Courtney Harriman

Stage 1- Desired Results

Established Goals:

1. Students will demonstrate their understanding of the simplification processes by creating and simplifying algebraic expressions
2. Students will work to improve their skills of working together in cooperative groups
3. Students will apply their knowledge of important terminology to compose and evaluate equations
4. Students will be able to evaluate one-step and multi-step equations and identify the process used to solve them
5. Students will demonstrate their comprehension of linear equations by creating, solving, and graphing them
6. Students will be able to explain how they solved an equation through their work and verbal explanation
7. Students will be able to distinguish the cause and effect relationship between an equation and its graph
8. Students will be able to provide examples that support the relationship between the process of problem solving for equations and for real-world problems

Standards:

1. Create equations that describe numbers or relationships:
    - Create equations in one variable and use them to solve problems
    - Graph equations on coordinates axes with labels and scales
    - Interpret solutions of equations
2. Problem Solving Standard:
    - Build new mathematical knowledge through problem solving
    - Monitor and reflect on the process of mathematical problem solving
3. Reasoning and Proof Standard:
    - Select and use various types of reasoning and methods of proof
4. Communication Standard:
    - Organize and consolidate their mathematical thinking through communication
    - Communicate their mathematical thinking coherently and clearly coherently and clearly to peers, teachers, and others
5. Connections Standard:
    - Recognize and use connections among mathematical ideas
    - Recognize and apply mathematics in contexts outside of mathematics
6. Representation Standard:
    - Create and use representations to organize, record, and communicate mathematical ideas

Big Ideas:

1. Algebraic Expressions
2. Solving Linear Equations
3. Graphing Linear Equations
4. Real-world Problems

Essential Questions:

1. Why is understanding algebraic expressions a critical part of solving equations?
2. How does the type of equation influence what processes must be used to solve that equation?
3. How are equations and graphs related?
4. In what ways can equations be used to solve real-world problems?

Enduring Understanding:

1. Understanding what makes up an algebraic expression is a crucial part of solving equations
2. There are specific processes that must be used to solve one-step and multi-step equations
3. A linear equation can be represented by a line on a graph
4. Understanding how to solve a problem, explaining the process used to solve it, and understanding the purpose for solving it are all important concepts when solving both equations and real-world problems.

Students will know:

- The difference between an algebraic expression and equation
- How to simplify algebraic expressions
- How to solve one-step and multi-step equations
- How to graph linear equations in slope-intercept form
- The relationship between real-world problems and equations

Students will be able to:

- Explain the simplification processes used to simplify algebraic expressions
- Explain how they solved an equation
- Identify the slope and y-intercept of a graph
- Explain the relationship between real-world problems and equations

Stage 2- Assessment Evidence

Performance Task

Goal:

You go to Verizon to purchase a new phone package. A store representative gives you three different package options:

1. Eighty dollars per month with a fifty-dollar startup fee
2. Two hundred and twenty dollars every three months with a fifteen-dollar startup fee
3. Four hundred and fifty dollars every six months with a ten-dollar startup fee

Your task is to determine the most cost-efficient phone package by presenting a poster in which you will create, solve, and graph an equation to represent each package option. **[Goal 7]**

The goal is to determine the most cost-efficient phone package by demonstrating and explaining the processes you used to determine it

The Problem or challenge to convince your parents that you have chosen the cheapest phone package by demonstrating your understanding to them by presenting them your poster.

The Obstacles to overcome are creating equations in slope-intercept form, solving the equations, explaining the processes used to solve them, graphing each equation, and determining a clear answer to which package is the most cost efficient **[Goal 5]**

Role:

You are a customer at Verizon

You have been asked to determine what phone package is the cheapest over a year

Your job is to create a poster that could be presented to your parents to ensure them that you are choosing the cheapest phone package by demonstrating the process you used to determine it.

Audience:

The target audience is your parents

You need to convince your parents that you have correctly determined the cheapest phone package over a year

Situation:

The context you find yourself in is at Verizon with three different phone packages to choose from

The challenge involves dealing with creating equations, solving them, explaining how you solved them, graphing them, interpreting your data, and determining which package is the most cost efficient.

Product, Performance, and Purpose:

You will create three equations in slope-intercept form **in order to** solve them, explain how you solved them, graph each equation, interpret your results, and provide a clear answer to which is package is the cheapest **[Goal 3]**

You need to develop a poster that represents all of this information **so that** your parents would clearly understand how to find the cheapest package

Standards and Criteria for Success:

Your performance needs to demonstrate your ability to create, solve, graph, interpret, and explain how you determined the most cost-efficient plan **[Goal 4,6]**

Your work will be judged by how well your understanding of the task is demonstrated on your poster

Your poster must meet the following standards Three written equations in slope-intercept form to represent the three different phone package options, work demonstrating how you solved each equation, a written explanation about the process/processes used to solve each equation, a graph of each equation on the same coordinate planes, an interpretation of the data, and a clear answer to which package is the most cost efficient.

A successful result will demonstrate a deep understanding of equations and their graphs

Other Evidence:

- **Cooperative Learning**: Students will work in groups of four. Each student will be provided a list containing both algebraic expressions and equations and each student of the group will turn in their work. The groups will be asked to:

1. Identify which problems are algebraic expressions and which are equations [written]
2. Simplify each expression and write down the processes used in each one [Written] **[Goal 1]**
3. Solve each equation and write down the processes used in each one [Written]
4. Discuss each problem with groups members [Observed] **[Goal 2]**
   (At various times throughout the unit)

- **Write a response** to the following question: "What would you say to someone that says problem solving isn't important in everyday life? How could you support your answer/what real life examples could you provide them?" **[Goal 8]**
- **Self-reflect** on the following questions and write down their response: "What are my strengths and weaknesses in solving and graphing equations? What could I do in order to strengthen my weaknesses?"

Stage 3 Overview: Learning Activities

Knowns and Unknowns

Vocabulary Wall

2-minute write

One-word response

Self-Reflection Questions

Hypothesize

RAFT

Think Pair Share

Rule Based Summarization

Cooperative Learning

Worksheets

Structured Notes

Cornell Notes

Outside Reading

Double Entry Journal

Stand-Up Sit-Down

Courtney Harriman

Vocabulary Word Wall

- **These are the words that will be on the board for reference throughout the unit**
- **More words will be added as we go**

Variables

Symbols

Order of Operations

Algebraic expressions

Inverse operations (Addition, subtraction, multiplication, division)

Distributive property

Combine like terms

Linear Equation

Coordinates

X-axis

Y-axis

Rate of change

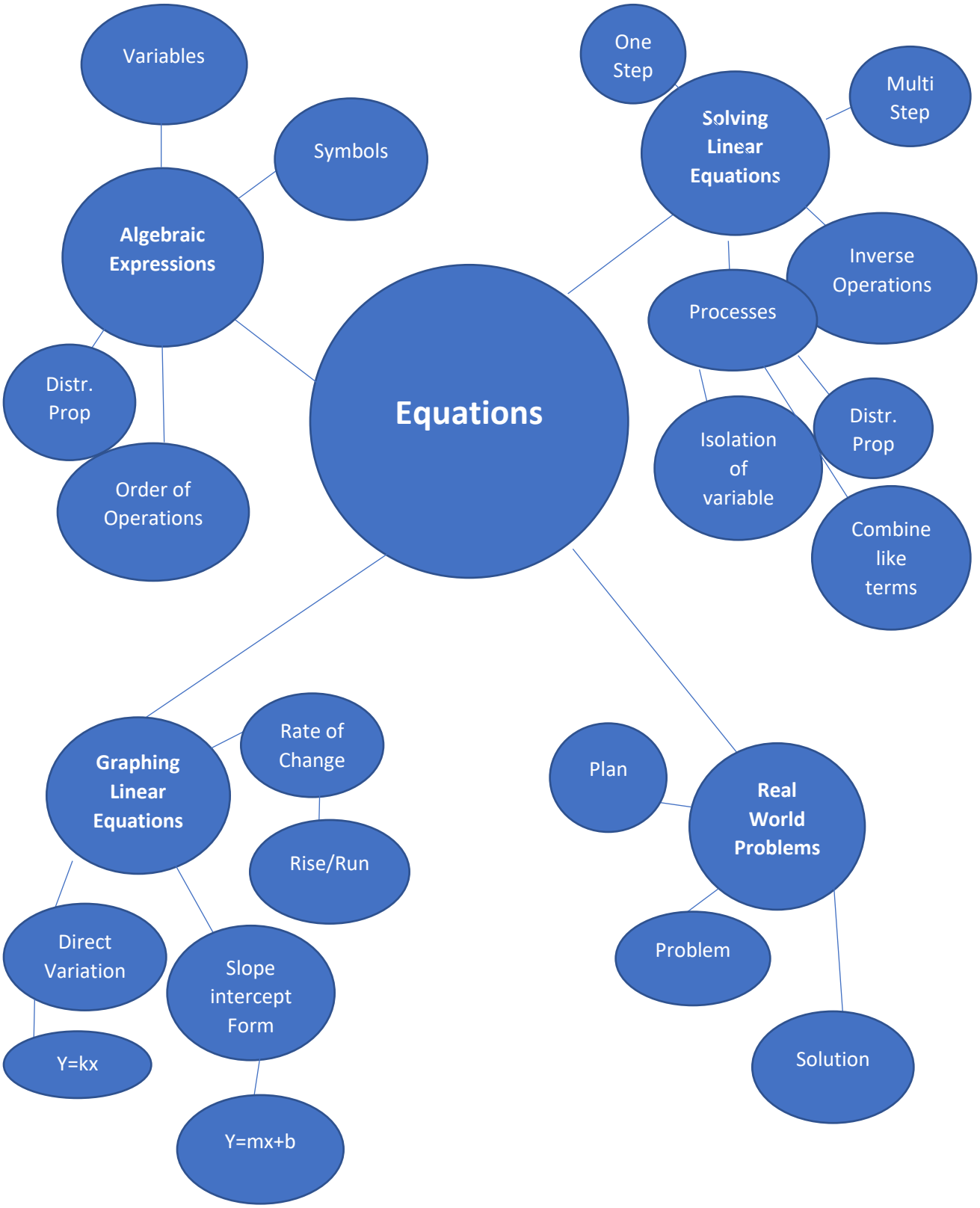
Direct variation

Slope

Slope-intercept form

Y-intercept

Concept Map


Equations
Algebraic Expressions
Variables
Symbols
Distr. Prop
Order of Operations
Solving Linear Equations
One Step
Multi Step
Processes
Inverse Operations
Isolation of variable
Distr. Prop
Combine like terms
Graphing Linear Equations
Rate of Change
Rise/Run
Direct Variation
Y=kx
Slope intercept Form
Y=mx+b
Real World Problems
Plan
Problem
Solution

W-H-E-R-E

Unit Plan: Equations

W

Learning Goals- Students will develop an understanding of vocabulary words through different vocabulary strategies such as "knowns and unknowns" and "read-alouds". Students use these words to to develop an understanding of algebraic expressions, equations, and their graphs.

Expectations- The students will demonstrate their understanding of expressions and equations by creating, simplifying, solving, and explaining the processes used in each step through both verbal and written communication. Students will work in cooperative learning groups, complete guided practice, and practice independently.

Relevance and Value- Solving real-world problems is very similar to solving equations. In both cases, there must be a plan, different steps to take to resolve the problem, and a solution to the problem. Understanding how to solve equations can be very helpful outside of the classroom because they are used often in everyday life. For example, equations can be helpful when calculating grocery expenses, filling up your gas tank, or determining the cost of your monthly phone bill.

Diagnosis- Since vocabulary is such an important part of the unit, it will be important to recognize what words students are already familiar with before beginning a lesson. The students' prior knowledge will be accessed by using "K-W-L's", "Knowns and Unknowns", and "read alouds". Common mistakes will be addressed in each part of the unit and checks for understanding will be made through learning activities, classroom discussions, and homework.

H

Hook- Students will be given a challenge that they will gradually complete throughout the unit. Each student will be given a list of 31 problems. All of the problems will be multiple choice. The answers to each of the 31 problems will correspond to one of the 31 blanks which will eventually spell out the statement "A n E q u a t i o n i s t w o e q u a l e x p r e s s i o n s". For example, the correct answer to number two would be n because the answer to number two will correspond to the second blank.

Example Problem #2: 2x=4

(a) 6

(n) 2

(k) 3

(h) 4

Since n is the correct answer, n would be put in the second blank because it is the second problem.

Hold- The goal of the challenge is to see which student will be able to complete the statement first. However, in order to complete the statement, the students will have to be able to solve each one of the problems on the list. The problems will serve as a check for understanding as we move through the unit and the students work gradually through the list of problems.

E

Experimental and Inductive Learning- Big ideas will be explored through discussion questions, cooperative learning, interactive lectures, vocabulary strategies, summaries, and independent practice. During the performance task and other assessments students will organize, record, and communicate big ideas.

Direct Instruction- To help students organize the material presented to them, they will be given graphic organizers where they can take notes on the perfect model and common mistakes that are often made. Students will have to be able to express their understanding through written and verbal communication. They will work both cooperatively and independently.

Homework and Other Out-of-Class Experiences- Outside of class, students will be expected to work on assigned homework problems for practice and complete a performance task at the end of the unit. Students will have time to reflect on their mistakes and have opportunities to revise their homework assignments.

R

Rethink- Students will rethink big ideas through anticipatory sets and closures where they will work with new information and summarize what they learned. Each big idea will be revisited throughout each lesson.

Revise or Refine- Students will be given opportunities to correct the mistakes made in graded homework. Mistakes and misconceptions will also be corrected during classroom discussions and guided practice. Students will also answer self-reflection questions to reflect on their strengths and weaknesses.

Reflect- Students will reflect on their learning in closures and self-reflection questions. Students will also reflect through their graded homework. Homework logs will be used for students to record any struggles they had while completing the homework.

E

Encouraging Self-Evaluation- Students will evaluate themselves by answering provided questions:

1. What are your strengths and weaknesses in solving equations?
2. How will you improve upon your weaknesses?
3. How difficult was it for you to graph equations? What made it difficult?
4. How does what you learned relate to the present and the future?

Calendar

Day 1

Algebraic Expressions

Procedural Lesson

Acquire New Knowledge: Students will complete a **knowns/unknown's chart** of vocabulary words as an anticipatory set. They will have the chance to revise their charts so that have a good definition/understanding of all words. These words will be used as the start of the **vocabulary wall**. Students will complete a graphic organizer of four different algebraic expressions that will be modeled on the board and common mistakes taught through shaping.

Apply/Deepen: Students will be put into groups of four where they will simplify expressions and explain the processes they used. Each student will complete their work on a separate sheet of paper and I will observe group work and clear up any misconceptions/misunderstandings.

Group Reflection Questions:

1. What did you find difficult when simplifying expressions?
2. Why was understanding the processes so important?

Hypothesize: Students will complete a **2 minute** in preparation for the next lesson: "Why do you think it is so important to understand algebraic expressions before understanding equations?".

Homework: Students will be given homework problems to work on where they will continue to state the processes they used to complete each problem.

Day 2

Algebraic expressions review

Procedural Lesson on Note-Taking

Review: Collect and go over any questions from the homework that was assigned the night before

Acquire New Knowledge: Students will complete a summary on page 71 to the best of their ability as an anticipatory set. Students will complete **structured notes** during modeling and shaping of the rule-based summarization process.

Apply/Deepen: Students will use what they learned to revise their summary from page 71.

Closure: Students will write a **one-word response** to the lesson

Homework: Students will use the rule-based summarization process to take notes on pages 78 and 79 in preparation for the next lesson on equations.

Day 3

Procedural Lesson- Solving Equations

Review: In pairs, students will discuss their summaries of the notes they completed for homework on equations and make any necessary revisions. Each pair will share their summary.

Acquire New Knowledge: More words will have been added to the **vocabulary wall**: Equation, inverse operations, one-step equations, two-step equations. Students will complete a graphic organizer of the equations that are modeled where they will include the equation, the inverse property/properties used to solve it, and the solution.

Shaping: Students will be given a list of 5 equations that are solved incorrectly where they will have to explain **[Aspects of the Topic]** why they are wrong/which processes were misused.

Reflection Questions:

1. Why is it so important to know the difference between each inverse operation?
2. How can misusing an operation affect the solution to your equation?

Day 4

Procedural Lesson on Equations- Continued

Apply/Deepen: Students will work individually on a worksheet where they will have to solve equations similar to the ones that were modeled. Along with the solution, students will have to explain the process/processes that were used in each one [Guided Practice]. Students will circle any problems that they struggled with and put check marks by the ones that they have a good understanding of.

Closure: Students will answer and turn in their answers to following **reflection questions**:

1. What did you find the most difficult when solving equations?
2. Is there anything that is still unclear to you or that you feel could be explained better?

Homework (Independent Practice): Students will work on solving equations similar to the ones that they circled during guided practice. They will not have to repeat any problems that they put check marks next to and demonstrated a good understanding of.

Day 5

Similarities and Differences

Apply/Deepen: Students will classify words under 2 categories: algebraic expressions and equations when given the following vocabulary words: unknown variable, symbols, simplify, order of operations, distributive property, combine like terms, isolation of variable, and inverse operations.

Follow-up Question: What can you conclude about the relationship between algebraic expressions and equations by using the lists you created?

Metaphor: Students will write an explanation about how solving equations is like a puzzle. Selected students will share their answers with the class.

Day 6

Graphing Equations

Acquire New Knowledge: New words will be added to the **vocabulary wall**: Rate of change, Direct Variation, Slope-intercept form, coordinate plane, x and y axis. Students will complete a vocabulary strategy to make meaning out of the vocabulary words.

Day 7

Graphing Equations- Continued

Apply/Deepen: Students will be given a set of equations that they will have to graph. They will also be given a set of graphs in which they will have to interpret the graphs to determine the equation that corresponds with it.

Reflection:

1. How can graphing an equation help you better understand the equation?
2. How does the slope of an equation influence its line on a graph?

Closure: Students will complete a 2 minute write

Day 8

Interactive Lecture on Real-World Problems

Inquire New Knowledge: Students will hypothesize by creating a list of scenarios in which equations could be used to solve a real-world problem as an anticipatory set. The power point will be presented as students take Cornell notes on the lecture (2 chunks). Students will compare their notes and summaries with a partner.

Check for Understanding: Students will solve equations that involve real-world scenarios and then correct answers and common mistakes will be discussed.

Day 9

Interactive Lecture on Real-World Problems-Continued

- **Apply/Deepen:** In groups of 4- students will: Create an equation that could be used to solve a real-world problem that includes
    1. The real-world problem
    2. The equation used to solve it
    3. Solution
    4. Process/process used to solve

Each group will present their work to the rest of the class through explanation and written work.

Students will complete a **3-2-1** where they will list:

-**3 reasons** that they believe what they learned is important to them

- **2 real-world scenarios** in which they believe equations will be the most useful to them

- **1-word response** about how they feel about the lesson

Day 10

Performance Task

Apply/Deepen: Students will be given a performance test where they will demonstrate their understanding of all four big ideas: algebraic expressions, solving equations, graphing equations, and real-world problems.

Goal:

You go to Verizon to purchase a new phone package. A store representative gives you three different package options:

4. Eighty dollars per month with a fifty-dollar startup fee
5. Two hundred and twenty dollars every three months with a fifteen-dollar startup fee
6. Four hundred and fifty dollars every six months with a ten-dollar startup fee

Your task is to determine the most cost-efficient phone package by presenting a poster in which you will create, solve, and graph an equation to represent each package option. **[Goal 7]**

The goal is to determine the most cost-efficient phone package by demonstrating and explaining the processes you used to determine it

The Problem or challenge to convince your parents that you have chosen the cheapest phone package by demonstrating your understanding to them by presenting them your poster.

Role:

You are a customer at Verizon

You have been asked to determine what phone package is the cheapest over a year

Your job is to create a poster that could be presented to your parents to ensure them that you are choosing the cheapest phone package by demonstrating the process you used to determine it.

Audience:

The target audience is your parents

You need to convince your parents that you have correctly determined the cheapest phone package over a year

Situation:

The context you find yourself in is at Verizon with three different phone packages to choose from

The challenge involves dealing with creating equations, solving them, explaining how you solved them, graphing them, interpreting your data, and determining which package is the most cost efficient.

Product, Performance, and Purpose:

You will create three equations in slope-intercept form **in order to** solve them, explain how you solved them, graph each equation, interpret your results, and provide a clear answer to which is package is the cheapest **[Goal 3]**

You need to develop a poster that represents all of this information **so that** your parents would clearly understand how to find the cheapest package

Your poster must meet the following standards Three written equations in slope-intercept form to represent the three different phone package options, work demonstrating how you solved each equation, a written explanation about the process/processes used to solve each equation, a graph of each equation on the same coordinate planes, an interpretation of the data, and a clear answer to which package is the most cost efficient.

A successful result will demonstrate a deep understanding of equations and their graphs.

- The expectations for the performance task will be explained and students will begin to work on assignment
- Each student will be given a grading rubric so they know what their final product must include

Day 11

Performance Task- Continued

- Students will work on their performance tasks in class. I will be there to observe and answer any questions that students may have. Anything that students do no finish in class they will have to finish for homework and be ready to turn in their assignment the following day. Their grade on the performance assessment will reflect their understanding of the unit as a whole.

Courtney Harriman

Knowns and Unknowns

Facets of Understanding (Interpretation, Explanation, and Self-Knowledge)

Think-Pair-Share

2-minute write

Bloom's (Analysis)

Lesson Plan: Procedural Lesson on Algebraic Expressions

1. Refer to concept map for chunks [Algebraic Expressions]
   Chunk 1- Four different algebraic expressions are modeled on the board
   Chunk 2- Shaping by using PEMDAS and going over common mistakes

Purpose: We need to understand what makes up an algebraic expression and what processes we can use to simplify them. Our job is to look at algebraic expressions and determine if they are already simplified or not. We will use specific processes to simplify the expressions and explain each one to demonstrate our understanding of algebraic expressions **[B.I.]** Our understanding of algebraic expressions will help us solve equations **[E.U.]**

Essential Question: Why is understanding algebraic expressions a critical part of solving equations?

Subsidiary Questions:

- What makes up an algebraic expression?
- What types of symbols can be used in algebraic expressions?
- What does a variable represent?
- What are the order of operations and what are they used for?

Enduring Understanding: Understanding what makes up an algebraic expression is a crucial part of solving equations.

Anticipatory Set: Students will complete a **known/unknowns chart** of vocabulary words: variable, coefficient, constant, order of operations, sum, difference, product, quotient, absolute value, solve, distribute, and combine like terms.

Facilitate:

- Discuss words as a class
- Students will revise their charts so that they have a good definition and understanding of all of the words

Objectives

1.Students will explain all of the processes used to simplify expressions [after observing four different models].

2. [After shaping], students will be able to list and explain common mistakes made while simplifying algebraic expressions.

3.[When put in groups of four,] each student will be able to simplify expressions and explain the processes used in each one.

Input [Acquire New Knowledge]

Chunk 1- Modeling

Four different models will be demonstrated on the board:

1. An expression that is already simplified: 5x+7
2. An expression that will be simplified by combining like terms: 5x+5x+10
3. An expression that will be simplified by using the distributive property: 5(x+10) +7
4. An expression that will be simplified by using the order of operations: 15÷ 3 x 6 – 4^2

Facilitate with the group:

- Elaborate on each expression modeled
- Students will complete a graphic organizer of the expressions modeled on the board(attached)

Chunk 2- Shaping

1. Discuss how PEMDAS can be used to remember how to use the order of operations **[Facets of Understanding]**

2. Common mistakes will be modeled (Using each of the processes wrong)

- Trying to simplify an expression that is already simplified. Example: 5x+6= 11x
- Combining terms that aren't the same. Example: 5x +6y= 11xy
- Not distributing to both terms. Example: 5(5x+7) = 25x+7
- Using the order of operations in the wrong order. Example: Dividing before solving inside of parentheses

Facilitate with the group

- Students will add to their common mistakes section of the graphic organizer used in modeling

- **Think-pair-share**: Think about **Prompt:** "Why is it so important to use PEMDAS in its exact order?"

Input [Apply/Deepen Knew Knowledge]

1. Students will work in **cooperative learning groups** of four [Guided Practice]
2. Students are given a list of algebraic expressions similar to the ones in the model where they are asked to:
    - State whether or not the expression can be simplified any further. If it can be simplified, explain **[Facets of Understanding]** the processes they used to simplify it
    - All students will do the assignment on their own piece of paper
    - Group members will discuss their answers

Facilitate: Observe work and discussions going on in the classroom and clear up any misconceptions or questions

Reflection Questions for each group[Self-Knowledge]:

1. What did you find difficult when simplifying expressions?
2. Why was understanding the processes so important?

Facilitate: Call on one member from each group to discuss how each group answered the reflection questions.

Closure:

- Students will complete a **2 minute write** that will summarize what they learned and hypothesize [Bloom's-Analysis] about the next lesson regarding equations: **Prompt:** "Why do you think it is so important to understand algebraic expressions before understanding how to solve equations?"

Facilitate- Have selected students read their answers to the class

Homework [Independent Practice]: Students will be given homework problems to work on independently where they will continue to state the processes used to simplify each expression. Students will write down any questions or struggles they may have had while completing the assignment on a separate sheet of paper.

Graphic Organizers used in Lesson Plan for Algebraic Expressions

Anticipatory Set: Knowns and Unknowns

Words	Knowns	Familiar	Unknowns
1. Symbols 2. Variable 3. Combine like terms 4. Order of operations 5. Distributive property 6. Exponents			

Model/Shaping:

Expression	**Simplified**	**Processes used**	**Common Mistakes**
5x+7			
5x+5x+10			
5(x+10) +7			
15÷ 3 x 6 – 4^2			

Pair and Share

Rule Based Summarization

Graphic Organizer

Facets (Explanation, Self-Knowledge)

Lesson Plan- Solving Linear Equations

1. Refer to concept map for chunks [Solving Equations]
   Chunk 1- One-step and Multi-Step equations are modeled on the board [Modeling]
   Chunk 2- Correcting equations that are solved incorrectly [Shaping]

Purpose: We will use our understanding of algebraic expressions to develop an understanding of linear equations **[E.U.].** Our job is to create and solve one-step and multi-step equations. We will use processes used previously as well as additional processes to solve and explain each one to demonstrate our understanding of equations **[B.I.]**.

Essential Question: How does the type of equation influence what processes must be used to solve that equation?

- What is the goal of solving an equation?
- When should the distributive property be used?
- What are inverse operations?
- When do you combine like terms?

Objectives:

1.[After Modeling], students will be able to solve and explain the process/processes used to solve an equation.

2. [When given a list of equations that are solved incorrectly], students will be able to explain the mistake made when solving the equation.

3. [At the end of the lesson], students will be able to identify and explain which parts of the equation they struggle with/need extra practice with.

Anticipatory Set- Pair and Share: Students will discuss the summaries they had for homework based off the rule-based summarization process

Facilitate- Each pair will share their summary with the class

Input [Acquire new knowledge]

Chunk 1- Modeling

Different equations will be modeled on the board using one-step inverse operations:

1. Inverse Property of Addition: X+7=14
2. Inverse Property of Subtraction: X-20=50
3. Inverse Property of Multiplication: 20X=100
4. Inverse Property of Division: X/20=80

Multiple step equations will be modeled on the board:

1. 5x+7=35
2. 3(x+10) -7= 50
3. x/4 – 10=60

Facilitate: Each expression will be elaborated on while students complete a graphic organizer where they will include the equation, the inverse property/properties used to solve it, and the solution (attached)

Chunk 2- Shaping

Students will be given a list of 4 equations that are solved incorrectly where they will have to explain why they are wrong/which processes were misused when solving the equations.

Facilitate: Students will answer the following reflection questions after shaping:

1. Why is it important to know the difference between each inverse operation?
2. How can misusing an operation affect the solution to an equation?
   -Selected Students will share their answers with the class **[Check for Understanding]**

Apply/Deepen:

Students will work individually on a worksheet where they will have to solve equations similar to the ones that were modeled on the board. Along with the solution, students will have to explain **[Facets-explanation]** the process/processes they used to solve each one **[Guided Practice].** Students will circle any problems they struggled with and put check marks next to the ones they have a good understanding of. This will be used at the end of the lesson to determine what problems each student will complete for homework.

Facilitate:

- Observe while students work
- Answer any questions/clear up any misconceptions

Closure: Students will answer and turn in their answers to the following **self-reflection** questions as they leave the class:

1. What did you find the most difficult when solving equations?
2. Is there anything that is still unclear to you or that you feel could be explained better?

Homework [Independent Practice]: Students will work on solving equations similar to the ones that they circled during guided practice, this way they can have extra practice on the problems that they struggled with. They will not have to repeat any of the problems that they put check marks next to and demonstrated a good understanding of.

Summarization

Facets (Explanation)

One-word Response

Structured Notes

Procedural Lesson- Rule Based Summarization Process

Purpose: We will be working with the three-step rule based summarization process. We will be able to look at material out of the book and delete unimportant information, categorize things together, and form a topic sentence. We will use this process to help prepare us for the next lesson on equations.

Objectives:

1. [After modeling], students will revise and improve their summaries of the four-step problem solving plan.
2. [During the lesson], students will complete structured notes on the rule-based summarization process.
3. [After the lesson], students will be able to use what they learned to complete homework that will prepare them for the net day.

Anticipatory Set: Students will be asked to read the four-step problem solving plan on page 71 in their textbook. They will be asked to read the paragraphs and write a summary to the best of their ability.

- Following the summary they will answer the following questions:
  1. What do you find difficult about summarizing material from the book?
  2. Are there any strategies you use to help make summarizing easier?
- After modeling, students will have the opportunity to return back to page 71 to revise their summaries using what they have learned

Input [Acquire new Knowledge]

Chunk 1-Modeling

- Students will complete **structured notes** while the rule-based summarization process is modeled on the board and explained:
  1. Delete (Unimportant-redundant)
  2. Categorize (List of things)
  3. Topic Sentence (Generalizes all of the info)
- Students will be given time to complete the question section in their structured notes

Facilitate with the group:

- Students will compare/revise their notes with a partner

Chunk 2- Shaping

- All students will share at least one question they had listed under the questions part of their structured notes
- Class will discuss answers to each question and any misconceptions/misunderstandings will be cleared up
- Students will draw their **graphic representation** that they will use as a helpful way to understand the summarization process

Facilitate: Selected students will share their graphic representation with the class and explain why they chose it

Apply/Deepen

- Students will now return back to page 71 in their books and have a chance to revise their summaries that they wrote in the anticipatory set by using the rule-based summarization process [guided practice]

Facilitate: Selected students will be asked to share their summaries with the class

All students will answer the following **reflection questions:**

1. Explain how what you learned helped you develop a better summary now than the one that you wrote in the beginning of class.
2. How will this be useful to you in the future?

Closure: Students will write down a **one-word response** to how they feel about the lesson. (Was it helpful, confusing, etc.)

Facilitate: Students will hand me their response as they leave the class. I will use it to judge where the students are at.

Homework [Independent Practice]: Students will read pages 78 and 79 and use what they learned to develop a good summary of the information. Their summaries will prepare them for their next class where they will begin to work with equations.

Stand-up Sit-down

Cornell Notes

Bloom's (Application, Synthesis)

Generating and Testing Hypotheses

Facets (Explanation)

Rule-Based Summarization

RAFT

Interactive Lecture: Equations and Real-world Problems

Big idea: Real-world Problems

Purpose: This lesson will be used to determine the relationship between solving equations and solving real-world problems. Equations are used in every-day scenarios. Understanding how to create and solve equations in which can be used to solve real-world problems will help us understand the connection between them.

Objectives:

1.[After first part of lecture] students will hypothesize about the ways in which equations can be used outside of the classroom.

2. [After the second chunk of lecture] students will create and solve equations used to solve real-world problems.

3. [After working in groups] students will discuss the equations, processes, and answers their groups used.

4. [After lecture] students will be able to explain the relationship between equations and real-world problems.

Anticipatory Set: Students will **hypothesize** a list of possible real-world scenarios in which equations could be used**.**

Facilitate: Students will participate in a **stand-up sit-down** activity of the scenarios they came up with. Possibilities will be listed on the board.

Acquire new knowledge:

- Power point presented (Chunk 1)- 3 step process used to solve both equations and real-world problems [Slide 4]
  -Students will take **Cornell notes** on each step of the process (Attached)

Facilitate: Students will compare their notes with a partner

- Power point presented (Chunk 2)- Examples of the use of the equations in the real-world **[Blooms-Application]**
  -Students will add to their Cornell notes and complete the summary section [Slide 4]

Facilitate: Students will compare their notes and summaries with a partner

- **Check for Understanding**- students will solve equations that involve real-world scenarios [slide 8]

Facilitate: Discuss correct answers as a class [on board]. Questions or misunderstandings will be cleared up.

Apply/Deepen:

- In groups of 4- students will create an equation that could be used to solve a real-world problem that includes:
  5. The real-world problem
  6. The equation used to solve it
  7. Solution
  8. Process/process used to solve
     [Bloom's Synthesis]

  Facilitate: Each group will present their work to the rest of the class through explanation and work shown **[Facets-Explanation]**

Closure: Outside Reading

- Students will be given a brief article to read about how equations are used in everyday life and why learning about equations is relevant
- Using the **Rule-Based Summarization process** learned in lesson 2, students will develop a summary of the article

Facilitate: Students will turn in their summaries as they leave

Homework: Students will write a **RAFT** in the form of a letter to a classmate that says the following: **Prompt:** "Problem Solving isn't important in everyday life". Within their letter, students will have to provide evidence and examples that support their response. Their letters should be no longer than 1 page.

Cornell Notes for Interactive Lecture

Key Words	Notes
Plan	
Process	
Solution	
Relevancy	
Summary-	

Linear Equations: Applications

August 10, 2016

The knowledge of mathematics is frequently applied through word problems and the applications of linear equations are observed on a wide scale to solve such word problems. In real life, the applications of **linear equations** are vast. To tackle real life problems using algebra we convert the given situation into mathematical statements in such a way that it clearly illustrates the relationship between the unknowns (variables) and the information provided. The following steps are involved while restating a situation into a mathematical statement:

Translate the problem statement into a mathematical statement and set it up in the form of algebraic expression in a manner it illustrates the problem aptly.

Identify the unknowns in the problem and assign variables (*quantity whose value can change depending upon the mathematical context*) to these unknown quantities.

Read the problem thoroughly multiple times and cite the data, phrases and the keywords. Organize the information obtained sequentially.

Frame an equation with help of the algebraic expression and the data provided in the problem statement and solve it using systematic techniques of equation solving.

Retrace your solution to the problem statement and analyze if it suits the criterion of the problem.

There you go!! Using these steps and applications of linear equations word problems can be solved easily. Let us look into an example to analyze the applications of linear equations in depth.

Example: Rishi is twice as old as Vani. 10 years ago his age was thrice of Vani. Find their present ages.

Solution: In this word problem, the ages of Rishi and Vani are unknown quantities. Therefore, as discussed above, let us first choose variables for the unknowns.

Let us assume that Vani's present age is 'x' years. Since Rishi's present age is 2 times that of Vani, therefore his present age can be assumed to be '2x'.

10 years ago Vani's age would have been 'x – 10' and Rishi's age would have been '2x – 10'. According to the problem statement, 10 years ago Rishi's age was thrice of Vani i.e. 2x – 10 = 3(x – 10).

We have our linear equation in the variable 'x' which clearly defines the problem statement. Now we can solve this linear equation easily and get the result.

$$2x - 10 = 3(x - 10)$$
$$\Rightarrow 2x - 10 = 3x - 30$$
$$\Rightarrow x = 20$$

This implies that the current age of Vani is 20 years and Rishi's age is '2x' i.e. 40 years. Let us retrace our solution. If present age of Vani is 20 years, then 10 years ago her age would have been 10 years and Rishi's age would have been 30 years which satisfies our problem statement. Thus, **applications of linear equations** enable us to tackle such real-world problems.