Interpreting MSTAR Diagnostic Assessments Reports

Savannah Hill & Cassandra Hatfield, SMU RME
Jo Ann Bilderback, TEA
Copyright © Texas Education Agency, 2015. These Materials are copyrighted © and trademarked ™ as the property of the Texas Education Agency (TEA) and may not be reproduced without the express written permission of TEA, except under the following conditions:

1) Texas public school districts, charter schools, and Education Service Centers may reproduce and use copies of the Materials and Related Materials for the districts’ and schools’ educational use without obtaining permission from TEA.

2) Residents of the state of Texas may reproduce and use copies of the Materials and Related Materials for individual personal use only, without obtaining written permission of TEA.

3) Any portion reproduced must be reproduced in its entirety and remain unedited, unaltered and unchanged in any way.

4) No monetary charge can be made for the reproduced materials or any document containing them; however, a reasonable charge to cover only the cost of reproduction and distribution may be charged.

Private entities or persons located in Texas that are not Texas public school districts, Texas Education Service Centers, or Texas charter schools or any entity, whether public or private, educational or non-educational, located outside the state of Texas MUST obtain written approval from TEA and will be required to enter into a license agreement that may involve the payment of a licensing fee or a royalty.

For information contact: Office of Copyrights, Trademarks, License Agreements, and Royalties, Texas Education Agency, 1701 N. Congress Ave., Austin, TX 78701-1494; phone 512-463-9041; email copyrights@tea.texas.gov.
Goals

• Participants will
  – understand the purpose of the MSTAR Diagnostic Assessments,
  – examine the connection between RtI and the MSTAR Assessment System, and
  – interpret results from MSTAR Diagnostic Assessments’ reports.
Purpose of TXAR Initiatives
TXAR Implementation

Curriculum

- TEKS (2012)
- TX Response to the Curriculum Focal Points (2012)

Formative Assessments: Universal Screeners and Diagnostic Assessments

Assessment

Professional Development Intervention Lessons

Instruction

Copyright © Texas Education Agency 2015. All rights reserved.
What is RTI?

Response to Intervention (RtI) is an approach that schools use to help all students, including struggling learners. The RtI approach gives Texas students opportunities to learn and work at their grade level. The idea is to help all students be successful.
Recommendation 1.
Make data part of an ongoing cycle of instructional improvement by

- **Collecting** and preparing a variety of **data** about student learning,
- **Interpreting data** and **developing hypotheses** about how to improve student learning, and
- **Modify instruction** to test hypotheses and increase student learning.
The Data Use Cycle

- **Identify** students that need additional support
- **Gather** data to support how you will intervene
- **Analyze** data and determine an intervention plan
- **Implement** an intervention plan
- **Evaluate** student progress
Identify

• Administer the ESTAR/MSTAR Universal Screener to all students in your classroom.

• Use the results to determine which students need additional support based on their performance.
ESTAR/MSTAR Universal Screener

Tier 1: Minimal Instructional Support

Tier 2: Strategic Instructional Support

Tier 3: Intensive Instructional Support
Gather

• Collect various forms of **qualitative** and **quantitative** data to help you determine which diagnostic assessment should be assigned.

• Use the ESTAR/MSTAR Diagnostic Decision Tree and Assessment Guide to select and assign an appropriate ESTAR/MSTAR Diagnostic Assessment.
ESTAR/MSTAR Diagnostic Assessments

Learning Progressions

Blueprint

Item Writing

Item Validation

Form Creation

Developmental
ESTAR Diagnostic Assessments

Understanding Addition and Subtraction of Whole Numbers (AS)
- A - Foundations of Addition and Subtraction of Whole Numbers
- B - Applications of Addition and Subtraction of Whole Numbers

Understanding Multiplication and Division of Whole Numbers (MD)
- A - Foundations of Multiplication and Division of Whole Numbers
- B - Applications of Multiplication and Division of Whole Numbers

Fractions as Numbers (FR)
- Fractions as Numbers

Copyright © Texas Education Agency 2015. All rights reserved.
MSTAR Diagnostic Assessments

Rational Numbers (RN)
- A – Understanding Fractions
- B – Representations of Positive Rational Numbers
- C – Applications of Positive Rational Numbers

Variables and Expressions (VE)
- A – Understanding Variables
- B – Expressions and Equations
MSTAR Diagnostic Decision Tree
# MSTAR Assessment Guide

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Content / Assessment Focus</th>
</tr>
</thead>
</table>
| **RN.A** Understanding Fractions | • Understanding the magnitude of whole numbers and fractions  
  • Partitioning whole and different-sized shapes and combining partitioned parts  
  • Composing and decomposing fractions using addition and multiplication |
| **RN.B** Representations of Positive Rational Numbers | • Representing and generating equivalent fractions  
  • Writing, comparing, and representing decimals  
  • Comparing fractions using visual models, by reasoning about the numerators and denominators, and by finding a common denominator  
  • Identifying and generating equivalent fractions and decimals |
| **RN.C** Applications of Positive Rational Numbers | • Understanding attributes of ratios and identifying equivalent ratios  
  • Identifying, applying, and extending unit rates  
  • Modeling and solving addition and subtraction problems with rational numbers  
  • Modeling and solving multiplication problems with rational numbers  
  • Modeling and solving division problems with rational numbers |
| **VE.A** Understanding Variables | • Identifying, describing, and using variables as unknown quantities  
  • Evaluating single and multi-variable expressions  
  • Translating between verbal descriptions and symbolic representations of equations and expressions  
  • Simplifying expressions with whole number, rational, or unwritten coefficients |
| **VE.B** Expressions & Equations | • Understanding relationship between expressions  
  • Solving single variable equations using a variety of methods |
Administering a Diagnostic Assessment

- Students have unlimited time to complete an ESTAR/MSTAR Diagnostic Assessment.
- There are 25-55 questions per assessment.
- Stopping rules are in place to minimize frustration.
- Give the diagnostic assessments electronically.
Administration Guidelines

**ESTAR/MSTAR Teacher**

- Accessing the system
- Assign students an assessment
- Access the reports
- Additional guidelines for administration

**ESTAR/MSTAR Student**

- Accessing the system
“But I thought —”

“I should give all of the diagnostic assessments to the students who were identified as ‘at-risk’ on the universal screener.”

“I should give every student in my class one of the diagnostic assessments.”
Use the reports from the diagnostic assessments to determine an action plan based upon students’ strengths and opportunities for growth.
The reports provide you with the students’ current location on a mathematical learning progression. 

**efficiently plan supplemental instruction**

information about students’ strengths and opportunities for growth.
Generating the Diagnostic Summary Report
Making Instructional Decisions using the Diagnostic Summary Report

<table>
<thead>
<tr>
<th>Misty Salasoza’s MSTAR Diagnostic Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student: Misty Salasoza</td>
</tr>
<tr>
<td>Teacher: Mrs. Barnhill</td>
</tr>
<tr>
<td>Assessment Date: 05-31-2013</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RN.A Understanding Fractions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnitude</td>
</tr>
<tr>
<td>Equipartition</td>
</tr>
<tr>
<td>Decomposition</td>
</tr>
</tbody>
</table>

What is the student’s greatest area of proficiency?

What is the student’s greatest area of non-proficiency?
### Making Instructional Decisions using the Diagnostic Summary Report

#### Opportunities

**The student does not understand:**
- equal intervals as they relate to counting distance using a number line, location of unit fractions and mixed numbers greater than 1, and relative size of a fraction compared to 1 based on the numerator and denominator. (RN.A 1.3)
- unit fractions as equal intervals on a number line, the location of mixed numbers based on the sum of unit fraction intervals, and the distance between two fractions based on unit fraction intervals. (RN.A 1.4)
- the connection between a) fractions as partitioning a whole into equal parts, and b) division as partitioning a set of objects into equal groups without a remainder. (RN.A 2.3)
- the connection between fractions and division as partitioning, a set can be composed of several wholes, and the number of equally-sized parts in a whole determines the unit fraction that can be used to compose larger fractions. (RN.A 2.4)
- composition and decomposition of fractions with the same denominator (including improper fractions) represents addition and subtraction of unit fractions. (RN.A 3.2)
- composition and decomposition to represent whole numbers as fractions, and models addition of unit fractions with the same denominator as multiplication. (RN.A 3.3)
- decomposition of fractions (including improper fractions) and whole numbers modeled as repeated addition of equal fractions (including unit fractions) or multiplication. (RN.A 3.4)

#### Strengths

**The student understands:**
- the natural order of a number line and how to create and interpret a number line with proper order and spacing using 0 and positive whole numbers. (RN.A 1.1)
- that numbers on a number line represent a location and a distance from 0, numerical values increase “to the right”, and common fractions can be used to approximate rational number distance. (RN.A 1.2)
- fractions can be modeled by equally partitioning circles and rectangles and the number of equally-sized pieces that compose one whole. (RN.A 2.1)
- fractions and unit fractions can be modeled by equally partitioned shapes, the total number of parts in one whole is the denominator of a fraction, and the same unit fraction can describe wholes of different shapes and sizes. (RN.A 2.2)
- how a visual model can be used to show the composition of a fraction as the number of equal parts and that the numerator and denominator of the fraction will be equal when all parts in the whole are counted. (RN.A 3.1)

---

**Which strengths can you build upon to support opportunities for growth?**

- set of objects into equal groups without a remainder. (RN.A 2.3)
- the connection between fractions and division as partitioning, a set can be composed of several wholes, and the number of equally-sized parts in a whole determines the unit fraction that can be used to compose larger fractions. (RN.A 2.4)

**In what order could you progress through these opportunities to increase the student’s understanding of the concepts?**

- composition and decomposition to represent whole numbers as fractions, and models addition of unit fractions with the same denominator as multiplication. (RN.A 3.3)
- decomposition of fractions (including improper fractions) and whole numbers modeled as repeated addition of equal fractions (including unit fractions) or multiplication. (RN.A 3.4)
## Making Instructional Decisions using the Diagnostic Summary Report

### Opportunities

The student does not understand:

- equal intervals as they relate to counting distance using a number line, location of unit fractions and mixed numbers greater than 1, and relative size of a fraction compared to 1 based on the numerator and denominator. (RN.A 1.3)
- unit fractions as equal intervals on a number line, the location of mixed numbers based on the sum of unit fraction intervals, and the distance between two fractions based on unit fraction intervals. (RN.A 1.4)
- the connection between a) fractions as partitioning a whole into equal parts, and b) division as partitioning a set of objects into equal groups without a remainder. (RN.A 2.3)
- the connection between fractions and division as partitioning, a set can be composed of several wholes, and the number of equally-sized parts in a whole determines the unit fraction that can be used to compose larger fractions. (RN.A 2.4)
- composition and decomposition of fractions with the same denominator (including improper fractions) represents addition and subtraction of unit fractions. (RN.A 3.2)
- composition and decomposition to represent whole numbers as fractions, and models addition of unit fractions with the same denominator as multiplication. (RN.A 3.3)
- decomposition of fractions (including improper fractions) and whole numbers modeled as repeated addition of equal fractions (including unit fractions) or multiplication. (RN.A 3.4)

### Strengths

The student understands:

- the natural order of a number line and how to create and interpret a number line with proper order and spacing using 0 and positive whole numbers. (RN.A 1.1)
- that numbers on a number line represent a location and a distance from 0, numerical values increase "to the right", and common fractions can be used to approximate rational number distance. (RN.A 1.2)
- fractions can be modeled by equally partitioning circles and rectangles and the number of equally-sized pieces that compose one whole. (RN.A 2.1)
- fractions and unit fractions can be modeled by equally-partitioned shapes, the total number of parts in one whole is the denominator of a fraction, and the same unit fraction can describe wholes of different shapes and sizes. (RN.A 2.2)
- how a visual model can be used to show the composition of a fraction as the number of equal parts and that the numerator and denominator of the fraction will be equal when all parts in the whole are counted. (RN.A 3.1)

---

Which strengths can you build upon to support opportunities for growth?
Making Instructional Decisions using the Diagnostic Summary Report

<table>
<thead>
<tr>
<th>Vernon Marcadi’s MSTAR Diagnostic Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student: Vernon Marcadi</td>
</tr>
<tr>
<td>Teacher: Mrs. Gilleski</td>
</tr>
<tr>
<td>Assessment Date: 05-31-2013</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RN.B Representations of Positive Rational Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not proficient</td>
</tr>
</tbody>
</table>

- **Decimals**
- **Equivalent Fractions**
- **Comparing Two Fractions**
- **Conversion Between Representations**

What is the student’s greatest area of proficiency?

What is the student’s greatest area of non-proficiency?
Making Instructional Decisions using the Diagnostic Summary Report

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Strengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student does not understand:</td>
<td>The student understands:</td>
</tr>
<tr>
<td>• multiplying a fraction by an equivalent representation of 1, (\frac{n}{n}), generates an equivalent fraction in which the denominator represents the whole.</td>
<td>• that equivalent fractions can be represented with a visual model and are located at the same point on a number line. (RN.B 4.1)</td>
</tr>
<tr>
<td>• how to a) accurately measure length as a decimal, b) identify the location of a decimal on a number line, and c) recognize equivalence between decimals and fractions with denominators that are powers of 10, and compares decimals that have the same place value. (RN.B 5.3)</td>
<td>• how to a) approximate the length of an object to the nearest hundredth, b) locate the point on a number line corresponding to this length, and c) use the money model to connect decimals (tenths, and hundredths) to fractions with denominators of 10 or 100. (RN.B 5.2)</td>
</tr>
<tr>
<td>• the fractional portion of a decimal represents part of another unit, and how to use place value and expanded notation to read, write, and compare decimals. (RN.B 5.4)</td>
<td>• fraction comparison with models through reasoning about the size of the denominator when the numerators are the same. (RN.B 6.1)</td>
</tr>
<tr>
<td>• comparing fractions with like denominators through reasoning about the number of parts in the numerator (with or without models). (RN.B 6.2)</td>
<td>• decimal equivalences for common fractions and uses division to determine the whole part of an improper fraction. (RN.B 7.1)</td>
</tr>
<tr>
<td>• comparing fractions with unlike denominators by finding a common denominator and/or reasoning about the quantity and size of each part in a fraction (with or without models). (RN.B 6.3)</td>
<td>• that equivalent fractions can be represented with a visual model and are located at the same point on a number line. (RN.B 4.1)</td>
</tr>
<tr>
<td>• different fractions can be equal or, when represented on a model, have the same magnitude. (RN.B 4.3)</td>
<td>• how to a) approximate the length of an object to the nearest tenth, and b) locate the point on a number line corresponding to this length. (RN.B 5.1)</td>
</tr>
<tr>
<td>• how to a) approximate the length of an object to the nearest hundredth, b) locate the point on a number line corresponding to this length, and c) use the money model to connect decimals (tenths, and hundredths) to fractions with denominators of 10 or 100. (RN.B 5.2)</td>
<td>• how to a) approximate the length of an object to the nearest hundredth, b) locate the point on a number line corresponding to this length, and c) use the money model to connect decimals (tenths, and hundredths) to fractions with denominators of 10 or 100. (RN.B 5.2)</td>
</tr>
<tr>
<td>• converting fractions to decimals by using long division and justifies that division represents counting unit fractions. (RN.B 7.3)</td>
<td>• how to a) approximate the length of an object to the nearest hundredth, b) locate the point on a number line corresponding to this length, and c) use the money model to connect decimals (tenths, and hundredths) to fractions with denominators of 10 or 100. (RN.B 5.2)</td>
</tr>
</tbody>
</table>

Which strengths can you build upon to support opportunities for growth?

In what order could you progress through these opportunities to increase the student’s understanding of the concepts?
## Making Instructional Decisions using the Diagnostic Summary Report

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Strengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student does not understand:</td>
<td>The student understands:</td>
</tr>
<tr>
<td>• multiplying a fraction by an equivalent representation of 1, ((n/n)), generates an equivalent fraction in which the denominator represents the whole divided (n) times and the numerator represents (n) times as many shaded parts. (RN.B 4.4)</td>
<td>• that equivalent fractions can be represented with a visual model and are located at the same point on a number line. (RN.B 4.1)</td>
</tr>
<tr>
<td>• how to a) accurately measure length as a decimal, b) identify the location of a decimal on a number line, and c) recognize equivalence between decimals and fractions with denominators that are powers of 10, and compares decimals that have the same place value. (RN.B 5.3)</td>
<td>• how to generate simple equivalent fractions using models, or by finding common denominators and multiplying the numerator and denominator by the same number. (RN.B 4.2)</td>
</tr>
<tr>
<td>• the fractional portion of a decimal represents part of another unit, and how to use place value and expanded notation to read, write, and compare decimals. (RN.B 5.4)</td>
<td>• that different fractions can be equal or, when represented on a model, have the same magnitude. (RN.B 4.3)</td>
</tr>
<tr>
<td>• comparing fractions with like denominators through reasoning about the number of parts in the denominators. (RN.B 6.3)</td>
<td>• how to a) approximate the length of an object to the nearest tenth, and b) locate the point on a number line corresponding to this length. (RN.B 5.1)</td>
</tr>
<tr>
<td>• comparing fractions with unlike denominators through reasoning about the number of parts in the denominators. (RN.B 6.3)</td>
<td>• how to a) approximate the length of an object to the nearest hundredth, b) locate the point on a number line corresponding to this length, and c) use the money model to connect decimals (tenths, and hundredths) to fractions with denominators of 10 or 100. (RN.B 5.2)</td>
</tr>
</tbody>
</table>

### Which strengths can you build upon to support opportunities for growth?

- • [Fractions](#) with [denominators](#) that are powers of 10.
- • [Decimals](#) with [place value](#).
- • [Money](#) with [fractions](#) of 10 or 100.

---

Copyright © Texas Education Agency 2015. All rights reserved.
Making Instructional Decisions using the Diagnostic Summary Report

In what order could you progress through these opportunities to increase the student’s understanding of the concepts?

**Opportunities**

The student does not understand:

- multiplying a fraction by an equivalent representation of 1, \( \frac{n}{n} \), generates an equivalent fraction in which the denominator represents the whole divided \( n \) times and the numerator represents \( n \) times as many shaded parts. (RN.B 4.4)
- how to a) accurately measure length as a decimal, b) identify the location of a decimal on a number line, and c) recognize equivalence between decimals and fractions with denominators that are powers of 10, and compares decimals that have the same place value. (RN.B 5.3)
- the fractional portion of a decimal represents part of another unit, and how to use place value and expanded notation to read, write, and compare decimals. (RN.B 5.4)
- comparing fractions with like denominators through reasoning about the number of parts in the

**Strengths**

The student understands:

- that equivalent fractions can be represented with a visual model and are located at the same point on a number line. (RN.B 4.1)
- how to generate simple equivalent fractions using models, or by finding common denominators and multiplying the numerator and denominator by the same number. (RN.B 4.2)
- that different fractions can be equal or, when represented on a model, have the same magnitude. (RN.B 4.3)
- how to a) approximate the length of an object to the nearest tenth, and b) locate the point on a number line corresponding to this length. (RN.B 5.1)
- how to a) approximate the length of an object to the nearest hundredth, b) locate the point on a number line corresponding to this length, and c) use the money model to connect decimals (tenths, and hundredths) to fractions with denominators of 10 or 100. (RN.B 5.2)
Making Instructional Decisions Using the Student and Group Misconceptions Report

Which circles would it be helpful to click on so that you could get more information about the students’ misconceptions and errors based on their responses?
Making Instructional Decisions Using the Student and Group Misconceptions Report

<table>
<thead>
<tr>
<th>Student</th>
<th>Classroom</th>
<th>RN.B.4.1 Representing Equivalence</th>
<th>RN.B.4.2 Generating Equivalent Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Summary</td>
<td>All Cls</td>
<td></td>
<td>1 of 2 students proficient</td>
</tr>
<tr>
<td>VERNON MARCADI</td>
<td>Math Peri</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Swe</td>
<td>RN.B.4.2 Generating Equivalent Models</td>
<td>The student generates simple equivalent fractions using a visual model.</td>
</tr>
<tr>
<td></td>
<td>Math Peri</td>
<td></td>
<td>The student finds common denominators needed to write equivalent fractions (e.g., 3/4 as 18/24). The student knows to perform the same operation to the numerator and denominator to generate equivalent fractions.</td>
</tr>
<tr>
<td></td>
<td>Swe</td>
<td>(M) Thinks adding to the numerator and denominator will generate equivalent fractions. (M) Thinks multiplying the numerator and denominator by the same number is x times the fraction [(ax/bx ≠ x(a/b)] (M) Cannot relate the process of finding equivalent fractions to the model of the whole (i.e., increasing the denominator by a factor of x (resulting in smaller parts) results in a numerator that is also increased by a factor of x (a larger # of parts) in order to be equivalent to the original fraction.</td>
<td></td>
</tr>
<tr>
<td>MARCUS DEWARE</td>
<td>Math Peri</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Swe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>Classroom</td>
<td>RN.A 1.1 Number Line Structure</td>
<td>RN.A 1.2 Magnitude as Distance</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>--------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Group Summary</td>
<td>Math Grade Period 1 BARNHILL</td>
<td>1 of 1 students proficient</td>
<td>0 of 1 students proficient</td>
</tr>
<tr>
<td>MISTY SALASOZA</td>
<td>Math Grade 6 Period 1 BARNHILL</td>
<td>![black_circle]</td>
<td>![gray_circle]</td>
</tr>
</tbody>
</table>

**RN.A 1.3 Part to Whole Relationships**

- (M1) Does not recognize that when dividing a whole into equal parts, each part has the same magnitude and the sum of the parts sum to equal the whole (e.g., $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{4}{4}$)
- (E1) Cannot correctly convert a mixed number to an improper fraction
The Data Use Cycle

- **Identify** students that need additional support
- **Gather** data to support how you will intervene
- **Analyze** data and determine an intervention plan
- **Implement** an intervention plan
- **Evaluate** student progress
ESTAR/MSTAR Professional Development

ESTAR/MSTAR Assessments
- ESTAR/MSTAR Universal Screeners
- ESTAR/MSTAR Diagnostic Assessments
- ESTAR/MSTAR Learning Progressions

Tier 1 Instruction
- ESTAR Academies

Tier II Instruction
- Coming Soon
  - ESTAR Implementation Tools
- Coming Soon
  - MSTAR Implementation Tools
Testing Windows

• Universal Screener
  – Fall – August 24 – October 2, 2015
  – Spring – April 4 – May 6, 2016

• Diagnostic Assessments
  – Fall – August 30 – October 9, 2015
  – Spring – April 11 – May 13, 2016
Accessing the ESTAR/MSTAR System

http://mstar.epsilen.com

mathtx@esc13.net

Help desk: 1-855-462-8489
# Additional Sessions

<table>
<thead>
<tr>
<th>ESTAR Diagnostic Assessments</th>
<th>Friday 10:00</th>
<th>381BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>RtI Website and App</td>
<td>Friday 1:00</td>
<td>381BC</td>
</tr>
</tbody>
</table>
Contact Information

www.smu.edu/RME
Email: RME@smu.edu
@RME_SMU

SMU Research in Mathematics Education - RME

Contact TEA

curriculum@tea.texas.gov