MATH 331 OBJECTIVES

Elementary and Middle School Mathematics: Teaching Developmentally, 5th ed., Van de Walle

CHAPTER 1
The student will be able to discuss:
1. the role of the National Council of Teachers of Mathematics (NCTM) in mathematics education.
2. the six principles of high-quality mathematics programs as presented in the Principles and Standards document.
3. the standards, content and process, as presented in the Principles and Standards document.
4. the 5 goals of mathematics education as presented in the Principles and Standards document.
5. shifts in classroom environment as presented in the Professional Standards for Teaching Mathematics document.
Note: Be prepared to take a classroom activity and relate it to the above 5 objectives.

CHAPTER 2
The student will be able to discuss:
1. traditional views vs. current views of school mathematics
2. the teacher's role in terms of traditional views vs. current views of school mathematics
3. what it means to "do mathematics"
4. the features of a mathematics classroom that are important for students to be engaged in doing mathematics.

CHAPTER 3
The student will be able to discuss:
1. what is meant by "constructing" knowledge.
2. conceptual & procedural knowledge including recommendations for teaching.
3. instrumental vs. relational understanding of mathematics.
4. benefits of relational understanding.
5. what a model is, give examples, explain appropriate uses in the classroom, explain how models can be misused.
6. the constructivist approach (developmental approach) to learning.

CHAPTER 4
The student will be able to:
1. explain the difference between problems and routine exercises.
2. discuss what a teacher should be doing before, during and after the problem (in detail and justify)
3. explain and justify problem solving as an instructional strategy
4. evaluate effective activities for making the problem solving approach work in the classroom

CHAPTER 5
The student will be able to:
1. define assessment and discuss the NCTM *Assessment principle.*
2. identify reasons for assessment.
3. discuss how instruction and assessment can and should be combined.
4. define rubric and explain how it can be used.
5. identify assessment options.
6. discuss grading issues.

CHAPTER 6
The student will be able to discuss:
1. the steps of planning for a successful mathematics lesson
2. before, during, and after steps of a lesson activity
3. why a problem-based approach is a good way to reach all students in a diverse classroom
4. how MS Framework 2000 for mathematics impacts lesson requirements for content and pedagogy.

CHAPTER 7
The student will be able to:
1. identify and discuss ways of planning for diverse student abilities.
2. identify and discuss ways of planning for diverse student learning needs.
3. discuss the meaning of NCTM's goal "Mathematics for All Children."

CHAPTER 8
The student will be able to:
1. discuss ways that technology has affected the mathematics curriculum and mathematics teaching.
2. describe some of the benefits of and arguments against using calculators and computers in the mathematics classroom.

CHAPTER 9
The student will be able to discuss:
1. the "big ideas" of developing early number concepts and number sense.
2. define number sense.
3. describe how number relationships and number sense for numbers through 20 can be built on knowledge of small numbers and describe an activity for each.

CHAPTER 10
The student will be able to discuss:
1. the "big ideas" of developing meanings for the operations.
2. discuss the meaning of: Addition, Subtraction, Multiplication, and Division
3. create and model problems for addition & subtraction, multiplication, and division.
4. discuss strategies for story problems in upper grades (include dealing with large numbers/ two-step problems)

CHAPTER 11
The student will be able to:
1. discuss the "Big Ideas" of helping children master the basic facts.
2. describe and use strategies to master basic facts including, Addition: one-more-than, two-more-than, zero, doubles, near-doubles, make-ten, doubles plus two, make ten extended, ten-frame facts; Subtraction: think addition, zero, one-less-than, two-less-than, ten-frame facts, doubles & near-doubles, build-up through ten, back down through ten; Multiplication: doubles, fives, zeros, ones, nines, helping fact; Division: think multiplication
3. discuss strategies for fact remediation with upper-level students.

CHAPTER 12
The student will be able to:
1. discuss the "Big Ideas" of whole-number place-value development
2. discuss the basic ideas which are involved in a relational understanding of place value.
3. discuss the 2 types of physical models for base 10 concepts. (Proportional and nonproportional). Include in your discussion groupable vs. pregrouped models.
4. discuss how place value concepts have a great impact on mental computation, estimation, and traditional algorithms.
5. describe activities that are effective for place-value development.

CHAPTER 13
The student will be able to:
1. discuss the "Big Ideas" of strategies for whole-number computation.
2. compare invented strategies to traditional algorithms including benefits and/or disadvantages.
3. explain why traditional algorithms work for whole number computations.
4. use models (diagrams, etc.) that are appropriate for whole number operations.

CHAPTER 14
The student will be able to:
1. discuss the "Big Ideas" of computational estimation with whole numbers.
2. discuss the importance of estimation as a tool for everyday living and for sense making in other areas of mathematics.
3. describe general strategies for conducting mental calculations and estimation activities.
4. discuss current recommendations for teaching mental calculations and estimations including what should be taught, when should it be taught and how should it be evaluated.

CHAPTER 15
The student will be able to:
1. discuss the "Big Ideas" of developing fraction concepts.
2. identify and describe types of fraction models.
3. define and model fractional parts.
4. identify aspects of fraction number sense and describe activities for developing each aspect.
5. recognize and explain the difference between finding equivalent fractions using concepts and using algorithms.
6. describe the concepts and appropriate activities for comparing fractions.

CHAPTER 16
The student will be able to:
1. discuss the "Big Ideas" of computations with fraction
2. model the operations of addition, subtraction, multiplication, and division with fractions.
3. explain the meanings of the operations with fractions.
4. explain the traditional algorithms for computations with fractions.
5. describe activities for developing the concepts of addition, subtraction, multiplication, and division of fractions.

CHAPTER 17

The student will be able to:

1. discuss the “Big Ideas” of decimal concepts and decimal computation.
2. identify and describe types of decimal models.
3. describe how to connect fractions and decimals.
4. describe how place value ideas extend to decimals.
5. identify aspects of number sense with respect to decimals and describe an activity for each aspect.

Literature Connections

The student will be able to:

1. describe some of the benefits of using literature connections in the mathematics classroom.
2. discuss at least two examples of appropriate literature choices.
3. discuss how literature connections are sometimes inappropriately used.