## Smarter Balanced Assessment Consortium:

## Mathematics Practice Test Scoring Guide Grade 10

08/14/2019

## Grade 10 Mathematics

About the Practice Test Scoring Guides
The Smarter Balanced Mathematics Practice Test Scoring Guides provide details about the items, student response types, correct responses, and related scoring considerations for the Smarter Balanced Practice Test items. The items selected for the Practice Test are designed to reflect

- a broad coverage of claims and targets that closely mirror the summative blueprint.
- a range of student response types.
- a breadth of difficulty levels across the items, ranging from easier to more difficult items.

It is important to note that all student response types are not fully represented on every practice test, but a distribution can be observed across all the practice tests. The items presented are reflective of refinements and adjustments to language based on pilot test results and expert recommendations from both content and accessibility perspectives.

Within this guide, each item is presented with the following information ${ }^{1}$ :

- Claim: statement derived from evidence about college and career readiness
- Domain: a broad content area that contains related targets and standards (i.e., Geometry)
- Target: statement that bridges the content standards and the assessment evidence that supports the claim
- Depth of Knowledge (DOK): measure of complexity considering the student's cognitive process in response to an item. There are four DOK levels, a 4 being the highest level.
- Common Core State Standards for Mathematical Content (CCSS-MC)
- Common Core State Standards for Mathematical Practice (CCSS-MP)
- Static presentation of the item: static presentation of item from test administration system
- Static presentation of student response field(s): static presentation of response field from test administration system
- Answer key or exemplar: expected student response or example response from score point value
- Rubric and applicable score points for each item: score point representations for student responses

The following items are representative of the kinds of items that students can expect to experience when taking the Computer Adaptive Test (CAT) portion of the summative assessment for high school. A separate document is available that provides a high school sample performance task and scoring guide.

[^0]
## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\# 1$ | 1 | A-SSE | D | 1 | A-SSE.A. 2 | 7 |

Select the expression that is equivalent to $\left(m^{2}-25\right)$.
(A) $\left(m^{2}-10 m+25\right)$
(B) $\left(m^{2}+10 m+25\right)$
(c) $(m-5)(m+5)$
(D) $(m-5)^{2}$

Key: C
Rubric: (1 point) The student selects the correct equivalent expression.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#2 | 1 | N-RN | A | 1 | N-RN.A.2 | 7 |

Select an expression that is equivalent to $\sqrt{3^{8}}$.
(A) $3^{\frac{1}{4}}$
(B) $3^{3}$
(c) $3^{4}$
(D) $3^{6}$

Key: C
Rubric: (1 point) Student selects the correct equivalent expression.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#3 | 1 | A-APR | F | 2 | A-APR.A.1 | 7 |

Enter an expression equivalent to

$$
\left(3 x^{2}+2 y^{2}-3 x\right)+\left(2 x^{2}+y^{2}-2 x\right)-\left(x^{2}+3 y^{2}+x\right)
$$ using the fewest number of possible terms.



Key: $4 x^{2}-6 x$ or $-6 x+4 x^{2}$
Rubric: (1 point) The student enters a correct equivalent expression.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | cCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\# 4$ | 3 | G-CO | F | 3 | G-CO.C.9 | 7 |

When a transversal intersects a pair of parallel lines it will create two pairs of alternate exterior angles.

Ricky claims the angles within each pair are congruent to each other, but not congruent to either angle in the other pair.

## Part A

Draw a transversal through the point that supports Ricky's claim or select NONE if there is not a situation to support the claim.

## Part B

Draw a transversal through the point that refutes Ricky's claim, or select NONE if there is not a
 situation to refute the claim.

## Exemplar: (shown at right)

Part A: a pair of parallel lines cut by transversal that is not perpendicular to the parallel lines
Part B: a pair of parallel lines cut by perpendicular transversal
Rubric: (2 points) Student draws correct transversals for Part A and Part B.
(1 point) Student draws correct transversal for Part A or Part B.


## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#5 | 1 | A-REI | I | 1 | A-REI.B.3 | 7 |

Which inequality represents all possible solutions of $-6 n<-12$ ?
(A) $n<72$
(B) $n>2$
(c) $n<2$
(D) $n>72$

Key: B
Rubric: (1 point) Student selects the correct inequality.

## Grade 10 Mathematics

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| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#6 | 1 | G-SRT | 0 | 1 | G-SRT.C.6 | 6 |

Consider this right triangle.


Enter the ratio equivalent to $\sin (B)$.


Key: 21/29
Rubric: (1 point) The student enters the correct ratio.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\# 7$ | 3 | N-RN | A | 2 | N-RN.B.3 | 7 |

Cheryl claims that any irrational number squared will result in a rational number.

## Part A

Drag an irrational number into the first response box that when squared will result in a rational number.

## Part B

Drag an irrational number into the second response box that when squared will result in an irrational number.


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Key: (Part A) any of the following: $\frac{\sqrt{3}}{\sqrt{2}}, \sqrt{2}$
(Part B) any of the following: $\frac{\sqrt[3]{2}}{\sqrt{3}}, \sqrt[3]{2}, \pi, \sqrt{\pi}$
Rubric: (1 point) The student correctly selects two numbers that when squared result in a rational number (Part A) and an irrational number (Part B).

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#8 | 1 | A-CED | G | 2 | A-CED.A.1 | N/A |

A train travels 250 miles at a constant speed ( $x$ ), in miles per hour.
Enter an equation that can be used to find the speed of the train, if the time to travel 250 miles is 5 hours.


Key: $\boldsymbol{x}=\frac{\mathbf{2 5 0}}{\mathbf{5}}$ or equivalent. However, do not accept $x=50$ only.
Rubric: (1 point) The student enters a correct equation.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#9 | 1 | S-ID | P | 2 | S-ID.A.1 | 4 |

Click above the numbers to create a line plot for the given percent chances of rain in different cities.

65, 65, 70, 70, 80, 80, 80, 80, 85, 95, 95, 95, 100


Exemplar: (shown at right)
Rubric: (1 point) The student clicks the bottom two boxes of 65 , two boxes of 70 , four boxes of 80 , one box of 85 , three boxes of 95 , and one box of 100 .


## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\# 10$ | 1 | A-Q | C | 2 | A-Q.A.1 | N/A |

The formula for the rate at which water is flowing is $R=\frac{V}{t}$, where

- $R$ is the rate,
- $V$ is the volume of water measured in gallons $(g)$, and
- $t$ is the amount of time, in seconds (s), for which the water was measured.

Select an appropriate measurement unit for the rate.
(A) $g s$
(B)
$\frac{g}{s}$
(c) $\frac{s}{g}$
(D) $\frac{1}{s g}$

Key: B
Rubric: (1 point) The student selects the correct measurement unit.

## Grade 10 Mathematics

E

Emily is solving the equation $2(x+9)=4(x+7)+2$. Her steps are shown.

## Part A

Click on the first step in which Emily made an error.

## Part B

Click on the solution to Emily's original equation.

Exemplar: (shown at right)
Rubric: (2 points) The student selects Step 3 in Part A and indicates -6 as the correct response in Part B.
(1 point) The student gets Part A or Part B correct, but not both.

## Part A

Step 1: $2(x+9)=4(x+7)+2$
Step 2: $2 x+18=4 x+28+2$
Step 3: $2 x+18=4 x+26$
Step 4: $-8=2 x$
Step 5: $-4=x$

## Part B

$$
\begin{array}{lllllll}
-10.5 & -6 & -2 & 0 & 2 & 4.5 & 8
\end{array}
$$

## Part A

Step 1: $2(x+9)=4(x+7)+2$
Step 2: $2 x+18=4 x+28+2$
Step 3: $2 x+18=4 x+26$
Step 4: $-8=2 x$
Step 5: $-4=x$

## Part B

$$
\begin{array}{cccccc}
-10.5 & -6 & -2 & 0 & 2 & 4.5 \\
8
\end{array}
$$

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\# 12$ | 4 | A-REI | D | 3 | A-REI.C | 1 |

A store sells used and new video games. New video games cost more than used video games. All used video games cost the same. All new video games also cost the same.

Omar spent a total of $\$ 84$ on 4 used video games and 2 new video games. Sally spent a total of $\$ 78$ on 6 used video games and 1 new video game. Janet has $\$ 120$ to spend.

Enter the number of used video games Janet can purchase after she purchases 3 new video games.
$\square$

Key: 5
Rubric: (1 point) The student enters the number of used video games that Janet can purchase.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#13 | 1 | A-REI | J | 1 | A-REI.D.12 | N/A |

Click on the region of the graph that contains the solution set of the system of linear inequalities.
$y \leq-\frac{1}{2} x+3$
$y \geq 2 x-2$


Exemplar: (shown at right)
Rubric: (1 point) The student correctly selects the region containing the solution set.


## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\# 14$ | 3 | G-C | G | 2 | G-C.A.3 | 6,7 |

Use the circle below to answer the question.


The circle is centered at point $C$. Line segment $P Q$ is parallel to $S R$. What is the measure of angle QPS?
(A) $68^{\circ}$
(B) $112^{\circ}$
(c) $136^{\circ}$
(D) $158^{\circ}$

Key: B
Rubric: (1 point) The student selects the correct angle measure.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#15 | 1 | A-REI | J | 2 | A-REI.D.10 | N/A |

Choose the ordered pair that is a solution to the equation represented by the graph.

(A) $(0,-3)$
(B) $(2,0)$
(c) $(2,2)$
(D) $(-3,0)$

Key: D
Rubric: (1 point) The student selects the correct ordered pair.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CcSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#16 | 3 | A-REI | E | 3 | A-REI.B.3 | 3 |

Consider this solution to a problem.
Problem: $-4(6-y)+4=-4$
Step 1: $-24-4 y+4=-4$
Step 2: $-20-4 y=-4$
Step 3: $-4 y=16$
Step 4: $y=-4$
In the first response box, enter the number of the step where the mistake is made.

In the second response box, enter the correct solution to the problem.


Key: Part 1: Step 1
Part 2: $y=4$ (or 4)
Rubric: (1 point) The student enters the step where the mistake occurs and enters the correct solution.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CcsS-MC | Ccss-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#17 | 1 | F-IF | K | 2 | F-IF.A.3 | N/A |

Consider a sequence whose first five terms are: $-1.75,-0.5,0.75,2,3.25$

Which function (with domain all integers $n \geq 1$ ) could be used to define and continue this sequence?
(A) $f(n)=\frac{7}{4}(n-1)-\frac{5}{4}$
(B) $f(n)=\frac{5}{4}(n-1)-\frac{7}{4}$
(c) $f(n)=\frac{7}{4} n-\frac{5}{4}$
(D) $f(n)=\frac{5}{4} n-\frac{7}{4}$

Key: B
Rubric: (1 point) The student selects the correct function.

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| Item | Claim | Domain | Target | DOK | CcsS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#18 | 1 | A-SSE | E | 2 | A-SSE.B.3 | 7 |

Write an expression equivalent to $\frac{b^{11}}{b^{4}}$ in the form $b^{m}$.


Key: $b^{7}$
Rubric: (1 point) The student enters the correct expression.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CcSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#19 | 4 | A-REI | E | 3 | A-REI.B.3 | 6 |

Nina has some money saved for a vacation she has planned.

- The vacation will cost a total of $\$ 1600$.
- She will put $\$ 150$ every week into her account to help pay for the vacation.
- She will have enough money for the vacation in 8 weeks.

If Nina was able to save $\$ 200$ a week instead of $\$ 150$ a week, how many fewer weeks would it take her to save enough money for the vacation? Enter the result in the response box.
$\square$

Key: 2
Rubric: (1 point) Student enters the correct number of weeks.

## Grade 10 Mathematics

Assessment Consortium

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#20 | 3 | G-CO | A | 2 | G-CO.C.11 | 3 |

Consider parallelogram $A B C D$ with point $X$ at the intersection of diagonal segments $A C$ and $B D$.


Evelyn claims that $A B C D$ is a square. Select all statements that must be true for Evelyn's claim to be true.

$$
A B=B D
$$$A D=A B$$A C=B X$$m \angle A B C \neq 90^{\circ}$$m \angle A X B=90^{\circ}$

Exemplar: (shown at right)
Rubric: (1 point) The student selects the statements that must be true.

$$
A B=B D
$$

$$
A D=A B
$$

$$
A C=B X
$$$m \angle A B C \neq 90^{\circ}$

$\nabla$
$m \angle A X B=90^{\circ}$

## Grade 10 Mathematics

Item
Claim
Domain
Target
DOK
CCSS-MC
CCSS-MP

| $\# 21$ | 2 | A-CED | A | 2 | A-CED.A.1 | 2 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |

A student earns $\$ 7.50$ per hour at her part-time job. She wants to earn at least \$200.

Enter an inequality that represents all of the possible numbers of hours $(h)$ the student could work to meet her goal. Enter your response in the first response box.

Enter the least whole number of hours the student needs to work in order to earn at least $\$ 200$. Enter your response in the second response box.


Key: Part A: $7.5 h \geq 200$ or equivalent
Part B: 27 or $h=27$
Rubric: (2 points) The student enters the correct inequality and value.
(1 point) The student enters the correct inequality or correct value. OR The student enters the correct answers in the wrong box.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\# 22$ | 1 | S-ID | P | 2 | S-ID.A | 7 |

Michael took 12 tests in his math class. His lowest test score was 78. His highest test score was 98 . On the 13th test, he earned a 64 . Select whether the value of each statistic for his test scores increased, decreased, or could not be determined when the last test score was added.

|  | Standard Deviation | Median | Mean |
| :--- | :---: | :---: | :---: |
| Increased | $\square$ | $\square$ | $\square$ |
| Decreased | $\square$ | $\square$ | $\square$ |
| Could Not Be Determined | $\square$ | $\square$ | $\square$ |

Exemplar: (shown below)

|  | Standard Deviation | Median | Mean |
| :--- | :---: | :---: | :---: |
| Increased | $\boxed{y y y y}$ | $\square$ | $\square$ |
| Decreased | $\square$ | $\square$ | $\square$ |
| Could Not Be Determined | $\square$ | $\square$ | $\square$ |

Rubric: (1 point) The student correctly selects the changes in statistics.

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#23 | 2 | G-SRT | D | 2 | G-SRT.C.8 | 3 |

Emma is standing 10 feet away from the base of a tree and tries to measure the angle of elevation to the top. She is unable to get an accurate measurement, but determines that the angle of elevation is between 55 degrees and 75 degrees.

Decide whether each value given in the table is a reasonable estimate for the tree height. Select Reasonable or Not Reasonable for each height.

|  | Reasonable | Not Reasonable |
| :---: | :---: | :---: |
| 4.2 feet | $\square$ | $\square$ |
| 14.7 feet | $\square$ | $\square$ |
| 24.4 feet | $\square$ | $\square$ |
| 33.9 feet | $\square$ | $\square$ |
| 39.1 feet | $\square$ | $\square$ |
| 58.7 feet | $\square$ | $\square$ |

Exemplar: (shown at right)
Rubric: (1 point) The student correctly identifies the reasonable estimates.

|  | Reasonable | Not Reasonable |
| :--- | :---: | :---: |
| 4.2 feet | $\square$ | $\square$ |
| 14.7 feet | $\square$ | $\square$ |
| 24.4 feet | $\square$ | $\square$ |
| 33.9 feet | $\square$ | $\square$ |
| 39.1 feet | $\square$ | $\square$ |
| $\mathbf{5 8 . 7}$ feet | $\square$ | $\square$ |

## Grade 10 Mathematics

| $\# 24$ | 4 | A-CED | F | 3 | A-CED | $1 ; 4$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |

Emily has a gift certificate for $\$ 10$ to use at an online store. She can purchase songs for $\$ 1$ each or episodes of TV shows for $\$ 3$ each. She wants to spend exactly $\$ 10$.

## Part A

Create an equation to show the relationship between the number of songs, $x$, Emily can purchase and the number of episodes of TV shows, $y$, she can purchase.

## Part B

Use the Add Point tool to plot all possible combinations of songs and TV shows Emily can purchase.


| Part A | Part B |
| :---: | :---: |
|  | Emily's Online Spending |

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#25 | 1 | G-SRT | 0 | 1 | G-SRT.C.8 | 2 |

Consider this right triangle.


Determine whether each expression can be used to find the length of side RS. Select Yes or No for each expression.

| Yes | No |  |
| :---: | :---: | :---: |
| $35 \cdot \sin (R)$ | $\square$ | $\square$ |
| $21 \cdot \tan (T)$ | $\square$ | $\square$ |
| $35 \cdot \cos (R)$ | $\square$ | $\square$ |
| $21 \cdot \tan (R)$ | $\square$ | $\square$ |

## Exemplar: (shown at right)

Rubric: (1 point) The student correctly selects the expressions that can be used to find the length of the side.

|  | Yes | No |
| :--- | :---: | :---: |
| $35 \cdot \sin (R)$ | $\square$ | $\square$ |
| $21 \cdot \tan (T)$ | $\square$ | $\square$ |
| $35 \cdot \cos (R)$ | $\square$ | $\square$ |
| $21 \cdot \tan (R)$ | $\square$ | $\square$ |

## Grade 10 Mathematics

| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $\# 26$ | 1 | F-IF | M | 2 | F-IF.C.7 | N/A |

Given the function
$y=3 x^{2}-12 x+9$,

- Place a point on the coordinate grid to show each $x$-intercept of the function.
- Place a point on the coordinate grid to show the minimum value of the function.



## Exemplar: (shown at right)

Rubric: (2 points) Part A: The student correctly plots the $x$-intercepts (with no other $x$ intercepts plotted). Part B: The student correctly plots the minimum (with no other points not on the $x$-axis plotted).
(1 point) The student gets Part A or Part B correct, but not both.


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| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#27 | 1 | A-CED | $G$ | 2 | A-CED.A.1 | N/A |

Mike earns $\$ 6.50$ per hour plus $4 \%$ of his sales.

Enter an equation for Mike's total earnings, $E$, when he works $x$ hours and has a total of $y$ sales, in dollars.

| $\leftrightarrow \rightarrow$ - |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | $x$ | $y$ E |  |  |  |  |  |  |  |
| 4 | 5 | 6 | + | - $\quad * \div$ |  |  |  |  |  |  |  |
| 7 | 8 | 9 | $<$ | $\leq \geq \geq>$ |  |  |  |  |  |  |  |
| 0 | . | - | 믐 | $\square^{\square}$ | $\square_{0}$ | 0 ( | ) 11 | $\sqrt{\square} \sqrt{\square}$ | $\pi$ | $i$ |  |
|  |  |  | sin | CO | ta | an | $\arcsin$ | arccos | arc |  |  |

Key: $E=6.5 x+0.04 y$ OR equivalent
Rubric: (1 point) The student enters the correct equation.

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| Item | Claim | Domain | Target | DOK | CCSS-MC | CCSS-MP |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| \#28 | 2 | A-REI | A | 2 | A-REI.C | 6 |

The basketball team sold t-shirts and hats as a fund-raiser. They sold a total of 23 items and made a profit of $\$ 246$. They made a profit of $\$ 10$ for every $t$-shirt they sold and $\$ 12$ for every hat they sold.

Determine the number of $t$-shirts and the number of hats the basketball team sold.
Enter the number of t-shirts in the first response box.
Enter the number of hats in the second response box.
$\square$

Key: Part A: 15
Part B: 8
Rubric: (1 point) The student enters the correct number of t-shirts in the first response box and the correct number of hats in the second box.


[^0]:    ${ }^{1}$ Most of these terms (Claim, Domain, Target, DOK, etc.) are further defined in various other Smarter Balanced documents, as well as the Common Core State Standards for Mathematics. Refer to the Content Specifications for the Summative Assessment of the Common Core State Standards for Mathematics for more information.

