

New Jersey Assessment of Skills and  
Knowledge (NJ ASK):  
Mathematics

Department of Education  
Office of Evaluation and Assessment

# NJ ASK - Overview

- The NJ ASK serves the assessment needs of the State's public schools.
- This assessment represents the first stage of the Department's plans to meet NCLB.
- The federal law requires states to use tests as a way of determining the performance levels of the schools.
- The tests are designed to assess how well students are learning the knowledge and skills called for by the State's standards.

# NJ ASK - Overview

- The NJ ASK is designed to give your school information about how well students are achieving in the areas required by the State's Core Curriculum Content Standards (CCCS).
- The CCCS determine what students should know and be able to do at a certain grade level.
- The CCCS were revised in 2002 and were developed by teachers and other education professionals from New Jersey.

# NJ ASK - Overview

- The NJ ASK assesses 4 Core Curriculum Content Standards in mathematics
- Number and Numerical Operations
- Geometry and Measurement
- Patterns and Algebra
- Data Analysis, Probability, and Discrete Mathematics

# NJ ASK – Mathematics Standards

- Standard 1 – Number and Numerical Operations
  - Number Sense
  - Numerical Operations
  - Estimation

# NJ ASK – Mathematics Standards

- Standard 2 – Geometry & Measurement
  - Geometric Properties
  - Transforming Shapes
  - Coordinates of Geometry
  - Units of Measurement
  - Measuring Geometric Objects

# NJ ASK – Mathematics Standards

- Standard 3 – Patterns and Algebra
  - Patterns and Relationships
  - Functions
  - Modeling
  - Procedures

# NJ ASK – Mathematics Standards

- Standard 4 – Data Analysis, Probability, and Discrete Mathematics
  - Data Analysis (Statistics)
  - Probability
  - Discrete Mathematics – systematic listing and counting
  - Discrete Mathematics – vertex-edge graphs and algorithms

# NJ ASK – Mathematics Standards

- Standard 5 – Mathematical Processes
  - Problem Solving
  - Communication
  - Connections
  - Reasoning
  - Representations
  - Technology

# NJ ASK – Mathematics Standards

- Each of the CCCS have associated Strands and Cumulative Progress Indicators (CPI's)
- Items on the NJ ASK assess each strand; however, cannot assess each CPI within each strand
- The mathematical processes highlight ways of acquiring and using the content knowledge and skills delineated in the first four mathematics standards. These mathematical processes are embedded within specific items contained on the assessment.

# Math Assessment - Overview

- The NJ ASK has two major types of questions.
- Multiple choice – the children are asked to choose one correct answer from among four choices.
- Multiple choice questions add much to the reliability and consistency of the test because many good questions that focus on a broad range of skills can be answered in a short span of time.
- MC questions are objective and do not require scoring by trained professionals.

# Math Assessment - Overview

- The second type of question is the open-ended question.
- Children will answer these questions with short or long written responses.
- The advantage of this type of question is that it allows the children to express what they know about each question in their own words.
- Students may also present their response using diagrams, graphics, and/or pictures.
- New Jersey has many years of experience in developing and scoring this type of question.

# Math Assessment

## Overview – cont'd

- NJ ASK 3 contains a total of 30 items
- 27 multiple choice items, which include 6 non-calculator multiple choice items
- Each multiple choice item is each worth 1 point, the non-calculator items are each worth  $\frac{1}{2}$  point
- Total points for multiple choice items is 24

# Math Assessment

## Overview – cont'd

- NJ ASK 3 contains 3 open-ended items worth 3 points each for a total of 9 points
- Total points on the NJ ASK 3 is 33

# Math Assessment

## Overview – cont'd

- 30.3% (10) of the points on the NJ ASK 3 assess Number and Numerical Operations
- 24.2% (8) of the points on the NJ ASK 3 assess Geometry and Measurement
- 24.2% (8) of the points on the NJ ASK 3 assess Patterns and Algebra
- 21.2% (7) of the points on the NJ ASK 3 assess Data Analysis, Probability, and Discrete Mathematics

# Math Assessment

## Overview – cont'd

- NJ ASK 4 contains a total of 37 items
- 32 multiple choice items, which include 8 non-calculator multiple choice items
- Each multiple choice item is each worth 1 point, the non-calculator items are each worth  $\frac{1}{2}$  point
- Total points for multiple choice items is 28

# Math Assessment

## Overview – cont'd

- NJ ASK 4 contains 5 open-ended items worth 3 points each for a total of 15 points
- Total points on the NJ ASK 4 is 43

# Math Assessment

## Overview – cont'd

- 30.232% (13) of the points on the NJ ASK 4 assess Number and Numerical Operations
- 23.256% (10) of the points on the NJ ASK 4 assess Geometry and Measurement
- 23.256% (10) of the points on the NJ ASK 4 assess Patterns and Algebra
- 23.256% (10) of the points on the NJ ASK 4 assess Data Analysis, Probability, and Discrete Mathematics

# Math Assessment Overview – cont'd

- The questions on the NJ ASK can contain items/concepts learned prior to each grade level
- The NJ ASK is administered in March
- Tests are administered in March so that schools and parents receive the reports as early as possible – by mid-June
- In relation to NCLB, scores are needed in order to do the AYP calculations in a timely way
- Preliminary AYP reports will be issued as close to 1 July as possible

# Math Assessment

## Overview – cont'd

- The NJ ASK 3 is not a diagnostic test but a test to measure how well children are achieving the NJ CCCS
- Common misconception is that the NJDOE expects to have ten months of material taught in just over 6 or 7 months. This would be true if answering 27 out of 30 questions correctly equaled an “A” and so on, but that isn’t the case.

# Math Assessment

## Overview – cont'd

- It is the number of raw points necessary to achieve a proficient score that determines how well a student achieves the NJ CCCS
- On NJ ASK 3 (2004) the raw points necessary to achieve “proficient” was 17/33. The number of raw points to achieve “advanced proficient” was 27.5/33.

# Math Assessment

## Overview – cont'd

- On NJ ASK 4 (2004) the raw points necessary to achieve “proficient” was 19.5/43. The number of raw points to achieve “advanced proficient” was 32.5/43.
- Depending on the difficulty level of the test, these raw point cut offs may change by +/-1 from year to year.

# Math Item Development

- NJ ASK 3 & 4 Math Committee meet 4 times per year to review math items
- Items are developed by Riverside, the sub-contractor for ETS.
- The Committee members are comprised of 3<sup>rd</sup> and 4<sup>th</sup> grade teachers from throughout the state.
- The Committee is very diverse and represents all district factor groups of NJ

# Math Item Development

- The Math Committee meets for 3-4 days for each item review meeting
- Items are reviewed for the field-test of the next assessment
- Hours are spent going through potential multiple choice and open-ended items
- Many revisions are made so that each item truly reflects the CCCS being assessed
- Items are revised in order to be understandable and clear for a 3<sup>rd</sup> or 4<sup>th</sup> grader

# Math Item Development

- Keeping the reading level to a minimum is a high priority for each item
- The Committee is very careful to maintain the mathematical content and correctness of the questions when reducing the amount of words so that there is no ambiguity within the question.
- Questions are also reviewed for any bias or sensitivity issues

# Math Item Development

- When items are finally approved, they will be field-tested on the next assessment.
- After the administration of the NJ ASK, there is a data/statistical review for each of the items on the test.
- We look at the statistics of the field test items in relation to how well or not so well the students did on these items compared to the items on the rest of the test.

# Math Item Development

- If a test question has poor statistical results, the item will either be eliminated or revised and re-field tested for a future assessment.
- If a test question has good statistics, it will become part of the operational pool and will be used on the base test of future assessments.

# Math Item Development

- Prior to the statistical review, the field-tested open-ended items must go through range-finding.
- Range-finding is the process to refine the item specific rubric and to determine the scores for specific papers.
- Each open-ended item has a unique scoring rubric.

# Math Item Development

- The item specific rubric is based upon the holistic scoring rubric of a 0-3 point scale.
- 3 points – response shows complete understanding of the problem’s essential mathematical concepts
- 2 points – response shows nearly complete understanding of the problem’s essential mathematical concepts

# Math Item Development

- 1 point – response shows limited understanding of the problem’s essential mathematical concepts
- 0 points – response shows insufficient understanding of the problems essential mathematical concept
- The generic rubric ensures that students are scored in the same way for the same demonstration of knowledge and skills regardless of the test question.

# Math Item Development

- The range-finding process involves scoring 30-40 papers for each field-test open-ended item.
- The papers are pulled to represent the score point range.
- The papers are scored by 1-2 Math Committee persons, a representative of PEM, and the NJ DOE Math Content Coordinator.

# Math Item Development

- During the range-finding process, the rubric may be refined to be more specific to aid in the training of the scorers.
- The range-finding process aids in delineating between a 0 & 1, 1 & 2, and a 2 & 3 score point response.
- The holistic scoring guide is used quite often to help refine the tenuous line between the score points.

# Math Item Development

- The papers that are scored and the rubric that is refined is then used to train the scorers of that item.
- If there is any problem or question with the scoring of a student's response, the NJ DOE Content Coordinator is contacted and makes the final decision for the score of that paper.
- After the open-ended papers have been scored, the same statistical review process is used as is done with the multiple-choice items.

# Suggestions for NJ ASK Mathematics

- Become familiar with New Jersey's Core Curriculum Content Standards for not only the grade level at which you teach, but for those before and after as well.
- Align your curriculum to the CCCS.
- Integrate concepts instead of taking one chapter at a time.
- If you don't understand certain concepts, find those who can help you.

# Suggestions for NJ ASK Mathematics

- Utilize resources
- NJ DOE: [www.nj.gov/njded/assessment/](http://www.nj.gov/njded/assessment/)
- NJ PEP: [www.njpep.org](http://www.njpep.org)
- ETS: [www.ets.org/njask](http://www.ets.org/njask)
- Know the CCCS before purchasing supplemental materials for your classroom
- Make sure students know how to work with a calculator and with the manipulatives and ruler provided for them.

# Designing Tests in Your Classroom

- Step 1 – Decide which local and state standards your activity encompasses.
- Step 2 – Decide which CPI are involved with the activity.
- Step 3 – Group the CPI's to enable a big picture view. Target specific CPI's involved in each standard.
- Step 4 – Develop questions for each CPI.

# Designing Tests in Your Classroom

- Step 5 – Examine the test specifications.
- Step 6 – Combine and/or re-word the questions developed in Step 4. Decide on the use of multiple choice and/or open-ended questions.
- Step 7 – Examine the test specifications- especially **knowledge statements** related to activity and **skill statements** for the particular grade level.
- Step 8 – Combine and/or re-word the questions developed in Step 7.

# Instructional Implications

- Review the test results when they arrive;
- Analyze for strengths and weaknesses;
- Review the state standards and be sure your district's curriculum and classroom instruction are aligned to it;
- Use the Frameworks for developing instructional practices;
- Familiarize yourself with the scoring rubrics; and
- Use the scoring rubric for scoring your students' work.

# Observations

- Standard 1 - Estimation ex:  $36 \times 7 = 40 \times 10$ . Students are rounding single digit numbers.
- Standard 1 - Make sure students understand the difference between 3 groups of 4 and 4 groups of 3.
- Standard 1 - Extend the use of fractions beyond pies, cakes and pizza slices (ie: containers being  $\frac{1}{2}$  full,  $\frac{1}{4}$  full, etc.)

# Observations

- Standard 2 - Make sure students are familiar with vocabulary of geometric objects (vertex - vertices).
- Standard 2 - Students understanding of line(s) of symmetry
- Standard 2 - Students need to understand the difference between perimeter, area, and volume.

# Observations

- Standard 3 - Understand the properties of the arithmetic operations (commutative, identity)
- Standard 3 - Concept of less than, greater than
- Standard 3 - (grade 4) - Understand, NAME, and APPLY properties of arithmetic operations (commutative, associative, identity)

# Observations

- Standard 4 (Graphing) - students are forgetting to give their graphs a label and title when prompted to do so.
- Standard 4 (Graphing) - a very frequent error that students make is numbering the boxes instead of the lines (axes) on the graph.
- Standard 4 (Graphing) - students need to be familiar with the different types of graphs (bar graphs, pictographs), reading tables.
- Standard 4 (Graphing) - (4<sup>th</sup> grade) line plots, line graphs

# Observations

- Standard 4 - probability vocabulary- more likely, equally likely, less likely, 1 out of 5, fractions (4<sup>th</sup> grade)
- Standard 4 - simple counting (combination) situations involving charts, trees, diagrams
- Standard 4 - Coloring a map (4<sup>th</sup> grade)
- Standard 4 - (4<sup>th</sup> grade) Average (mean), most frequent (mode), middle term (median)

# To Help Students Prepare For The NJ ASK

- Reflect on how you are currently assessing your students in your classroom.
- Are any of the knowledge and skills that you are assessing part of the NJ CCCS?
- If so, as part of your assessment, develop a couple of multiple choice questions and/or open-ended items for that knowledge and skill

# To Help Students Prepare For The NJ ASK

- When developing multiple choice items, make sure that the question is clear, using grade appropriate vocabulary, and contains as few words as possible
- Think about how much time it will take the student to answer the question. It should take no longer than 1 minute.
- The distractors for the question should be common mistakes made by the student.

# To Help Students Prepare For The NJ ASK

Orlando has a bag of 10 marbles that contains 4 red marbles and 6 blue marbles. If Orlando reached into the bag without looking and picked one marble, what is the probability that he would pick a blue marble?

- A. 1 out of 10
- B. 4 out of 10
- C. 6 out of 10
- D. 10 out of 10

# To Help Students Prepare For The NJ ASK

- When developing an open-ended item make sure that the problem is truly open-ended and not a couple of multiple choice questions put together.
- An open-ended item allows a student to demonstrate his/her knowledge of a concept through a written explanation of the answer.
- Develop a question that has a number of ways to answer it correctly.

# To Help Students Prepare For The NJ ASK

A juice machine charges 65¢ for a can of juice and accepts only nickels, dimes, and quarters. The machine requires exact change.

- Show a combination of coins you could put in the juice machine to get a can of juice.
- Is there another combination of coins you could use to get a can of juice? Show your work or explain your answer.

# To Help Students Prepare For The NJ ASK

- The open-ended items also need a rubric. You must define what would be acceptable for a 3,2,1, and 0 point response.
- 3 points – Everything correct (a minor error is sometimes acceptable)
- 2 points – Something wrong
- 1 point – Something correct
- 0 points – Nothing correct

# To Help Students Prepare For The NJ ASK

- In the orange juice problem, what would be 3 points? 2 points? 1 point? 0 points?
- Reminder – there is always a range of points within each score point. This helps define the tenuous line between a 2/3, 1/2 and 0/1. (low 2, high 2, low 1, high 1)
- If a student makes an error in one part and uses the correct process for the second part (which incorporates the error made), the error will only be counted once.

## CONTACT INFORMATION

NJ ASK Coordinator – Orlando Vadel

Office #: 609/341-3456

Email: [orlando.vadel@doe.state.nj.us](mailto:orlando.vadel@doe.state.nj.us)

Mathematics Coordinator – Tim Giordano

Office #: 609/633-8015

Email: [timothy.giordano@doe.state.nj.us](mailto:timothy.giordano@doe.state.nj.us)

Director of Evaluation & Assessment

Brian Robinson

Office #: 609/984-6311

Email: [brian.robinson@doe.state.nj.us](mailto:brian.robinson@doe.state.nj.us)