

High School Proficiency Assessment (HSPA)

HSPA 11 Math Prep

Grade 11

Vineland Board of Education

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Vineland Public Schools
Vineland, NJ
2006-2007

Course Description

This course is designed to improve each student's mathematical and problem solving skills in each of the clusters on the High School Proficiency Assessment, so that they may be successful in passing the NJ HSPA. This course is also aimed to improve each student's written responses when answering open-ended questions, provide test taking strategies, improve students ability to complete the exam in a timely manner, and to provide the students classroom time to complete the state required SRA. The course will introduce and familiarize students with the Accuplacer; a college placement assessment for some colleges. Prerequisite: Students will be placed in this course for remediation based upon their standardized test scores taken the previous year.

CREDITS: 5

NJ Math Standards and Indicators

4.1 NUMBER AND NUMERICAL OPERATIONS

A. Number Sense

1. Extend understanding of the number system to all real numbers.
2. Compare and order rational and irrational numbers.

B. Numerical Operations

1. Extend understanding and use of operations to real numbers and algebraic procedures.
3. Perform operations on matrices.
 - 1 Additions and subtraction
 - 2 Scalar multiplication
4. Understand and apply the laws of exponents to simplify expressions involving numbers raised to powers.

4.2 GEOMETRY AND MEASUREMENT

A. Geometric Properties

1. Use geometric models to represent real-world situations and objects and to solve problems using these models.
3. Apply the properties of geometric shapes.
 - 1 Parallel lines
 - 2 Triangles
 - 3 Conditions of congruence
 - 4 Midpoint formulas
 - 5 Triangle Inequality
 - 6 Circles
 - 7 Self-similarity

B. Transforming Shapes

1. Determine, describe, and draw the effect of a transformation, or a sequence of transformations, on a geometric or algebraic object, and, conversely, determine whether and how one object can be transformed to another by a transformation or a sequence of transformations.
2. Determine whether two or more given shapes can be used to generate a tessellation.
3. Recognize three-dimensional figures obtained through transformations of two-dimensional figures, using software as an aid to visualization.
4. Generate and analyze iterative geometric patterns.
 - 1 Fractals
 - 2 Patterns in areas and perimeters of self-similar figures.
 - 3 Outcome of extending iterative process indefinitely

C. Coordinate Geometry

1. Use coordinate geometry to represent and verify properties of lines
 - 1 Distance between two points
 - 2 Midpoint and slope of a line segment
 - 3 Finding the intersection of two lines
 - 4 Lines with the same slope are parallel
 - 5 Lines that are perpendicular
2. Show position and represent motion in the coordinate plane using vectors.
 - 1 Addition and subtraction of vectors

D. Units of Measurement

1. Understand and use to concept of significant digits.

E. Measuring Geometric Objects

1. Use techniques of indirect measurement to represent and solve problems.
 - 2 Similar triangles
 - 3 Pythagorean theorem
 - 4 Right triangle trigonometry
2. Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.

4.3 PATTERNS AND ALGEBRA

A. Patterns

1. Use models and algebraic formulas to represent and analyze sequences and series.
 - 1 Explicit formulas for nth terms
 - 2 Sums of finite arithmetic series
 - 3 Sums of finite and infinite geometric series

B. Functions and Relationships

1. Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.
2. Analyze and explain the general properties and behavior of functions of one variable, using appropriate technologies.
3. Understand and perform transformations on commonly-used functions.
4. Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions

C. Modeling

1. Use functions to model real-world phenomena and solve problems that involve varying quantities.

D. Procedures

1. Evaluate and simplify expressions.
 - 1 Add and subtract polynomials
 - 2 Multiply a polynomial by a monomial or binomial
 - 3 Divide a polynomial by a monomial
2. Select and use appropriate methods to solve equations and inequalities.
 - 1 Linear equations
 - 2 Quadratic equations

4.4 DATA ANALYSIS, PROBABILITY, AND DISCRETE MATHEMATICS

A. Data Analysis

1. Use surveys and sampling techniques to generate data and draw conclusions about large groups.
2. Evaluate the use of data in real-world contexts
4. Estimate or determine lines of best fit with technology
5. Analyze data using technology, and use statistical terminology to describe conclusions.

B. Probability

1. Calculate the expected value of a probability-based game, given the probabilities and payoffs of various outcomes, and determine whether the game is fair.
2. Use concepts and formulas of area to calculate geometric probabilities.
3. Model situations involving probability with simulations and theoretical models, and solve problems using these models.
4. Determine probabilities in complex situations.
 - 1 Conditional events
 - 2 Complementary events
 - 3 Dependent and independent events

C. Discrete Math – Systematic Listing and Counting

1. Calculate combinations with replacement and without replacement.
2. Apply the multiplication rule of counting in complex situations, recognize the difference between situations with replacement and without replacement, and recognize the difference between ordered and unordered counting situations.

D. Discrete Math – Vertex-Edge Graphs and Algorithms

1. Use vertex-edge graphs and algorithmic thinking to represent and solve practical problems.

4.5 MATHEMATICAL PROCESSES

A. Problem Solving

1. Learn mathematics through problem solving, inquiry, and discovery.
2. Solve problems that arise in mathematics and in other contexts.
 - 1 Open-ended problems
 - 2 Non-routine problems
 - 3 Problems with multiple solutions
 - 4 Problems that can be solved in several ways
3. Select and apply a variety of appropriate problem-solving strategies to solve problems.
4. Pose problems of various types and levels of difficulty.
5. Monitor their progress and reflect on the process of their problem solving activity.

C. Connections

1. Use communication to organize and clarify their mathematical thinking.
 - 1 Reading and writing
 - 2 Discussion, listening, and questioning
2. Communicate their mathematical thinking coherently and clearly.

E. Representations

1. Create and use representations to organize, record, and communicate mathematical ideas.
2. Select, apply, and translate among mathematical representations to solve problems.
3. Use representations to model and interpret physical, social, and mathematical phenomena.

F. Technology

1. Use technology to gather, analyze, and communicate mathematical information.
2. Use computer spreadsheets, software and graphing utilities.
3. Using graphing calculators and computer software to investigate properties of functions and their graphs.
4. Use calculators as problem-solving tools
5. Use computer software to make and verify conjectures about geometric objects.
6. Use computer-based technology for mathematical applications in the sciences.

Students Proficiencies

1. Students will be able to apply investigation, estimation, and computation skills to problem-solving approaches and strategies within and outside mathematics.
2. Students will be able to use problem solving strategies to analyze and solve real-world, mathematical problems through the selection and application of appropriate tools.
3. Students will be able to apply numerical relationships and number theory concepts in real-world and mathematical problem situations.
4. Students will be able to use patterns and functions to represent and solve problems and apply algebraic principles to solve, graph and represent expressions, equations, and inequalities algebraically and geometrically.
5. Students will be able to understand and apply geometric properties/relationships and the process of measurement by using physical models.
6. Students will be able to collect, represent, and interpret data in order to state and evaluate arguments that are based on data analysis, and to understand the role probability plays in interpreting such arguments.
7. Students will incorporate graphing and scientific calculators in their computations.
8. Students will practice and time HSPA quiz questions that will vary and include multiple choice, open ended, and short constructed responses.
9. Students will use hands on manipulatives to discover and comprehend geometric, algebraic, and discrete concepts.
10. Students will recognize the need for being well prepared for the test in advance, being well rested and fueled the day of the test, and understand the need for using time efficiently on the HSPA.
11. Students will gain confidence by becoming familiar with the HSPA Test format.
12. Students will gain confidence by mastering strategies to help answer difficult questions on the HSPA.
13. Students will practice and time Accuplacer College Placement questions.

Activities

1. Administer sample HSPA test at the beginning of the course over a period of not less than 4 days. This will be a student's progress indicator for the future learning.
2. Students will complete one HSPA sample Problem of the Day.
3. Students will have a notebook for keeping problems of the days with solutions, and to keep any calculator functions, vocabulary, and notes in general for each cluster.
4. Students will create open ended questions for each individual cluster of the HSPA using at least 2 of the 4 clusters per problem. It will incorporate the graphing or scientific calculator, charts, and a diagram of the problem.
5. Students will assess open ended scoring rubric and then review and grade their peer's open ended responses.
6. Students will become familiar with graphing and scientific calculator functions, and be able to use them as a tool when answering HSPA and Accuplacer problems.
7. As part of the HSPA course, the teacher will administer a sample test at the beginning of the year, at mid-year, and at the end of the year to gauge student's progress. The mid-year HSPA test will be used as a midterm, and the end of the year HSPA test will be part of the final assessment.
8. After the HSPA test is taken in March students will work on projects and activities that incorporate mathematical situations of everyday life and skills learned through out the course. These projects include but not limited to, budgeting, calculating college tuition and loans, financing a car, buying and selling stocks, etc.
9. At the end of the year, teachers will collaborate and create a project that students in each class will complete as part of their final assessment grade.

X. SUPPLEMENTAL and RESOURCE MATERIALS

A. Resource Workbooks

<p><u>Preparing for the New Jersey HSPA</u></p> <p>Author: Glatzer, David and Joyce</p> <p>Publisher: Amsco</p> <p>Copyright: 2001</p>	<p><u>Preparing for the HSPA Mathematics Coach</u></p> <p>Author: Edwards, Merv</p> <p>Publisher: EDI</p> <p>Copyright: 2000</p>
<p><u>Measuring Up Early and Final Prep</u></p> <p>Author: Miller, Diane, Publisher</p> <p>Publisher: Peoples Publishing</p> <p>Copyright: 2004</p>	

B. Supplemental/Resource Materials

1. New Jersey Department of Education, Academic and Professional Standards: Curriculum and Instruction, <http://www.nj.gov/njded/aps/cccs/>.
2. NJ Department of Education, NJPEP: Virtual Academy, <http://www.njpep.org/index.html>
3. Teacher Resource Manual
4. Teacher Assessment Guide
5. RAP's – Review and Practice Manuals
6. Integrated Mathematics, Author: Rubenstein, Crane, Butts, Publisher: McDougal Littell, Copyright: 2002
7. Algebra1: Author: Larson, Boswell, Kanold, Stiff, Publisher: McDougal Littell, Copyright: 2001
8. Geometry: Author: Larson, Boswell, Stiff, Publisher: McDougal Littell, Copyright: 2001

C. TI-83 Plus Graphing Calculator & TI-34II Scientific Calculator

HSPA 11 Pacing Chart

Cluster 1: Number Sense, Concepts, and Applications

Cluster 2: Spatial and Geometry

Cluster 3: Data Analysis, Probability, Statistics, and Discrete Mathematics

Cluster 4: Patterns, Functions, and Algebra

College Placement: Accuplacer Secrets and Practice Tests

Projects and Alternate Assessments

Cluster 1: Weeks 1 – 6

Week 1	Real Numbers, Order of Operations
Week 2	Factors & Multiples, Percents
Week 3	Percents & Ratios
Week 4	Radicals
Week 5	Radicals & Exponents
Week 6	Exponents

HSPA Math Prep: Number Sense

	Stand.	Lesson Objectives	Activities/Assignments
Real Numbers		Macro A: Real Numbers	
Day 1-10		Powers, Roots, Exponents, Scientific Notation	Worksheets, Workbooks, Resource Manuals
Days 5, 10,			Assessments
Day 11-19		Ratio, Proportion, & Percent	Worksheets, Workbooks, Resource Manuals
Day 20			Assessment
Day 21-23		Property of Arithmetic Operations and Equivalent Relations	Worksheets, Workbooks, Resource Manuals
Day 24			Assessment
Day 25-30		Radicals & Exponents	Worksheets, Workbooks, Resource Manuals
Day 31			Assessment
Throughout		Alternate Assessment	Project TBD

Cluster 2: Weeks 7 – 14

Week 1	Geometric Figures
Week 2	Geometric Figures, Perimeter, Circumference,
Week 3	Geometric Figures, Area, Volume
Week 4	Area, Volume, Perimeter, Circumference, Surface Area
Week 5	Angles, Intersecting Lines
Week 6	Pythagorean Theorem, Right Triangle Trigonometry
Week 7	Transformations
Week 8	Transformations

HSPA Math Prep: Spatial Sense

	Stand.	Lesson Objectives	Activities/Assignments
Geometric Terms		Macro A: Geometric Terms	
Day 1-15		Definitions, Properties of Geometric Figures, Geometric Relationships	Worksheets, Workbooks, Resource Manuals
Days 7, 15,			Assessments
Day 16-19		Inductive and Deductive Reasoning	Worksheets, Workbooks, Resource Manuals
Day 20			Assessment
Day 21-26		Area, Volume, Perimeter, Circumference, Surface Area Spatial Relationships	Worksheets, Workbooks, Resource Manuals
Day 27			Assessment
Day 28-32		Similarity	Worksheets, Workbooks, Resource Manuals
Day 33			Assessment
Day 34-37		Pythagorean Theorem, Right Triangle Trigonometry	Worksheets, Workbooks, Resource Manuals
Day 38			Assessment
Day 39-42		Tessellations, Vectors	Worksheets, Workbooks, Resource Manuals
Day 43			Assessment
Day 39-42		Transformations	Worksheets, Workbooks, Resource Manuals
Day 43			Assessment
Throughout		Alternate Assessment	Project TBD

Cluster 3: Weeks 15 – 17

Week 1	Analyzing Data, Mean, Median, Mode, Range
Week 2	Probability of Simple Events
Week 3	Probability of Compound Events

HSPA Math Prep: Data Analysis

	Stand.	Lesson Objectives	Activities/Assignments
Data Analysis		Analyzing Data	
Day 1-7		Analyzing Data, Mean, Median, Mode, Range	Worksheets, Workbooks, Resource Manuals
Days 4, 7,			Assessments
Day 8-14		Probability of Simple Events	Worksheets, Workbooks, Resource Manuals
Day 15			Assessment
Day 16-20		Probability of Compound Events	Worksheets, Workbooks, Resource Manuals
Day 21			Assessment
Throughout		Alternate Assessment	Project TBD

Cluster 4: Weeks 18 – 22

Week 1	Slope, Midpoint, Distance
Week 2	Analyzing Patterns, Fibonacci Sequence
Week 3	Solving Equations
Week 4	Solving Equations
Week 5	Solving Equations

HSPA Math Prep: Patterns, Functions, Algebra

	Stand.	Lesson Objectives	Activities/Assignments
Algebra		Functions	
Day 1-7		Slope, Midpoint, Distance	Worksheets, Workbooks, Resource Manuals
Days 3, 8,			Assessments
Day 9-13		Analyzing Patterns, Fibonacci Sequence	Worksheets, Workbooks, Resource Manuals
Day 14			Assessment
Day 15-30		Solving Equations – Multiple Types	Worksheets, Workbooks, Resource Manuals
Day 18, 25, 31			Assessments
Throughout		Alternate Assessment	Project TBD

Week 23: Students will assess other students’ open-ended answers and delegate appropriate scores based on the given rubric. Students will take practice open-end exam questions and grade each others.

	Stand.	Lesson Objectives	Activities/Assignments
Open-Ended		Reading and Analyzing Problems	
Day 1-7		Open-Ended Questions w/ Rubric	Worksheets, Workbooks, Resource Manuals
Day 8			Assessment

Week 24: Students will take practice exams.

	Stand.	Lesson Objectives	Activities/Assignments
Practice Exams		Reading and Analyzing Problems	
Day 1-7		Using Practice Problems & Open-Ended Questions w/ Rubric to master skills needed for the HSPA	Worksheets, Workbooks, Resource Manuals
		Assessments Determined by Teacher Throughout	Assessment

Week 25: Students will take the HSPA EXAM.

GOOD LUCK!!!

Weeks 26 - 31: Students will be able to review, analyze, use creative thinking, and problem-solving skills to develop the skills and knowledge to be proficient in taking the Accuplacer College Placement Assessment.

	Stand.	Lesson Objectives	Activities/Assignments
Accuplacer		Reading and Analyzing Problems for College Placement	
Day 1-30		Accuplacer Secrets	Worksheets, Workbooks, Resource Manuals
Day 5, 8, 12, 20, 25, 31		Practice Accuplacer Exams	Assessments

Week 32-36: Students will complete final assessment project created collaboratively by HSPA teachers.

	Stand.	Lesson Objectives	Activities/Assignments
Project		Alternate Assessment(s)	
Day 1-30		Projects, Reports, Power Point Presentations, Portfolios	Internet, Library, Cyber-Library,

Week 37: Students will finalize all alternative assessments. Power Point presentations and oral reports will be given.

Week 38: Students will review and take the written final assessment.

Instructional Resources

High School Proficiency Assessment (HSPA); A Mathematics Handbook: Open-Ended Questions. New Jersey Department of Education, 2006

New Jersey HSPA Practice Test, Mathematics, 2002, CEO Solutions

Walton, J., Klein, S., HSPA: A Collection of Activities, 1999, CEO Solutions

TI-83 Graphing Calculator

TI 34 II Scientific Calculators

Geometer's Sketchpad

Assessment

Student assessment (satisfactory achievement) in each of the outcomes/objectives listed in this curriculum shall be determined by student attainment of the 70% district passing standard which pertains to all mathematical curriculums and student populations. Such student proficiency shall be measured by a multiplicity of evaluation techniques and instruments, which include, but is not restricted to the following:

1. Quizzes - Created by Individual Teacher
2. Tests - Created by Individual Teacher
3. Projects/Alternate Assessments
4. Notebooks
5. Homework
6. Class Work
7. Student Participation
8. Student Generated Problems