

Super SHARING STRATEGIES

INCORPORATING CRISS WITH ALGEBRA —A CRISS STRATEGIC LEARNING PLAN

[NOTE: For the items in green, you will find examples at the end of this article.]

In developing a lesson plan for any chapter in a mathematics text, I know it is vital that I create or view the assessments prior to my developing any activities. And, if my students are to be successful with their learning, it is just as important for *them* to know and to understand the desired outcomes as it is for *me*. I find exposing students to performance tasks or pre-tests prior to the beginning of a chapter sets the purpose for students' learning.

"Tools of Algebra" is the first and essential chapter for the success of my pre-algebra students. At the beginning of this chapter, I have the students complete an order of operations **Pattern Puzzle**. The Pattern Puzzle allows the students to review the correct process (order) in which a problem should be solved. There is little opportunity to make a mistake, because I include only the correct steps. Misconceptions disappear when students realize the operation they thought was next is not included in the strips.

I use a **Semantic Feature Analysis** chart to help students learn the **vocabulary** from a chapter or section. For the "Tools of Algebra" chapter, I ask students to think of all of the words they associate with the four basic operations (addition, subtraction, multiplication, division). We write these words down the left-hand column of the Semantic Feature Analysis chart; across the top, we record the basic operations. Many words have duplicate meanings, so it is possible for a word to fit into more than one category. Students continue to add words throughout the year as they work through the text.

We use a variety of Foldables® <<http://www.dinah.com/>> to organize the properties used in Algebra. The Foldables are a valuable resource for the students throughout the year as the properties are imbedded into the entire curriculum. Many students use additional strategies to learn and remember the Foldables' information. Any time students can transform information in several ways, the results are successful.

I use **algebraic phrases** and their verbal translations to reinforce vocabulary. For example, students have a difficult time understanding the difference between an algebraic *equation* (e.g., $2X+3=9$) and an algebraic *expression* (e.g., $2X+3$). The Venn Diagram works beautifully to help them see the difference.

To get kids writing about mathematics, I conclude this chapter with a **RAFT** that involves each student (R) writing a letter (F) to an elementary student (A) convincing him or her that the use of order of operations is important (T with strong verb).

During the course of the chapter, I help my students with metacognition by continually sharing what I am thinking (Think-Alouds) as I solve problems. In addition, I try to offer as many strategies as possible when solving a problem, and I have the students share their problem solving strategies with each other, as well. Distributive practice is essential for student success in mathematics; students must continually practice concepts and make connections to other concepts for the learning to become their own. Mathematics and CRISS are an exciting combination. CRISS allows mathematics teachers to empower their students with the skills they need to become lifelong learners.

The following CSLP is similar to the format shared in Chapter 12 of the CRISS manual (pp. 258-272). It combines a lot of the ideas from Understanding by Design <<http://www.grantwiggins.org/ubd.html>> by Jay McTighe and Grant Wiggins.

This lesson plan template was designed for Pinellas County teachers to make lesson plan writing easier to do, while ensuring that all lesson plan components are met. To find the grade level expectations for Pinellas County Schools aligned to Sunshine State Standards, go to <<http://sage.pineillas.k12.fl.us>>, which links directly to the Pinellas County Schools' Student Expectations (PCSSE) Web site.

STEP 1

Instructor's Name: Bridget Bohnet – Coachman Fundamental Middle School, Clearwater, Florida

Subject: Pre-Algebra

Materials needed: Student text, practice workbook, whiteboards, smart board, document camera, LCD, operation word strips, order of operations Pattern Puzzle strips, mix and match expression phrases

STEP 2

Essential Learnings

(from Florida State Sunshine Standards)

MA.7.A.3.1 – Use and justify the rules for adding, subtracting, multiplying, dividing, and finding the absolute value of integers.

MA.7.A.3.2 – Add, subtract, multiply, and divide integers, fractions, and terminating decimals, and perform exponential operations with rational bases and whole number exponents, including solving problems in everyday contexts.

MA.7.A.3.3 – Formulate and use different strategies to solve one-step and two-step linear equations, including equations with rational coefficients.

MA.7.A.3.4 – Use the properties of equality to represent an equation in a different way and to show that two equations are equivalent in a given context.

Purpose Setting

Understandings:

- Students will learn to solve problems, to evaluate expressions, and to use variables and expressions when solving real-world problems.

Essential questions that guide and focus teaching and learning:

- Why is it important to understand the meaning of operations and how they relate to each other?
- Why is “understanding how mathematical ideas build on one another to produce a coherent whole” necessary to be successful in mathematics?
- How can the use of the mathematical properties make mathematics easier?

STEP 3

Assessment

Performance tasks: (Develop participation strategies that scaffold students toward being successful on the independent assessments.)

Thomas works 4 hours after school, five days a week, at the Auto Lube Shop for \$6 per hour. Sometimes, the shop gets busy and he works extra hours after school and on Saturday for \$8 per hour.

Part A—Write an equation that can be used to calculate Thomas’s total weekly earnings. (Let “ t ” represent Thomas’s total weekly earnings, and “ h ” represent the extra hours he works during any week.

Part B—Use your equation to determine how many extra hours Thomas must work in one week to earn \$200.00. Show all work.

Independent assessments: Other (quizzes, tests, work samples)

- Quiz—Sections 1-1—1-3
- Test—Chapter 1
- Completion of Daily Homework
- Order of Operations RAFT

RUBRIC SCALES

Score 2—Indicates the student has demonstrated a thorough understanding of the mathematics concepts and/or procedures personified in the task. The student has completed the task correctly, in a mathematically sound manner. When required, student explanations and/or interpretations are clear and complete. The response may contain minor flaws that do not detract from the demonstration of a thorough understanding.

Score 1—Indicates the student has provided a response that is only partially correct. For example, the student may provide a correct solution, but may demonstrate some misunderstanding of the underlying mathematical concepts or procedures. On the other hand, a student may provide a computationally incorrect solution, but could have applied appropriate and mathematically sound procedures, or the student’s explanation could indicate an understanding of the task, despite the error.

Score 0—Indicates the student has provided no response at all, or a completely incorrect or uninterpretable response, or demonstrated insufficient understanding of the mathematics concepts and/or procedures personified in the task. For example, a student may provide some work that is mathematically correct, but the work does not demonstrate even a rudimentary understanding of the primary focus of the task.

Students’ Scoring Guide A = 2 C = 1 F = 0

STEP 4

Instructional Activities

(Develop participation strategies that scaffold students toward being successful on the independent assessments.)

Preparing for Understanding (Before)

- Chapter Survey (Textbook Scavenger Hunt)
- Operations Vocabulary (Power Thinking)
- Find the Mistake (Think-Pair-Share)

Integrating Strategies for Understanding (During)

- Modeling/Guided Practice/Group Practice/Independent Practice
- Order of Operations (Pattern Puzzle)
- Operations (Semantic Feature Analysis)
- Properties (Foldable)
- Expression Phrases (Mix and Match)

- Equations vs. Expressions (Venn)

Checking for Understanding (*During/After*)

- Order of Operations (RAFT)
- Whiteboard Practice (Informal)
- Homework (Formal)
- Quiz/Test (Formal)
- Performance Task (Formal)

STEP 5

Process Conference with Students

*How did the **scavenger hunt** familiarize you with the book layout and the positive features of the text?*

*How did completing the **Operations Vocabulary (Power Thinking)** generate background knowledge?*

*How did creating the **Semantic Feature Analysis** of the vocabulary assist in organizing the information?*

*How did writing the **RAFT** assist you in organizing and transferring information regarding order of operations?*

*How did constructing the **properties Foldable** help you remember the properties and their use?*

How might you apply the strategies you learned in this lesson to other classes?

STEP 6

(Plan for specific student needs.)

ESOL strategies **must be** documented in the lesson plan.

Accommodations:

- The use of a student planner and homework calendar for communication along with weekly e-mails and class Web site.
- All directions are read aloud, as well as posted. Extended time and preferential seating are given when needed.



About the Author: Bridget Bohnet, District Trainer, National Board Certified, teaches math at Coachman Fundamental Middle School in Clearwater, Florida. Bridget has taught in the middle school mathematics classroom for twenty years and has had the opportunity to work with an outstanding group of dedicated CRISS trainers for the past 10 years. Originally from Michigan, she enjoys spending her summers on the beach of Lake Michigan with her family and with plenty of books.

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$$2 \times 9 - 4$$

$$18 - 4$$

$$14$$

$$24 - 4 \times 5$$

$$24 - 20$$

$$4$$

$$24 / (2 + 4) \times 2$$

$$24 / 6 \times 2$$

$$4 \times 2$$

$$8$$

$$3 + 9 \times 4 - 10 / 5$$

$$3 + 36 - 10 / 5$$

$$3 + 36 - 2$$

$$39 - 2$$

$$37$$

Vocabulary
Increase

Add
x

Subtract

Multiply
x

Divide

addition

total

plus

accumulate

more than

sum

increase

add

in all

enlarge

subtraction

subtract

decrease

minus

less than

deduct

difference

reduce

less

remove

multiplication

multiply

product

times

of

factors

each

twice

triple

double

division

quotient

per

rate

ratio

separate

dividend

divide by

twenty increased by eight

$20 + 8$

twenty more than eight

$8 + 20$

the difference of twenty and eight

$20 - 8$

twenty less than 8

$8 - 20$

the product of twenty and eight

$20(8)$

the quotient of twenty four and eight

$24/8$

eight doubled

$8(2)$

the sum of eight and six

$8 + 6$

eight decreased by six

$8 - 6$

eight times six

$8(6)$

six tripled

$6(3)$

eight more than six

$6 + 8$

RAFT

Role - A set of parenthesis

Audience - Middle school student

Format - letter

Topic - Explain all of the roles in the order of operations

Dear Student,

Are you tired of rules? Well you might as well get used to them. Your parents have rules to keep you safe and help you grow up smart. Your school has rules to help you learn better. Your city has rules to keep everyone safe and maintain order. Math has rules also. The orders of operation are the rules that you need to know to solve math problems. You must use these operations in the following order or you will not get the right answer.

1. Simplify the operation inside of parenthesis
2. Evaluate all powers
3. Do all multiplications or divisions in order from left to right
4. Do all additions or subtractions in order from left to right

Take it from me, Pete Parenthesis, if you want to do well in math you need to follow the rules for order of operations. When you read a book you always read left to right but in math that is not the case. Let me show you an example of what I mean. In the problem $3 + 5 \times 8$ if you work left to right you will get an answer of 64 but this answer is incorrect. You must first multiply 5×8 and then add the 3 to get 43. As you can see, you get two completely different answers depending on the method you use. As the problems get more difficult you will see parenthesis to separate operations. Make sure you always solve what is in the parenthesis first and then continue on with the other operations. Good luck with your math work and always remember to follow the rules!

Pete Parenthesis