Allamuchy Township School District
Allamuchy, NJ

Math
Grade 7

CURRICULUM GUIDE

August 2017

Mr. Joseph E. Flynn, Superintendent

Developed by:
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This curriculum may be modified through varying techniques, strategies and materials, as per an individual student's Individualized Education Plan (IEP).

Approved by the Allamuchy Board of Education
At the regular meeting held on August 28, 2017
And
Aligned with the New Jersey Core Curriculum Content Standards
And Common Core Content Standards

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Philosophy and Rationale

This School Level Math Curriculum was designed to be consistent with the Common Core Standards for Mathematics and the NJDOE Model Curriculum Unit format. The content of each course; Grade 6 Math, Grade

7 Math, Grade 7 Accelerated Math, Grade 8 Math and Algebra 1 was designed in collaboration with representatives from the middle schools within the Hackettstown sending district cluster. The standards included in each course are organized by unit as recommended by the NJDOE. The curriculum provides a correlation between standards, officially adopted textbook resources and sample assessment items for each student learning objective.

Mission Statement

The mission of the Allamuchy Township District, in partnership with the larger community, is to provide a comprehensive, caring program for all of our students which:

*Nurtures the unique talents and interests of each individual
*Supports social responsibility and a love of learning
*Embraces the total development of each student intellectually, morally and physically
*Develops confidence, creativity and skills necessary to face the challenges of a technologically advanced and ever-changing society
*Promotes a culture of mutual respect with all other community members
*Supports the attainment of the New Jersey Core Curriculum Content Standards

The District seeks to exceed objective standards of achievement set by both the State and Federal government and to provide an educational experience beyond the boundaries established by the Core Curriculum Standards.

Scope and Sequence

Stage 1: Desired Results

Unit 1

Topic: The Number System

Content Standards 7.NS.1-3

Essential Questions
1. How do negative and positive numbers help in describing the situation?
2. What will integer operations tell about a problem?
3. What models would help in showing the relationships in the problem situation?

Enduring Understandings
1. Positive or negative numbers and their opposites are additive inverses. 2. Commutative Property, Distributive Property and the order of operations makes solving expressions easier. 3. Algorithms for integer operations explain the relationships between positive and negative numbers.

Knowledge and Skills (SWBAT embedded course proficiencies)

1. Describe and model, on a horizontal and vertical number line, real-world situations in which rational numbers are combined.
2. Apply the additive inverse property to subtraction problems and develop the argument that the distance between two points is the absolute value of the difference between their coordinates.
3. Explain why a divisor cannot be zero and why division of integers results in a rational number.
4. Model the multiplication and division of signed numbers using real-world contexts, such as taking multiple steps backwards.
5. Convert a rational number to a decimal using long division and explain in oral or written language why the decimal is either a terminating or repeating decimal.
6. Apply properties of operations as strategies to add, subtract, multiply, and divide rational numbers.
7. Solve mathematical and real-world problems involving addition, subtraction, multiplication, and division of rational numbers.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

1. The temperature is -3ºF at 7:00 A.M. The temperature increases 21ºF in 4 hours. Show what is the new temperature is on a number line.
2. Show the distance between the two numbers on a number line; 8.4 and -2.2. Use the additive inverse property to show the distance between the two values.
3. Use a model to answer the following. Is 12 ÷ 0 possible? Why or why not? What about 0 ÷ 12?
4. Draw a picture to model how many 0.75-lb packages you can make with 6 pounds of sunflower seeds.
5. Write the rational number 5/11 as a decimal using long division. How do you know if the decimal is terminating or repeating?
6. An investor owns three stocks. In one week, Stock A had an overall change of -180.23, stock B 127.65 and stock C -285.91. What is the mean change in value of the stocks?
7. Your bank account balance is -$20.85. You deposit $15.30. Two days later, you deposit another $23.71. What's your new balance?

Assessment: Assessments may include, but are not limited to homework, class discussions, internet practice utilities (such as IXL.com) and mid unit quizzes as forms of formative assessment. End of unit tests and projects are the primary form of summative assessment.

Stage 3: Learning Plan

A. To show evidence students may complete the following assessment:
   - Story creation

B. Instructor will provide differentiated instruction through any and all of the following strategies:
   - Readiness/ability
   - Adjusting questions
   - Compacting Curriculum
   - Tiered Assignments
   - Acceleration/Deceleration
   - Peer teaching

C. Students will reflect, rethink, revise, and refine by:
   - Unit self-assessment
   - Preparation reflection form
   - Work corrections

Time Allotment: 16 class meetings

Resources: Big Ideas Math
Chapter 1, Lesson 1
Chapter 2, Lessons 1-6
Chapter 6, Lessons 1,3
Chapter 9, Lessons 1-5
Chapter 10, Lessons 2-4

• Teacher created material • Graph paper • Construction paper • Crayons • Colored pencils • Rulers • Calculator

Technology: • SmartBoard • Scientific Calculators • Internet websites

Stage 1: Desired Results

Unit 2

Topic: Expressions and Equations

Content Standards: 7.EE.1-4

Essential Questions
1. What relationships are linear?
2. How can a linear relationship be represented?

3. How do you find solutions of linear equations?

Enduring Understandings
1. Linear relationships can be modeled by a table, graph or equation
2. Linear equations can be solved algebraically or by analyzing a table or graph.
3. Slope of a line represents the rate of change.

Knowledge and Skills (SWBAT embedded course proficiencies)

1. Apply the properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients (including additive and multiplicative inverse, distributive, commutative, and associative properties).
2. Use equivalent expressions to demonstrate the relationship between quantities and determine simpler solutions to a problem, such as a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."
3. Solve multi-step real life and mathematical problems with rational numbers in any form (fractions, decimals, percents) by applying properties of operations and converting rational numbers between forms as needed, and then assess the reasonableness of results using mental computation and estimation strategies.
4. Use variables to represent quantities in a real-world or mathematical problem by constructing simple equations and inequalities to represent problems. *Equations of the form px + q = r and p(x + q) = r and inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers.*
5. Fluently solve equations and inequalities and graph the solution set of the inequality; interpret the solutions in the context of the problem.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

1. Simplify the algebraic expressions:
    1. 2/5y – 4 + 7 + 9/10y
    2. 4p -6(p + 4)
2. A basket holds “a” apples. You pick 4n -2 apples and your friend picks n +5 apples. Write an equivalent expression that represents the number of apples you and your friend picked.
3. A basket holds “a” apples. You pick 4n -2 apples and your friend picks n +5 apples. Write an equivalent expression that represents the number of apples you and your friend picked.
4. Construct an equation to find the width of a rectangle that has a perimeter of 54 cm and a length of 6 cm.
5. As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.

Assessment: Assessments may include, but are not limited to homework, class discussions, internet practice utilities (such as IXL.com) and mid unit quizzes as forms of formative assessment. End of unit tests and projects are the primary form of summative assessment.

Stage 3: Learning Plan

A. To show evidence students may complete the following assessment:
    - Research linear relationships in life, analyze and compile research

B. Instructor will provide differentiated instruction through any and all of the following strategies:
    - Readiness/ability
    - Adjusting questions

- Compacting Curriculum
- Tiered Assignments
- Acceleration/Deceleration
- Peer teaching

C. Students will reflect, rethink, revise, and refine by:
- Unit self-assessment
- Preparation reflection form
- Work corrections

Time Allotment: 12 class meetings

Resources Big Ideas Math Chapter 1, Lesson 2-6
Chapter 3, Lessons 1-4

• Teacher created material • Graph paper • Construction paper • Crayons
• Colored pencils • Rulers • Calculator

Technology: • SmartBoard • Scientific Calculators • Internet websites

Stage 1: Desired Results

Unit 3

Topic: Ratios and Proportions

Content Standards 7.RP.1-3
7.G.1-2

Essential Questions
1. When quantities have different measurements, how can they be compared?
2. How can a unit rate be used to find the total cost of something?
3. Why is a ratio a good means of comparison?
4. What is the relationship between ratios and similar figures?
5. How can ratios be used in daily life to find unknown quantities or inaccessible measurements?
6. How can we use proportions to solve problems?

Enduring Understandings

1. Proportions are a good way to solve linear problems by scaling ratios up or down.
2. Unit rates make it easy to find any number of solutions.
3. Ratios make it easy to compare two quantities.
4. A straight line on a graph represents a proportional relationship.

Knowledge and Skills (SWBAT embedded course proficiencies)

1. Calculate and interpret unit rates of various quantities involving ratios of fractions that contain like and different units using real world examples such as speed and unit price.
2. Determine if a proportional relationship exists between two quantities e.g. by testing for equivalent ratios in a table or graph on the coordinate plane and observing whether the graph is a straight line through the origin.
3. Identify the constant of proportionality (unit rate) from tables, graphs, equations, diagrams, and verbal descriptions.
4. Write equations to model proportional relationships in real world problems.
5. Represent real world problems with proportions on a graph and describe how the graph can be used to explain the values of any point (x, y) on the graph including the points (0, 0) and (1, r), recognizing that r is the unit rate.
6. Solve multistep ratio and percent problems using proportional relationships, including scale drawings of geometric figures, simple interest, tax, markups and markdowns, gratuities and commissions, and fees.
7. Use freehand, mechanical (i.e. ruler, protractor) and technological tools to draw geometric shapes with given conditions (e.g. scale factor), focusing on constructing triangles.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

1. If a person walks 1/2 mile in each 1/4 hour, compute the unit rate per hour.
2. Determine whether x and y are proportional using the table: # of birdhouses (x), Nails used (y)

x	1	2	4	6	8
y	12	24	48	72	?

3. Tell whether x and y show direct variation algebraically and graphically. Explain your reasoning and identify the constant of proportionality. ½ y = x
4. A recipe that serves 6 people calls for 2 ½ cups of sugar. How much sugar is needed if you are serving only 2 people?
5. Two tickets for a concert cost $26, five tickets for $65 and nine tickets for $117. Create a graph to represent the data. Find the constant of proportionality and explain what the point (0,0) represents. How much would it cost for 14 tickets? Plot the point on the graph.
6. A salesperson receives a 3% commission on sales. The salesperson receives $180 in commission. What is the amount of sales?
7. Draw a triangle with a 3 cm side, a 4 cm side that meet at a 20^{o} angle. Classify the triangle.

Assessment: Assessments may include, but are not limited to homework, class discussions, internet practice utilities (such as IXL.com) and mid unit quizzes as forms of formative assessment. End of unit tests and projects are the primary form of summative assessment.

Stage 3: Learning Plan

A. To show evidence students may complete the following assessment:
   - All-Similar Shapes Project – use ratios and proportions to draw conclusions about similar shapes

B. Instructor will provide differentiated instruction through any and all of the following strategies:

- Readiness/ability
- Adjusting questions
- Compacting Curriculum
- Tiered Assignments
- Acceleration/Deceleration
- Peer teaching

C. Students will reflect, rethink, revise, and refine by:
- Unit self-assessment
- Preparation reflection form
- Work corrections

Time Allotment: 14 class meetings

Resources: Big Ideas Math
Chapter 3, Lesson 2-4
Chapter 4, Lessons 1-3
Chapter 7, Lessons 1-3, 5-7
Chapter 8, Lessons 1-4

• Teacher created material • Graph paper • Construction paper • Crayons • Colored pencils • Rulers 15 • Calculator

Technology: • SmartBoard • Calculators • Internet websites

Stage 1: Desired Results

Unit 4

Topic: Statistics and Probability

Content Standards 7.SP.1-8
7.RP.3

Essential Questions
1. What is a random sample and how does it represent a population?
2. How does the probability of an event occurring affect the decisions that we make?

Enduring Understandings
1. Random samples can be used to draw conclusions about a general population.
2. Probability is the chance that an event will occur

Knowledge and Skills (SWBAT embedded course proficiencies)

1. Solve multi-step ratio and percent problems using proportional relationships (*simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error).*
2. Distinguish between valid and invalid samples from a population by determining if the sample is representative of the subgroups within the population (*e.g. if the class had 50% girls and the sample had 25% girls, then the number of girls was not representative of the whole population*).
3. Use random sampling to produce a representative sample, develop valid inferences about a population with an unknown characteristic of interest, and compare the variation in estimates using multiple samples of the same and different size.
4. Visually and numerically compare the means and variations of two distinct populations (such as the mean height of different sports teams) to draw informal comparative inferences about measures of center and variability using graphical representations and statistical calculations.
5. Interpret and express the likelihood of a chance event as a number between 0 and 1, relating that the probability of an unlikely event happening is near 0, a likely event is near 1, and 1/2 is neither likely nor unlikely.
6. Conduct experimental probability events that are both uniform (*rolling a number cube multiple times*) and non-uniform (*tossing a paper cup to see if it lands up or down*) to collect and analyze data to make predictions for the approximate relative frequency of chance events.
7. Develop uniform and non-uniform theoretical probability models by listing the probabilities of all possible outcomes in an event, for instance, the probability of the number cube landing on each number being 1/6. Then, conduct an experiment of the event using frequencies to determine the probabilities of each outcome and use the results to explain possible sources of discrepancies in theoretical and experimental probabilities.
8. Design a simulation of a compound probability event and determine the sample space using organized lists, tables, and tree diagrams, calculate the fractional probabilities for each outcome in the sample space, and conduct the simulation using the data collected to determine the frequencies of the outcomes in the sample space.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

1. A $129.50 stereo is discounted 40%. The next month, the sale price is discount 60%. Is the stereo now "free"? If not, what is the sale price?
2. Determine whether the conclusion is valid and explain: You want to determine the # of students in your school who have visited a science museum. You surveyed 50 students at random. 20 have and 30 have not. So, you conclude that 40% of the students in your school have visited a science museum.
3. You want to know how residents of your town feel about a ban on texting while driving. Determine whether the conclusion is valid: After surveying 200 residents at random, 164 residents support the ban and 36 do not. So, you conclude that 82% of the residents of your town support the ban.
4. (Create chart with 8 different schools and 10 students). You want to know the mean number of hours students with part-time jobs work each week. You go to 8 different schools and randomly survey 10 students with part-time jobs. Compare the two means in a box-whisker plot and by finding the mean of each sample.
5. There is an 85% chance of thunderstorms tomorrow. Describe the likelihood of the event in a sentence.
6. It rains 2 out of the last 12 days in March. If this trend continues, how many rainy days would you expect in April? Find the experimental probability of a rainy day and make your prediction.

7. If a student is selected at random from a class of 16 females and 20 males, find the probability that Jane will be selected and the probability that a girl will be selected. Find the approximate probability that a spinning penny will land heads up. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?
8. You flip three nickels. Determine the fractional probabilities for each outcome. What is the probability of flipping two tails and one head? Create a tree diagram to show the sample space.

Assessment: Assessments may include, but are not limited to homework, class discussions, internet practice utilities (such as IXL.com) and mid unit quizzes as forms of formative assessment. End of unit tests and projects are the primary form of summative assessment.

Stage 3: Learning Plan

A. To show evidence students may complete the following assessment:
   - Game Evaluation-evaluate the probability of all outcomes of a known game

B. Instructor will provide differentiated instruction through any and all of the following strategies:
   - Readiness/ability
   - Adjusting questions
   - Compacting Curriculum
   - Tiered Assignments
   - Acceleration/Deceleration
   - Peer teaching

C. Students will reflect, rethink, revise, and refine by:
   - Unit self-assessment
   - Preparation reflection form
   - Work corrections

Time Allotment: 16 class meetings

Resources: Big Ideas Math
Chapter 4, Lesson 4
Chapter 6, Lessons 1-5
Chapter 9, Lessons 1, 2, 5
Chapter 10, Lessons 1-4

• Teacher created material • Graph paper • Crayons • Colored pencils • Rulers
• Calculator • Dice • Spinners • Color-coded cubes • Coins • Paper cups

Technology: • SmartBoard • Calculators • Internet websites

Stage 1: Desired Results

Unit 5

Topic Geometry

Content Standards 7.EE.3-4
7.G.3-6

Essential Questions

1. How can real-world situations be represented by scale drawings?
2. How do two- and three-dimensional figures relate?

Enduring Understandings

1. Scale drawings can be used to solve real-world problems
2. Formulas can be used to find circumference, area, volume & surface area of many realworld shapes.

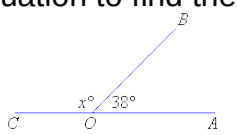
Knowledge and Skills (SWBAT embedded course proficiencies)

1. Use variables to represent quantities in a real-world or mathematical problem; write and fluently solve simple equations and inequalities, interpret the solutions in the context of the problem and graph the solution set on a number line. [Please note this unit addresses standard 7.EE.4 again to assess fluency.]
2. Use tools strategically to solve multi-step real-world and mathematical problems involving positive and negative rational numbers in any form (converting between forms as needed) and determine the reasonableness of the answers. [Please note this unit addresses standard 7.EE.3 again to assess fluency.]
3. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
4. Write and solve simple algebraic equations involving supplementary, complementary, vertical, and adjacent angles for multi-step problems and finding the unknown measure of an angle in a figure.
5. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
6. Describe, using drawings or written descriptions, the 2-dimensional figures that result when 3-dimensional figures (right rectangular prisms and pyramids) are sliced from multiple angles given both concrete models and a written description of the 3-dimensional figure.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

1. Mandy's monthly earnings consist of a fixed salary of $2800 and an 18% commission on all her monthly sales. To cover her planned expenses, Mandy needs to earn an income of at least $6400 this month. Write an inequality that, when solved, will give the amount of sales Mandy needs to cover her planned expenses.
2. A basket holds "a" apples. You pick 4n -2 apples and your friend picks n +5 apples. Write an equivalent expression that represents the number of apples you and your friend picked.
3. One can of frosting covers about 280 square inches. Your cake is 13 inches long, 9 inches wide and 3 inches high. Is one can of frosting enough to frost the cake? Explain.
4. Write and solve an equation to find the measure of angle x.



5. The area of an orchestra pit is one-half the area of a circle with a diameter of 60 feet. Find the area and circumference of the orchestra pit.
6.

Describe the intersection of the plane and the solid for each figure below.

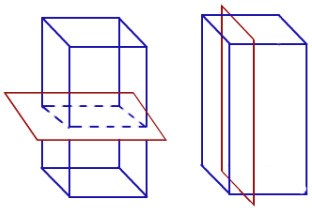


Figure1 Figure 2

Assessment: Assessments may include, but are not limited to homework, class discussions, internet practice utilities (such as IXL.com) and mid unit quizzes as forms of formative assessment. End of unit tests and projects are the primary form of summative assessment.

Stage 3: Learning Plan

A. To show evidence students may complete the following assessment: • Evaluate given packaging to minimize surface area and cost
B. Instructor will provide differentiated instruction through any and all of the following strategies: • Readiness/ability • Adjusting questions • Compacting Curriculum • Tiered Assignments • Acceleration/Deceleration • Peer teaching
C. Students will reflect, rethink, revise, and refine by: • Unit self-assessment • Preparation reflection form • Work corrections

Time Allotment: 14 class meetings

Resources: Big Ideas Math Chapter 5, Lesson 1-7
Chapter 7, Lessons 4

• Teacher created material • Graph paper • Crayons • Colored pencils • Rulers
• Calculator• Cartoons • Compasses • Protractors • 3-Dimensional Shape Sets

Technology: • SmartBoard • Calculators • Internet websites

New Jersey Core Curriculum and Common Core Content Standards

http://www.state.nj.us/education/cccs/

Integration of 21st Century Theme(s)

The following websites are sources for the following 21st Century Themes and Skills:
http://www.nj.gov/education/code/current/title6a/chap8.pdf
http://www.p21.org/about-us/p21-framework .
http://www.state.nj.us/education/cccs/standards/9/index.html

21st Century Interdisciplinary Themes (into core subjects)

- **Global Awareness**
- **Financial, Economic, Business and Entrepreneurial Literacy**
- **Civic Literacy**
- **Health Literacy**
- **Environmental Literacy**

Learning and Innovation Skills

- **Creativity and Innovation**
- **Critical Thinking and Problem Solving**
- **Communication and Collaboration**

Information, Media and Technology Skills

- **Information Literacy**
- **Media Literacy**
- **ICT (Information, Communications and Technology) Literacy**

Life and Career Skills

- **Flexibility and Adaptability**
- **Initiative and Self-Direction**
- **Social and Cross-Cultural Skills**
- **Productivity and Accountability**
- **Leadership and Responsibility**

Integration of Digital Tools

- **Classroom computers/laptops/Chromebooks**
- **Technology Lab**
- **Voice amplification device**
- **Other software programs**