



### **MTED 7???**

**Topics: Mathematics for Special Education Teachers – Content and Pedagogy  
Spring 2014 (1/18/14 – 5/18/14)  
Online with two face-to-face meetings**

### **INSTRUCTORS**

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### **REQUIRED TEXTS**

\*Van de Walle, J. A., Karp, K. S., & Bay-Williams, J. M. (2013). *Elementary and Middle School Mathematics: Teaching Developmentally* (8<sup>th</sup> ed.). Boston, MA: Allyn and Bacon.

Massachusetts Department of Education. (2011). *Massachusetts mathematics curriculum framework*. Malden, MA: Author.  
[www.doe.mass.edu/frameworks/math/0111.pdf](http://www.doe.mass.edu/frameworks/math/0111.pdf)

Massachusetts Department of Education. (2011). *Resource Guide to the 2011 Massachusetts Curriculum Frameworks for Students with Disabilities*. Malden, MA.  
[www.doe.mass.edu/mcas/alt/rg/2013Math.pdf](http://www.doe.mass.edu/mcas/alt/rg/2013Math.pdf)

\*S. Stump, K. Roebuck, J. Bishop, *Algebra for Elementary and Middle School Teachers: An Inquiry Approach*, 2<sup>nd</sup> ed., Pearson Custom Publishing.

Wehe, Amy (2013). *Informal Geometry*. Fitchburg State University Print Services.

*\*The necessary chapters from the Walle and Stump texts will be combined into a single customized text*

### **TECHNOLOGY**

Users of the Fitchburg State University technology systems are subject to all applicable federal, state, and international technology laws. Questions regarding regulations may be directed to the Office of Information Technology.

Students will utilize technology to access lessons online, submit assignments and communicate with the instructors and other students. This will be done through *Moodle*, an open source online learning management system used by the Massachusetts Department of Elementary and Secondary Education. All students will be set up with a *Moodle* account. Students will also need access to a scanner and a high-speed internet connection. In addition appropriate technology will be used to enhance the design of lessons plan presentations.

### **COURSE DESCRIPTION**

This is an online course for educators and will address the basic principles and concepts important for teaching elementary school mathematics to students with disabilities including numbers and operations, functions and algebra, geometry and measurement, statistics and probability, and the Standards for Mathematic Practice as outlined in the Massachusetts Mathematics Curriculum Framework. Explanations and depth of understanding will be stressed and multiple methods of teaching and learning these concepts will be addressed. Students will also explore instructional pedagogy designed to teach mathematics to students with disabilities and develop the knowledge and skills to plan and modify mathematics curriculum based on current research. In addition, the mathematics content of this course covers the concepts addressed in the Mathematics Subtest of the General Curriculum Massachusetts Test for Educator Licensure (MTEL).

### **CLASS STRUCTURE**

All course materials will be posted in *Moodle*. Materials include notes, assignments with due dates, handouts and supplementary resources and readings. Online discussions will also be a significant component of this course.

**This course will have a face-to-face meeting at the start of the course where students will get their materials and be introduced to the course. Training on Moodle will also be incorporated into this face-to-face meeting.**

**There will be another face-to-face meeting at the end of the course for a final exam and wrap up activities.**

### **COURSE OBJECTIVES**

- 1) Conceptual understanding of numbers and operations, including the number system and concept of place value; integers, fractions, decimals, percent's and mixed numbers; operations on numbers; and, the application of principles of number theory

- 2) Understanding of functions and algebra including linear functions and linear equations, the concept of function, and recognition of algebra as generalized arithmetic
- 3) Understanding and application of the concepts of measurement and geometry
- 4) Understanding of statistics, including descriptive statistics and the application of basic concepts of probability
- 5) Ability to use place value knowledge to successfully perform computational skills and elementary mathematical concepts
- 6) Ability to use multiple representations to teach and improve students' understanding of elementary math.

### **COURSE EXPECTATIONS**

- 1) Review arithmetic and algebra skills as needed and be able to use them properly.
- 2) Complete all assignments on time.
- 3) Be prepared for and actively participate in online discussions.
- 4) Use precise mathematical language in assignments and discussions.
- 5) Show all your work and justify your steps when solving a problem.
- 6) Solve problems in multiple ways.
- 7) Be able to explain why certain methods, formulas and/or algorithms work.
- 8) Ask LOTS of questions and seek help as needed from the instructor and/or classmates.
- 9) Never settle for rules or formulas unless you fully understand them.
- 10) Struggle with a problem even after you get stuck (you may be surprised at how much you can do if you just keep at it!)

### **INSTRUCTIONAL STRATEGIES**

<u>X</u>	Lecture	—	Data Collection and Analysis
<u>X</u>	Discussion/Questioning	—	Pre-Practicum
—	Laboratory	—	Role Playing/Simulation
<u>X</u>	Problem Finding/Solving	<u>X</u>	Independent Learning
<u>X</u>	Discovery	—	Field Trips
—	Interviewing	<u>X</u>	Computer Applications
—	Collaborative Learning Groups	<u>X</u>	Viewing or Listening to Followed by
<u>X</u>	Reflective Responses		Discussing
<u>X</u>	Creating Visual Illustrations of Concepts	—	Other_____

### **ASSESSMENTS**

**Formative Assessments:** Students will be assessed for their understanding of the course content and their ability to apply this knowledge to their classroom practice. Online assessments will include reading assignments, quizzes, problems sets, exams, discussion posts, problems solving reports and lesson plans. For discussion posts, students will be evaluated on the degree to which their contribution provides evidence that they have read the material and integrated it with the information from class notes. For other course

requirements specific methods of evaluation (including rubrics) will be detailed in Moodle and in the syllabus appendices.

**Summative Assessments:** Participants will participate in a face to face class at the end of the course which will include presentations and a final exam. The final exam will include problems addressing mathematical content as well as a series of case studies designed to assess participants' ability to integrate and apply key knowledge and skills.

### **TESTING & GRADING**

The points for this class will be distributed as follows as percentage of the final grade:

Numbers and Operations	20%
Geometry and Measurement, Probability and Statistics	20%
Functions and Algebra	20%
Pedagogical Component	20%
Final Exam/Final Project	20%

Module 1, 2 and 3 will have a comprehensive final exam. Module 4 will have a final project. The grading scheme for each module is shown below.

#### **Module 1**

Numbers and Operations	
Quizzes	50%
Discussion	25%
Module Exam	25%

#### **Module 2**

Geometry and Measurement, Probability and Statistics	
Quizzes/Assignments	50%
Discussion	25%
Module Exam	25%

#### **Module 3**

Functions and Algebra	
Quizzes/Assignments	50%
Discussion	25%
Module Exam	25%

#### **Module 4**

Pedagogical Component	
Reading Responses	25%
Discussion	25%
Student Assessment and Instructional Plan	50%

## Graduate Grading Policy

4.0	95-100	A
3.7	92-94	A-
3.5	89-91	A-/B+
3.3	86-88	B+
3.0	83-85	B
2.7	80-82	B-
2.5	77-79	B-/C+
2.3	74-76	C+
2.0	71-73	C
0.0	0-70	F
W	Withdrawn	
IN	Incomplete	

## Late Assignment Policy

There will be no acceptance of late assignments, quizzes or exams.

## COURSE TOPICS/OUTLINE

The following outlines are approximate and subject to change with appropriate notice. More details on each component will be posted in *Moodle*.

**Numbers and Operations:** This portion of the course will cover number systems, real number properties, operations on real numbers including fractions base 10, GCF, LCM, prime numbers and common algorithms with a focus on why they work.

**Geometry and Measurement, Probability and Statistics:** This portion of the course will cover measurement, including length, area, volume and surface area, scaling, unit conversion, probability, 2-dimensional symmetry and some basic statistics as time permits.

**Functions and Algebra:** This portion of the course will cover algebra and mathematical modeling in the context of explorations that appropriately relate to mathematics in the elementary classroom. Topics include linear equations and functions, patterns/sequences and multiple representations of functions.

**Pedagogy:** This portion of the course will address instructional and assessment strategies to teach various mathematical concepts to students with disabilities. Moreover, it will include strategies to assess, plan, and implement individualized and whole group instruction to build conceptual understanding and procedural knowledge through the use of concrete, representational and abstract forms. In addition, differentiated instruction strategies and concepts of Universal Design for Learning will be addressed.

**First class (face to face) Saturday, Jan. 18<sup>th</sup>, 2014, 9am – 3pm**  
**Fitchburg State University, Center for Professional Studies**

Week 1	1/18 - 1/19	Introduction, materials & Moodle training
<b>Module 1</b>		
Week 2	1/20 - 1/26	Numbers & Operations
Week 3	1/27 - 2/2	Numbers & Operations
Week 4	2/3 - 2/9	Numbers & Operations
Week 5	2/10 - 2/16	Numbers, Operations & <i>Module Exam</i>
<b>Module 2</b>		
Week 6	2/17 - 2/23	Geom, Measure, Prob & Stats
Week 7	2/24 - 3/2	Geom, Measure, Prob & Stats
Week 8	3/3 - 3/9	Geom, Measure, Prob & Stats
<b>Week 9</b>	<b>3/10 - 3/16</b>	<b>Spring Break</b>
Week 10	3/17 - 3/23	Geom, Measure, Prob & Stats and <i>Module Exam</i>
<b>Module 3</b>		
Week 11	3/24 - 3/30	Functions & Algebra
Week 12	3/31 - 4/6	Functions & Algebra
Week 13	4/7 - 4/13	Functions & Algebra
Week 14	4/14 - 4/20	Functions, Algebra and <i>Module Exam</i>
<b>Module 4</b>		
Week 15	4/21 - 4/27	Pedagogy
Week 16	4/28 - 5/4	Pedagogy
Week 17	5/5 - 5/11	Pedagogy
Week 18	5/12 - 5/16	Pedagogy and Final Project
Week 19: Sunday, May 18, 2014. Final Exam (face to face)		
Fitchburg State University, Center for Professional Studies		

**Note that Jan. 20, Feb.17 and April 21<sup>st</sup> are holidays.**

## **COURSE POLICIES**

### **Policy on Disability**

Disability Services is the primary support system for students with disabilities taking classes in the day and evening divisions. The office is located on the third floor of the Hammond Building and can be reached at (978) 665-3427 or (978) 665-3575 TTY. If you need course adaptations or accommodations because of a disability, if you have emergency medication information, or if you need special arrangements in case the building must be evacuated, please make an appointment with the staff of Disability Services as soon as possible. It is important that the issues relating to disabilities be discussed with faculty early in the course in order to provide you with appropriate accommodations.

### **Academic Integrity**

If some form of academic dishonesty (i.e. cheating) is suspected to have taken place, the procedures in the Fitchburg State policy for Academic Integrity will be followed. See the following link for details: <http://www.fitchburgstate.edu/campus-life/student-services/office-of-student-conduct-mediation-education/academic-integrity/>

If the instructor determines that academic dishonesty has taken place, then the student will, at the very least, receive a zero on the corresponding assignment and may also receive a zero in the class.

### **Copyright Policy**

You are reminded that in preparing handouts for peers or the instructor, reproduction of copyrighted material without permission of the copyright owner is illegal. Such unauthorized copying may violate the rights of the author or the publisher. Fitchburg State University adheres to federal laws regarding use of copyrighted materials. See your Student Handbook for more details.

**Fitchburg State University** encourages all Extended Campus students to take advantage of our online student services. We have created a “virtual student center” just for you. Here you will find access to Counseling Services, Career Services, The Student Activity Center, the university bookstore and many other helpful links. You can access our student center by going to the university homepage at <http://www.fitchburgstate.edu> and clicking on Offices and Services. Scroll down and click on Extended Campus Center. You will find links to Library Services, our Virtual Student Center and other important information.

## **FITCHBURG STATE UNIVERSITY**

### **DISTANCE LEARNING & EXTENDED CAMPUS LIBRARY SERVICES**

The Gallucci-Cirio Library at Fitchburg State University provides a full range of library services including borrowing privileges; document delivery (books and articles mailed to your home); Interlibrary Loan; reference assistance via: phone, email, IM, Blackboard's Collaboration and Elluminate tools, Skype and in-person; library instruction; research help and more. Any questions relating to library services should be directed to the Linda LeBlanc, Access Services Librarian, at 978-665-3062 or [dllibrary@fitchburgstate.edu](mailto:dllibrary@fitchburgstate.edu). There is also a special section for

Distance Learning and Extended Campus Services at <http://fitchburgstate.libguides.com/dlservices> outlining the wide range of services available to you and how to access them.

Students who are currently registered with the university may access any of the library's subscription databases, including an increasing number with full-text, by visiting the Gallucci-Cirio Library's homepage at <http://www.fitchburgstate.edu/academics/library> and clicking on the Research Databases button in the center of the page. Select the resource you want to access from the alphabetical or subject listing. Once you click on the database title you will be prompted for your Falcon Key logon information; this is the same logon you will use for your Fitchburg State email account and if you have any online Blackboard courses. If you do not know your Falcon Key username and password or if you have any problems logging in, contact the university's Technology Help Desk at 978-665-4500 or [helpdesk@fitchburgstate.edu](mailto:helpdesk@fitchburgstate.edu). The Library can issue you a temporary guest Falcon Key to use while the Technology Department is setting up your account: contact us at 978-665-3062 or [dllibrary@fitchburgstate.edu](mailto:dllibrary@fitchburgstate.edu)

All registered Fitchburg State University students are eligible for a Fitchburg State University OneCard ID which also serves as his/her library card. If you have not received your OneCard yet, you can still access all of our online services as long as you have activated your library account. Activate your library account online at <http://www.fitchburgstate.edu/librarycf/cardrequest.cfm> or in person at the Circulation Desk. After activation by the Gallucci-Cirio Library and receipt of your OneCard, students may also use any Massachusetts State College/University Library as well as participating libraries in the Academic and Research Collaborative (ARC) during the current semester. OneCards are available on campus all year round. Students wanting a OneCard must either complete the online Extended Campus OneCard request form <http://web.fitchburgstate.edu/technology/onecard/photoless/index.cfm> or present a course registration confirmation at the OneCard Office in the Anthony Building, main campus. Please call 978-665-3039 for available times or if you have any questions about your OneCard.

### **ADDITIONAL RESOURCES**

Association for Childhood Education International. (2007). *2007 ACEI/NCATE elementary education standards and supporting explanation*. Olney, MD: Author.

Fitchburg State University Teacher Preparation Programs. (2003). *Conceptual framework*. Fitchburg, MA: Author.

Massachusetts Department of Education. (2007). *Guidelines for the mathematical preparation of elementary teachers*. Malden, MA: Author.

National Middle School Association. (2005). *National Middle School Association initial*



*level teacher preparation standards*. Westerville, OH: Author. Available at [http://www.nmsa.org/portals/0/doc/preparation/standards/NMSA Initial Standards July 2005.doc](http://www.nmsa.org/portals/0/doc/preparation/standards/NMSA%20Initial%20Standards%20July%202005.doc)

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*, Reston,VA: Author.

National Council of Teachers of Mathematics. (2003). *NCATE/NCTM program standards (2003): Programs for initial preparation of mathematics teachers* [NCATE approved through 2012]. Arlington, VA: Author.

### **Fitchburg State University Teacher Education Conceptual Framework**



**This course will address the dispositions of the Conceptual Framework as well as the standards of the Association for Childhood Education International (ACEI). In addition, the NCATE (National Council for Accreditation of Teacher Education)/NCTM (National Council of Teachers of Mathematics) Program Standards (2003) for Initial Preparation of Mathematics Teachers and the Massachusetts Department of Elementary and Secondary Education *Guidelines for the Mathematical Preparation of Elementary Teachers* will be addressed.**

**The course objectives are as follows:**

**Knowledgeable - As a result of the learning experiences in the course, you will become more cognizant of the following:**

- ❖ The fundamental concepts of numbers, integers, and computational operations (ACEI 2.3, NCATE/NCTM 9).
- ❖ Algebraic principles (ACEI 2.3, NCATE/NCTM 10).
- ❖ Multi-dimensional shapes and transformational principles (ACEI 2.3, NCATE/NCTM 11).
- ❖ Measurement units and tools (ACEI 2.3, NCATE/NCTM 13).
- ❖ Data analysis and probability concepts (ACEI 2.3, NCATE/NCTM 12).

- ❖ The process of problem solving (ACEI 2.3, NCATE/NCTM 1).
- ❖ Mathematical arguments, mathematical rigor, and mathematical inquiry (ACEI 2.3, NCATE/NCTM 2).
- ❖ Ways to communicate mathematical thinking – orally and in writing (ACEI 2.3, NCATE/NCTM 3).
- ❖ Connections between and among mathematical ideas and in contexts outside of mathematics (ACEI 2.3, NCATE/NCTM 4).
- ❖ The role of technology in mathematics (ACEI 2.3, NCATE/NCTM 6).

**Skillful - As a result of the learning experiences in the course, you will become more prepared to do the following:**

- ❖ Demonstrate a number of ways to present number concepts involving whole numbers, negative integers, and rational numbers (ACEI 2.3, NCATE/NCTM 5).
- ❖ Balance and link conceptual understanding and computational proficiency within whole numbers, integers, and rational numbers (ACEI 2.3, NCATE/NCTM 9).
- ❖ Develop computational fluency and a well-developed sense of number (ACEI 2.3, NCATE/NCTM 9).
- ❖ Explore and analyze patterns, relations, and functions (ACEI 2.3, NCATE/NCTM 10).
- ❖ Demonstrate an understanding of the role of mathematical structures and in the use of equality, equations, and inequalities (ACEI 2.3, NCATE/NCTM 10).
- ❖ Model two- and three-dimensional shapes; apply transformations; and use symmetry, congruence, similarity, and coordinate geometry (ACEI 2.3, NCATE/NCTM 11).
- ❖ Use measurement units and tools (ACEI 2.3, NCATE/NCTM 13).
- ❖ Use estimation as a way to understand measurement (ACEI 2.3, NCATE/NCTM 13).
- ❖ Design investigations that engage students in creating data sets and in collecting, organizing, and displaying data (ACEI 2.3, NCATE/NCTM 12).
- ❖ Apply a variety of strategies to solve problems (ACEI 2.3, NCATE/NCTM 1).
- ❖ Communicate your mathematical thinking – orally and in writing (ACEI 2.3, NCATE/NCTM 3).
- ❖ Make connections among mathematical ideas and to contexts outside of mathematics (ACEI 2.3, NCATE/NCTM 4).
- ❖ Use a variety of representations of mathematical ideas to support and deepen students' mathematical understanding (ACEI 2.3, NCATE/NCTM 5).
- ❖ Use technology as an important role in the teaching and learning of mathematics (ACEI 2.3, NCATE/NCTM 6).

**Caring - As a result of the learning experiences in the course, you will become more prepared to do the following:**

- ❖ Relate major concepts, principles, and theories of mathematics to the development of children and young adolescents to construct learning opportunities that support individual students' development, acquisition of knowledge, and motivation (ACEI 1.0, NCATE/NCTM 7 and 8).

- ❖ Create instructional opportunities that are adapted to diverse students (ACEI 3.2, NCATE/NCTM 7 and 8).
- ❖ Use a variety of teaching strategies that encourage students' development of critical thinking and problem solving (ACEI 3.3, NCATE/NCTM 7 and 8).
- ❖ Foster active engagement in learning, self-motivation, and positive social interaction and to create a supportive learning environment (ACEI 3.4, NCATE/NCTM 7 and 8).
- ❖ Foster active inquiry, collaboration, and supportive interaction in the classroom (ACEI 3.5, NCATE/NCTM 7 and 8).
- ❖ Establish and maintain a positive collaborative relationship with families, colleagues, and agencies in the larger community to promote intellectual, social, emotional, physical growth, and well-being of students (ACEI 5.2, NCATE/NCTM 7 and 8).

**Ethical - As a result of the learning experiences in the course, you will become more prepared to do the following:**

- ❖ Use formal and informal assessment strategies to plan, evaluate, and strengthen instruction that will promote continuous intellectual, social, emotional, and physical development of *each* student (ACEI 4.0).
- ❖ Evaluate the effects of your professional decisions and actions on students, families, and other professionals in the learning community and actively seek out opportunities to grow professionally (ACEI 5.1).

**Reflective Leader – As a result of the learning experiences in the course, you will become a more reflective leader by doing the following:**

- ❖ Thinking about and responding to readings and research-based practices in a reading response journal and during class discussions.
- ❖ Thinking about your field-based experiences and recording your observations and reflections in a journal as well as discussing them in class.
- ❖ Working with peers and teachers to analyze, prepare, and model best teaching practices in the classroom.

## **APPENDICES**

Appendix 1: Lab Rubric for Geometry and Measurement

Appendix 2: Problem Solving Report Rubric for Functions and Algebra

Appendix 3: Individual Student Assessment Report Plan and Rubric for Pedagogical Module

**Appendix 1****Lab Rubric for Geometry and Measurement**

Geometry and Measurement labs will be graded on the following scale:

10 pts.

The lab is completely perfect except for 2 inconsequential mistakes, and all questions are answered with well thought out and executed explanations. All explanations are given in clearly written, complete sentences.

9 pts.

The lab is complete, has fewer than 7 errors, and all questions are answered with well thought out and executed explanations. All explanations are given in clearly written, complete sentences. Each error will be counted, so there may be more than one error in each problem.

8 pts.

The lab is complete and has fewer than 12 errors. The answers given show that the student read and attempted to answer each question. All explanations are given in clearly written, complete sentences. Each error will be counted, so there may be more than one error in each problem.

7 pts.

The lab is complete, and has fewer than 20 errors. The answers given show that the student read and attempted to answer each question. Most explanations are given in clearly written, complete sentences. Each error will be counted, so there may be more than one error in each problem.

6 pts.

The lab is incomplete but at least 3/4 of the questions are answered. All answers are given in complete sentences, and it is clear that the student attempted to complete the lab.

5 pts.

The lab is incomplete, but at least 1/2 of the questions are answered and it is clear that the student attempted to complete the lab.

4 pts.

The lab is incomplete, but at least 1/4 of the questions are answered and it is clear that the student attempted to complete the lab.

0 pts. Otherwise.

## Appendix 2

### Problem Solving Rubric for Functions and Algebra

#### I. Problem Statement (in your own words)

- 0: No problem statement
- 1: Unclear or partial problem statement
- 2: Clear, complete problem statement

#### II. Solution Strategies and Answer(s)

##### Process

- 0: Unclear method, or method that would not lead to correct solution
- 1: Incomplete solution
- 2: Clear, thoughtful method leading to complete solution

##### Presentation

- 0: Unclear work
- 1: Clear description of work in some places but not in others
- 2: Easily understood, neat, well-organized work

##### Identification and description of patterns and/or quantities represented by variables

- 0: None
- 1: Partial
- 2: Complete

##### Explanation of relationships represented by expressions and equations

- 0: None
- 1: Partial
- 2: Complete

##### Inclusion of representations—graphs, tables, expressions, equations, etc.

- 0: None
- 1: Partial
- 2: Complete

##### Correct use of mathematical terminology and symbols

- 0: None
- 1: Partial
- 2: Complete

##### Solution justification/check

- 0: None
- 1: Partial
- 2: Complete

#### III. Reflection

- 0: No reflection
- 1: Partial reflection
- 2: Complete reflection

## Appendix 3 (Pedagogy)

### Individual Student Assessment Report Performance Based Assessment

In order to plan effective instruction, you need to know how to assess a child's knowledge of mathematical concepts, conceptual understanding, and procedural knowledge. For this assignment, you will choose one child and use a diagnostic assessment to evaluate one mathematical concept. First you will design a plan for the assessment, assessing a specific mathematics topic using concrete, pictorial and abstract representations. Then you will conduct the assessment with a child and write a report describing the outcome of the assessment. The report is broken down into 4 sections so that you will be able to submit each section at the end of the week on Friday (see Moodle for specific deadlines). I will read and provide feedback to you for each section. The completed report will be due on the date of the final exam for the course. The report must include the information below.

**Background Information:** Describe the child you plan to assess. Please maintain confidentiality by not including a last name and by changing the child's first name. Include information you gathered about the child (grade level, age, gender, race, disability, and academic ability level). What do you know about the child's level of understanding about the mathematical concept before the assessment? What is the child's disability and how does it impact his/her ability to understand and do math?

**The Mathematics Concept:** Select one specific mathematics concept to assess during the assessment. Examples of concepts might include patterns, counting, addition or subtraction, multiplication or division, place value, algebraic functions, geometric shapes, or measurement. Cite the appropriate MA Curriculum Framework standard and tell why this concept is appropriate and important for this child to understand. Read the corresponding chapter in the text for specific information.

**The Assessment Plan:** This section of the assessment report includes the planning of the assessment. Include the information below:

1. **Different Forms of Representation:** During the assessment, assess the child using three different forms of representation. Identify the three different forms of representation you will use during the assessment with at least one example in each form.

- Concrete representations are math models and include manipulatives, measuring tools, number lines, base ten blocks, or other objects the child can manipulate during the assessment.
- Pictorial representations include drawings, diagrams, charts, or graphs that are drawn by the child or are provided for the child to read and interpret.
- Abstract or Symbolic representations include numbers or letters the child writes or interprets to demonstrate understanding of a task.

2. **Tasks & Questions:** Design tasks and questions that use three different forms of representation (concrete, pictorial, abstract symbols) to diagnose the child's understanding of

ONE basic concept. Go beyond the basic level of determining the child's factual knowledge of the concept by asking questions that determine how much the child understands about the concept. For example, suppose you are assessing the concept of ADDITION. (1) Create several tasks where the child uses concrete manipulatives to demonstrate her understanding of addition; ask questions about the child's understanding of the addition tasks with manipulatives. (2) Create tasks where the child is asked to create or interpret drawings to demonstrate her understanding of addition; ask questions about the child's understanding of these tasks with pictorial models; (3) Create tasks where the child uses abstract symbols (and letters) to demonstrate her understanding of addition; ask questions about the child's understanding of these addition tasks using the symbols.

**The Assessment Procedure:** This section describes the details of the assessment implementation. Include the steps you took and key excerpts from the assessment. Type only those questions and responses that pertain to mathematics. Be sure to include your questions and the child's responses. Indicate what you said and what the child said by using T for you (the teacher) and C for the child. The information presented in this section should be a reporting of the procedure and how the events unfolded. This will become your supporting evidence. You should not include any diagnostic information or recommendations in this section.

**Evaluation of Child's Mathematical Knowledge:** Write an evaluation of the child's mathematical knowledge in the content area. Use evidence from the assessment procedure to support your conclusions. Use your textbook to help you describe the specific types of behaviors and verbalizations you observed using specific mathematical language. Describe how the child's disability impacted either (positively or negatively) the performance of the tasks. For example, if you conclude that the student has an understanding of addition of fractions with like denominators, you should base this on evidence that shows the child was able to represent with fraction pieces (concrete), and/or the child used a drawing to find the sum (pictorial), and/or the child computed the answer with symbols (abstract). Give specific examples of the child's responses to support your statements.

**Instructional Plan:** Develop a suggested instructional plan for the child. Your assessment of the child's thinking will give you some information for planning instruction. Your suggestions should be based on what you learned about the child during the assessment and may include information previously gathered on the child's disability. Many general suggestions can be valuable for children; however, your recommendations should relate to specifics. For example, if you assessed basic division concepts and you suggest that the instructional plan for the child should include more manipulatives, that would be an important teaching strategy, but it would be too general. You should be more specific about why and how manipulatives might be used. Example: "The student had difficulty making 3 equal groups from a set of 21 chips; therefore, the student should be given more experiences with grouping and partitioning manipulatives in sets of 15 to 30 to develop both the measurement and partitive concepts of division."

**Reflection of the Assessment Process:** Comment on the assessment process. How long did the assessment last? What did you learn about assessment techniques? What did you learn about your ability to create mathematics questions and tasks for this concept? If you were to conduct the assessment with another child, would there be any changes in your questions, either the order or the level of difficulty, or the materials you had available for the child to use? Why or why not?

What have you learned about how children learn mathematics from this assessment? How might a classroom teacher use the diagnostic mathematics assessment to assess children?

**Professional Preparation:** The plan should be typed, double-spaced, size 12 font. Please use page numbers, report headings, concise language, and appropriate sentence structure, punctuation, and grammar.



### Rubric for Individual Student Assessment Report

**Rating Scale:** 0- Does not meet the standard (information is missing), 1 - Approaching the Standard, 2- Acceptably Meets the Standard  
3-Comprehensively Meets the Standard

Criteria	Approaching the Standard	Acceptably Meets the Standard	Comprehensively Meets the Standard	Rating
The required information about the child is included.	One or more of the required descriptive items about the child is missing.	The report includes the child's grade level, age, gender, race, disability, academic ability level, and the child's level of understanding about the math concept.	In addition to the required information, the report includes information about the child's performances in other academic, social, or behavioral areas.	
One specific math concept was chosen and assessed. The appropriate MA Curriculum Framework Standard is included in the report.	One or more math concepts were chosen. They were inappropriate or the report is missing the appropriate MA Curriculum Framework Standard.	One age-appropriate math concept is selected and clearly described. The appropriate MA Curriculum Framework Standard is included in the report.	Information on age-appropriate variations of the math concepts was gathered in preparation for the assessment. One math concept is clearly described.	
Three different forms of representation. (concrete, pictorial, abstract) were used to assess the child with a clear description of an example for each representation.	The report is missing one or more representations and/or examples.	Three forms of representations are described and used appropriately. The example of each representation is clearly described.	Three different forms of representations, with multiple examples in each form, are designed for use in interesting and creative ways.	
Design tasks and questions to match the specific concept being addressed. Use a variety of tasks and questions for each of the three forms of representation.	The tasks and questions designed are not clearly aligned with the math concept being addressed. The report is missing tasks/questions for one or more of the forms of representation.	The tasks and questions align with the specific concept being addressed. There are a variety of tasks and questions used for each of the three forms of representation.	In addition to the tasks being aligned to the math concept, there are questions that differentiate and provide extensions for different levels of student performance. In addition to the variety of tasks and questions used for each of the three forms of representation, the tasks show creativity and are motivating to the child.	
The Assessment procedure includes the steps taken during the implementation and key excerpts of questions and child responses.	The assessment procedure is vague and/or too broad. The key excerpts are unorganized or missing.	The report includes the steps taken during the implementation with key excerpts of the dialogue. The verbalizations are clearly written using T for teacher and C for child.	The report includes key excerpts that are clearly written and include descriptions of the behaviors and verbalizations that occurred during the implementation of the assessment.	
The evaluation accurately represents the child's current level of understanding on this concept. Provide supporting evidence from the assessment.	The evaluation provides a minimal description of the child's understanding of the math concept. A few examples are given but there is not enough information to provide supporting evidence for the evaluation.	The evaluation provides an accurate description of the child's current level of understanding of the math concept. Different examples are given as evidence to support the evaluation.	The evaluation provides an accurate and detailed description of the child's current level of understanding of the math concept. Many examples are given to support the evaluation and include the child's quotations, additional work samples, information on the child's	

			disability, or other information gathered as evidence.	
The instructional plan includes developmentally appropriate next steps for remediation and/or instruction.	The plan describes some next steps for instruction that may not be developmentally appropriate. The plan gives general examples of activities and tasks for the child. The tasks may not be appropriate for the child or for the development of the math skill.	The instructional plan describes developmentally appropriate next steps for remediation and/or instruction. The plan identifies several specific examples of tasks that would be appropriate to further enhance the child's knowledge of this concept. The plan describes these tasks in relation to the child's current level of understanding.	The plan is a creative detailed description of developmentally appropriate next steps for remediation and/or instruction taking into account the child's current level of understanding. The plan identifies several specific examples of tasks that would be appropriate to further enhance the child's knowledge of this concept. Additional resources on math development and disability were used in the plan. Cite references.	
The report includes a conclusion that is an appropriate reflection of the assessment process.	The report does not include one or more of the required elements for the reflection.	The report includes a reflection and evaluation on the assessment process including the required elements.	In addition to the required information, the report includes detailed analysis, self-reflection, and self-evaluation of the assessment process.	
Professional Preparation of the report	The report is single spaced, size 12 font. The pages are not numbered and appropriate headings are not used or there is a lack of clear organization. There are more than 3 errors in sentence structure, punctuation, and grammar.	The report is double spaced, size 12 font. The pages are numbered and appropriate headings are used to organize the information. There are less than 3 errors in sentence structure, punctuation, and grammar.	The report is double spaced, size 12 font. The pages are numbered and appropriate headings are used to organize the information and the writing is clearly organized. There is no more than one error in sentence structure, punctuation, and grammar.	
All materials used in the assessment process are attached as appendices.	One or more of the materials is missing.	All materials are clearly labeled and submitted as appendices to the report.	All materials are clearly labeled with brief descriptions that indicate the form of representation.	

