## Curriculum Grid

### Next Generation Science Standards

**OBJECTIVE NUMBER**

<table>
<thead>
<tr>
<th>BASICS OF GEARS</th>
<th>LEARNING MISSIONS</th>
<th>CHALLENGE MISSIONS</th>
<th>RESEARCH PROJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basics of Gears</td>
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<td>Activating Communication</td>
<td>How Can Robots Help Human Exploration?</td>
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<td>Precise Turn</td>
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<td>Detect a Color</td>
<td>Follow a Line</td>
<td>How Can We Study the Milky Way?</td>
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<td>Follow a Line</td>
<td>Detect and React</td>
<td>How Can We Travel to Other Planets?</td>
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<td>Intelligent Movements</td>
<td>How Can We Explain the History of the Universe?</td>
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### Practices

1. Asking questions
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

### Crosscutting Concepts

1. Patterns
2. Cause and effect: Mechanism and explanation
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter: Flows, cycles, and conservation
6. Structure and function
7. Stability and change

### Physical Science

- **MS-PS1** Matter and its Interactions
- **MS-PS2** Motion and Stability: Forces and Interactions
- **MS-PS3** Energy
- **MS-PS4** Waves and Their Applications in Technologies for Information Transfer

### Life Science

- **MS-LS1** From Molecules to Organisms
- **MS-LS2** Ecosystems
- **MS-LS3** Heredity
- **MS-LS4** Biological evolution

### Earth and Space Science

- **MS-ESS1** Earth’s Place in the universe
- **MS-ESS2** Earth’s Systems
- **MS-ESS3** Earth and Human Activity

### Engineering Design

- **MS-ETS1** Engineering Design
## Introduction

### Common Core

**English Language Arts**

- **STANDARD**

#### English Language Arts

- **GRADE**

  - **ENGLISH LANGUAGE ARTS**

  - **STANDARD**

  - **BASICS OF GEARS**

  - **LEARNING MISSIONS**

  - **BASES OF GEARS**

  - **CONTROLLED MOVEMENTS**

  - **PERFECTING MOVEMENTS**

  - **PRECISE MOVEMENTS**

  - **DETECT AND REACT**

  - **INTELLIGENT MOVEMENTS**

  - **CHALLENGE MISSIONS**

  - **RESEARCH PROJECTS**

#### Speaking and Listening Standards - Presentation of Knowledge and Ideas

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<tr>
<td>6-8</td>
<td>SPEAKING AND LISTENING STANDARDS</td>
<td>Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on topics, texts, and issues, building on others’ ideas and expressing their own clearly.</td>
</tr>
<tr>
<td>6</td>
<td>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.</td>
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<tr>
<td>7</td>
<td>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.</td>
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<tr>
<td>8</td>
<td>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.</td>
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<tr>
<td>6</td>
<td>Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.</td>
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</tr>
<tr>
<td>7</td>
<td>Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.</td>
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</tr>
<tr>
<td>8</td>
<td>Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.</td>
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#### Reading Standards for Literacy in Science and Technical Subjects

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<td>6-8</td>
<td>Identify the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</td>
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<td>Follow a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</td>
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<td>Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.</td>
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<td>Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</td>
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<td>Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.</td>
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<tr>
<td>6-8</td>
<td>Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</td>
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<tr>
<td>6-8</td>
<td>By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.</td>
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## Introduction

### BASICS OF GEARS

**Common Core**

**English Language Arts**

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<td><strong>Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6–12</strong></td>
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1. **Writing arguments focused on discipline-specific content.**

2. **Writing informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.**

3. **Produce clear and coherent writing in which development, organization, and style are appropriate to task, purpose, and audience.**

4. **With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.**

5. **Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.**

6. **Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.**

7. **Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.**

8. **Draw evidence from informational texts to support analysis, reflection, and research.**

9. **Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.**

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## Common Core Mathematics Standards

### Practices

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<tr>
<td>1.1</td>
<td>Make sense of problems and persevere in solving them.</td>
</tr>
<tr>
<td>1.2</td>
<td>Reason abstractly and quantitatively.</td>
</tr>
<tr>
<td>1.3</td>
<td>Construct viable arguments and critique the reasoning of others.</td>
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<tr>
<td>1.4</td>
<td>Model with mathematics.</td>
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<tr>
<td>1.5</td>
<td>Use appropriate tools strategically.</td>
</tr>
<tr>
<td>1.6</td>
<td>Attend to precision.</td>
</tr>
<tr>
<td>1.7</td>
<td>Look for and make use of structure.</td>
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<td>1.8</td>
<td>Look for and express regularity in repeated reasoning.</td>
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### Ratios and Proportional Relationships

| Grade 6 | Understand ratio concepts and use ratio reasoning to solve problems. |
| Grade 7 | Analyze proportional relationships and use them to solve real-world and mathematical problems. |

### The Number System

| Grade 6 | Apply and extend previous understandings of multiplication and division to divide fractions by fractions. |
| Grade 6 | Compute fluently with multi-digit numbers and find common factors and multiples. |
| Grade 6 | Apply and extend previous understandings of numbers to the system of rational numbers. |
| Grade 7 | Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. |
| Grade 8 | Know that there are numbers that are not rational, and approximate them by rational numbers. |

### Expressions and Equations

| Grade 6 | Apply and extend previous understandings of arithmetic to algebraic expressions. |
| Grade 6 | Reason about and solve one-variable equations and inequalities. |
| Grade 6 | Represent and analyze quantitative relationships between dependent and independent variables. |
| Grade 7 | Use properties of operations to generate equivalent expressions. |
| Grade 7 | Solve real-life and mathematical problems using numerical and algebraic expressions and equations. |
| Grade 8 | Work with radicals and integer exponents. |
| Grade 8 | Understand the connections between proportional relationships, lines, and linear equations. |
| Grade 8 | Analyze and solve linear equations and pairs of simultaneous linear equations. |
## Common Core Mathematics Standards

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<th>Functions</th>
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<td>Define, evaluate, and compare functions.</td>
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<td>● ● ● ● ●</td>
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<tr>
<td>Use functions to model relationships between quantities.</td>
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<td>● ●</td>
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<tr>
<th>Geometry</th>
<th>Grade 6</th>
<th>Grade 7</th>
<th>Grade 7</th>
<th>Grade 8</th>
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<tr>
<td>Solve real-world and mathematical problems involving area, surface area, and volume.</td>
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<td>● ●</td>
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<tr>
<td>Draw, construct, and describe geometrical figures and the relationship between them.</td>
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<td>●</td>
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<tr>
<td>Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</td>
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<tr>
<td>Understand congruence, and similarity using physical models, transparencies, or geometry software.</td>
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<td>Understand the Pythagorean theorem.</td>
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<tr>
<td>Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.</td>
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<th>Statistics and Probability</th>
<th>Grade 6</th>
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<tr>
<td>Develop understanding of statistical variability.</td>
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<td>● ● ● ● ● ● ● ● ●</td>
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<tr>
<td>Summarize and describe distributions.</td>
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<tr>
<td>Use random sampling to draw inferences about a population.</td>
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<td>● ● ● ● ● ● ● ● ●</td>
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<tr>
<td>Investigate chance processes and develop, use, and evaluate probability models.</td>
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<tr>
<td>Investigate patterns of association in bivariate data.</td>
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## ITEEA Standards for Technological Literacy

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### The Nature of Technology

1. Students will develop an understanding of the characteristics and scope of technology.
2. Students will develop an understanding of the core concepts of technology.
3. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.

### Technology and Society

4. Students will develop an understanding of the cultural, social, economic, and political effects of technology.
5. Students will develop an understanding of the effects of technology on the environment.
6. Students will develop an understanding of the role of society in the development and use of technology.
7. Students will develop an understanding of the influence of technology on history.

### Design

8. Students will develop an understanding of the attributes of design.
9. Students will develop an understanding of engineering design.
10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

### Abilities for a Technological World

11. Students will develop abilities to apply the design process.
12. Students will develop abilities to use and maintain technological products and systems.
13. Students will develop abilities to assess the impact of products and systems.

### The Designed World

14. Students will develop an understanding of and be able to select and use medical technologies.
15. Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.
16. Students will develop an understanding of and be able to select and use energy and power technologies.
17. Students will develop an understanding of and be able to select and use information and communication technologies.
18. Students will develop an understanding of and be able to select and use transportation technologies.
19. Students will develop an understanding of and be able to select and use manufacturing technologies.
20. Students will develop an understanding of and be able to select and use construction technologies.
# ISTE National Education Technology Standards

## 1. Creativity and Innovation
Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

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### a. Apply existing knowledge to generate new ideas, products, or processes.

### b. Create original works as a means of personal or group expression.

### c. Use models and simulations to explore complex systems and issues.

### d. Identify trends and forecast possibilities.

## 2. 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.

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- **a**: Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.

- **b**: Communicate information and ideas effectively to multiple audiences using a variety of media and formats.

- **c**: Develop cultural understanding and global awareness by engaging with learners of other cultures.

- **d**: Contribute to project teams to produce original works or solve problems.

## 3. Research and Information Fluency
Students apply digital tools to gather, evaluate, and use information.

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- **a**: Plan strategies to guide inquiry.

- **b**: Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.

- **c**: Evaluate and select information sources and digital tools based on the appropriateness to specific tasks.

- **d**: Process data and report results.

## 4. 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.

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- **a**: Identify and define authentic problems and significant questions for investigation.

- **b**: Plan and manage activities to develop a solution or complete a project.

- **c**: Collect and analyze data to identify solutions and/or make informed decisions.

- **d**: Use multiple processes and diverse perspectives to explore alternative solutions.
# ISTE National Education Technology Standards

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<td>How Can We Share Our Findings?</td>
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<td>How Can We Improve Our Findings?</td>
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</table>

## 5. Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

| a | Advocate and practice safe, legal, and responsible use of information and technology. |
| b | Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity. |
| c | Demonstrate personal responsibility for lifelong learning. |
| d | Exhibit leadership for digital citizenship. |

## 6. Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations.

| a | Understand and use technology systems. |
| b | Select and use applications effectively and productively. |
| c | Troubleshoot systems and applications. |
| d | Transfer current knowledge to learning of new technologies. |