

GIFTED AND TALENTED

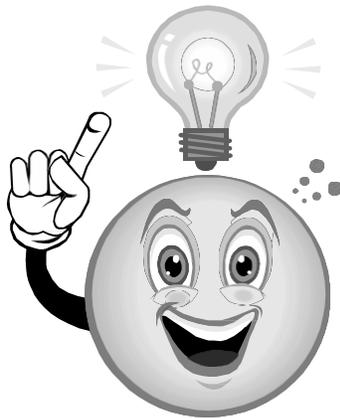


Milltown School District  
Milltown, NJ 08850



BASED ON NJSL

# Gifted and Talented Curriculum



Kindergarten through Eighth Grade

Adoption Date: September 19, 2016

Milltown Public Schools  
Milltown, NJ 08850

## **GIFTED AND TALENTED CURRICULUM**

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Rachel Sobota, G&T Teacher  
Sara McGowan, G&T Teacher  
Nina Marinello, G&T Teacher

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### **Foreword**

Humankind is developing in an increasingly technological environment. With the greatest of rapidity, we can retrieve enormous amounts of data. Communication is becoming more accelerated as the Earth continues to shrink. People, out of necessity, are compelled to interact more as one than as different societies.

Education today requires a cadre of highly skilled teachers to bring forward to the minds of the children entrusted to their care the very best that there is to offer. The role of the classroom teacher can only be successful with the support of a Board of Education committed to excellence and parents and guardians who are knowledgeable and supportive of the individual needs of their own children. Teaching is best accomplished when the home, school, and community respond in this positive way.

A well-developed curriculum is one of the most fundamental ingredients for every child's educational success. It is the curriculum that melds into one the most current educational trends, the philosophy of education of the school district, and the desires of each and every parent and guardian to have his or her child reach the optimum of success. Education is global and addresses current as well as past events, offering students opportunities to make real world connections across every curricular area. In preparing our students for the 21<sup>st</sup> century, we must provide classroom instruction that prepares them with the skills necessary to access and connect information in a rapidly changing world.

There will be a continuing need to reach across the subject areas if we are to develop the child into a wholly educated individual. The skills of reading must be taught and reinforced in every subject, as must those of writing and mathematics. For the present time, and for the reasonably foreseeable future, these three fundamental areas will continue to be the core of the strength of the American society. Collectively they open the doors to all learning. In order for one to understand the laws of the nation, to make a contribution to society, and to value one's self and the rest of humankind, it is essential that this cross-curricular approach be embraced with enthusiasm.

This curriculum guide seeks to foster these ideals, so that the children of Milltown will be as well prepared as those from any other educational system. This guide emphasizes decision-making and citizenship skills and the need to conceptualize, rather than to learn by rote.

The educators of this district and the community are encouraged to utilize this guide as a vehicle to help assure that in Milltown we have indeed fulfilled our obligation to create a better world. A world in which there is more understanding for what is the common good of its entire people. A world in which our children will be better communicators and fully able to interact more as one, than as different societies.

**Affirmative Action Statement**

It is the policy of the Board of Education to provide equal employment and educational opportunities, regardless of race, color, creed, religion, sex, ancestry, national origin, place of residence, social or economic condition, or non-applicable handicap.

Affirmative Action Officer:

Norma Tursi, Business Administrator  
Milltown Board of Education  
21 West Church Street  
Milltown, New Jersey 08850  
(732) 214-2365

**Adaptation for Special Education Statement**

Although this curriculum guide has been developed for general education delivery, the knowledge, skills, attitudes, and behaviors identified are appropriate for the special education pupils in Milltown. Modifications necessary to accommodate the educational needs of an individual pupil's disability will be described in the Individualized Educational Program (IEP). They are on file at:

Office of Student Support Services  
c/o Joyce Kilmer School  
21 West Church Street  
Milltown, NJ 08850  
(732) 214-2365

**Philosophy of Education**  
(Board Policy File # 6010)

The Milltown Board of Education accepts the responsibility for coordinating the available resources for home, school, and community in a mutual effort to guide every pupil's growth towards becoming a self-respecting individual who can effectively function politically, economically, and socially in a democratic society.

The Board believes New Jersey State goals should be applicable for every pupil in the Milltown School District to the limit to which the Board possesses jurisdiction, financial and staff resources.

- A. All children should start school ready to learn.
  - 1. Quality preschool opportunities shall be provided for all specially eligible children, through collaboration between public schools and community agencies.
  - 2. Within financial and staff resources parent education programs shall be designed and implemented by the District to assist parents in providing readiness experiences for their preschool children.
  
- B. The high school graduation rate shall be at least 90 percent (the receiving high school district shall be encouraged to embrace and implement these goals).
  - 1. The District shall provide least restrictive, alternative programs for pupils who cannot succeed in the regular high school environment, including those students with disabilities.
  - 2. The District shall provide dropout prevention programs for pupils at risk.
  
- C. Pupils shall leave grades four, eight and eleven having demonstrated competency in challenging subject matter including Language Arts/ literacy, mathematics, science, and social studies (civics, history and geography), health, physical education, visual and performing arts and world languages.
  - 1. The District shall implement state-approved curriculum content standards and appropriate assessments to enable pupils to succeed and to evaluate their performance.
  - 2. The District shall provide staff development opportunities to ensure that teachers are adequately equipped to teach challenging and up-to-date subject matter and to implement effective teaching techniques.
  
- D. Pupils shall learn to use their minds well, so that they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy.
  - 1. The District shall provide students with experiences in higher-level thinking, information processing, the responsibilities of citizenship, and employability skills.
  - 2. All pupils shall demonstrate competency in the skills identified in the cross-content workplace readiness standards.

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3. All pupils shall demonstrate respect for racial, cultural, ethnic and religious diversity.
- E. All pupils shall increase their achievement levels in science and mathematics to contribute to our country's ability to compete academically with other countries of the world.
1. The District shall revise its curriculum offerings in science and mathematics according to state standards as they are developed.
  2. The District shall provide staff training in the teaching of mathematics and science at grades K-8 to increase teachers' understanding of and ability to teach these subjects.
- F. Every adult shall be literate and possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship.
1. Adult education programs shall be increased in conjunction with other local districts, community colleges and other educational agencies, to provide greater opportunities for adults to continue learning for work skills, leisure pursuits, intellectual and cultural growth and to assist their children in learning.
  2. Business and industry shall be encouraged to collaborate with educational agencies to design and increase access to educational programs for adults, such as flex time, distance learning and interactive technology.
- G. District schools shall be free of drugs and violence and offer a safe, disciplined environment conducive to learning.
1. The District shall develop partnerships with parents to establish the responsibilities of each to create and maintain safe and healthy educational environments for all pupils.
  2. The District shall provide programs and staffing to deal with pupils at risk.
  3. The school and community shall expand their cooperative efforts to create drug and violence-free environments.
  4. All students shall develop a positive view of self and learn to use effective interpersonal skills.

The Board shall develop, in consultation with the chief school administrator and teaching staff members, a written educational plan for the District. This plan shall be reviewed and adopted annually and shall include:

- A. Written educational goals;
- B. An assessment of pupil needs;
- C. Specific annual objectives based on identified needs and action plans to implement them;

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- D. Standards for assessing and evaluating the achievement of objectives;
- E. The establishment of reasonable pupil minimum proficiency levels in the areas addressed in the core curriculum content standards;
- F. An educational program consistent with these goals, objectives, standards and needs;
- G. An evaluation of pupil progress.

*Adopted: September 23, 1997*

*Revised: March 29, 1999*

*Revised: May 27, 2008*

## **PURPOSE AND RATIONALE**

The primary purpose of the Enrichment/Gifted and Talented Curriculum is to challenge eligible students to think differently and critically through a variety of instructional approaches. Such instructional approaches may include brainstorming, cooperative learning, oral demonstrations and presentations, creative analytical writing, and creative problem solving techniques.

The primary goal for the teacher/facilitator is to determine a particular area of study. Such study may include short term tasks as well as long term projects. Instruction then focuses on refining and expanding previously learned skills through practice and application.

Through the program, students continue to develop critical thinking, increase creative problem solving skills, and broaden the skills of fluency, flexibility, originality and elaboration through a variety of creative activities. The exposure is designed to stimulate students to respond and relate to the human experience and to motivate them to become life-long self-directed learners.

The Milltown School District realizes that it has an obligation to meet the needs of the gifted students in the regular classroom. Therefore, classroom teachers design lessons and activities within lessons that require students to use higher level thinking skills (Bloom's Taxonomy), creative problem solving skills and/or critical thinking skills. These skills are often evidenced through strategies such as thematic instruction, activity centers, lesson extenders, cooperative learning structures. These learning situations and experiences cross the various Core Curriculum Subject Standards.

"It is our purpose also to provide learning experiences and support systems that promote the interaction of creativity, task commitment, and above average ability" (Joseph Renzulli).

## **GOALS FOR ENRICHMENT**

- Students will develop the ability to analyze and react to literature.
- Students will develop the ability to think and reason logically.
- Students will develop more adequate self-concepts by utilizing small group cooperative learning strategies with other students.
- Students will develop their intellectual and creative abilities through challenging instructional activities.
- Students will learn to appreciate his/her values, worth, potential and achieve a sense of pride in work accomplished.
- Students will develop improved task commitment.
- Students will develop self- motivation and consistently produce quality work.

## **GOALS FOR THE GIFTED AND TALENTED PROGRAM**

- Students will learn and use the necessary guidelines for brainstorming.
- Students will utilize brainstorming skills to develop new and unusual ideas.
- Students will extend their understanding of logical thinking through the use of deductive and inductive reasoning.
- Students will develop techniques for creative problem solving.
- Students will develop the ability to use higher level thinking skills.
- Students will develop techniques necessary for creative expression in both written and oral modes.
- Students will develop techniques necessary to become educated decision makers.
- Students will develop self-motivation and consistently present high-quality work.

## **PHILOSOPHY STATEMENT**

### **K-3 ENRICHMENT**

Kindergarten through Grade 3 Enrichment represents a program for students displaying an unusually high aptitude in the areas of verbal communication skills, math, reading and writing skills. It is a program to complement the district's gifted and talented program. Pupils enrolled in this program are not automatically eligible for the district's gifted and talented program offered in grades four through eight.

The main emphasis of the Enrichment program is to provide students with challenging education experiences and to give them opportunities to exchange ideas and learn from one another.

### **GRADES 4-5 GIFTED AND TALENTED PROGRAM**

The main emphasis or philosophy of the Gifted and Talented Program is to provide students with challenging education and creative experiences. Children participating in the program should have the opportunity to exchange ideas and learn from one another. The activities offered should provide a creative, stimulating, and interactive learning environment.

Within this environment, the gifted learner will use his/her thinking processes to the fullest potential. As a result, the facilitator will develop each student's ability to function at increased levels of independence. In addition, gifted students should be given ample opportunity to develop more adequate self-concepts by providing small group interaction with other gifted students. To this end, the children who have similar skills and talents will be able to challenge each other's capabilities and motivate each other to become involved in new areas of study.

The philosophy of educating the Gifted and Talented students shall include providing an environment where his/her special talents and skills, whether intellectual or creative can expand and develop, and the child can become a self-directed learner. Special subject teachers also enhance the gifted learner through student talents which include artistic, dramatic, musical (vocal and instrumental) and athletic. The gifted student should learn to appreciate his/her values, worth, and potential and to achieve a sense of pride in work accomplished.

### **GRADES 6-8 ACCELERATED PROGRAM**

Middle school language arts and mathematics instruction are differentiated to meet the needs of highly capable learners through our accelerated course offerings. Accelerated courses provide extension activities and projects according to grade level Common Core State. Higher level exploration and discovery-learning of general course topics, extensive application to real world problems, and challenging hands-on extension projects allow students to gain a greater depth of understanding and breadth of skill application. Students enrolled in accelerated courses are expected to achieve mastery in select indicators beyond the expectations of the general courses. Additionally, the accelerated mathematics courses in grades 7 and 8 follow the Common Core State Standard Accelerated Pathways, which is developed to allow students to complete Algebra I in 8<sup>th</sup> grade.

### **VISUAL ARTS, PERFORMING ARTS, AND ATHLETIC PROGRAMS FOR TALENTED STUDENTS**

Special subject teachers enhance the gifted learner through student talents, which include artistic, dramatic, musical (vocal and instrumental) and athletic. Through the use of rubrics, portfolios, and teacher observation, the special subject teachers are able to identify those students with exceptional

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talent. In the regular education art classes, bringing students to the next level in their artistic development challenges the individual potential of the exceptional student. Art clubs are offered after school at both schools, displaying their work at school, municipal, or other local art exhibits is encouraged. Gifted seventh and eighth grade art students are nominated by the art teacher for county level programs such as Teen Arts and the Middle School of the Arts programs are available. Students who present exceptional talent in the areas of creative writing or vocal or instrumental music are also recommended for the Teens Art program. A creative writing club is offered after school at the middle school level. Gifted lower elementary students have the opportunities within the classroom and school assemblies to perform solos vocally and with the recorder. Exceptionally talented instrumental music students at the upper elementary level are exposed to a variety of challenging exercises within their individual lessons and are given solo and supplementary materials, when needed. These students are recommended to perform in the school's Jazz Band, Concert Band, and to perform an individual solo at the school's Coffeehouse program. At the middle school level, talented vocal music students are challenged by singing using sheet music instead of printed music, in addition to given opportunities to sing solos in the classroom. Music Club is offered during lunchtime and chorus is offered all year. Talented drama students audition for the school musical in the fall. Starting at grade six, students who display exceptional athletic ability are given opportunities to try-out for varsity sports and cheerleading.

### **CURRICULUM COMPACTING**

The general educational program in Milltown embraces differentiation as part of the routine course of instruction. Curriculum compacting is a research-based instructional model for the regular education classroom popularized by Renzulli & Reis, highly regarded national experts on gifted education.

Curriculum compacting allows highly capable learners the opportunity to engage in challenging extension activities based on their demonstration of mastery on chapter/unit pre-assessments. This model embraces the premise that advanced students should be offered different learning opportunities and challenged beyond the norm of routine classroom instruction. Compacting is offered through the social studies and/or science curriculum in grades 3-7.

Highly capable students are identified for curriculum compacting based on a combination of criteria. Teacher recommendation is critical to assessing whether a student would benefit from the challenging work and the independent responsibility associated with mastery of content and completion of the project. Test performance in that subject area at the upper grades or reading level at the lower grades is also considered when offering a student the opportunity to participate in curriculum compacting. Parents are a valuable partner in assessing student readiness as well.

Curriculum compacting is typically offered once per marking period. Once student participants are identified they participate in a guided preview period for the particular chapter/unit. Students who meet mastery on the pretest with a 91 or above will immediately participate in a 21st century learning project that relates to the current topic for the duration of the classroom chapter/unit. Other students who take the pretest and do not meet mastery on the first try, but score between an 84 and 90, will participate in a compacting period with the teacher. This compacting period will most likely span 1-2 days during which time the teacher will work with the student to review the material that was incorrect on the pretest and offer a retest. The student will participate in the 21st century project if he/she scores above a 91 on the retest. If the retest score remains below a 91, the student will be included in the regular course of instruction for that unit/chapter.

**Kindergarten Enrichment Projects:** Begins Marking Period 2

Standards are reinforced based on expected grade level proficiency in each content area matrix.

**1. Row, Row, Row: Classification**

- 5.1.P.A.1 Habits of the Mind

Students will identify common traits in similar items.

**2. Rhyming**

- RF 2.a Phonological Awareness

Identify and produce rhyming words.

**3. Book of Rhymes**

- WK 2a Writing

Students will create and illustrate an original book of rhymes.

**4. Dudley the Detective, Mystery Creatures**

- SL 2 Active Listening
- SL 3 Listening Comprehension

Students will demonstrate ability to use deductive logic by listening for and applying clues.

**5. Logic Grids**

- K Mathematical Practices 8. (Reasoning)

Solve matrix logic puzzles using reasoning skills.

**6. Make Way for Ducklings**

- K RL10 Reading
- K SL 2 Listening

Students will read and/or listen to the book and answer literal, inferential, and critical thinking questions.

**7. Animal Homes**

- 1.3.2.D.1 Creation and Performance
- 5.3 Life Science
- 9.1.4.A.1 Critical Thinking

Students will research animal habitats then design and build a home for an imaginary creature using analysis and synthesis skills.

**8. A Party In the Woods: Deductive Thinking**

- SL 2 Active Listening
- SL 3 Listening Comprehension
- KRL 4 Constructing Meaning

Students will use visual and verbal clues to form conclusions.

**9. Bubble Bonanza: Creative Thinking**

- 1.3.2.D.1 Visual Art
- 9.1.4.A.1 Critical Thinking

Students will demonstrate creative thinking by finishing a scene and creating new pictures.

**10. Carrot Nibbles: Using Our Five Senses**

- KW 2 Writing Forms, Audiences, and Purposes
- WK 1 Word Choice

Select and use descriptive words.

**11. Cooperative Story Writing**

- WK 3 Writing

Students participate in shared writing of an original fairy tale.

**12. What if... : Critical and Creative Thinking**

- WK 3 Writing
- SL 2 Listening

Students will use critical thinking skills to analyze nursery rhymes and creative thinking skills to develop alternate endings.

**13. Seasons**

- SL 6 Speaking
- SL 2 Listening
- 5.4.P.F.1 Atmosphere and Weather

Distinguish the four seasons using descriptive words and illustrations.

**14. Frederick**

- RL 1 Comprehension Skills and Response to Text
- SL 2 Listening

Students answer evaluation level questions on the book.

**15. Oral Presentations**

- SL 6 Speaking

Students will use oral presentation, discussion, and questioning skills throughout the year to attain speaking confidence and fluency in various situations.

## **First Grade Enrichment Projects**

Standards are reinforced based on expected grade level proficiency in each content area matrix.

### **1. Baseball Math**

- 1.OA Operations and Algebraic Thinking
- 1.MD Measurement and Data

Students will use mental math and tally charts to play a baseball mathematics game.

### **2. Scarecrow Classification**

- 5.1 Scientific Practices

Students will use observation skills to classify using different attributes.

### **3. Storyboards: Sequencing and Creativity**

- RL 1.1 Reading
- W 1.3 Writing

Students logically sequence events and write beginnings or endings of stories.

### **4. Bezzuzicks and Perkles**

- 5.1.A Habits of the Mind

Students classify shapes and provide justification with supporting statements.

### **5. Math for All Seasons**

- SMP.1 Mathematical Processes

Students will select and apply problem solving strategies.

### **6. Thanksgiving Online Research Quiz**

- SL 1.2 Active Listening
- 8.1.2.A.5 Basic Computer Tools and Skills

Themed computer research project utilizing LittleExplorers.com.

### **7. Winter Hats**

- 5.1 Scientific Practices

Students use Venn diagrams to demonstrate classification.

### **8. Trip Across the Room: Non-Standard Measurement**

- 1.MD Measurement and Data

Students will make estimations, use non-standard measurement, and draw conclusions from collected data.

### **9. Autobiography**

- W1.2 Writing

Students organize and write a brief autobiography after viewing examples of biographies and autobiographies.

### **10. Logic Grids**

- SMP.2 Reasoning

Solve matrix logic puzzles using reasoning skills.

**11. Rhyming and Poetry**

- RL.1.1, RL.1.4, RL 1.10 Reading
- W.1.3 Writing

Students will write original poems.

**12. Tooth Tally**

- 1.OA Operations and Algebraic Thinking
- 1.MD Measurement and Data
- SMP.1 Mathematical Processes

Students use data analysis and computation skills for problem solving.

**13. Tangrams**

- 1.G Geometry

Students manipulate tangrams to replicate a given design reinforcing visual thinking skills.

**14. Themed Songs: Creative Thinking**

- 1.1 The Creative Process
- W.1.3 Write Narratives

Students incorporate prior knowledge with creative thinking to write original lyrics for a known tune.

**15. Aesop's Fables: Making Inferences and Creative Thinking**

- RL.1.10 Read Complex Text
- RL.1.2 Central Message of Text
- W.4.3 Alternate Endings

Students determine the moral of a fable and write alternate endings.

**16. Alike and Different**

- W.1.2 Informative Writing
- RL.1.9 Compare and Contrast
- SL.1.3 Ask and Answer Questions

Students will compare and contrast through discussion, active listening, and writing.

**17. Communi-Trees**

- 5.3.2.E.2 Evolution and Diversity
- 9.1.4.A.1 Critical Thinking

Students will learn about and discuss the three levels of living space in a tree, then determine which creatures live at each level based on needs and adaptations.

**18. Oral Presentations**

- SL.1.3. Ask and Answer Questions
- SL.3.4 Oral Report

Students will use oral presentation, discussion, and questioning skills throughout the year to attain speaking confidence and fluency in various situations.

## Second Grade Enrichment Projects

Standards are reinforced based on expected grade level proficiency in each content area matrix.

### 1. Picking Apples: Divergent Thinking

- 9.1.4.A.1 Critical Thinking

Students will use brainstorming, divergent thinking, and fluency to problem solve.

### 2. Mrs. Pinky's Apartment: Logic

- MP 2.3 Reasoning

Students will select and apply an appropriate strategy for problem solving.

### 3. Isabel's Spare Parts

- 5.1.4.A.1 Scientific Processes
- 5.1.4.B.1 Technological Design

Students define brainstorming and discuss how it can help solve problems. Students use brainstorming and divergent thinking to problem solve.

### 4. Odd One Out

- RL 2.1 Understanding the 5 W's
- L 2.1 Standard English usage in writing and speaking

Using inferential thinking skills students will determine which item doesn't belong and provide justification with supporting statements.

### 5. The Birthday Present

- 2.MD Measurement & Data
- 2.MP.1 Data Analysis (Statistics)

Students will use Venn diagrams and deductive thinking to solve problems.

### 6. Poetry and Rhyming

- RL 2.4 Rhymes, rhythm and meaning in story, poem or song
- RL 2.1 Understanding key details in text
- L 2.5 Word relationships and meanings

Students will write and illustrate original poems.

### 7. Cause and Effect

- RL 2.7 Comprehension Skills and Response to Text
- RL 2.5 Structure of text
- SL 2.2 Comprehension and collaboration

Students will state a cause for the effect to each letter represented in *The Z Was Zapped* by Chris VanAllsburg. Supporting details must be supplied.

### 8. Similes

- W 2.5 Writing Forms, Audiences, and Purposes

Students use critical and creative thinking skills to produce similes.

### 9. Persuasive Letter Writing

- W 2.2 Text types and purposes

Students will use analysis and synthesis skills to compose a persuasive letter about a relevant personal, local, state, or national topic of choice.

**10. Tree Treasure Hunt**

- MP 2.3 Data Analysis and Probability
- MP 2.4 Environmental Studies

Students learn about tree products and categorize items found in everyday life. Collected data is then represented graphically using an online pie graph program.

**11. How to...**

- W 2D Writing Forms, Audiences, and Purposes
- SL 2.3 Listening Comprehension
- 9.1.8.A.4 Self-Management (Accept criticism)

Students will generate ideas and write procedures to share with an audience. Audience members will follow directions and critique instructions.

**12. Sybil's Scientific Pairs: Compare and Contrast**

- 5.1 Scientific Practices

Students use analytical thinking skills to compare and contrast sets of items and animals.

**13. Max and His Shadowy Shapes**

- 2.MD Measurement & Data
- 2.G Geometry

Students use visual thinking skills to manipulate tangram shapes and solve problems.

**14. Oral Presentations**

- SL 2.6 Complete sentences using details and clarification

Students will use oral presentation, discussion, and questioning skills throughout the year to attain speaking confidence and fluency in various situations.

## Third Grade Enrichment Projects

Standards are reinforced based on expected grade level proficiency in each content area.

### 1. The Giving Tree

- RL 5.5 Comprehension Skills and Response to Text

Students analyze and evaluate the classic children's book *The Giving Tree* by Shel Silverstein.

### 2. Math Mystery Series

- 3.OA.3 Math Operation
- SMP.1 Problem Solving

Students will select and apply problem solving strategies and perform computations to solve math story problems.

### 3. Related Pictures: Analogies

- RI 4.1 & 5.9 Reading

Students will use critical thinking and analysis skills to determine relationships between objects.

### 4. What Might This Be?

- SL 4.3 Listening
- 9.1A Critical Thinking

Students will use divergent thinking skills to "invent" answers that fit a given criteria.

### 5. Sybil's Laboratory

- SL 3.1 Discussion
- 5.3 Life Science

Students sort creatures into groups by creating a classification system.

### 6. Logic Puzzles

- SMP.2 Reasoning

Solve matrix logic puzzles using reasoning skills.

### 7. Holiday Gift Shopping

- 3.OA.7 Numerical Operations
- SMP.4 Mathematical Models
- 9.1A Critical Thinking

Students must plan a budget and perform computations to solve a real world mathematical problem.

### 8. Educational Board Game

- 1.3.5.D.1 Principles of Design
- RI 5.9 Inquiry and Research
- 9.1A Critical Thinking
- 9.1F Accountability
- 9.1D Interpersonal Communication

Students become the design team for an educational board game based on a topic studied in their homeroom classes. Additional research is done on the topic of choice. The students then use synthesis skills to create an original game.

## **Fourth Grade Gifted and Talented Projects**

Standards are reinforced based on expected grade level proficiency in each content area.

### **1. Peer Interview**

- NJSLA.SL.1 Prepare for a Range of Conversations
- NJSLA.SL.3 Evaluate a Speaker's Point of View
- NJSLA.SL.6 Adapt Speech to a Variety of Contexts

Use interview techniques to conduct a peer interview to develop inquiry skills.

### **2. Talk, Turkey, Talk!**

- W 4.1 Opinion Writing
- L 4.2-3 Language Conventions

This is an activity that allows the student to imagine that he/she is the Thanksgiving turkey about to be served up for dinner! The student must quickly convince the farmer that it would be much better to serve another dish such as roast beef. This activity involves brainstorming and creative writing. The creative thinking objectives of fluency, flexibility, originality and elaboration are used.

### **3. Mysteries for Group Detectives**

- RL 4.1&3 Ideas and Details
- W 4.3c Sequencing

These mysteries provide opportunities for students to improve leadership skills, communication skills, and thinking skills. The students will analyze a series of interrelated facts and solve a mystery. Students will place a series of related events in logical order. Students analyze mysteries to determine mystery-story elements (characters, setting, essential clues, and misleading clues, sequence of events, motive, and solution). The students will state the evidence they used to arrive at the solution.

### **4. Legal Eagles-Step into the Courtroom**

- NJSLA.R.10 Comprehension Skills and Response to Text
- L 4.1-Conventions of Standard English
- SL 4.4-6- Presentation of Knowledge and Ideas
- SMP.1 Problem Solving

Students will be able to understand how laws affect their lives, analyze hypothetical court cases, understand the appeal process, and recognize the value of jury duty. Students will identify the difference between criminal and civil cases, apply concepts of justice to cases, manage conflict, utilize problem solving skills, develop higher think skill, and speak publicly.

## **Fifth Grade Enrichment Projects**

Standards are reinforced based on expected grade level proficiency in each content area.

### **1. Presentation Skills – Speaking and Listening**

- L 5.1 Conventions of Standard English
- SL 5.4-6 Presentation of Knowledge and Idea

Students learn how to overcome symptoms of stage fright, all platform presentation skills, how to introduce a speaker, use of a formal feedback model. Students will present a demonstration presentation to their class and obtain feedback from the audience on each platform skill using the feedback model.

### **2. Creative Concoctions: Invention Theme Unit**

- L 5.1 Speaking; Questioning; (Inquiry); Contributing
- SL 5.4-6 Presentation of Knowledge and Ideas
- Critical Thinking

This theme unit introduces students to the amazing world of inventions — they'll learn about famous inventors, explore everyday inventions, discuss the "Top 10" inventions of all time, and even imagine a new invention for the 21st century. Students will create an original invention.

### **3. Mysteries for Detective Work**

- SMP.1-Problem Solving
- SMP.2-Reasoning
- NF 5.3 =-Interpret Fraction, Mixed Numbers And Word Problems
- NF 5.7C-Solve Real Word Problems
- RI 5.4-General Academic And Domain Specific Words
- RI 5.6-8-Points of View, Use Of Sources And Evidence
- RF 5.3-A Phonics And Word Analysis
- RF 5.4C-Word Recognition And Understanding
- SL 5.1-Comprehension And Collaboration

Comprehension and response to text; discussion; questioning; active listening; deductive reasoning; listening; comprehension; problem solving and decision making; strong concentration to details.

### **4. Math Mysteries**

- SMP. 1 Problem Solving
- SMP.2 Reasoning

Students will work to solve math mysteries using math background information and reasoning. Students will foster better reading skills by using clues in the text, identify unfamiliar vocabulary through context clues, and problem solving skills.

### **5. Discovering Logic**

- SMP.1-Problem Solving
- SMP.2-Reasoning
- W4.3c- Sequencing
- Critical Thinking

Students will analyze situations, see relationships, organize information and draw generalizations using several activities. These activities fall under the categories: analogies, syllogisms, inference, logical notations, sequencing, deduction, and logical reasoning. The students will use puzzles and mind maneuvers designed to sharpen critical thinking skills.

## SIXTH GRADE HONORS

### Mathematics Emphasis in Grade 6 Honors

- Understand ratio concepts and use ratio reasoning to solve problems.
- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Apply and extend previous understandings of numbers to the system of rational numbers.
- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Reason about and solve one-variable equations and inequalities.
- Represent and analyze quantitative relationships between dependent and independent variables.
- This course is made up of two textbooks Holt 6 & Holt 7

### PARCC Grade Level Fluency Expectations

1. Apply and extend previous understandings of multiplication and division to divide fractions by fractions.  
The Number System: 6.NS.1
2. Compute fluently with multi-digit numbers and find common factors and multiples.  
The Number System: 6.NS.2-3

### Major Within Grade Dependencies

- Equations of the form  $px = q$  (6.EE.7) are unknown-factor problems; the solution will sometimes be the quotient of a fraction by a fraction (6.NS.1).
- Solving problems by writing and solving equations (6.EE.7) involves not only an appreciation of how variables are used (6.EE.6) and what it means to solve an equation (6.EE.5) but also some ability to write, read, and evaluate expressions in which letters stand for numbers (6.EE.2).
- Students must be able to place rational numbers on a number line (6.NS.7) before they can place ordered pairs of rational numbers on a coordinate plane (6.NS.8). The former standard about ordering rational numbers is much more fundamental.

**OPERATIONS AND PROPERTIES**

*How do you use properties to find equivalent expressions?*

Holt Grade 6 Chapter 1  
Holt Grade 7 Chapter 1

**BIG IDEAS**

- 6.NS.B Compute fluently with multi-digit numbers and find common factors and multiples.
- 6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 6.NS.2 Fluently divide multi-digit numbers using the standard algorithm
- 6.NS.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express  $36 + 8$  as  $4(9 + 2)$ .
- 7.NS.1d[M] Apply properties of operations as strategies to add and subtract rational numbers.

**Expressions and Equations**

- 6.EE.1[M] Write and evaluate numerical expressions involving whole-number exponents.
- 6.EE.2c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas  $V = s^3$  and  $A = 6s^2$  to find the volume and surface area of a cube with sides of length  $s = 1/2$ .
- 6.EE.3 Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression  $3(2 + x)$  to produce the equivalent expression  $6 + 3x$ ; apply the distributive property to the expression  $24x + 18y$  to produce the equivalent expression  $6(4x + 3y)$ ; apply properties of operations to  $y + y + y$  to produce the equivalent expression  $3y$ .
- 7.EE.1[M] Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
- 7.EE.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example,  $a + 0.05a = 1.05a$  means that “increase by 5%” is the same as “multiply by 1.05.”
- 7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional  $1/10$  of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar  $9\frac{3}{4}$  inches long in the center of a door that is  $27\frac{1}{2}$  inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

**INTRODUCTION TO ALGEBRA**  
*How do you evaluate expressions?*

Holt Grade 6 Chapter 2  
Holt Grade 7 Chapter 2

**BIG IDEAS**

- 6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.  
6.EE.B Reason about and solve one-variable equations and inequalities.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
- 7.NS.1a[M] Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.
- 7.NS.1b Understand  $p + q$  as the number located a distance  $|q|$  from  $p$ , in the positive or negative direction depending on whether  $q$  is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
- 7.NS.1c Understand subtraction of rational numbers as adding the additive inverse,  $p - q = p + (-q)$ . Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
- 7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
- 7.NS.2a Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as  $(-1)(-1) = 1$  and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
- 7.NS.2b Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If  $p$  and  $q$  are integers, then  $-(p/q) = (-p)/q = p/(-q)$ . Interpret quotients of rational numbers by describing real-world contexts.
- 7.NS.2c[M] Apply properties of operations as strategies to multiply and divide rational numbers.
- 7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

**Expressions and Equations**

- 6.EE.2[M] Write, read, and evaluate expressions in which letters stand for numbers.
- 6.EE.2a[M] Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation "Subtract  $y$  from 5" as  $5 - y$ .
- 6.EE.2b Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, and coefficient); view one or more parts of an expression as a single entity. For example, describe the expression  $2(8 + 7)$  as a product of two factors; view  $(8 + 7)$  as both a single entity and a sum of two terms.
- 6.EE.3 Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression  $3(2 + x)$  to produce the equivalent expression  $6 + 3x$ ; apply the distributive property to the expression  $24x + 18y$  to produce the equivalent expression  $6(4x + 3y)$ ; apply properties of operations to  $y + y + y$  to produce the equivalent expression  $3y$ .
- 6.EE.4 Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions  $y + y + y$  and  $3y$  are equivalent because they name the same number regardless of which number  $y$  stands for.

- 6.EE.5[M] Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- 6.EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
- 6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form  $x + p = q$  and  $px = q$  for cases in which  $p$ ,  $q$  and  $x$  are all nonnegative rational numbers.
- 7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

**DECIMALS**

*What are common procedures to multiply and divide decimals?*

Chapter 3

**BIG IDEAS**

- 6.NS.B Compute fluently with multi-digit numbers and find common factors and multiples.
- 6.EE.B Reason about and solve one-variable equations and inequalities.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 6.NS.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

**Expressions and Equations**

- 6.EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
- 6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form  $x + p = q$  and  $px = q$  for cases in which  $p$ ,  $q$  and  $x$  are all nonnegative rational numbers.

**NUMBER THEORY AND FRACTIONS**

*How do you use multiplication and division to determine equivalent fractions?*

Chapter 4

**BIG IDEAS**

- 6.NS.B Compute fluently with multi-digit numbers and find common factors and multiples.
- 6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.
- 6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 6.NS.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express  $36 + 8$  as  $4(9 + 2)$ .

6.NS.7[M] Understand ordering and absolute value of rational numbers.

**Expressions and Equations**

6.EE.2b[M] Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, and coefficient); view one or more parts of an expression as a single entity. For example, describe the expression  $2(8 + 7)$  as a product of two factors; view  $(8 + 7)$  as both a single entity and a sum of two terms.

6.EE.3[M] Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression  $3(2 + x)$  to produce the equivalent expression  $6 + 3x$ ; apply the distributive property to the expression  $24x + 18y$  to produce the equivalent expression  $6(4x + 3y)$ ; apply properties of operations to  $y + y + y$  to produce the equivalent expression  $3y$ .

6.EE.4[M] Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions  $y + y + y$  and  $3y$  are equivalent because they name the same number regardless of which number  $y$  stands for.

**FRACTION OPERATIONS**

*How do you evaluate expressions and solve equations with fractions?*

Chapter 5

**BIG IDEAS**

6.NS.A Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

6.NS.B Compute fluently with multi-digit numbers and find common factors and multiples.

6.EE.B Reason about and solve one-variable equations and inequalities.

**ENDURING UNDERSTANDINGS**

**The Number System**

6.NS.1[M] Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for  $(2/3) \div (3/4)$  and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that  $(2/3) \div (3/4) = 8/9$  because  $3/4$  of  $8/9$  is  $2/3$ . (In general,  $(a/b) \div (c/d) = ad/bc$ .)

How much chocolate will each person get if 3 people share  $1/2$  lb of chocolate equally? How many  $3/4$ -cup servings are in  $2/3$  of a cup of yogurt? How wide is a rectangular strip of land with length  $3/4$  mi and area  $1/2$  square mi?

6.NS.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express  $36 + 8$  as  $4(9 + 2)$ .

**Expressions and Equations**

6.EE.6[M] Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

6.EE.7[M] Solve real-world and mathematical problems by writing and solving equations of the form  $x + p = q$  and  $px = q$  for cases in which  $p$ ,  $q$  and  $x$  are all nonnegative rational numbers.

**DATA COLLECTION AND ANALYSIS**  
*What methods can be used to summarize data?*

**BIG IDEAS**

- 6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.
- 6.SP.A Develop understanding of statistical variability.
- 6.SP.B Summarize and describe distributions.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 6.NS.7c Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of –30 dollars, write  $|-30| = 30$  to describe the size of the debt in dollars.
- 6.NS.7d Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.

**Statistics and Probability**

- 6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.
- 6.SP.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
- 6.SP.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
- 6.SP.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
- 6.SP.5 Summarize numerical data sets in relation to their context, such as by:
  - 6.SP.5a Reporting the number of observations.
  - 6.SP.5b Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
  - 6.SP.5c Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
  - 6.SP.5d Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

**PROPORTIONAL RELATIONSHIPS**

*How can proportional reasoning help to solve rate and ratio problems?*

Holt Grade 6 Chapter 7  
Holt Grade 7 Chapter 4

**BIG IDEAS**

- 6.RP.A Understand ratio concepts and use ratio reasoning to solve problems.
- 6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.
- 7.RP.A Analyze proportional relationships and use them to solve real-world and mathematical problems (Slope).

**ENDURING UNDERSTANDINGS**

**The Number System**

- 6.NS.6 Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
- 6.NS.6c Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

**Ratios and Proportional Relationships**

- 6.RP.1[M] Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."
- 6.RP.2[M] Understand the concept of a unit rate  $a/b$  associated with a ratio  $a:b$  with  $b \neq 0$ , and use rate language in the context of a ratio relationship. For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is  $3/4$  cup of flour for each cup of sugar." "We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger."
- 6.RP.3[M] Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
- 6.RP.3a[M] Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
- 6.RP.3b[M] Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?
- 6.RP.3c[M] Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means  $30/100$  times the quantity); solve problems involving finding the whole, given a part and the percent.
- 7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks  $1/2$  mile in each  $1/4$  hour, compute the unit rate as the complex fraction  $1/2/1/4$  miles per hour, equivalently 2 miles per hour.
- 7.RP.2 Recognize and represent proportional relationships between quantities.
- 7.RP.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
- 7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- 7.RP.2c Represent proportional relationships by equations. For example, if total cost  $t$  is proportional to the number  $n$  of items purchased at a constant price  $p$ , the relationship

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between the total cost and the number of items can be expressed as  $t = pn$ .

- 7.RP.2d Explain what a point  $(x, y)$  on the graph of a proportional relationship means in terms of the situation, with special attention to the points  $(0, 0)$  and  $(1, r)$  where  $r$  is the unit rate.
- 7.RP.3 Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

**Geometry**

- 7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

**MEASUREMENT AND GEOMETRY**

*How do you solve problems that involve lengths, areas, and volumes?*

Holt Grade 6 Chapter 8  
Holt Grade 7 Chapter 9

**BIG IDEAS**

- 6.RP.A Understand ratio concepts and use ratio reasoning to solve problems.
- 6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.
- 6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.

**ENDURING UNDERSTANDINGS**

**Ratios and Proportional Relationships**

- 6.RP.3d[M] Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

**Expressions and Equations**

- 6.EE.2c[M] Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas  $V = s^3$  and  $A = 6s^2$  to find the volume and surface area of a cube with sides of length  $s = 1/2$ .

**Geometry**

- 6.G.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
- 6.G.2 Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas  $V = lwh$  and  $V = bh$  to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
- 6.G.4 Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
- 7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
- 7.G.4 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.
- 7.G.6 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.

**INTEGERS AND COORDINATE PLANE**

*How do you graph and locate ordered pairs on four quadrants of a coordinate plane?*

Chapter 9

**BIG IDEAS**

- 6.NS.C Apply and extend previous understandings of numbers to the system of rational numbers.
- 6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.
- 7.NS.A Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 6.NS.5[M] Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- 6.NS.6[M] Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
- 6.NS.6a[M] Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g.,  $-(-3) = 3$ , and that 0 is its own opposite.
- 6.NS.6b[M] Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
- 6.NS.6c[M] Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
- 6.NS.7 Understand ordering and absolute value of rational numbers.
- 6.NS.7a[M] Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret  $-3 > -7$  as a statement that  $-3$  is located to the right of  $-7$  on a number line oriented from left to right.
- 6.NS.7b[M] Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write  $-3\text{ }^{\circ}\text{C} > -7\text{ }^{\circ}\text{C}$  to express the fact that  $-3\text{ }^{\circ}\text{C}$  is warmer than  $-7\text{ }^{\circ}\text{C}$ .
- 6.NS.7c[M] Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of  $-30$  dollars, write  $|-30| = 30$  to describe the size of the debt in dollars.
- 6.NS.7d[M] Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than  $-30$  dollars represents a debt greater than 30 dollars.
- 6.NS.8[M] Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
- 7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
- 7.NS.1a Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.

- 7.NS.1b Understand  $p + q$  as the number located a distance  $|q|$  from  $p$ , in the positive or negative direction depending on whether  $q$  is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
- 7.NS.1c Understand subtraction of rational numbers as adding the additive inverse,  $p - q = p + (-q)$ . Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
- 7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
- 7.NS.2a Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as  $(-1)(-1) = 1$  and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
- 7.NS.2b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If  $p$  and  $q$  are integers, then  $-(p/q) = (-p)/q = p/(-q)$ . Interpret quotients of rational numbers by describing real-world contexts.
- 7.NS.2c Apply properties of operations as strategies to multiply and divide rational numbers.
- 7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

**Geometry**

- 6.G.3 Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
- 8.G.1 Verify experimentally the properties of rotations, reflections, and translations.

**FUNCTIONS**

*How can you use mathematics to describe an observable event?*

Holt Grade 6 Chapter 10  
Holt Grade 7 Chapter 11

**BIG IDEAS**

- 6.RP.A Understand ratio concepts and use ratio reasoning to solve problems.
- 6.EE.A Apply and extend previous understandings of arithmetic to algebraic expressions.
- 6.EE.B Reason about and solve one-variable equations and inequalities.
- 6.EE.C Represent and analyze quantitative relationships between dependent and independent variables.
- 6.G.A Solve real-world and mathematical problems involving area, surface area, and volume.

**ENDURING UNDERSTANDINGS**

**Ratios and Proportional Relationships**

- 6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

**Expressions and Equations**

- 6.EE.2c Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas  $V = s^3$  and  $A = 6s^2$  to find the volume and surface area of a cube with sides of length  $s = 1/2$ .
- 6.EE.8[M] Write an inequality of the form  $x > c$  or  $x < c$  to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form  $x > c$  or  $x < c$  have infinitely many solutions; represent solutions of such inequalities on number line diagrams.
- 6.EE.9[M] Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

**Geometry**

- 6.G.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

**PRE-ALGEBRA PREREQUISITES**

*What skills and concepts are important for pre-algebra?*

**BIG IDEAS**

- 7.EE.A Use properties of operations to generate equivalent expressions.
- 7.SP.A Use random sampling to draw inferences about a population.
- 7.SP.C Investigate chance processes and develop, use, and evaluate probability models.

**ENDURING UNDERSTANDINGS**

**Expressions and Equations**

- 6.EE.2c Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

**Statistics and Probability**

- 7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
- 7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
- 7.SP.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.

## Seventh and Eighth Grade Accelerated Language Arts

Standard mastery is expected according to district Language Arts Curriculum Guide.

### Reading

- RL 1-3 & 10

Literature circles are employed to debrief on themes, motifs and symbolism contained in novels of an advanced level of text complexity.

#### Grade 7

*A Christmas Carol*: literary devices [RL 2-5]

*Devil's Arithmetic*: theme, central idea, setting [RL 1-4; RL 6]

*Miracle Worker*: reader's theater [RL 1]

*Roll of Thunder, Hear My Cry*: technology presentation and essential note-taking [RL 1-3]

*The Boy in Striped Pajamas*: setting, essential note-taking [RL 1-3]

*The Giver*: technology presentation [RL 1]

*The Outsiders*: character analysis [RL 7]

*Where the Red Fern Grows*: technology presentation and essential note-taking [RL 1-3]

#### Grade 8

*I Have Lived a Thousand Years*: technology presentation [RL 1-4]

*Night*: technology presentation [RL 1]

*Old Man and the Sea*: interactive journal [RL 1-4; W 2; L 1-3]

*Pigman and Pigman's Legacy*: text analysis [RL 6&9]

*Soldier Boys*: essential key points [RL 1-3]

*The Cay*: simulation, diversity [RL 1-3&6-7]

*The Pearl*: theme, central idea, character analysis, motif, symbolism [RL 1-4&6]

### Writing

- L 1-6

The Six Traits of Writing are integrated with all writing pieces.

Arguments [W 1a-e, W 3-8, W 9b]

Persuasive essay writing

Research report to support formal debate

Narratives [W 3a-e]

Personal narrative

Narrative suspense poem

Responsive and Reflective [W 10]

Journals

Quote interpretation

Open-ended responses

Do-Now writing

Clearly and Coherently [W 3-5; L 5]

Anthology of Poetry

Anthology of Short Stories

Letters about Literature

Author Letter—Bette Greene

### Language

- L 1-4&6

Vocabulary and Literature  
Grammar Grabber lessons

### Speaking and Listening

- SL 6

Instruction of life-long presentation skills are focused on to ensure confident and powerful presentations:

- Life Cycle of Growth
- How to Overcome Symptoms of Stage Fright
- Platform Skills
- Feedback Model
- How to Handle a Heckler
- How to Handle a Question and Answer Session
- How to Introduce a Speaker

## PROJECTS

### 1. Harlem Renaissance

- SL 1-6
- W 2a-f
- W 4-6
- RL 4-5

Research Harlem Renaissance period and prepare a technology presentation on specific areas of concentration. Specifically, yet not limited to:

- History of the Harlem Renaissance (effect of the time period, etc.)
- Music and talent during this time period (i.e. jazz, Duke Ellington, etc.)

### 2. Steve Jobs

- SL 1
- W 4-6
- SL 6

Review and analyze a video recording of Steve Jobs' delivery at the Stanford University commencement.

### 3. 1960s America

- SL 1-6
- W 2a-f
- W 4-6

Research the 1960s in support of learning the setting/themes/times/character analysis relating to *The Pigman* and *Pigman's Legacy*. Create a technology presentation focusing on the fashion, music, social movements and political events during the 1960s.

### 4. Compare/Contrast

- W 2a-f
- W 4-6
- W 5
- W 9a

Compare and contrast the characters in *The Pigman* and *Pigman's Legacy* through working with text, analyzing text, and character analysis.

**5. Poe Recitation**

- RL 4-5

Analyze, interpret, and perform *The Raven* by Edgar Allan Poe for an audience.

**6. Shakespeare Recitation**

- RL 4-5

Analyze, interpret, and perform a Shakespearean soliloquy.

**7. Persuasive Business Plan**

- SL 1-6
- W 1a-e
- W 1-6

Evaluate products and create or modify an existing business plan. Prepare a business plan with advertising and promotions, cost breakdown analysis, risk mitigating milestones, preventive measures, and expansion over time, logo/product sketch, persuasive essay, etc.

**8. Career Presenters**

- SL 1d

Focus on enhancing knowledge by listening and viewing career presenters who each focus on steps to achieve career goals and offer artifacts or explanation of services related to the career.

**9. Poetry [RL 5;W 10]**

Students review and analyze poems and identify the specific literary devices along with the mood, setting, and interpretation. To that end, they are asked to then present their poem to their class and integrate the setting within their delivery. They are to bring the poem to life.

Equally students write repetition, limericks, free verse, and narrative suspense poetry to support their learning. Topics are identified based on World Events, Anti-bullying, Novel interpretation, and Character and Text Analysis. Specifically, for Roll of Thunder Hear My Cry (Diversity), The Cay (Diversity), Rachel's Challenge (Acts of Kindness), The Miracle Worker, Devil's Arithmetic, Night, and The Boy in the Striped Pajamas.

**SEVENTH GRADE  
PRE-ALGEBRA HONORS**

**Mathematics Emphasis in Grade 7 Honors**

- Develop a unified understanding of numbers, recognizing fractions, decimals, and percents as different representations of rational numbers.
- Formulate expressions and equations in one variable and use these equations to solve problems.
- Develop an understanding of integer exponents, and work with numbers written in scientific notation.
- Use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems (proportion/slope).
- Compare two data distributions and analyze differences between them.
- Solve problems involving area, circumference and volume of objects.
- Examine the relationship of lines and angles in a variety of contexts.

**PARCC Grade Level Fluency Expectations**

1. Know that there are numbers that are not rational, and approximate them by rational numbers.  
The Number System: 8.NS.1&2
2. Work with radicals and integer exponents.  
Expressions and Equations: 8.EE.1-4
3. Understand the connections between proportional relationships, lines, and linear equations.  
Expressions and Equations: 8.EE.5-6
4. Analyze and solve linear equations and pairs of simultaneous linear equations.  
Expressions and Equations: 8.EE.7
5. Understand congruence and similarity using physical models, transparencies, or geometry software.  
Geometry: 8.G.1-5
6. Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.  
Geometry: 8.G.9

**THE LANGUAGE OF ALGEBRA**

*How can you use numbers and symbols to represent mathematical ideas?*

Chapter 1

**BIG IDEAS**

- 7.NS.A Apply and extend previous understandings of operations with fractions.
- 7.EE.A Use properties of operations to generate equivalent expressions.
- 7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

**Expressions & Equations**

- 7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
- 7.EE.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example,  $a + 0.05a = 1.05a$  means that “increase by 5%” is the same as “multiply by 1.05.”
- 7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional  $\frac{1}{10}$  of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar  $9\frac{3}{4}$  inches long in the center of a door that is  $27\frac{1}{2}$  inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.
- 7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

**OPERATIONS WITH INTEGERS**

*What happens when you add, subtract, multiply, and divide with integers?*

Chapter 2

**BIG IDEAS**

- 7.NS.A Apply and extend previous understandings of operations with fractions.
- 7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
- 7.NS.1a[M] Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.

- 7.NS.1b[M] Understand  $p + q$  as the number located a distance  $|q|$  from  $p$ , in the positive or negative direction depending on whether  $q$  is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
- 7.NS.1c[M] Understand subtraction of rational numbers as adding the additive inverse,  $p - q = p + (-q)$ . Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
- 7.NS.1d Apply properties of operations as strategies to add and subtract rational numbers.
- 7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
- 7.NS.2a Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as  $(-1)(-1) = 1$  and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
- 7.NS.2b[M] Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If  $p$  and  $q$  are integers, then  $-(p/q) = (-p)/q = p/(-q)$ . Interpret quotients of rational numbers by describing real-world contexts.
- 7.NS.2c Apply properties of operations as strategies to multiply and divide rational numbers.
- 7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

**Expressions & Equations**

- 7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional  $1/10$  of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar  $9 \frac{3}{4}$  inches long in the center of a door that is  $27 \frac{1}{2}$  inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

**OPERATIONS WITH RATIONAL NUMBERS**

*What happens when you add, subtract, multiply, and divide rational numbers?*

Chapter 3

**BIG IDEAS**

- 7.NS.A Apply and extend previous understandings of operations with fractions.
- 8.NS.A Know that there are numbers that are not rational, and approximate them by rational numbers.
- 7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 7.NS.1[M] Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
- 7.NS.1d[M] Apply properties of operations as strategies to add and subtract rational numbers.

- 7.NS.2[M] Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
- 7.NS.2a[M] Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as  $(-1)(-1) = 1$  and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
- 7.NS.2c[M] Apply properties of operations as strategies to multiply and divide rational numbers.
- 7.NS.2d[M] Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
- 7.NS.3[M] Solve real-world and mathematical problems involving the four operations with rational numbers.
- 8.NS.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

**Expressions & Equations**

- 7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional  $1/10$  of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar  $9\frac{3}{4}$  inches long in the center of a door that is  $27\frac{1}{2}$  inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

**POWERS AND ROOTS**

*Why is it useful to write numbers in different ways?*

Chapter 4

**BIG IDEAS**

- 7.NS.A Apply and extend previous understandings of operations with fractions.
- 8.EE.A Expressions and Equations Work with radicals and integer exponents.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 8.NS.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
- 8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g.,  $\pi^2$ ). For example, by truncating the decimal expansion of  $\sqrt{2}$ , show that  $\sqrt{2}$  is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.

**Expressions & Equations**

- 8.EE.1[M] Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example,  $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$ .
- 8.EE.2[M] Use square root and cube root symbols to represent solutions to equations of the form  $x^2 = p$  and  $x^3 = p$ , where  $p$  is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that  $\sqrt{2}$  is irrational.

- 8.EE.3[M] Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 times  $10^8$  and the population of the world as 7 times  $10^9$ , and determine that the world population is more than 20 times larger.
- 8.EE.4[M] Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

**RATIOS, PROPORTION, AND SIMILAR FIGURES**

*How can you identify and represent proportional relationships?*

Chapter 5

**BIG IDEAS**

- 7.NS.A Apply and extend previous understandings of operations with fractions.
- 8.EE.B Understand the connections between proportional relationships, lines, and linear equations.
- 7.RP.A Analyze proportional relationships and use them to solve real-world and mathematical problems.
- 7.G.A Draw, construct, and describe geometrical figures and describe the relationships between them.

**ENDURING UNDERSTANDINGS**

**The Number System**

- 7.NS.3[M] Solve real-world and mathematical problems involving the four operations with rational numbers.

**Expressions & Equations**

- 8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

**Ratios & Proportional Relationships**

- 7.RP.1[M] Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks  $\frac{1}{2}$  mile in each  $\frac{1}{4}$  hour, compute the unit rate as the complex fraction  $\frac{1/2}{1/4}$  miles per hour, equivalently 2 miles per hour.
- 7.RP.2 Recognize and represent proportional relationships between quantities.
- 7.RP.2a[M] Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
- 7.RP.2b[M] Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- 7.RP.2c Represent proportional relationships by equations. For example, if total cost  $t$  is proportional to the number  $n$  of items purchased at a constant price  $p$ , the relationship between the total cost and the number of items can be expressed as  $t = pn$ .
- 7.RP.2d[M] Explain what a point  $(x, y)$  on the graph of a proportional relationship means in terms of the situation, with special attention to the points  $(0, 0)$  and  $(1, r)$  where  $r$  is the unit rate.

- 7.RP.3 Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

**Geometry**

- 7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

**PERCENTS**

*How can you use proportional relationships to solve real-world percent problems?*

Chapter 6

**BIG IDEAS**

- 7.EE.A Use properties of operations to generate equivalent expressions.  
 7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.  
 7.RP.A Analyze proportional relationships and use them to solve real-world and mathematical problems.

**ENDURING UNDERSTANDINGS**

**Expressions & Equations**

- 7.EE.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example,  $a + 0.05a = 1.05a$  means that “increase by 5%” is the same as “multiply by 1.05.”  
 7.EE.3[M] Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional  $\frac{1}{10}$  of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar  $9\frac{3}{4}$  inches long in the center of a door that is  $27\frac{1}{2}$  inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

**Ratios & Proportional Relationships**

- 7.RP.2 Recognize and represent proportional relationships between quantities.  
 7.RP.2c Represent proportional relationships by equations. For example, if total cost  $t$  is proportional to the number  $n$  of items purchased at a constant price  $p$ , the relationship between the total cost and the number of items can be expressed as  $t = pn$ .  
 7.RP.3 Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

**ALGEBRAIC EXPRESSIONS**

*Why are algebraic rules useful?*

Chapter 7

**BIG IDEAS**

- 7.EE.A Use properties of operations to generate equivalent expressions.
- 7.NS.A Apply and extend previous understandings of operations with fractions.

**ENDURING UNDERSTANDINGS**

**Expressions & Equations**

- 7.EE.1[M] Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
- 7.EE.2[M] Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example,  $a + 0.05a = 1.05a$  means that “increase by 5%” is the same as “multiply by 1.05.”

**The Number System**

- 7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

**EQUATIONS AND INEQUALITIES**

*How are equations and inequalities used to describe and solve multistep problems?*

Chapter 8

**BIG IDEAS**

- 7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
- 8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.
- 8.F.A Define, evaluate, and compare functions.
- 8.F.B Use functions to model relationships between quantities.
- 8.SP.A Investigate patterns of association in bivariate data.

**ENDURING UNDERSTANDINGS**

**Expressions & Equations**

- 7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
- 7.EE.4a[M] Solve word problems leading to equations of the form  $px + q = r$  and  $p(x + q) = r$ , where  $p$ ,  $q$ , and  $r$  are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
- 7.EE.4b[M] Solve word problems leading to inequalities of the form  $px + q > r$  or  $px + q < r$ , where  $p$ ,  $q$ , and  $r$  are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: 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.
- 8.EE.7[M] Solve linear equations in one variable.

- 8.EE.7a[M] Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form  $x = a$ ,  $a = a$ , or  $a = b$  results (where  $a$  and  $b$  are different numbers).
- 8.EE.7b[M] Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
- 8.EE.8a[M] Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
- 8.EE.8b[M] Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example,  $3x + 2y = 5$  and  $3x + 2y = 6$  have no solution because  $3x + 2y$  cannot simultaneously be 5 and 6.
- 8.EE.8c[M] Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

### Functions

- 8.F.3[M] Interpret the equation  $y = mx + b$  as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function  $A = s^2$  giving the area of a square as a function of its side length is not linear because its graph contains the points  $(1,1)$ ,  $(2,4)$  and  $(3,9)$ , which are not on a straight line.
- 8.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two  $(x, y)$  values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

### Statistics and Probability

- 8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

## LINEAR FUNCTIONS

*How are linear functions used to model proportional relationships?*

Chapter 9

### BIG IDEAS

- 7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
- 8.EE.B Understand the connections between proportional relationships, lines, and linear equations.
- 8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.
- 7.RP.A Analyze proportional relationships and use them to solve real-world and mathematical problems.
- 8.F.A Define, evaluate, and compare functions.
- 8.F.B Use functions to model relationships between quantities.

**ENDURING UNDERSTANDINGS**

**Expressions & Equations**

- 7.EE.4[M] Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
- 8.EE.5[M] Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
- 8.EE.6[M] Use similar triangles to explain why the slope  $m$  is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation  $y = mx$  for a line through the origin and the equation  $y = mx + b$  for a line intercepting the vertical axis at  $b$ .
- 8.EE.8 Analyze and solve pairs of simultaneous linear equations.

**Functions**

- 8.F.1[M] 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.
- 8.F.2[M] Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). 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.
- 8.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

**Ratios & Proportional Relationships**

- 7.RP.2 Recognize and represent proportional relationships between quantities.
- 7.RP.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

**STATISTICS AND PROBABILITY**  
*How are statistics used to draw inferences about and compare populations?*

Chapter 10

**BIG IDEAS**

- 7.SP.A Use random sampling to draw inferences about a population.
- 7.SP.B Draw informal comparative inferences about two populations.
- 7.SP.C Investigate chance processes and develop, use, and evaluate probability models.
- 8.SP.A Investigate patterns of association in bivariate data.

**ENDURING UNDERSTANDINGS**

**Statistics & Probability**

- 7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

## MATHEMATICS: Seventh Grade Honors

- 7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.
- 7.SP.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.
- 7.SP.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.
- 7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around  $\frac{1}{2}$  indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
- 7.SP.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.
- 7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
- 7.SP.7a Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.
- 7.SP.7b Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?
- 7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
- 7.SP.8 Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
- 7.SP.8b Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.
- 7.SP.8c Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?

### **Statistics and Probability**

- 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.

- 8.SP.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
- 8.SP.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?

**CONGRUENCE, SIMILARITY, AND TRANSFORMATIONS**

*How can you determine congruence and similarity?*

Chapter 11

**BIG IDEAS**

- 7.G.A Draw, construct, and describe geometrical figures and describe the relationships between them.
- 7.G.B Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
- 8.G.A Understand congruence and similarity using physical models, transparencies, or geometry software.
- 8.G.B Understand and apply the Pythagorean Theorem.

**ENDURING UNDERSTANDINGS**

**Geometry**

- 7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
- 7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
- 8.G.1[M] Verify experimentally the properties of rotations, reflections, and translations.
- 8.G.1a[M] Lines are taken to lines, and line segments to line segments of the same length.
- 8.G.1b[M] Angles are taken to angles of the same measure.
- 8.G.1c[M] Parallel lines are taken to parallel lines.
- 8.G.2[M] 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.
- 8.G.3[M] Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
- 8.G.4[M] 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.
- 8.G.5[M] 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. 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.

- 8.G.6[M] Explain a proof of the Pythagorean Theorem and its converse.
- 8.G.7[M] Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and threedimensions.
- 8.G.8[M] Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

**VOLUME AND SURFACE AREA**

*How are 2D figures used to solve problems involving 3D figures?*

Chapter 12

**BIG IDEAS**

- 7.G.A Draw construct, and describe geometrical figures and describe the relationships between them.
- 7.G.B Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
- 8.G.C Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

**ENDURING UNDERSTANDINGS**

**Geometry**

- 7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
- 7.G.4 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.
- 7.G.6 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.
- 8.G.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

## **EIGHTH GRADE ALGEBRA I**

### **Mathematics Emphasis in Grade 8 Algebra I**

- Understand the real number system as an extension to previously recognized rational and irrational numbers.
- Solve problems in which reasoning about units adds insight.
- Use properties of operations to rewrite expressions, gaining fluency and engaging in “mindful manipulation.”
- Master linear and quadratic functions.
- Solidify understanding of the analytic geometry of lines (Cartesian coordinate plane)
- Apply the study of algebra and functions in a statistical context.
- Solve complex word problems.

### **PARCC Algebra I Fluency Expectations**

1. Become fluent in solving characteristic problems involving the analytic geometry of lines, such as writing down the equation of a line given a point and a slope.  
Interpreting Categorical & Quantitative Data: S.ID.7-9
2. Fluency in adding, subtracting, and multiplying polynomials.  
Arithmetic with Polynomials & Rational Expressions: HSA-APR.1
3. Fluency in transforming expressions and chunking (seeing parts of an expression as a single object).  
Seeing Structure in Expressions: HSA-SSE.1b

**Expressions, Equations, and Functions**  
*How can mathematical ideas be represented?*

**BIG IDEAS**

- HSN-Q.A Reason quantitatively and use units to solve problems.
- HSA-SSE.A Interpret the structure of expressions.
- HSA-CED.A Create equations that describe numbers or relationships.
- HSA-REI.B Solve equations and inequalities in one variable.
- HSA-REI.D Represent and solve equations and inequalities graphically.
- HSF-IF.A Understand the concept of a function and use function notation.
- HSF-IF.B Interpret functions that arise in applications in terms of the context.
- HSF-IF.C Analyze functions using different representations.

**ENDURING UNDERSTANDINGS**

**Quantities**

- N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

**Seeing Structure in Expressions**

- A.SSE.1a[M] Interpret parts of an expression, such as terms, factors, and coefficients.
- A.SSE.1b[M] Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret  $P(1+r)^n$  as the product of  $P$  and a factor not depending on  $P$ .
- A.SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see  $x^4 - y^4$  as  $(x^2)^2 - (y^2)^2$ , thus recognizing it as a difference of squares that can be factored as  $(x^2 - y^2)(x^2 + y^2)$ .

**Creating Equations**

- A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
- A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

**Reasoning with Equations & Inequalities**

- A.REI.10[M] Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
- A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

**Interpreting Functions**

- F.IF.1[M] Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If  $f$  is a function and  $x$  is an element of its domain, then  $f(x)$  denotes the output of  $f$  corresponding to the input  $x$ . The graph of  $f$  is the graph of the equation  $y = f(x)$ .
- F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
- F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.

**LINEAR EQUATIONS**

*Why is it helpful to represent the same mathematical idea in different ways?*

Chapter 2

**BIG IDEAS**

- HSN-Q.A Reason quantitatively and use units to solve problems.
- HSA-CED.A Create equations that describe numbers or relationships.
- HSA-REI.A Understand solving equations as a process of reasoning and explain the reasoning.
- HSA-REI.B Solve equations and inequalities in one variable.

**ENDURING UNDERSTANDINGS**

**Quantities**

- N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
- N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.

**Creating Equations**

- A.CED.1[M] Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
- A.CED.4[M] Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm’s law  $V = IR$  to highlight resistance  $R$ .

**Reasoning with Equations & Inequalities**

- A.REI.1[M] Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
- A.REI.3[M] Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

**LINEAR FUNCTIONS**

*Why are graphs useful?*

Chapter 3

**BIG IDEAS**

- HSN-Q.A Reason quantitatively and use units to solve problems.
- HSA-REI.D Represent and solve equations and inequalities graphically.
- HSF-IF.B Interpret functions that arise in applications in terms of the context.
- HSF-IF.C Analyze functions using different representations.

**ENDURING UNDERSTANDINGS**

**Quantities**

- N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

**Reasoning with Equations & Inequalities**

- A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

### Interpreting Functions

- F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
- F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
- F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.

### Building Functions

- F.BF.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

### Linear, Quadratic, & Exponential Models

- F.LE.1a Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
- F.LE.1b Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
- F.LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

## EQUATIONS OF LINEAR FUNCTIONS

*Why is math used to model real-world situations?*

Chapter 4

### BIG IDEAS

- HSA-CED.A Create equations that describe numbers or relationships.
- HSF-IF.A Understand the concept of a function and use function notation.
- HSF-IF.C Analyze functions using different representations.
- HSF-BF.A Build a function that models a relationship between two quantities.
- HSF-BF.B Build new functions from existing functions.
- HSF-LE.A Construct and compare linear, quadratic, and exponential models and solve problems.
- HSF-LE.B Interpret expressions for functions in terms of the situation they model.
- HSS-ID.B Summarize, represent, and interpret data on two categorical and quantitative variables.
- HSS-ID.C Interpret linear models.

### ENDURING UNDERSTANDINGS

#### Creating Equations

- A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

#### Interpreting Functions

- F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.

#### Building Functions

- F.BF.4a Solve an equation of the form  $f(x) = c$  for a simple function  $f$  that has an inverse and write an expression for the inverse. For example,  $f(x) = 2x^3$  or  $f(x) = (x+1)/(x-1)$  for  $x \neq 1$ .

#### Linear, Quadratic, & Exponential Models

- F.LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- F.LE.5 Interpret the parameters in a linear or exponential function in terms of a context.

**Interpreting Categorical & Quantitative Data**

- S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
- S.ID.6a Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
- S.ID.6c Fit a linear function for a scatter plot that suggests a linear association.
- S.ID.7[M] Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
- S.ID.8[M] Compute (using technology) and interpret the correlation coefficient of a linear fit.
- S.ID.9[M] Distinguish between correlation and causation.

**LINEAR INEQUALITIES**  
*How are symbols useful in mathematics?*

Chapter 5

**BIG IDEAS**

- HSA-CED.A Create equations that describe numbers or relationships.
- HSA-REI.B Solve equations and inequalities in one variable.
- HSA-REI.D Represent and solve equations and inequalities graphically.

**ENDURING UNDERSTANDINGS**

**Creating Equations**

- A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
- A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

**Reasoning with Equations & Inequalities**

- A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
- A.REI.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

**SYSTEMS OF LINEAR EQUATIONS AND INEQUALITIES**

*How can you find the solution to a math problem?*

Chapter 6

**BIG IDEAS**

- HSA-CED.A Create equations that describe numbers or relationships.
- HSA-REI.C Solve systems of equations.
- HSA-REI.D Represent and solve equations and inequalities graphically.

**ENDURING UNDERSTANDINGS**

**Creating Equations**

- A.CED.2[M] Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- A.CED.3[M] Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

**Reasoning with Equations & Inequalities**

- A.REI.5[M] Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
- A.REI.6[M] Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
- A.REI.11[M] Explain why the x-coordinates of the points where the graphs of the equations  $y = f(x)$  and  $y = g(x)$  intersect are the solutions of the equation  $f(x) = g(x)$ ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where  $f(x)$  and/or  $g(x)$  are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
- A.REI.12[M] Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

**EXPONENTS AND EXPONENTIAL FUNCTIONS**

*What factors can affect good decision making?*

Chapter 7

**BIG IDEAS**

- HSN-RN.A Extend the properties of exponents to rational exponents.
- HSA-SSE.A Interpret the structure of expressions.
- HSA-SSE.B Write expressions in equivalent forms to solve problems.
- HSA-REI.D Represent and solve equations and inequalities graphically.
- HSF-IF.A Understand the concept of a function and use function notation.
- HSF-IF.B Interpret functions that arise in applications in terms of the context.
- HSF-IF.C Analyze functions using different representations.
- HSF-BF.A Build a function that models a relationship between two quantities.
- HSF-BF.B Build new functions from existing functions.
- HSF-LE.A Construct and compare linear, quadratic, and exponential models and solve problems.

## ENDURING UNDERSTANDINGS

### The Real Number System

- N.RN.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define  $5^{1/3}$  to be the cube root of 5 because we want  $(5^{1/3})^3 = 5(1/3)^3$  to hold, so  $(5^{1/3})^3$  must equal 5.
- N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

### Seeing Structure in Expressions

- A.SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see  $x^4 - y^4$  as  $(x^2)^2 - (y^2)^2$ , thus recognizing it as a difference of squares that can be factored as  $(x^2 - y^2)(x^2 + y^2)$ .
- A.SSE.3c Use the properties of exponents to transform expressions for exponential functions. For example the expression  $1.15t$  can be rewritten as  $(1.15^{1/12})^{12t} \approx 1.012^{12t}$  to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

### Reasoning with Equations & Inequalities

- A.REI.11 Explain why the x-coordinates of the points where the graphs of the equations  $y = f(x)$  and  $y = g(x)$  intersect are the solutions of the equation  $f(x) = g(x)$ ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where  $f(x)$  and/or  $g(x)$  are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

### Interpreting Functions

- F.IF.3[M] Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by  $f(0) = f(1) = 1$ ,  $f(n+1) = f(n) + f(n-1)$  for  $n \geq 1$ .
- F.IF.5[M] Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function  $h(n)$  gives the number of person-hours it takes to assemble  $n$  engines in a factory, then the positive integers would be an appropriate domain for the function.
- F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
- F.IF.7e Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
- F.IF.8b Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as  $y = (1.02)^t$ ,  $y = (0.97)^t$ ,  $y = (1.01)^{12t}$ ,  $y = (1.2)^t/10$ , and classify them as representing exponential growth or decay.

### Building Functions

- F.BF.1a Determine an explicit expression, a recursive process, or steps for calculation from a context.
- F.BF.1b Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.
- F.BF.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms
- F.BF.3 Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

### Linear, Quadratic, & Exponential Models

- F.LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.

- F.LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

**QUADRATIC EXPRESSIONS AND EQUATIONS**

*When could a nonlinear function be used to model a real-world situation?*

Chapter 8

**BIG IDEAS**

- HSA-SSE.A Interpret the structure of expressions.
- HSA-SSE.B Write expressions in equivalent forms to solve problems.
- HSA-APR.A Perform arithmetic operations on polynomials.
- HSA-REI.A Understand solving equations as a process of reasoning and explain the reasoning.
- HSA-REI.B Solve equations and inequalities in one variable.

**ENDURING UNDERSTANDINGS**

**Seeing Structure in Expressions**

- A.SSE.1a[M] Interpret parts of an expression, such as terms, factors, and coefficients.
- A.SSE.2[M] Use the structure of an expression to identify ways to rewrite it. For example, see  $x^4 - y^4$  as  $(x^2)^2 - (y^2)^2$ , thus recognizing it as a difference of squares that can be factored as  $(x^2 - y^2)(x^2 + y^2)$ .
- A.SSE.3a Factor a quadratic expression to reveal the zeros of the function it defines.

**Arithmetic with Polynomials & Rational Expressions**

- A.APR.1[M] Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials

**Reasoning with Equations & Inequalities**

- A.REI.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
- A.REI.4b Solve quadratic equations by inspection (e.g., for  $x^2 = 49$ ), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as  $a \pm bi$  for real numbers  $a$  and  $b$ .

**QUADRATIC FUNCTIONS AND EQUATIONS**

*Why do we use different methods to solve math problems?*

Chapter 9

**BIG IDEAS**

- HSA-SSE.B Write expressions in equivalent forms to solve problems.
- HSA-REI.B Solve equations and inequalities in one variable.
- HSA-REI.C Solve systems of equations.
- HSF-IF.A Understand the concept of a function and use function notation.
- HSF-IF.B Interpret functions that arise in applications in terms of the context.
- HSF-IF.C Analyze functions using different representations.

- HSF-BF.B Build new functions from existing functions.  
 HSF-LE.A Construct and compare linear, quadratic, and exponential models and solve problems.  
 HSS-ID.B Summarize, represent, and interpret data on two categorical and quantitative variables  
 HSA-REI.C Solve systems of equations.

### ENDURING UNDERSTANDINGS

#### Seeing Structure in Expressions

- A.SSE.3b Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

#### Reasoning with Equations & Inequalities

- A.REI.4 Solve quadratic equations in one variable.  
 A.REI.4b[M] Solve quadratic equations by inspection (e.g., for  $x^2 = 49$ ), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as  $a \pm bi$  for real numbers  $a$  and  $b$ .  
 A.REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line  $y = -3x$  and the circle  $x^2 + y^2 = 3$ .

#### Interpreting Functions

- F.IF.4[M] For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity  
 F.IF.6[M] Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.  
 F.IF.7a Graph linear and quadratic functions and show intercepts, maxima, and minima.  
 F.IF.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.  
 F.IF.8a Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

#### Building Functions

- F.BF.3 Identify the effect on the graph of replacing  $f(x)$  by  $f(x) + k$ ,  $k f(x)$ ,  $f(kx)$ , and  $f(x + k)$  for specific values of  $k$  (both positive and negative); find the value of  $k$  given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

#### Linear, Quadratic, & Exponential Models

- F.LE.1 Distinguish between situations that can be modeled with linear functions and with exponential functions.  
 F.LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

#### Interpreting Categorical & Quantitative Data

- S.ID.6a Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.

#### Reasoning with Equations & Inequalities

- A.REI.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line  $y = -3x$  and the circle  $x^2 + y^2 = 3$ .

**RADICAL FUNCTIONS AND GEOMETRY**

*How can you choose a model to represent a real-world situation?*

Chapter 10

**BIG IDEAS**

- HSN-RN.A Extend the properties of exponents to rational exponents.
- HSN-RN.B Use properties of rational and irrational numbers.
- HSA-CED.A Create equations that describe numbers or relationships.
- HSA-REI.B Solve equations and inequalities in one variable.
- HSF-IF.B Interpret functions that arise in applications in terms of the context.
- HSF-IF.C Analyze functions using different representations.
- HSF-BF.B Build new functions from existing functions.

**ENDURING UNDERSTANDINGS**

**The Real Number System**

- N.RN.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.
- N.RN.3 Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

**Creating Equations**

- A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

**Reasoning with Equations & Inequalities**

- A.REI.4a[M] Use the method of completing the square to transform any quadratic equation in  $x$  into an equation of the form  $(x - p)^2 = q$  that has the same solutions. Derive the quadratic formula from this form.

**Interpreting Functions**

- F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity
- F.IF.7b Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

**Building Functions**

- F.BF.4a Solve an equation of the form  $f(x) = c$  for a simple function  $f$  that has an inverse and write an expression for the inverse. For example,  $f(x) = 2x^3$  or  $f(x) = (x+1)/(x-1)$  for  $x \neq 1$ .

**RATIONAL FUNCTIONS AND EQUATIONS**

*How can simplifying mathematical expressions be useful?*

Chapter 11

**BIG IDEAS**

- HSA-CED.A Create equations that describe numbers or relationships.  
HSA-REI.D Represent and solve equations and inequalities graphically.

**ENDURING UNDERSTANDINGS**

**Creating Equations**

- A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

**Reasoning with Equations & Inequalities**

- A.REI.11 Explain why the x-coordinates of the points where the graphs of the equations  $y = f(x)$  and  $y = g(x)$  intersect are the solutions of the equation  $f(x) = g(x)$ ; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where  $f(x)$  and/or  $g(x)$  are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

**STATISTICS AND PROBABILITY**

*How are statistics and probability used in the real world?*

Chapter 12

**BIG IDEAS**

- HSS-ID.A Summarize, represent, and interpret data on a single count or measurement variable.  
HSS-ID.B Summarize, represent, and interpret data on two categorical and quantitative variables

**ENDURING UNDERSTANDINGS**

**Interpreting Categorical & Quantitative Data**

- S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.  
S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).  
S.ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.