. These students might not always "show their work" because they really can do this in their head, but in this case that is acceptable as long as they can visually prove their work (using algebra tiles or the Tabular Method) when requested.

Focus on Disciplinary Literacy

INM #2

Lesson Look Fors

Look for teachers to…

- ❑ use the provided monitoring questions in the green box on TE p55 to help students when they're stuck with INM #s 2-3, or the Qs provided in p56 for INM #s 4-5.

Look for students to…

- ❑ recall what they learned in Lesson 8.5, potentially flipping back in the workbook to revisit the "patterns" for special products of binomials.
- ❑ be able to use algebra tiles and/or the Tabular Method to justify their responses

Student Know/Do Chart

Students can identify that there is a GCF in a polynomial expression and factor it out before factoring the remaining polynomial.

Students can factor a perfect square trinomial.

When all terms in a polynomial share a common factor, factoring it out can reveal a polynomial that is easier to factor.

A perfect square trinomial is a trinomial that can be written as the square of a binomial.

Lesson 9: Factoring Trinomials Date: _____

Standard(s)	Notes for Intellectual Preparation & Lesson Planning	Lesson Look Fors

Standard(s)

- **A.10(E)** factor, if possible, trinomials with real factors in the form $ax^2 + bx + c$, including perfect square trinomials of degree two

Important Vocabulary

- factor (noun)
- factor (verb)
- Tabular Method

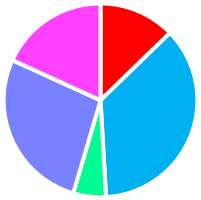
Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 8.9 Student Workbook pages
- Class set of red pens and colored pencils

Lesson Structure:

- Do Now (7 min)
- INM (20 min)
- Debrief (3 min)
- Student Practice (15 min)
- Exit Ticket (10 min)



Mathematical Goal of this Lesson

By the end of this lesson, students should be able to factor trinomials in the form $ax^2 + bx + c$ whether $a = 1$ or not. This lesson focuses heavily on the Tabular Method not just to keep work organized, but also as a visual that supports students' ability to factor. Like a crossword puzzle, students are able to get information that is new to them as they fill in each missing piece.

Opportunities to CFU

- ✓ INM: 2d, 2d, 4
- ✓ Student Practice: 2, 6, 9

Other Notes to Inform Your Planning

For **Do Now**: This Do Now

For **Debrief:** When Debriefing 2c, emphasize that the Tabular Method helps you identify the GCF of each row or column, and that when done appropriately, the products of the "diagonals" are equal. See TE p101 for more details.

For INM #4: I you would like to see INM #4 worked out, please watch this video.

Focus on Disciplinary Literacy

DEBRIEF

Lesson Look Fors

Look for teachers to…

- ❑ coach students to factor out a GCF if possible before continuing to factor a trinomial.
- ❑ Use different colored pens/pencils to show steps when debriefing, because it can be hard to tell how the problem was worked out when the finished product in just one color since these problems aren't just worked out "left to right" or "up to down"

Look for students to…

- ❑ once they have "broken up" the middle term of a trinomial, ensure that the product of the "diagonals" are equal (see TE p63).
- ❑ identify GCFs of two terms to determine factor parts
- ❑ check their factoring by multiplying the factors together to ensure they did not make a mistake.

Student Know/Do Chart

Do: Students can factor a polynomial of the form $ax^2 + bx + c$ when $a > 1$.

Know: You can use the Tabular Method to factor a trinomial when the leading coefficient is greater than 1.

Lesson 10: Factoring to Divide Polynomials Date: _____

Standard(s)

- **A.10(C)** determine the quotient of a polynomial of degree one and polynomial of degree two when divided by a polynomial of degree one and polynomial of degree two when the degree of the divisor does not exceed the degree of the dividend

Important Vocabulary

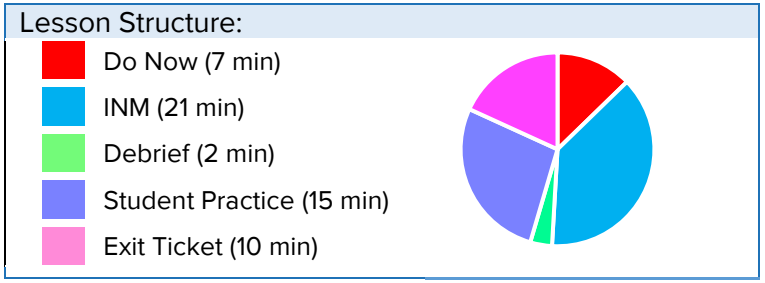
- **"divide to 1"**
- **dividend**
- **divisor**
- factor (noun)
- factor (verb)
- Tabular Method

Notes for Intellectual Preparation & Lesson Planning

Necessary Materials and Pre-Lesson Prep

- Lesson 8.10 Student Workbook pages
- Class set of red pens and colored pencils

Lesson Structure:



Mathematical Goal of this Lesson

By the end of this lesson, students should be able to use factoring to divide polynomials. While there are other ways to divide polynomials, we focus on factoring. Note that dividing polynomials has been assessed ONCE on the STAAR EOC (in 2023), and that this particular TEKS has been deprioritized because of its low frequency.

Opportunities to CFU

✓ INM: 6 ✓ Student Practice: 1, 2

Other Notes to Inform Your Planning

For **Do Now**: This Do Now should not be skipped or replaced, as it reminds students what it means to "divide to 1" with the familiar context of simplifying fractions. Students have used "divide to 1" since 6th grade to explain why, for example, $\frac{24}{30} = \frac{4*6}{5*6} = \frac{4}{5}$.

For **Debrief:** As you circulate while students are engaged in the INM, see if you can find a group of students that use the reverse tabular method to just identify the other factor. If you do, you can show both methods during the Debrief and have students explain their work.

Focus on Disciplinary Literacy

Debrief of #4

Lesson Look Fors

Look for teachers to…

- ❑ connect what students are doing in this lesson to the factoring they have done in the previous three lessons.
- ❑ avoid the language "cancel out," which is vague in mathematics; use the specific phrase "divide to one" to reinforce what is actually happening.

Look for students to…

- ❑ use the factoring strategies they've learned in the previous three lessons to help them divide polynomials.
- ❑ explain why having the same factor in the numerator and denominator means they "disappear" (because they divide to 1, and anything times 1 is itself!)

Student Know/Do Chart

Do: Students can factor a polynomial of the form $ax^2 + bx + c$ when $a > 1$.

Do: Students can identify common factors in the numerator and denominator of an expression and simplify that expression.

Know: When you have the same factor in the numerator and the denominator, that factor divides to 1.

Know: Anything times 1 is itself.

Recommended Success Day Materials and Resources

A.10(E): factor trinomials

- ☐ Imagine Math: Factor Polynomials Completely: SW | TE
- ☐ Imagine Math: Factor Trinomials When $a = 1$: SW | TE
- ☐ Imagine Math: Factor Trinomials When $a > 1$: SW | TE
- ☐ Kuta: Factor Polynomials

A.10(A): add and subtract polynomials

- ☐ Imagine Math: Classify Polynomials: SW | TE
- ☐ Imagine Math: Add and subtract polynomials: SW | TE
- ☐ Kuta: Polynomial Basics
- ☐ Kahoot: Understanding Polynomials
- ☐ Kahoot: Add and Subtract Polynomials

A.10(B): multiply polynomials

- ☐ Imagine Math: Multiply Monomials and Binomials: SW | TE
- ☐ ThatQuiz: Multiply Binomials
- ☐ Kahoot: Multiply Polyomials

A.10(F): difference of squares

- ☐ Imagine Math: Difference of Squares: SW | TE
- ☐ Virtual Nerd video: How do you factor a polynomial using differences of squares?
- ☐ Virtual Nerd video: How do you use a shortcut to factor a perfect square trinomial?

A.10(D): rewrite polynomials...using distributive property

- ☐ Imagine Math: Factoring Polynomials by GCF: SW | TE
- ☐ Khan Academy exercise: Factoring Polynomials by GCF
- ☐ GeoGebra activity: Finding Things in Common

Mixed Polynomial Review

- ☐ General Review packet: pick and choose problems carefully!

Unit 8 Tech Enhanced Question Practice

This problem set gives students opportunities to work with equation editor and drop-down menus on EdCite. It is not mandatory, and it can be retaken as many times as the student wishes to take it. You'll need to click "copy assignment" to be able to assign it to your students.

If student data indicates a pause point is not necessary, you can opt to move forward and reserve a Success Day to use at a later date.

Unit 8 Exam	Date: _____
Standard(s)	Notes for Intellectual Preparation & Lesson Planning
◆ **A.10(E)** factor, if possible, trinomials with real factors in the form $ax^2 + bx + c$, including perfect square trinomials of degree two ◆ **A.10(A)** add and subtract polynomials of degree one and degree two ◆ **A.10(B)** multiply polynomials of degree one and degree two ◆ **A.10(C)** determine the quotient of a polynomial of degree one and polynomial of degree two when divided by a polynomial of degree one and polynomial of degree two when the degree of the divisor does not exceed the degree of the dividend ◆ **A.10(D)** rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property ◆ **A.10(F)** decide if a binomial can be written as the difference of two squares and, if possible, use the structure of a difference of two squares to rewrite the binomial	**Necessary Materials and Pre-Lesson Prep** ▪ Ensure you can access UE8 on EdCite. **Notes to Inform Your Planning** Review the Unit 8 Exam on Curriculum Corner. Internalize and create an exemplar for the assessment prior to teaching the unit as part of unpacking the unit. Use your exemplar to spar with the solutions provided in the Assessment Companion on Curriculum Corner. The scanning deadline for the Unit 8 Exam is February 19th, 2026. For any test items that are not multiple choice, verify that student responses marked incorrect by Edcite truly are incorrect. (Edcite occasionally does not recognize all possible equivalent correct responses.)

UNPACKED STANDARDS

Focus standards for this unit.

Standard Breakdown

Standard	Specificity	STAAR Alignment
A.10E factor, if possible, trinomials with real factors in the form $ax^2 + bx + c$, including perfect square trinomials of degree two	**Concepts** - Trinomials - Real Factors - $ax^2 + bx + c$ - Perfect Square trinomials - Degree Two **Skills** - Factor **Limitations:** • Polynomials are limited to degree one and two (exponents of 1 or 2)	**2025 – Q20** Which expression is a factor of $5x^2 - 30x - 80$? Ⓐ $x + 4$ Ⓑ $x + 8$ Ⓒ $x - 4$ Ⓓ $x - 8$ **2025 – Q44** Which expressions are equivalent to $6x^2 + 3x - 9$? Select **TWO** correct answers. ☐ $-3(2x^2 + x + 3)$ ☐ $3(2x^2 + x - 3)$ ☐ $3(2x - 3)(x + 1)$ ☐ $3(2x + 3)(x - 1)$ ☐ $-3(2x - 3)(x - 1)$ **2024 – Q16** Which function is equivalent to $f(x) = 6x^2 - 23x + 21$? Ⓐ $f(x) = (3x - 7)(2x - 3)$ Ⓑ $f(x) = 3(x - 1)(2x - 7)$ Ⓒ $f(x) = (6x - 7)(x - 3)$ Ⓓ $f(x) = 3(x - 7)(2x - 1)$ **2024 – Q37** Which expression is a factor of $x^2 + 7x - 30$? Ⓐ $x + 15$ Ⓑ $x - 10$ Ⓒ $x + 5$ Ⓓ $x - 3$

A.10A add and subtract polynomials of degree one and degree two

A.10B multiply polynomials of degree one and degree two

Concepts (Know)
- Polynomials of degree one and two

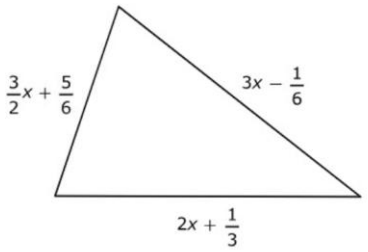
Skills (Do)
- Add
- Subtract
- Multiply

Clarifications Including, but not limited to:
- Terms may include any rational numbers

Limitations:
- Polynomials limited to degree one and two (exponents of 1 or 2)

10(A) 2024 – Q35

A triangle has sides whose lengths in units are represented by polynomials as shown, where x is a positive integer.



Which expression represents the perimeter of the triangle in units?

Ⓐ $\frac{15}{2}x$

Ⓑ $\frac{47}{6}x$

Ⓒ $\frac{13}{2}x + 1$

Ⓓ $\frac{13}{2}x + \frac{4}{3}$

10(B) 2025 – Q23

Which expression is equivalent to $(2k^2 - 3m)(3k - 4)$?

Ⓐ $6k^3 + 12m$

Ⓑ $-2k^3 + 3km$

Ⓒ $6k^3 - 8k^2 - 9km + 12m$

Ⓓ $-2k^2 - 9km - 12m$

A.10D rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property	**Concepts (Know)** - Polynomial Expressions of degree 1 & 2 - Equivalent forms - Distributive Property **Skills (Do)** - Rewrite **Clarifications Including (not limited to):** - Terms may include any rational numbers **Limitations:** - Polynomials limited to degree one and two (exponents of 1 or 2)	**2025 – Q1** Which expression is equivalent to $1.5(4j - 10k) - 2.5(8j + 6k)$? Ⓐ $-12j + 4k$ Ⓑ $-26j$ Ⓒ $-14j - 30k$ Ⓓ $-14j$
A.10F decide if a binomial can be written as the difference of two squares and, if possible, use the structure of a difference of two squares to rewrite the binomial	**Concepts (Know)** - Binomials - Difference of two squares **Skills (Do)** - Decide - Rewrite	**2024 – Q47** Choose two factors to create an expression equivalent to $4x^2 - 81$. Move the correct answer to each box. Each answer may be used more than once. Not all answers will be used. $9x - 2$ $2x - 9$ $4x - 9$ $9x + 2$ $2x + 9$ $4x + 9$ $4x^2 - 81 = (\square)(\square)$

VERTICAL STANDARDS

This section details the **progression** of key student expectations/standards** in the courses **before** and **after** this course. This will help you understand what **prior knowledge skills to build upon** and guide you in knowing what **skills you are preparing your students** for in the subsequent course.

6th / 7th Grade	Algebra I	Algebra II
6.2(E) extend representations for division to include fraction notation such as $\frac{a}{b}$ represents the same number as $a \div b$ where $b \neq 0$ 6.3(A) recognize that dividing by a rational number and multiplying by its reciprocal result in equivalent values 6.3(D) add, subtract, multiply, and divide integers fluently 6.3(E) multiply and divide positive rational numbers fluently 6.7(A) generate equivalent numerical expressions using order of operations, including whole number exponents and prime factorization	A.10(E) Factor, if possible, trinomials with real factors in the form $ax^2 + bx + c$, including perfect square trinomials of degree two. A.10(A) add and subtract polynomials of degree one and degree two A.10(B) multiply polynomials of degree one and degree two A.10(D) rewrite polynomial expressions of degree one and degree two in equivalent forms using the distributive property A.10(C) determine the quotient of a polynomial of degree one and polynomial of degree two when divided by a polynomial of degree one and polynomial of degree two when the degree of the divisor does not exceed the degree of the dividend A.10(F) decide if a binomial can be written as the difference of two squares and, if possible, use the structure of a difference of two squares to rewrite the binomial	A2.7(E) determine linear and quadratic factors of a polynomial expression of degree three and of degree four, including factoring the sum and difference of two cubes and factoring by grouping A2.7(A) add, subtract, and multiply complex numbers A2.7(B) add, subtract, and multiply polynomials A2.7(C) determine the quotient of a polynomial of degree three and of degree four when divided by a polynomial of degree one and of degree two A2.7(D) determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods