**Grade Level: \_9\_\_ Subject: Algebra I\_**

**Unit Number and Title:** Unit 01: Linear Expressions, Equations, and Inequalities (one variable)

**#Days 15 #SEs 6 #PAs 3**

**\_\_IFD Planning Guide**

(Math, Science, and Social Studies)

*Stage* 1: Identifying desired results; What should the students know and be able to do after this unit?

This unit bundles student expectations that address polynomial expressions of degree one, operations with polynomial expressions of degree one, and solving linear equations and inequalities in one variable. Solving formulas and literal equations for a specified variable are also addressed. Concepts are incorporated into both mathematical and real-world problem situations.

* define polynomial expressions and perform operations (addition, subtraction, scalar multiplication) with polynomials of degree one, including
* rewriting a polynomial to an equivalent form when distributing by a rational scale factor
* determine the quotient of a polynomial of degree one divided by a polynomial of degree one
* make connections between expressions and equations, and solve linear equations in one variable, including variables on both sides and the application of the distributive property
* model both mathematical and real-world problem situations using equations
* solve linear inequalities in one variable, including variables on both sides and the application of the distributive property
* model both mathematical and real-world problem situations using inequalities
* solve mathematic formulas (including solving for y), scientific formulas, and other literal equations for a specified variable.

Additional Notes on sections of the IFD:

2 major understandings

* Algebraic expressions (numbers, variables, and operational symbols) are the basic tools of algebra.
* Equations and inequalities can model problem situations and be solved using various methods

*Stage* 2: Determine Acceptable Evidence of Learning; How will students demonstrate what they know and can do?

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PA # \_1:**  **Description of PA:** | | **Unit Understandings** | | **Standard Specificity** | | **Assessment Alignment:** | | **Instructional Ideas** | |
| Echo Engineering builds rectangular settling tanks that include covered tops. Rubber stripping must be placed around the edge of the rectangular settling tank to seal the top covering. Seymour Industries contracted a project with Echo Engineering to construct two settling tanks, including the rubber stripping. Since Tank A is to be larger than Tank B, Tank A will require more rubber stripping than Tank B.   1. Tank A will have a length in feet represented by 25*x* + 12 and a width in feet represented by 7*x* + 18. Write and simplify an expression that could be used to determine the amount of rubber stripping, in feet, needed to place around the top edge of this rectangular settling tank. 2. For Tank B, Seymour Industries wants the width of the tank to be 8*x* + 11 feet. If the area covered by the top can be represented in square feet by 360*x* + 495, write and simplify an expression that can be used to represent the length of the tank. Write and simplify an expression that could be used to determine the amount of rubber stripping, in feet, needed to place around the top edge of this rectangular settling tank. 3. Write and simplify an expression that could be used to determine the total amount of rubber stripping, in feet, needed for both rectangular settling tanks. 4. Write and simplify an expression that could be used to determine how much more rubber stripping is needed for Tank A than Tank B. | | Algebraic expressions represent quantities whose values are unknown and defined by generalizations or patterns using variables, numbers, and operators.  Equivalence between two algebraic expressions is indicated by an equal sign creating a generalized equation.  Algebraic expressions can be simplified or transformed to equivalent expressions. | | [A.10A](http://www.teksresourcesystem.net/module/standards/0/182953/standard.ashx) Supporting  Add, Subtract    POLYNOMIALS OF DEGREE ONE | | **None tested**  **Only degree two** | | **Use algebra tiles and sketches**  **Perimeter** | |
| [A.10C](http://www.teksresourcesystem.net/module/standards/0/182961/standard.ashx) Supporting  Determine    THE QUOTIENT OF A POLYNOMIAL OF DEGREE ONE WHEN DIVIDED BY A POLYNOMIAL OF DEGREE ONE | | **None tested**  **Only degree two** | | **Long division of degree 1 polynomials**  **Perimeter/Area** | |
| [A.10D](http://www.teksresourcesystem.net/module/standards/0/182965/standard.ashx) Supporting  Rewrite    POLYNOMIAL EXPRESSIONS OF DEGREE ONE IN EQUIVALENT FORMS USING THE DISTRIBUTIVE PROPERTY | | **None tested**  **Only degree two** | | **Matching cards for equivalent expression**  **Write round robin**  **Checking strategies** | |
| **PA # \_2\_:**  **Description of PA:** | | **Unit Understandings** | | **Standard Specificity** | | **Assessment Alignment:** | | **Instructional Ideas** | |
| Two companies, Chocolate Bliss and Expressions in Sweets, sell a special heart shaped box of chocolate candy for Valentine’s Day containing the same number of candies.  Create a graphic organizer to represent the analysis of the problem situation. For each problem situation:  -Formulate representative equations or inequalities  -Demonstrate two different solution methods  -Explain the mathematical relationship between the two solution methods  -Interpret the reasonableness of the solution in terms of the problem situation   1. Chocolate Bliss sells their box of chocolate candy for $2.00 per candy plus a $12 packaging fee. Expressions in Sweets sell their box of chocolate candy for $3.00 per candy plus a $10 packaging fee. If five boxes of Chocolate Bliss chocolate candy cost the same as four boxes of Expressions in Sweets chocolate candy, how many candies are in each box? 2. Chocolate Bliss and Expressions in Sweets also sell chocolate candy from the counter display that they put in white boxes. Chocolate Bliss charges $3.00 per candy plus $4.00 for the box. Expression in Sweets charges $3.50 per candy and does not charge for the box. When is it less expensive to purchase chocolate candy from the counter display at Chocolate Bliss compared to Expressions in Sweets?   In writing,   1. Discuss other factors that may influence the decision whether to purchase from Chocolate Bliss or Expressions in Sweets | | Equations include an equal sign which result in a distinct solution, whereas inequalities include a comparison symbol which result in a range of solutions.  Equations and inequalities can be solved using graphs, tables, and algebraic operations.  Real-world problem situations, when analyzed, can be represented by equations or inequalities that can be solved. | | [A.5A](http://www.teksresourcesystem.net/module/standards/0/182881/standard.ashx) Readiness  Solve  LINEAR EQUATIONS IN ONE VARIABLE, INCLUDING THOSE FOR WHICH THE APPLICATION OF THE DISTRIBUTIVE PROPERTY IS NECESSARY AND FOR WHICH VARIABLES ARE INCLUDED ON BOTH SIDES | |  | | **Use algebra tiles**  **Sketches**  **Graphing calculators**  **Verbal descriptions**  **Thinking maps** | |
| [A.5B](http://www.teksresourcesystem.net/module/standards/0/182885/standard.ashx) Supporting  Solve  LINEAR INEQUALITIES IN ONE VARIABLE, INCLUDING THOSE FOR WHICH THE APPLICATION OF THE DISTRIBUTIVE PROPERTY IS NECESSARY AND FOR WHICH VARIABLES ARE INCLUDED ON BOTH SIDES | |  | | **Verbal language for inequalities**  **Graphing calculator**  **Thinking Maps**  **Algebra tiles**  **#line solutions** | |
| **PA # \_3\_:**  **Description of PA:** | **Unit Understandings** | | **Standard Specificity** | | **Assessment Alignment:** | | **Instructional Ideas** | |
| Julie is writing a research paper comparing the relationships between acceleration, velocity, and time. During her research, Julie found the following formula, where *a* is acceleration, *vf* is the final velocity, *vi* is the initial velocity, *t2* is the ending time, and *t1* is the beginning time:  http://files5.teksresourcesystem.net/174138183112002141004021132245099123159144025141/Download.ashx?hash=2.2  Using a formula for final velocity she must load into a computer program, Julie must determine the final velocity from collected data on acceleration, initial velocity, initial time, and final time.   1. Determine a formula for final velocity that Julie can enter into the computer program. 2. Write a summary using precise mathematical language that includes why the original formula must be solved for final velocity and describe and justify the procedures used to solve for final velocity. | | Formulas can be rewritten by solving for a specified variable. | | A.12E Supporting  Solve  MATHEMATIC AND SCIENTIFIC FORMULAS, AND OTHER LITERAL EQUATIONS, FOR A SPECIFIED VARIABLE | |  | | **Distance formula**  **Area**  **Circumference**  **Science formulas** | |

*Stage 3*-Plan Learning Experiences; What learning experiences are needed to equip students with the knowledge and skills?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Day 1-2**  **Simplify polynomials**   * **Algebra tiles** * **Thinking maps** * **Foldables** * **How-to journals** | | | **Day 3-4**  **Add/subtract polynomials**   * **Perimeter** * **Algebra tiles** * **Matching cards** * **Correction problems journals** | | **Day 5-6**  **Divide polynomials**   * **Long division process** * **Area/perimeter problems**   **(PA #1)** |
|  | **Day 7-9**  **Equations**   * **Concrete/pictorial/abstract** * **#line sol’n** * **R-W application** * **Calculator applications** | | | | **Day 10-11**  **Inequalities**   * **Concrete/pictorial/abstract** * **#line sol’n** * **R-W application** * **Calculator applications** |
|  | **Day 12**  **(PA #2)** | **Day 13-15**  **Solving literal equations**   * **Geometry/Science formulas** * **2 variables/both sides/degree 1**   **(PA #3)** | | | |
| **Day 16 Unit 1 Exam**  **5a-4**  **5b-1**  **10a-1**  **10c-1**  **10d-1**  **12e-2** | **Day 17** | | **Day 18** | **Day 19** | **Day 20** |