

Mississippi Academic Assessment Program

Item Writing Training Grades 7-12

June 2018



Mrs. Marsha Hillhouse

Pontotoc City School District

Mrs. Michelle Corbin

Desoto County School District

Mississippi Department of Education

VISION

To create a world-class educational system that gives students the knowledge and skills to be successful in college and the workforce, and to flourish as parents and citizens

MISSION

To provide leadership through the development of policy and accountability systems so that all students are prepared to compete in the global community



State Board of Education Goals FIVE-YEAR STRATEGIC PLAN FOR 2016-2020

- 1.All Students Proficient and Showing Growth in All Assessed Areas
- 2.Every Student Graduates from High School and is Ready for College and Career
- 3.Every Child Has Access to a High-Quality Early Childhood Program
- 4.Every School Has Effective Teachers and Leaders
- 5.Every Community Effectively Uses a World-Class Data System to Improve Student Outcomes
- 6.Every School and District is Rated “C” or Higher



3

Ice Breaker

Math Stars



4

Math Stars

What do you have in common with your team members?

1. Fold the paper on the vertical/horizontal dotted lines and then cut along the solid lines of the star.
2. Unfold and glue onto a piece of paper. Write each person's name on a star.



Math Stars Cont.

- Find ways that each person in the team is unique from the others (things that are about that person only), and write those things on each person's star.
- List your team's common attributes in the center of the 4 stars.
- If extra time, find something in common with those that the points of your star are connected.

Item Writing Training Goals

- Understand grade level math standards and expectations
- Collaborate with math educators from across the state
- Develop an understanding of best practices in item writing

Unpacking for Item Writing

What is important?

Unpacking the Standard

What does this standard mean?

7.RP.2c	<p><u>Represent</u> <u>proportional relationships</u> by <u>equations</u>.</p> <p><i>For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t=pn$.</i></p>
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7.RP.2c

Knowledge/ Concept	Skills
<p>What do students need to know/understand?</p> <p>Underline the Nouns</p> <p>List Nouns:</p> <p>proportional relationships</p> <p>equations</p> <p>Think KEY TERMS!</p>	<p>What do students need to be able to do?</p> <p>Circle the Verbs</p> <p>List Verbs:</p> <p>represent</p> <p>Think ACTIONS!</p>

7.RP.2c

- What standards should students have mastery of from the prior grade, (6th)?
- Where is this leading to in the next grade level, (8th)?

7.RP.2c

Prior grade:

6.EE.9 - Write an equation to express on quantity, in terms of another quantity.

6.RP.2 – Understand the concept of unit rate

6.RP.3b – Solve unit rate problems

Next grade:

8.F.2 - Compare two functions given in different forms.

8.EE.5 – Graph proportional relationships.

Now it's your turn...

- As a team, “unpack” standard 8.EE.7b.
- What standards should students have mastery of from the prior grade, (7th)?
- Where is this leading to in the next grade level, (Algebra I)?



8.EE.7b

Knowledge/ Concept	Skills
What do students need to understand? Think KEY TERMS! List Nouns: linear equations inequalities rational number coefficients expressions distributive property like terms	What do students need to do? Think ACTIONS! List Verbs: solve including* (this is important info) expanding using collecting

8.EE.7b

Prior grade:

7.EE.4a - Solve word problems leading to $px+q$ and $p(x+q) = r$, where p , q , and r are rational numbers.

7.NS.2a – distributive property with negatives

7.EE.1 – Properties of operations to add, subtract, factor, expand, linear expressions.

Next grade:

A-REI.3 - Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

A-CED.1 – Create equations and inequalities in one variable and use them to solve problems.



Content

Alignment

What does it mean?



Content Alignment

- Literal interpretation of the standard
- On grade level
- Skill specific
- Item should be written to one standard, not overlapping standards
- Items may not cover the entire standard
- Specific to sub standards (e.g., a, b, c...)
- Appropriate DOK level



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17

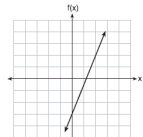
Sample Items

Two functions are given.

Function 1

x	y
2	1
3	3
4	5

Function 2



1. Which statement is a true comparison of the two functions?

- A. The y -intercept of Function 1 is the same as the y -intercept of Function 2.
- B. The y -intercept of Function 1 is the opposite of the y -intercept of Function 2.
- C. The rate of change of Function 1 is the same as the rate of change of Function 2.
- D. The rate of change of Function 1 is the opposite of the rate of change of Function 2.



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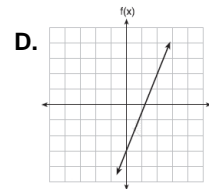
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2. Of the four linear functions represented below, which has the **greatest** y -intercept?

- A. A number (y) is two less than twice a number, x .
- B. $y = 4x + 3$

C.

x	$h(x)$
-1	-1
0	0
1	1



8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

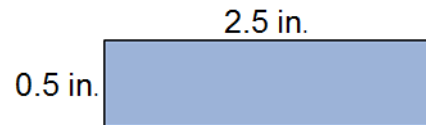
18

Sample Items

1. Sandy made a scale drawing for a rectangular flower bed. If the actual flower bed is 15 feet long, what is the scale factor?



2. Sandy made a scale drawing for a rectangular flower bed. If the scale used is 1 inch:6 feet, what is the area of the actual flower bed?



7.G.1

Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.



19

Sample Items

1. Which expression is equivalent to $\frac{4}{3}x + 4\frac{2}{3}$?

A $\frac{1}{3}(4x + 6)$

B $\frac{2}{3}(2x + 7)$

C $\frac{2}{3}(2x + 4)$

D $\frac{4}{3}(4x + 2)$

2. Which expressions are equivalent to $4(x + 7)$?
Select two choices.

A $2(x + 3.5)$

B $2(2x + 14)$

C $4x + 7$

D $4x + 11$

E $4x + 28$

7.EE.1

Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.



20

Depth of

Knowledge (DOK)

Level 1 Recall/Reproduction

Level 2 Skill/Concept

Level 3 Strategic Thinking

Level 4 Extended Thinking



21

Understanding DOK—Big Ideas

- Verbs do not dictate DOK level
- Level increases if it is not common knowledge, (difficulty)
- DOK level
 - Does not equal rigor
 - Should equal the “**thought process**”
- Writers
 - Aim for DOK 2 and DOK 3
 - No DOK 4 items on this assessment



22

DOK Activity

- Take out the cards from the envelope so that every member can see/read the question.
- As a team, sort each item according to the DOK level you think it best aligns.

To what DOK level does this item align?

- Solve for the missing value.

$$3x + 6 = 18$$

- Write the answer in the box.

$$x = \boxed{}$$



DOK 1

7.EE.4a

To what DOK level does this item align?

- Michael earns an allowance of \$10 per week. He can earn another \$2 for each extra chore he completes. He wants to earn \$40 in the next two weeks. How many extra chores must be completed to earn Michael the desired amount?
- Write the answer in the box.

extra chores

7.EE.4a

DOK 2

To what DOK level does this item align?

Sherry likes to rent movies. She has two options from which to choose. Adventureland Video charges \$3.50 per movie. Videos on Demand (VOD) charges a one-time \$10 membership fee, then \$2 per video.

What is the least number of movies, m , Sherry must rent to make VOD the better deal? Fill in the blanks with the appropriate value.

For VOD to be the better deal,
Sherry must rent at least videos.

DOK 3

7.EE.4b

To what DOK level does this item align?

What is the value of x ?

$$\frac{1}{2}(x - 12) + \frac{3}{2}x = \frac{2}{3}(15)$$

Write the answer in the box.

$x =$

DOK 1



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8.EE.7.b

27

To what DOK level does this item align?

Compare the two functions. Which statement is true?

	Function 1			
x	2	4	5	7
y	6	4	3	1

Function 2
 $2x + y = 5$

- A. The rate of change of Function 2 is twice the rate of change of Function 1.
- B. The rate of change of Function 2 is half the rate of change of Function 1.
- C. The rate of change of Function 2 is the opposite of the rate of change of Function 1.
- D. The rate of change of Function 2 is the opposite of the rate of change of Function 1.

DOK 2



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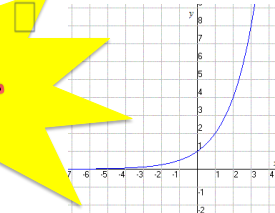
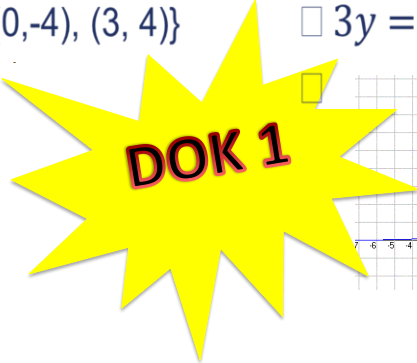
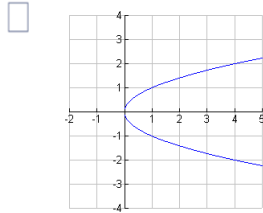
8.F.2

28

To what DOK level does this item align?

Which are functions? Select all that apply.

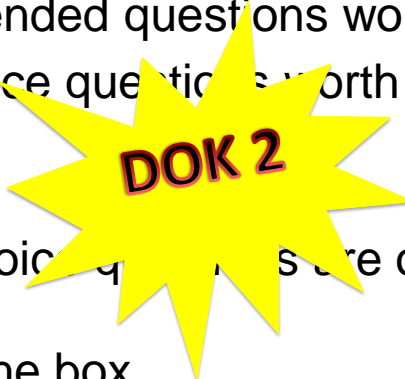
- $\{(-1, 6), (0,5), (1, 4), (-1,-6)\}$
 $xy = 36$
 $\{(2, 8), (-3, 8), (0,-4), (3, 4)\}$
 $3y = 2x - 12$



HS-F-IF.1

To what DOK level does this item align?

A test has sixteen questions worth 100 points. The test consists of open-ended questions worth 8 points each and multiple choice questions worth 4 points each.



How many multiple choice questions are on the test?

Write your answer in the box.

multiple choice questions

HS-A-REI.6

Understanding DOK—Big Ideas Revisited

- Verbs do not dictate DOK level
- Level increases if it is not common knowledge, (difficulty)
- DOK level
 - Does not equal rigor
 - Should equal the “process”
- Writers
 - Aim for DOK 2 and DOK 3
 - No DOK 4 items on this assessment

Content Standard

7.RP.2c

Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p , the relationship between the total cost and the number of items can be expressed as $t=pn$.*

Depth of Knowledge (DOK) Level

- Recall
- Skill/Concept
- Strategic Thinking
- Extended Thinking

Content Standard		Depth of Knowledge (DOK) Level
8.EE.7b	Solve linear equations and inequalities with rational number coefficients, including those whose solutions require expanding expressions using the distributive property and collecting like terms.	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Recall <input checked="" type="checkbox"/> Skill/Concept <input type="checkbox"/> Strategic Thinking <input type="checkbox"/> Extended Thinking

Item Writing

Basics

Item Writing Basics

- No barriers
- Accessible for all students
- Short sentences
- Most important ideas first
- One idea, fact, or process introduced at a time
- Simple, uncluttered graphics and line drawings



Multiple Choice Basics

- Alignment to standard
 - Right down to the verb
- Clearly worded
 - Avoid negatives when possible
- Written as a question
 - Not as a completion statement
- Parallel construction to choices
- Answer choices should follow order, (i.e., least to greatest; shortest to longest, etc.).

Multiple Choice Basics

- To interpret the question
 - Students should not have to read the choices
- Avoid absolutes
 - “None of the Above” and “All of the Above”
- Use of
 - “What” or “Which”
- Eliminate
 - Any unnecessary or nonfunctional words
 - Excessive prepositional phrases

Multiple Choice Basics

- Avoid window dressing
 - Put questions in context
- Avoid cluing or clang associations
- Avoid phrases or topics that
 - Date an item or limit its lifespan
- Avoid misleading graphics
 - Graphics should be clear and labeled

Question #1

Revise this question to match the guidelines.

Anna was wearing her favorite dress while baking a cake on a warm and sunny day. The recipe called for $\frac{1}{4}$ cup of sugar. She wanted to triple the recipe. Which ...

Window Dressing

Question #2

Revise this question to match the guidelines.

What must be true of a right triangle?

- A. The angles must sum to 360 degrees
- B. All 3 sides must be equal
- C. The height must be half of the base
- D. There must be one right angle

**Absolutes
Short – long
clueing**

Question #3

Revise this question to match the guidelines.

Quadrilaterals all have _____

- A. 4 sides
- B. 3 sides
- C. 2 sides
- D. 5 sides



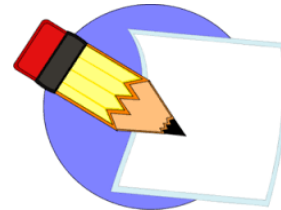
**Question
Order choices
repetition**

Parts of an Item

Item Types

Parts of an Item

- I. Directions (with appropriate directional line)
- II. Stem
- III. Graphic- sketch/drawing/picture to support your item (if needed)
- IV. Answer choices
 - a) Distractors (incorrect answers)
 - b) Rationales



Distractor/Rationale Item

- In addition to the correct answer, create three distractors and provide your rationales for the question.

A cake recipe calls for $\frac{1}{2}$ cup of sugar. Anna wants to triple the recipe. How much sugar does she need?

MAAP Item Types

TAO	Description	Item Classification
Choice	<ul style="list-style-type: none"> Regular Multiple Choice M of N Multiple Choice (2 of 5 or 3 of 7) 	Multiple Choice
Inline Choice	Drop Down Options	Technology Enhanced
Drag and Drop	Drag and Drop	
Match	Multi-Select Table	
Line Match	Matching	
Text Entry	Type-in-Text	Constructed Response (currently, MAAP only allows text entry for numbers & symbols only)
Two-Part	Part A/Part B	Varies



*Questar currently uses TAO as their item development platform.

45

Parts of an Item

Solve for the missing value.

Directions

$$3x + 6 = 18$$

Stem

Write the answer in the box.

Directional Line

$x =$

Answer



46

Choice Items

- Answer choices are A-D
- *Standard Choice items do not have a directional line.*

Which expression is equivalent to $3x^2 + 7x - (x + 4)^2 - 9$?

- Ⓐ $2x^2 + 7x - 25$
- Ⓑ $2x^2 + 7x + 7$
- Ⓒ $2x^2 + 6x + 7$
- Ⓓ $2x^2 - x - 25$

Choice M of N Items

Which groupings represent 36 apples placed equally into baskets?

Select **two** answer choices.

- Ⓐ 6 apples in 4 baskets
- Ⓑ 6 apples in 6 baskets
- Ⓒ 7 apples in 4 baskets
- Ⓓ 8 apples in 3 baskets
- Ⓔ 9 apples in 4 baskets

Choice M of N:
Select 2 of 5;
Select 3 of 7

Inline Choice (Drop Down)

A nanometer can be expressed as 1×10^{-9} meters, and a millimeter can be expressed as 1×10^{-3} meters.

Select the options that correctly complete the sentence.

A is larger than a .

millimeter nanometer	10,000 100,000 1,000,000 10,000,000	millimeter nanometer
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Matching/Line Match

Draw a line from each equation in Column A to an equation in Column B that is equal.

Column A

$485 - 255 = ?$

$296 + 504 = ?$

$800 - 420 = ?$

Column B

$375 - 145 = ?$

$600 - 220 = ?$

$640 + 160 = ?$

Match (Multi-Select Table)

Select the box or boxes that represent the transformation of each function from the parent function $f(x) = x^2$.

	Vertical Reflection	Vertical Translation	Horizontal Translation
$f(x) = x^2 - \frac{9}{7}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$f(x) = -x^2$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$f(x) = (x + 3)^2$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$f(x) = (x + 1)^2 + 13$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Drag and Drop

Drag each expression on the left to its equivalent value.

$$2^7$$

$$3^5$$

$$4^3$$

$$\square = 12$$

$$\square = 14$$

$$\square = 15$$

$$\square = 64$$

$$\square = 128$$

$$\square = 243$$

Text Entry (Type-in-Text)

The basket attached to each model balloon is a rectangular box. The box is 10 inches long and 8 inches wide. The volume of the box is 400 cubic inches. What is the height of the box (in inches)?

Write the answer in the box.

inches

Include appropriate units

Text Entry (Type-in-Text)

A soccer game started at 2:15 p.m. and ended at 3:35 p.m. How long did the game last?

minutes

What is missing?

LUNCH BREAK

Who's hungry?

Group Task

Item Writing

Practice time

Team Practice

- As a team, write a test item of your choice on the chart paper from one of the given standards.
- Be sure to write the standard and include all the parts of an item.



Carousel Activity – As a team:

1. Standards Packet – check for alignment (actions/key terms).
2. Item Type reference sheet – check for all parts of the item.
3. Post-its and pen – write groups feedback.

Use a post-it to give the team feedback that can be used to improve their item.

Individual Task

Item Writing

Show What You Know



59

Individual Exit Activity

Using the Standards, write 1 multiple choice question and 1 technology enhanced question.

Be sure to include:

- Directions (with directional line)
- Stem
- Graphic/Sketch (if needed)
- Answer Choices
 - Distractors (incorrect answers)
 - Rationales (plausible reason a student would choose)



60

Choose a Standard from a Domain below:

7 th Grade	8 th Grade	Algebra I
Geometry	Functions	A-SSE
Statistics	Statistics and Probability	A-APR
		Functions
		Statistics

Wrap-Up

- All participants are required to complete the survey, evaluation, and the exit task sheet.
- Please turn in all paperwork on your way out and pick up your CEU certificate.
- Thanks for coming and have a great afternoon!



Contact Information

Contact	Email
Vinnie Segalini State Assessment Director	vsegalini@mdek12.org
Libby Cook OSA Mathematics Content Specialist	ecook@mdek12.org
Marsha Hillhouse Pontotoc City Schools	mhillhouse@pontotoc.k12.ms.us
Michelle Corbin Desoto County Schools	Michelle.corbin@dcsms.org