Orange Public Schools

Office of Curriculum & Instruction

2019-2020 Mathematics Curriculum Guide

PLTW Gateway
Green Architecture

Curriculum Framework

September 9, 2019 – June 25, 2020

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Curriculum Framework – Gateway (2015-2016)
Green Architecture – Lesson 1 Architectural Basics

<table>
<tr><th colspan="3">Desired Results (stage 1)</th></tr>
<tr><td rowspan="3">ESTABLISHED GOALS
It is expected that students will…

• G1 – Demonstrate an ability to identify, formulate, and solve engineering problems.
• G2 – Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
• G3 – Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
• G4 – Demonstrate an ability to apply knowledge of mathematics, science, and engineering.</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">TRANSFER: Students will be able to independently use their learning to …

• T1 – Apply principles and practices related to designing and documenting a structure.
• T2 – Apply techniques (measuring), skills (reading an architectural scale), and modern engineering tools (Revit) necessary for engineering practice.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>UNDERSTANDINGS: Students will understand that …

• U1 – The ability to measure accurately is important at school and at home, at work, and when pursuing hobbies.
• U2 – Precision measuring tools are needed for accuracy, but tools must be used correctly to ensure that accurate measurements are taken.
• U3 – Quality of workmanship and accurate measurements with precise instruments are necessary to successfully solve problems.
• U4 – The use of scale is important in design in order to create a functional space that is proportional and aesthetically pleasing to the client.
• U5 – Dimensioning and measuring are required for any architectural project as well as many careers in related fields.</td><td>ESSENTIAL QUESTIONS: Students will keep considering …

• Q1 - Why is knowledge of area and perimeter important when designing and constructing a building?
• Q2 - Describe a potential consequence if you do not pay attention to accuracy and precision when designing and constructing a building.
• Q3 - How do architects pay attention to both form and function when designing and constructing a building?</td></tr>
</table>

Format guided by: Wiggins, G. & McTighe, J. (2011). The understanding by design guide to creating high quality units. Alexandria. VA: ASCD

<table>
<tr>
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G5 – Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
G6 – Pursue the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
G7 – Demonstrate an understanding of professional and ethical responsibility.
G8 – Demonstrate an ability to function on multidisciplinary teams.
G9 – Demonstrate an ability to communicate effectively.
G10 – Gain knowledge of contemporary issues.
G11 – Recognize the need for, and develop an ability to engage in life-long learning.

</td>
<td>

U6 – Area and perimeter are used to find the square footage of a floor, a wall, or the length and width needed to build the exterior of a home.
U7 – When designing a home, standard rules must be followed in regards to traffic flow, room sizes and relationships, and the layout of kitchens and bathrooms.
U8 – A set of architectural plans includes: plot plan, foundation plan, floor plan, elevations, 3-D views, and construction details.

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<tr>
<td colspan="2">Acquisition</td>
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<tr>
<td>
KNOWLEDGE: Students will …

K1 – Identify the systems required in a residential home, including electrical, plumbing, heating, ventilation, and air conditioning. U7
K2 – Describe the three areas of a house and the rooms that belong to them. U7
K3 – Identify common roof styles. U7
K4 – Describe the working triangle and its purpose. U7
K5 – Identify and use appropriate symbols in a basic floor plan for a residential home. U8

</td>
<td>
SKILLS: Students will …

S1 – Demonstrate the proper use of a standard ruler and an architectural scale. U1, U2, U3, U4, U5
S2 – Use proper notation in regards to dimensioning an architectural drawing. U1, U2, U3, U4, U5
S3 – Calculate area and perimeter of a floor plan given dimensions. U6
S4 – Measure a room and draw it to scale using common symbols. U2, U3, U4, U5, U6, U7
S5 – Read and interpret a blueprint of a floor plan. U7, U8

</td>
</tr>
</table>

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Evidence *(stage 2)*		
Activities (A) Projects (P) Problems(B)	Assessment FOR Learning	Assessment OF Learning
A.7.1.1 Measuring Practice	• Essential Questions	• Conclusion Questions
A.7.1.2 Architectural Measurement	• Essential Questions	• Conclusion Questions
A.7.1.3 Architectural Dimensioning	• Essential Questions	• Conclusion Questions
A.7.1.4 Measuring Your Classroom	• Essential Questions	• Conclusion Questions
A.7.1.5 Using Autodesk Revit – Creating Your Classroom Tutorial	• Essential Questions	• Conclusion Questions
A.7.1.6 Estimating Flooring Materials	• Essential Questions	• Conclusion Questions
A.7.1.7 Bedroom Floor Plan Homework	• Essential Questions	• Conclusion Questions
A.7.1.8 Fundamentals of Construction	• Essential Questions	• Conclusion Questions
A.7.1.9 Reading a Floor Plan	• Essential Questions	• Conclusion Questions
A.7.1.10 Room Sizes and Relationships Study Guide	• Essential Questions	• Conclusion Questions
P 7.1.11 My Bedroom Using Revit	• Essential Questions	• Conclusion Questions
P 7.1.12 Bedroom Remodeling	• Essential Questions	• Conclusion Questions

Learning Plan *(stage 3)*	
Activities (A) Projects (P) Problems(B)	Knowledge and Skills
A.7.1.1 Measuring Practice	S1, S2
A.7.1.2 Architectural Measurement	S1, S2
A.7.1.3 Architectural Dimensioning	S2, S3
A.7.1.4 Measuring Your Classroom	S2, S3, S4
A.7.1.5 Using Autodesk Revit – Creating Your Classroom Tutorial	S4
A.7.1.6 Estimating Flooring Materials	S3, S4
A.7.1.7 Bedroom Floor Plan Homework	S1, S2, S3, S4
A.7.1.8 Fundamentals of Construction	K1, S5
A.7.1.9 Reading a Floor Plan	K1, S5
A.7.1.10 Room Sizes and Relationships Study Guide	K1, K2, K3, K4, S5
P 7.1.11 My Bedroom Using Revit	K5, S4, S5
P 7.1.12 Bedroom Remodeling	K5, S4, S5

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Curriculum Framework – Gateway (2015-2016)
Green Architecture – Lesson 2 Introduction to Sustainability and Architecture

Desired Results *(stage 1)*

ESTABLISHED GOALS
It is expected that students will…

- G1 – Demonstrate an ability to identify, formulate, and solve engineering problems.
- G2 – Demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- G3 – Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
- G4 – Demonstrate an ability to apply knowledge of mathematics, science, and engineering.
- G5 – Demonstrate an ability to use the techniques, skills, and modern engineering tools

Transfer

TRANFER: Students will be able to independently use their learning to …

- T1 – Make informed decisions about environmentally friendly construction and its impact on the economy, human health and society.

Meaning

UNDERSTANDINGS: Students will understand that …

- U1 – Sustainable building solutions are an important part of the world today as our resources are dwindling.
- U2 – Many different processes are used to recycle a variety of materials.
- U3 – Researching the various recycling processes helps one better understand the requirements and the complexity of recycling processes.
- U4 – The air we breathe inside a room can contain contaminants and particles, making it potentially dangerous for humans.
- U5 – The health consequences of poor indoor air quality include coughs, colds, cancer, and even death.
- U6 – Building green refers to methods of fabricating both commercial and residential structures to reduce their impact on human health and the natural environment.
- U7 – Architectural designs are created based on the needs of humans and function of the building in relationship to the climate, region, and culture.

ESSENTIAL QUESTIONS: Students will keep considering …

- Q1 - Where do the products that you recycle end up?
- Q2 - How does the air you breathe every day affect your health?
- Q3 - What can you do to make the environment better for future generations?
- Q4 – How can you remodel a house to make it more “green”?

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<table>
<tr>
<td rowspan="3">necessary for engineering practice.
• G6 – Pursue the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
• G7 – Demonstrate an understanding of professional and ethical responsibility.
• G8 – Demonstrate an ability to function on multidisciplinary teams.
• G9 – Demonstrate an ability to communicate effectively.
• G10 – Gain knowledge of contemporary issues.
• G11 – Recognize the need for, and develop an ability to engage in life-long learning.</td>
<td>• U8 – Within a local community there can be a variety of construction materials and architectural styles depending on purpose.
• U9 – Architects, engineers, designers, and engineering technologists are in high demand for the development of future technology to meet societal needs and wants.</td>
<td></td>
</tr>
<tr>
<td colspan="2">Acquisition</td>
</tr>
<tr>
<td>KNOWLEDGE: Students will …

• K1 – Describe the steps of the recycling system. U2, U3
• K2 – List ways to improve indoor air quality. U4, U5
• K3 – Explain the consequences of poor indoor air quality. U4, U5
• K4 – Identify the local home styles in the region and outside of the region. U7, U8
• K5 – Describe different house styles and how they can be built green. U7, U8</td>
<td>SKILLS: Students will …

• S1 – Communicate, using a variety of media, the effects that daily living has on the environment. U1, U2, U3, U4, U5
• S2 – Categorize concepts related to building eco-friendly. U6, U7, U8
• S3 – Provide examples of STEM careers and the need for these professionals in our society. U9</td>
</tr>
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Evidence *(stage 2)*		
Activities (A) Projects (P) Problems(B)	Assessment FOR Learning	Assessment OF Learning
A 7.2.1 Rebuilding Grennsburg	• Essential Questions	• Conclusion Questions
A 7.2.2 Green Vocabulary	• Essential Questions	• Conclusion Questions
A 7.2.3 Why Recycle?	• Essential Questions	• Conclusion Questions
A 7.2.4 Save the Earth Comic Strip	• Essential Questions	• Conclusion Questions
A 7.2.5 Indoor Air Quality	• Essential Questions	• Conclusion Questions
A 7.2.6 Building Green	• Essential Questions	• Conclusion Questions
A 7.2.7 House Styles	• Essential Questions	• Conclusion Questions
A 1.1.5 Engineering Careers	• Essential Questions	• Conclusion Questions

Learning Plan *(stage 3)*	
Activities (A) Projects (P) Problems(B)	Knowledge and Skills
A 7.2.1 Rebuilding Grennsburg	S1
A 7.2.2 Green Vocabulary	S1
A 7.2.3 Why Recycle?	K1, S1
A 7.2.4 Save the Earth Comic Strip	K1, S1
A 7.2.5 Indoor Air Quality	K2, K3, S1
A 7.2.6 Building Green	S2
A 7.2.7 House Styles	K4, K5
A 1.1.5 Engineering Careers	S3

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Desired Results *(stage 1)*

ESTABLISHED GOALS
It is expected that students will…

- G1 – Demonstrate an ability to identify, formulate, and solve engineering problems.
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- G3 – Demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
- G4 – Demonstrate an ability to apply knowledge of mathematics, science, and engineering.
- G5 – Demonstrate an ability to use the techniques, skills, and modern engineering tools

Transfer

TRANSFER: Students will be able to independently use their learning to …

- T1 – Design a sustainable home using repurposed materials.
- T2 – Design and conduct experiments, analyze and interpret data to determine the best building material and insulation for an energy-efficient home.

Meaning

UNDERSTANDINGS: Students will understand that …

- U1 – The ability to measure precisely and accurately is important at school and at home, at work, and when pursuing hobbies.
- U2 – Numerous symbols are part of architectural plans. It is important to be able to identify such symbols.
- U3 – Wood frame construction is popular because it is economical and strong.
- U4 – Using graph paper and an architectural scale can help in the visualization of a space before the start of the prototype phase.
- U5 – Architecture today uses computer-aided design (CAD) systems to quickly generate and annotate working drawings.
- U6 – Three-dimensional computer modeling uses descriptive geometry, geometric relationships, and dimensions to communicate an idea or solution to a technological problem.

ESSENTIAL QUESTIONS: Students will keep considering …

- Q1 –What are the advantages and disadvantages of using repurposed materials, such as a shipping container, for constructing living or work space?
- Q2 - What materials are used in construction to improve the energy-efficiency of a building?
- Q3 - How is the environment affected by shipping containers sitting on the dock?

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• G7 – Demonstrate an understanding of professional and ethical responsibility.
• G8 – Demonstrate an ability to function on multidisciplinary teams.
• G9 – Demonstrate an ability to communicate effectively.
• G10 – Gain knowledge of contemporary issues.
• G11 – Recognize the need for, and develop an ability to engage in life-long learning.</td>
<td>• U7 – Using alternative materials in construction is beneficial to our environment.
• U8 – Architecture and construction emphasize using environmentally friendly practices in their career fields.
• U9 – Architects and engineers use the design process when designing and building structures.
• U10 – Shipping containers stack up as waste unless they are repurposed; they offer many benefits as construction materials that are strong, water proof, pest proof, recycled, easy to build with, etc.
• U11 – Creating a functional and environmentally friendly home is considered sustainable housing that could be adapted for emergency shelter in disaster areas.</td>
<td></td>
</tr>
<tr>
<td colspan="2">Acquisition</td>
</tr>
<tr>
<td>KNOWLEDGE: Students will …
• K1 – Demonstrate knowledge of measurement, construction, and design. U2, U4
• K2 – Identify the parts of a wall section. U3</td>
<td>SKILLS: Students will …
• S1 – Measure accurately using a tape measure and architectural scale. U1
• S2 – Read and interpret a blueprint of a floor plan. U2
• S3 – Construct a model of the framing of a wall section. U3
• S4 – Demonstrate use of the Design Process including a Design Brief, Sketching, and Decision Making Matrix. U4, U9
• S5 – Use Autodesk Revit Architecture to create an architectural drawing. U5, U6
• S6 – Design an environmentally friendly home U7, U8, U9, U10, U11</td>
</tr>
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Evidence *(stage 2)*		
Activities (A) Projects (P) Problems(B)	Assessment FOR Learning	Assessment OF Learning
A.7.3.1 Wood Frame Construction	• Essential Questions	• Conclusion Questions
A 7.3.2 Building a Shed (Wall)	• Essential Questions	• Conclusion Questions
A 7.3.3 Why Insulate?	• Essential Questions	• Conclusion Questions
B 7.3.4 Shipping Container Home	• Essential Questions • Shipping Container Rubric	• Conclusion Questions • Shipping Container Rubric

Learning Plan *(stage 3)*	
Activities (A) Projects (P) Problems(B)	Knowledge and Skills
A.7.3.1 Wood Frame Construction	K1, K2, S1
A 7.3.2 Building a Shed (Wall)	K1, K2, S1, S2, S3
A 7.3.3 Why Insulate?	K1, K2, S1, S2, S3
B 7.3.4 Shipping Container Home	K1, S2, S4, S5, S6

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Modifications

Special Education/504:	English Language Learners:
• Adhere to all modifications and health concerns stated in each IEP. • Give students a MENU of options, allowing them to choose assignments from different levels based on difficulty. • Accommodate Instructional Strategies: use of post-its, reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), handouts, definition list with visuals, extended time • Allow extra time to complete assignments or tests • Allow students to demonstrate understanding of a problem by drawing a functional model of the answer and then explaining the reasoning orally and/or writing. • Provide breaks between tasks, use positive reinforcement, use proximity • Work in a small group • Use large print books, Braille, or digital texts • Strategies for Students with 504 Plans	• Simplify written and verbal instructions • Use manipulatives to promote conceptual understanding and enhance vocabulary usage • Allow for alternate forms of responses- drawing or speaking instead of writing to demonstrate knowledge when you are not specifically assessing writing • Allow the use of an online dictionary to look up the definition and hear the pronunciation of unknown words • Provide graphic representations, gestures, drawings, equations, and pictures during all segments of instruction • Utilize program translations tools such as Snap and Read (if available) • Utilize graphic organizers which are concrete, pictorial ways of constructing knowledge and organizing information • Use sentence frames and questioning strategies so that students will explain their thinking/ process of how to solve real life problems. • Reword questions in simpler language • Provide class notes ahead of time to allow students to preview material and increase comprehension • Provide extended time
Gifted and Talented:	**Students at Risk for Failure:**
• Organize and offer flexible small group learning opportunities / activities. • Utilize elevated contextual complexity • Inquiry based or open ended assignments, performance tasks and projects • Allow more time to study concepts with greater depth • Provide options, alternatives and choices to differentiate and broaden the curriculum. • Promote the synthesis of concepts and making real world connections	• Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum • Modify Instructional Strategies; extended time, reading aloud text, graphic organizers, flexible grouping, one-on-one instruction, class website (Google Classroom), inclusion of more visuals and manipulatives, Utilize Scaffolded Questioning, Field Trips, Google Expeditions, Peer Support, Modified Assignments, Chunking of Information, Peer Buddies • Assure constant parental/ guardian contact throughout the year with successes/ challenges • Provide academic contracts to students and guardians

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• Provide students with enrichment practice that are imbedded in the curriculum
  o allowing students to design problems to be addressed by the class
  o allowing students to modify the lesson by introducing a related phenomena
  o allow for interest-based extension activities
• Utilize an enhanced set of introductory activities (e.g. phenomena, organizers, concept maps etc)
• Provide whole group enrichment explorations.
• Teach cognitive and methodological skills
• Allow for the use of stations
• Organize integrated problem-solving simulations.
	• Create an interactive notebook with samples, key vocabulary words, student goals/ objectives.
	• Always plan to address students at risk in the designing of learning tasks, instructions, and directions.
	• Try to anticipate where the needs will be and then address them prior to lessons.
	• Teacher should allow for preferential seating
	• Include Visual Cues/Modeling
	• Allow for technology Integration, especially Assistive Technology

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21st Century Life and Career Skills:

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. These skills enable students to make informed decisions that prepare them to engage as active citizens in a dynamic global society and to successfully meet the challenges and opportunities of the 21st century workplace.
As such, they should be taught and reinforced in all career exploration and preparation programs, with increasingly higher levels of complexity and expectation as a student advances through a program of study.

https://www.state.nj.us/education/cccs/2014/career/9.pdf

- **CRP1**. Act as a responsible and contributing citizen and employee.
- **CRP2**. Apply appropriate academic and technical skills.
- **CRP3**. Attend to personal health and financial well-being.
- **CRP4**. Communicate clearly and effectively and with reason.
- **CRP5**. Consider the environmental, social and economic impacts of decisions.
- **CRP6**. Demonstrate creativity and innovation.
- **CRP7**. Employ valid and reliable research strategies.
- **CRP8**. Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP9**. Model integrity, ethical leadership and effective management.
- **CRP10**. Plan education and career paths aligned to personal goals.
- **CRP11**. Use technology to enhance productivity.
- **CRP12**. Work productively in teams while using cultural global competence.

Students are provided with an equitable opportunity to communicate with peers effectively, clearly, and with the use of technical language. They are also encouraged to reason through experiences and exposure to phenomena that promote critical thinking and emphasize the importance of perseverance. Students are exposed to various mediums of technology, such as digital learning, and educational websites.

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Technology Standards:

All students will be prepared to meet the challenge of a dynamic global society in which they participate, contribute, achieve, and flourish through universal access to people, information, and ideas.
https://www.state.nj.us/education/cccs/2014/tech/

8.1 Educational Technology:

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

A. **Technology Operations and Concepts:** Students demonstrate a sound understanding of technology concepts, systems and operations.
B. **Creativity and Innovation:** Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
C. **Communication and Collaboration:** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
D. **Digital Citizenship:** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
E. **Research and Information Fluency:** Students apply digital tools to gather, evaluate, and use of information.
F. **Critical thinking, problem solving, and decision making:** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

A. **The Nature of Technology: Creativity and Innovation-** Technology systems impact every aspect of the world in which we live.
B. **Technology and Society:** Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.
C. **Design:** The design process is a systematic approach to solving problems.
D. **Abilities in a Technological World:** The designed world in a product of a design process that provides the means to convert resources into products and systems.
E. **Computational Thinking: Programming-** Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

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Interdisciplinary Connections:

Science:

- MS-ESS3-2 – Earth and Human Activity
  Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
- MS-ESS3-3 – Earth and Human Activity
  Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- MS-ESS3-4 – Earth and Human Activity
  Construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems.
- MS-ESS3-5 – Earth and Human Activity
  Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
- MS-ETS1-1 - Engineering Design
  Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- MS-ETS1-2 - Engineering Design Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- MS-ETS1-3 - Engineering Design
  Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- MS-ETS1-4 - Engineering Design
  Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

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Interdisciplinary Connections:

English Language Arts:

- AS.R.1: Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- AS.R.7: Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.
- AS.W.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
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- AS.SL.2: Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
- AS.SL.4: Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
- AS.L.1: Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- AS.L.2: Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
- AS.L.6: Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
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Interdisciplinary Connections:

Mathematics:

- 6.NS.1 - The Number System
  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.
- 6.NS.3 - The Number System
  Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
- 6.EE.2 – Expressions and Equations
  Write, read, and evaluate expressions in which letters stand for numbers.
- 6.G.4 - Geometry
  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.EE.3 Expressions and Equations
  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.
- 7.EE.4 Expressions and Equations
  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 Expressions and Equations
  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.
- 7.G.1 - Geometry
  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.
- 7.G.2 - Geometry
  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.6 - Geometry
  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.

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