



**The New York City
Department of Education**

**Grade 8 Mathematics Benchmark
Assessment**

**Teacher Guide
Fall 2012**

November 26, 2012–January 11, 2013



Table of Contents

Test Design and Instructional Purpose	3
Limitations	3
Test Content	4
Rubrics for Scoring Short-Response & Extended-Response/ Performance Task Items	6

Test Design and Instructional Purpose

The Mathematics Benchmark Assessment is designed to help you collect *some* information about your students' progress toward meeting the Common Core expectations for eighth grade. This information can provide insights into your students' mathematical proficiency, specifically their fluency with skills, their conceptual understanding, and their ability to apply concepts and skills in novel settings. Consequently, the results from the Benchmark Assessment may influence your plans for targeting instruction to meet your students' needs.

There are two Benchmark Assessments available for the school year. Both assessments are aligned to units from the New York City Department of Education's Curriculum Maps. The first Grade 8 Mathematics Benchmark Assessment, designed to be administered in the fall, focuses on Units 1 and 2; and the second Grade 8 Mathematics Benchmark Assessment, designed to be administered in the winter, focuses on Units 3 and 4. The assessments contain various item types: multiple choice, short response, and constructed response/performance tasks. Items may partially align to a single standard, several standards, a cluster, or a domain, or may require synthesis across clusters and/or domains.

The Benchmark Assessments are meant to provide a lens for identifying some of the skills and concepts that may need to be taught or reinforced if students are to meet the Common Core expectations for eighth grade. The results of this assessment will best support your instruction and your students' learning if you are familiar with the Common Core Learning Standards, including the fluency expectations, key advances, and culminating standards.

Limitations

Neither Benchmark Assessment is an exhaustive test. While each Benchmark Assessment reflects the Common Core Standards in the units that comprise its blueprint, Common Core Standards contain a breadth of skills and concepts that cannot be fully assessed by any single measure.

Additionally, each Benchmark Assessment is limited to a maximum of three units and covers approximately 25–40% of the year's instruction. Accordingly, the Benchmark Assessments do not reflect the work of the entire grade.

As a result, this assessment is best used as part of a comprehensive set of evaluative measures that include teacher observation, classwork, homework, and school- or teacher-made assessments.

Test Content

Unit 1 focuses on Congruence and Similarity. Unit 2 focuses on Functions.

Content of Benchmark 1

Unit	Domain	Cluster	Standard	Items
1	Geometry	Understand congruence and similarity using physical models, transparencies, or geometry software.	8.G.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	1, 4, 9, 12, 17, 20, 30
1	Geometry	Understand congruence and similarity using physical models, transparencies, or geometry software.	8.G.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	5, 10, 16, 18, 21, 29
1	Geometry	Understand congruence and similarity using physical models, transparencies, or geometry software.	8.G.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	7, 24, 26, 28, 14
1	Geometry	Understand congruence and similarity using physical models, transparencies, or geometry software.	8.G.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. <i>For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.</i>	32, 22
2	Functions	Define, evaluate, and compare functions.	8.F.1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	3, 8, 11, 31

2	Functions	Define, evaluate, and compare functions.	8.F.2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</i>	2, 15, 19, 25, 27
2	Statistics and Probability	Investigate patterns of association in bivariate data.	8.SP.1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	6, 13, 23, 33

Rubrics for Scoring Short-Response and Extended-Response/Performance Task Items

Item # 27

Key Elements	
N/A	
Criteria	
2	<p>Meets Standard (Meets criteria at grade level) 2 correct elements Writes the difference, in dollars, between the rate per hour charged by the two teachers AND Shows complete and correct work</p>
1	<p>Near Standard (Mostly meets criteria) 1 correct element Writes the difference, in dollars, between the rate per hour charged by the two teachers OR Shows complete and correct work</p>
0	<p>Far Below Standard Incorrect response</p>
Exemplar	
2	<p>15 dollars AND Rate per hour for Teacher A = $75/3 = \\$25$ Rate per hour for Teacher B = $(240 - 120)/(6 - 3) = \\$40$ Difference = $\\$40 - \\$25 = \\$15$ OR Other valid answer</p>

Item # 28

Key Elements	
N/A	
Criteria	
3	<p>Meets Standard (Meets criteria at grade level) 3 correct elements Draws the image <i>PQRS</i> AND Explains the steps needed to find the image AND States that the quadrilaterals are similar</p>

2	<p>Near Standard (Mostly meets criteria) 2 correct elements Draws the image $PQRS$ and explains the steps needed to find the image. OR Draws the image $PQRS$ and states that the quadrilaterals are similar OR Explains the steps needed to find the image and states that the quadrilaterals are similar</p>
1	<p>Approaching standard (Partially meets criteria) 1 correct element Draws the image $PQRS$ OR Explains the steps needed to find the image OR States that the quadrilaterals are similar</p>
0	<p>Far Below Standard Incorrect response</p>
Exemplar	
3	<div style="text-align: center;"> </div> <p>OR Other valid drawing/sketch/image AND The coordinates of ABCD after it is reflected across the x-axis are $(0, -[-2])$, $(2, -[-2])$, $(4, -[-4])$, and $(4, -[-2])$. Therefore, the reflected image has</p>

	<p>coordinates (0, 2), (2, 2), (4, 4), (4, 2). When the reflected image is dilated by a scale factor of $\frac{1}{2}$, the coordinates are (0/2, 2/2), (2/2, 2/2), (4/2, 4/2), and (4/2, 2/2); therefore, the dilated image has coordinates (0, 1), (1, 1), (2, 2), and (2, 1).</p> <p>AND</p> <p>The quadrilaterals are similar.</p> <p>OR</p> <p>Other valid answer</p>
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Item # 29

Key Elements	
N/A	
Criteria	
3	<p>Meets Standard (Meets criteria at grade level)</p> <p>3 correct elements</p> <p>Draws triangle <i>ABC</i> and triangle <i>PQR</i></p> <p>AND</p> <p>Explains the method and effects</p> <p>AND</p> <p>Writes the coordinates of the points <i>X</i>, <i>Y</i>, and <i>Z</i></p>
2	<p>Near Standard (Mostly meets criteria)</p> <p>2 correct elements</p> <p>Draws triangle <i>ABC</i> and triangle <i>PQR</i> and explains the method and effects</p> <p>OR</p> <p>Draws triangle <i>ABC</i> and triangle <i>PQR</i> and writes the coordinates of the points <i>X</i>, <i>Y</i>, and <i>Z</i></p> <p>OR</p> <p>Explains the method and effects and writes the coordinates of the points <i>X</i>, <i>Y</i>, and <i>Z</i></p> <p>OR</p> <p>Explains the method and effects and writes the correct coordinate pairs based on incorrect pairs found for <i>P</i>, <i>Q</i>, and <i>R</i></p>
1	<p>Approaching standard (Partially meets criteria)</p> <p>1 correct element</p> <p>Draws triangle <i>ABC</i> and triangle <i>PQR</i></p> <p>OR</p> <p>Explains the method of finding the coordinates and the effects of the rotation</p> <p>OR</p> <p>Writes the coordinates of the points <i>X</i>, <i>Y</i>, and <i>Z</i></p> <p>OR</p> <p>Correct coordinate pairs based on incorrect pairs found for <i>P</i>, <i>Q</i>, and <i>R</i></p>
0	<p>Far Below Standard</p> <p>Incorrect response</p>

Exemplar	
3	<div> </div> <p>OR Other valid drawing/sketch/image AND</p> <p>When triangle ABC is dilated by a scale factor of $\frac{2}{3}$, the image obtained would have coordinates $(-9 \times \frac{2}{3}, 9 \times \frac{2}{3})$, $(-3 \times \frac{2}{3}, 6 \times \frac{2}{3})$, and $(-6 \times \frac{2}{3}, 3 \times \frac{2}{3})$. Hence, the dilated image will have coordinates $(-6, 6)$, $(-2, 4)$, and $(-4, 2)$. When the dilated image is rotated by 180° counterclockwise about the origin, the final image PQR will have coordinates whose sign of x- and y-coordinates is reversed. Hence, PQR will have coordinates $P(6, -6)$, $Q(2, -4)$, and $R(4, -2)$.</p> <p>AND $X(6, 6)$, $Y(2, 4)$, and $Z(4, 2)$</p> <p>OR Other valid answer</p>

Item # 30

Key Elements	
N/A	
Criteria	
3	<p>Meets Standard (Meets criteria at grade level)</p> <p>3 correct elements</p> <p>Describes the sequence of two transformations used to create figure $PQRS$ from figure $ABCD$</p> <p>AND</p> <p>Gives the coordinates after the first transformation</p> <p>AND</p> <p>Explains how the coordinates were determined</p>

2	<p>Near Standard (Mostly meets criteria) 2 correct elements Describes the sequence of two transformations used to create figure <i>PQRS</i> from figure <i>ABCD</i> and gives the coordinates after the first transformation OR Describes the sequence of two transformations used to create figure <i>PQRS</i> from figure <i>ABCD</i> and explains how the coordinates were determined OR Gives the coordinates after the first transformation and explains how the coordinates were determined</p>
1	<p>Approaching Standard (Partially meets criteria) 1 correct element Describes the sequence of two transformations used to create figure <i>PQRS</i> from figure <i>ABCD</i> OR Gives the coordinates after the first transformation OR Explains how the coordinates were determined</p>
0	<p>Far Below Standard Incorrect response</p>
Exemplar	
3	<p>Dilation by a scale factor of $\frac{1}{2}$ followed by translation upward by 2 units OR Translation upward by 4 units followed by a dilation by a scale factor of $\frac{1}{2}$ AND (-3, -1), (-1, -1), (-2, -2), (-4, -2) OR (-6, 2), (-2, 2), (-4, 0), (-8, 0) AND Each value of each of the coordinates in the original figure was divided by 2. OR Each of the y-values in the original figure was increased by 4. OR Other valid answer</p>

Item # 31

Key Elements	
N/A	
Criteria	
3	<p>Meets Standard (Meets criteria at grade level)</p> <p>3 correct elements</p> <p>Writes no</p> <p>AND</p> <p>Explains why it is not a function</p> <p>AND</p> <p>Changes one of the sevens to a number not already used for tomatoes</p>
2	<p>Near Standard (Mostly meets criteria)</p> <p>2 correct elements</p> <p>Writes no and explains why it is not a function</p> <p>OR</p> <p>Writes no and changes one of the sevens to a number not already used for tomatoes</p> <p>OR</p> <p>Explains why it is not a function and changes one of the sevens to a number not already used for tomatoes</p>
1	<p>Approaching Standard (Partially meets criteria)</p> <p>1 correct element</p> <p>Writes no</p> <p>OR</p> <p>Explains why it is not a function</p> <p>OR</p> <p>Changes one of the sevens to a number not already used for tomatoes</p>
0	<p>Far Below Standard</p> <p>Incorrect response</p>
Exemplar	
3	<p>Part A</p> <p>No,</p> <p>AND</p> <p>There are 2 days where there were 7 tomatoes and they had different numbers of peppers on those days, therefore it would not be a function.</p> <p>AND</p> <p>Part B</p> <p>You could change either one of the sevens under tomatoes to a number not listed for tomatoes already.</p> <p>OR</p> <p>Other valid answer</p>

Item # 32

Key Elements	
N/A	
Criteria	
6	<p>Meets Standard (Meets criteria at grade level)</p> <p>6 correct elements</p> <p>Writes an equation that shows the relationship between $m\angle ABC$, $m\angle BAC$, and $m\angle ACD$</p> <p>AND</p> <p>Writes that $\angle ACB$ and $\angle ACD$ are supplementary; therefore, their sum is 180° and writes that the sum of $\angle BAC$, $\angle ABC$, and $\angle ACB$ is 180° because the sum of the angles of a triangle equals 180 degrees</p> <p>AND</p> <p>States Arnie's statement is incorrect</p> <p>AND</p> <p>Explains why Arnie's statement is incorrect</p> <p>AND</p> <p>Writes the measure of $\angle ABC$</p> <p>AND</p> <p>Explains the answer</p>
5	5 correct elements
4	4 correct elements
3	3 correct elements
2	2 correct elements
1	1 correct element
0	<p>Far Below Standard</p> <p>Incorrect response</p>
Exemplar	
6	<p>Part A.1</p> <p>$m\angle ABC + m\angle BAC = m\angle ACD$</p> <p>Part A.2</p> <p>AND</p> <p>$\angle ACB$ and $\angle ACD$ are supplementary; therefore, their sum is 180°. Also, the sum of $\angle BAC$, $\angle ABC$, and $\angle ACB$ is 180° because the sum of the angles of a triangle equals 180°. Therefore, the sum of $\angle ACB$ and $\angle ACD$ is equal to the sum of $\angle BAC$, $\angle ABC$, and $\angle ACB$. Therefore, $m\angle ABC + m\angle BAC = m\angle ACD$.</p> <p>AND</p> <p>Part B</p> <p>Arnie's statement is incorrect.</p> <p>AND</p>

	<p>Arnie's statement is incorrect because the sum of the opposite interior angles is equal to the exterior $\angle ACD$. Therefore, $m\angle BAC$ is equal to the difference of $m\angle ACD$ and $m\angle ABC$, which is equal to 60°.</p> <p>AND</p> <p>Part C</p> <p>15°</p> <p>AND</p> <p>$m\angle ABC$ is the difference of the $m\angle ACD$ and $m\angle BAC$ because the sum of the opposite interior angles of a triangle is equal to the exterior angle.</p> <p>OR</p> <p>Other valid answer</p>
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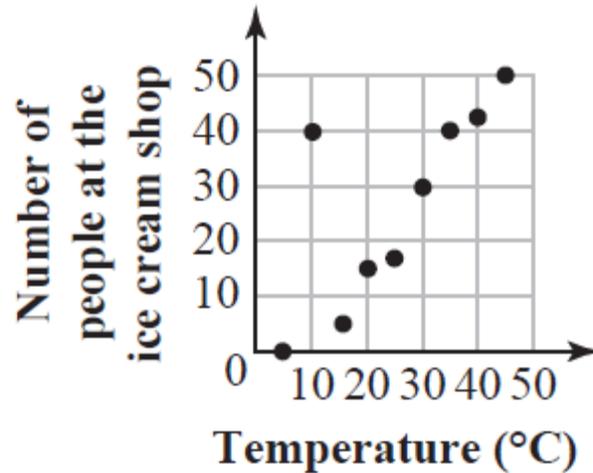
Item # 33

Key Elements	
N/A	
Criteria	
6	<p>Meets Standard (Meets criteria at grade level)</p> <p>6 correct elements</p> <p>plots all 9 points correctly</p> <p>AND</p> <p>describes the association between the temperature of Jack's city and the number of people at his ice cream shop</p> <p>AND</p> <p>explains the answer</p> <p>AND</p> <p>explains why Jack's statement is incorrect</p> <p>AND</p> <p>states a reason for the presence of an outlier</p>
5	5 correct elements
4	4 correct elements
3	3 correct elements
2	2 correct elements
1	1 correct element
0	<p>Far Below Standard</p> <p>Incorrect response</p>

Exemplar

6

Temperature and Ice Cream Sales



OR

Other valid art/sketch/image

AND

There is a positive association between the temperature of Jack's city and the number of people at his ice cream shop.

AND

When the temperature increases, there are more people at Jack's ice cream shop, and when the temperature decreases, there are fewer people at the shop. If a line is drawn through the data points, it will show a positive rate of change.

AND

Jack's statement is incorrect because the scatter plot shows a positive association. Hence, if the temperature increases, the number of people at the shop should also increase.

AND

The ice cream shop offered a discount on the sale of ice cream.

OR

Other valid answer



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