

# COMMON CORE STATE STANDARDS FOR MATHEMATICS CONTENT ALIGNED TO INVENTION PROJECT III(TM) / 6-8

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## RATIOS AND PROPORTIONAL RELATIONSHIPS

- Understand ratio concepts and use ratio reasoning to solve problems.
  - 6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems.
    - a. 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.
    - b. Solve unit rate problems including those involving unit pricing and constant speed.
    - c. 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.
- Analyze proportional relationships and use them to solve real-world and mathematical problems.
  - 7.RP.2 Recognize and 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  $t = pn$

## THE NUMBER SYSTEM

- Compute fluently with multi-digit numbers and find common factors and multiples.
  - 6.NS.2 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
- Apply and extend previous understanding of numbers to the system of rational numbers.
  - 6.NS.7 Understand ordering and absolute value of rational numbers.
    - b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.
    - c. 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.
- Apply and extend previous understanding of operations with fractions to add, subtract, multiply, and divide rational numbers.
  - 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.
    - d. 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.
    - c. Apply properties of operations as strategies to multiply and divide rational numbers.
    - d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0's or eventually repeats.
- Know that there are numbers that are not rational, and approximate them by 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.

## GEOMETRY

- Solve real-world and mathematical problems involving area, surface area, and volume.

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 context of solving real-world and mathematical problems.

- Draw, construct, and describe geometrical figures and describe the relationships between them.

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.

## STATISTICS AND PROBABILITY

- Summarize and describe distributions.

6.SP.5 Summarize numerical data sets in relation to their context, such as by:

- a. Reporting the number of observations.
- b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
- c. 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.

# COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS CONTENT ALIGNED TO INVENTION PROJECT III(TM) / 6-8

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## SPEAKING AND LISTENING

- Comprehension and Collaboration

6.SL.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 6 topics, texts, and issues, building on other's ideas and expressing their own clearly.

- a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
- b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
- c. Pose and respond to specific questions with elaborations and detail by making comments that contribute to the topic, text, or issue under discussion.

7.SL.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.

- a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
- b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.
- c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussions back on topic as needed.
- d. Acknowledge new information expressed by others and, when warranted, modify their own views.

8.SL1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacherled)d with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

- a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
- b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.
- c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.
- d. Acknowledge new information expressed by others, and when warranted, qualify or justify their own views in light of the evidence presented.

- **Presentation of Knowledge and Ideas**

6.SL.2 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

6.SL.3 Include multimedia components (e.g., graphics images, music, sound) and visual displays in presentations to clarify information.

7.SL.2 Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

7.SL.3 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

8.SL.2 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

8.SL.3 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

## **STANDARDS FOR LITERACY IN SCIENCE AND TECHNICAL SUBJECTS**

- **Key ideas and Details**

6-8.RST.3 Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks.

## **NEXT GENERATION SCIENCE STANDARDS ALIGNED TO INVENTION PROJECT III(TM) 6-8**

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### **MIDDLE SCHOOL PHYSICAL SCIENCES**

- **MS-PS1 Matter and Its Interactions**

MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

- **MS.PS2 Motion and Stability: Forces and Interactions**

MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

- MS.PS3 Energy

MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

- MS.PS4 Waves and their Applications in Technologies for Information Transfer

MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.

## MIDDLE SCHOOL LIFE SCIENCE

- MS.LS1 From Molecules to Organisms: Structures and Processes

MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

- MS.LS2.2 Ecosystems: Interactions, Energy, and Dynamics

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

- MS.LS3 Heredity: Inheritance and Variation of Traits

MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

## MIDDLE SCHOOL EARTH AND SPACE SCIENCES

- MS.ESS1.Earth's Place in the Universe

MS-ESS1-1. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.

- MS.ESS2 Earth's Systems

MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.

MS-ESS2-6. Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

- MS.ESS3.Earth and Human Activity

MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption

of natural resources impact Earth's systems.

## MIDDLE SCHOOL ENGINEERING DESIGN

- MS.ETS1 Engineering Design

MS-ETS1-1. 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. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. 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. 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.