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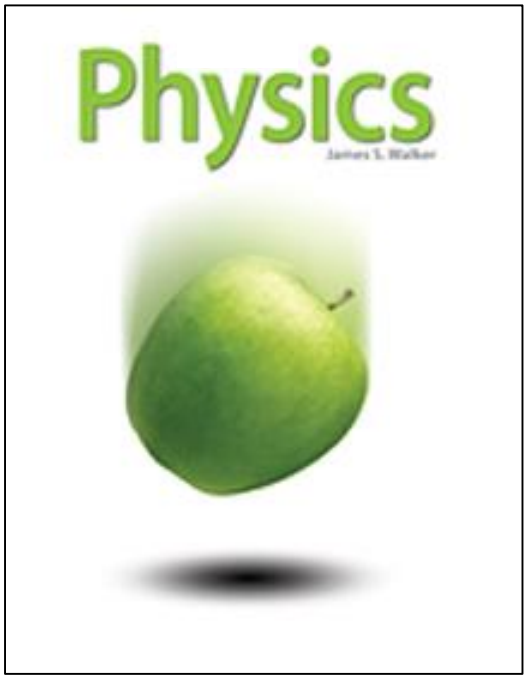


**To the**

# West Virginia 2016-2022
# Group IV – Science, Physics

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## Table of Contents

**Disclaimer: The Specific Criteria for science is currently out on public comment as part of Policy 2520.3C – The Next Generation Content Standards and Objectives for Science in West Virginia Schools. The Policy is out for comment until February 17, 2015. The State Board of Education will then act on the Policy at the March board meeting. I will notify you as soon as possible if changes are made to the specific criteria due to the current comment period.**

| | | | |
|---|---|---|---|
| **PUBLISHER:** | Savvas Learning Company | | |
| **SUBJECT:** | Science | **SPECIFIC GRADE:** | 12 |
| **COURSE:** | Physics | **TITLE** | Pearson Physics |
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## NON-NEGOTIBLE EVALUATION CRITERIA

**2016-2022**
**Group IV – Science**
**Physics**

| **Equity, Accessibility and Format** | | | | |
|---|---|---|---|---|
| Yes | No | N/A | CRITERIA | NOTES |
| | | | **1. INTER-ETHNIC**<br>The **instructional** materials meets the requirements of inter-ethnic: concepts, content and illustrations, as set by WV Board of Education Policy (Adopted December 1970). | The photos and features throughout ***Pearson Physics*** connect with an array of cultures and ethnicities with which a variety of students can identify. The Physics and You - Technology and Society feature explains the impact of technology on society. Sample references include:<br>Photos: 15, 24, 58, 83, 98, 108, 197, 243, 248, 273, 289, 291, 308, 369, 431, 482, 625, 665, 814, 941<br>Physics and You - Technology and Society: 35, 141, 217, 333, 554, 903 |

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| | | | **2. EQUAL OPPORTUNITY**<br>The instructional material meets the requirements of equal opportunity: concepts, content, illustration, heritage, roles contributions, experiences and achievements of males and females in American and other cultures, as set by WV Board of Education Policy (Adopted May 1975). | A variety of races, colors, genders, nationalities, religions, and potential disabilities are highlighted throughout ***Pearson Physics***. The Physics and You - Careers feature highlights interesting careers held by men and women of a diverse array of ethnicities and cultures that apply physics. Sample references include:<br>Photos: 3, 7, 24, 33, 58, 83, 108, 153, 166, 188, 191, 281, 291, 369, 539, 596, 665, 728<br>Untamed Science: 3, 33, 63, 129, 153, 189, 225, 249, 273, 307, 337, 417, 449, 509, 573, 601, 695, 729, 781, 861, 895<br>Physics & You - Careers: 177, 443, 626, 695, 772, 873, 941 |
| | | | **3. FORMAT**<br>This resource is available as an option for adoption in an interactive electronic format. | The Student etext of ***Pearson Physics*** is available through the Mastering platform – the most effective and widely used online homework, tutorial, and assessment system for physics. Students interact with self-paced tutorials that focus on course objectives.<br>Instructors use the Mastering system to maximize class time with easy-to-assign, customizable, and automatically graded assessments that motivate students to learn outside of class and arrive prepared for lecture and lab. |
| | | | **4. BIAS**<br>The instructional material is free of political bias. | ***Pearson Physics*** offers a variety of unique product options to support a range of teaching and learning styles that is free from political bias. ***Pearson Physics*** is the only high school program that blends conceptual development and quantitative problem solving. The conversational and engaging writing style, numerous and varied examples, annotated art program, and dual emphasis on concepts and math—together with MasteringPhysics®— deliver a superior program. |

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| | | | 5. **INQUIRY**<br>This resource must include rigorous and developmentally appropriate active inquiry, investigations, and hands-on activities. | ***Pearson Physics*** provides hands-on lab explorations in the text itself and through a separate Lab Manual. Extra study support features appear throughout the chapters when students need them most.<br>Short, simple, and interesting Inquiry Labs open each chapter and offer a chance to explore some of the chapter's fundamental concepts. Physics Labs are traditional single-page lab activities that use easy to obtain materials.<br>Sample references include:<br>Physics Lab: 64, 142, 218, 298, 376, 444, 521, 588, 666, 736, 808, 874, 942<br>Inquiry Lab: 3, 43, 73, 113, 189, 267, 385, 453, 529, 597, 675, 745, 817, 883, 949<br>Lab Manual: 1-5, 25-29, 37-40, 65-69, 101-104, 113-116, 123-126, 135-137, 147-150, 159-163 |
| | | | 6. **SAFETY**<br>This resource must include explicit guidance for demonstrating the safe and proper techniques for handling, manipulating and caring for developmentally appropriate science materials and treating living organisms humanely. | ***Pearson Physics*** highlights a variety of safety symbols throughout the text in the Physics Lab feature. These symbols alert students to possible dangers and remind them to work carefully. The safety symbols are explained in depth on page R73. A complete Safety in the Laboratory section is provided on pages R72 to R73.<br>Sample references include:<br>Physics Lab: 36, 103, 178, 258, 334, 408, 484, 555, 627, 696, 773, 842, 904, 969<br>Lab Manual: ix-x, 57, 89, 113, 124-126, 245-246 |

# GENERAL EVALUATION CRITERIA

## 2016-2022
## Group IV – Science
## Physics

The general evaluation criteria apply to each grade level and are to be evaluated for each grade level unless otherwise specified. These criteria consist of information critical to the development of all grade levels. In reading the general evaluation criteria and subsequent specific grade level criteria, **e.g. means "examples of" and i.e. means that "each of" those items must be addressed**. Eighty percent of the general and eighty percent of the specific criteria must be met with I (in-depth) or A (adequate) in order to be recommended.

| **(Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS** | **(IMR Committee) Responses** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **I**=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent | **I** | | **A** | | **M** | | **N** |
| | *In addition to alignment of Content Standards and Objectives (CSOs), materials must also clearly connect to Learning for the 21st Century which includes opportunities for students to develop:* | | | | | | | |
| **Next Generation Skills:** | | | | | | | | |
| **Thinking and Problem-Solving Skills**<br>Science Content: | | | | | | | | |
| **SE/TE:**<br>**Inquiry Lab:** 3, 151, 415<br>**Physics Lab:** 36, 64, 335, 521<br><br>**Lab Manual:**<br>7-8, 19-22, 23-24, 79-81, 90-92, 147-150 | 1. provides opportunities for student collaboration. | | | | | | | |
| **SE/TE:**<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Careers:** 63, 177, 695, 873<br>**Technology and Society:** 35, 141, 217, 554, 903<br>**How Things Work:** 102, 257, 375, 520, 587, 968<br><br>**Lab Manual:**<br>57-63, 93-94, 145-146, 147-149, 263-26 | 2. requires students to investigate and discover multiple solutions through inquiry. | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| **SE/TE:**<br>**Inquiry Lab:** 637<br>**Careers:** 63, 177, 695, 873<br>**How Things Work:** 375, 520, 968<br><br>**Lab Manual:**<br>13, 15, 25, 41-42, 47, 117, 139, 165-166 | 3. includes options for using technology tools to gather information, make informed decisions and justify solutions. | | | | | | | |
| **SE/TE:**<br>**Technology and Society:** 35, 141, 217, 554, 903<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**How Things Work:** 102, 257, 375, 520, 587, 968<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672 | 4. engages students in critical thinking and the synthesis of information to analyze real-world problems. | | | | | | | |
| **SE/TE:**<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**How Things Work:** 102, 257, 375, 520, 587, 968<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Cool Physics:** 18, 399, 469, 786<br>**Technology and Society**: 141, 217, 333, 554, 903<br><br>**Lab Manual:**<br>7-8, 51-55, 123-125, 171-174, 189-193, 225-228, 259-262 | 5. offers activities to connect multiple scientific phenomena to real-world events. | | | | | | | |

| **Information and Communication Skills**<br>*For student mastery of content standards and objectives, the instructional materials will include multiple strategies that provide students with opportunities to:* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **SE/TE:**<br>**Technology and Society**: 333 | 6. interact with secure external multimedia resources for local and global collaboration. | | | | | | | |
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**How Things Work:** 102, 257, 375, 520, 587, 968<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Careers:** 63, 177, 297, 695, 873<br>**Technology and Society**: 141, 217, 333, 554, 903<br><br>**Lab Manual:**<br>7-8, 19-22, 23-24, 79-81, 90-92, 147-150, 157-158, 199, 200 | 7. develop conceptual understanding and research skills. | | | | | | | |
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>Careers: 63, 177, 297, 695, 873<br>**Technology and Society**: 141, 217, 333, 554, 903<br>**How Things Work**: 102, 257, 375, 520, 587, 968<br>**Lesson Check**: 296, 461, 553, 689, 887<br>**Chapter Assessment:** 180-186<br><br>**Lab Manual:**<br>23-24, 63-64, 101-104, 113-115, 179-182 | 8. articulate thoughts and ideas through oral, written, and multimedia communications. | | | | | | | |

| **Personal and Workplace Productivity Skills**<br>*For students mastery of content standards and objectives, the instructional materials will provide students with opportunities to:* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Inquiry Activity:** 3, 151, 415<br>**Physics Lab:** 36, 64, 335, 521<br><br>**Lab Manual:**<br>7-8, 19-22, 23-24, 79-81, 90-92, 147-150 | 9. use interpersonal skills to work cooperatively to accomplish a task. | | | | | | | |
| **SE/TE:**<br>**Careers:** 626<br><br>**TE Only:**<br>**Assess and Remediate: (Planning and Carrying Out Investigations)**<br>744B<br><br>**Lab Manual:**<br>13-14, 23-24, 45-46, 63-64, 199-200 | 10. develop and initiate a plan of action to complete a task or project. | | | | | | | |
| **SE/TE:**<br>**Performing Physics Investigations:**<br>14<br>**Physics Lab:** 36<br><br>**Lab Manual:**<br>13-14, 23-24, 45-46, 63-64, 199-200 | 11. practice time- and project-management skills | | | | | | | |
| **SE/TE:**<br>**Physics Lab:** 178<br>**Technology and Society**: 333, 554<br><br>**Lab Manual:**<br>14, 36, 64, 112, 146, 188 | 12. reflect upon and evaluate the results of a task or project. | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| **SE/TE:**<br>**Inquiry Lab:** 3, 151, 415<br>**Physics Lab:** 36, 64, 335, 521<br><br>**Lab Manual:**<br>19-22, 23-24, 79-81, 90-92, 147-150 | 13. assume various roles and responsibilities when working independently or as a group. | | | | | | | |
| **SE/TE:**<br>**Careers:** 63, 177, 297, 443, 626, 695, 772, 873, 941 | 14. explore science-related careers. | | | | | | | |
| **SE/TE:**<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**How Things Work:** 102, 257, 375, 520, 587, 968<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Careers:** 63, 177, 297, 695, 873<br>**Technology and Society**: 141, 217, 333, 554, 903 | 15. conduct research, validate sources, and report findings ethically. | | | | | | | |
| **SE/TE:**<br>**Lesson Check:** 296, 461, 553, 689, 887<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**Practice Problems:** 60, 214, 455, 678, 921<br>**Physics Lab:** 103, 258, 376, 696, 874<br><br>**Lab Manual:**<br>1-5, 25-29, 37-40, 65-69, 101-104, 113-116, 123-126, 135-137, 147-150, 159-163 | 16. provide learning experiences for students to demonstrate mastery through multiple efforts. | | | | | | | |

| **Developmentally Appropriate Instructional Resources and Strategies**<br>*For student mastery of content standards and objectives, the instructional materials:* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Technology and Society**: 141, 217, 333, 554, 903<br><br>**TE Only:**<br>**Differentiated Instruction: Advanced Students:** 361, 390, 479, 549, 604<br>**Differentiated Instruction: Struggling Students:** 44, 402, 693, 706<br>**Differentiated Instruction: Less Proficient Students:** 58<br>**Common Misconceptions:** 387, 462, 473, 963 | 17. include multiple research-based strategies for differentiation, intervention and enrichment to support all learners. | | | | | | | |
| **SE/TE:**<br>**Physics and You – Careers:** 63, 177, 297, 443, 626, 695, 772, 873, 941<br>**Standardized Test Prep:** 71, 149, 227, 341, 491, 635<br><br>**TE Only:**<br>**Building Scientific Literacy:** 188A, 266A, 882A, 910A, 948A | 18. support college and career readiness. | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Technology and Society**: 141, 217, 333, 554, 903<br>**TE Only:**<br>**Differentiated Instruction: Advanced Students:** 361, 390, 479, 549, 604<br>**Differentiated Instruction: Struggling Students:** 44, 402, 693, 706<br>**Differentiated Instruction: Less Proficient Students:** 58<br>**Science and Engineering Practices:** 585<br>**Teach:** 564B, 704B<br><br>**Lab Manual:**<br>19-22, 79-82, 89-92, 139-144, 189-194, 259-262 | 19. provide multiple opportunities for incorporating various learning modalities. | | | | | | | |
| **SE/TE:**<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**How Things Work:** 102, 257, 375, 520, 587, 968<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Careers:** 63, 177, 297, 695, 873<br>**Technology and Society:** 35, 217, 407, 807, 968<br><br>**Lab Manual:**<br>1-5, 25-29, 37-40, 65-69, 101-104, 113-116, 123-126, 135-137, 147-150, 159-163 | 20. cultivate investigative abilities leading to logical conclusions. | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Figure Caption**: 173, 295, 345, 604, 676<br>**How Things Work:** 257, 375, 520, 587, 968<br>**Lesson Check:** 256, 296, 461, 553, 689, 887<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br><br>**Lab Manual:**<br>37-40, 71-74, 157-158, 201-204, 253-256 | 21. incorporate authentic vocabulary acquisition. | | | | | | | |
| **SE/TE:**<br>**Physics Lab:** 334, 376, 408, 484, 521, 588, 666, 904<br>**Safety in the Laboratory:** R72-R73<br><br>**Lab Manual:**<br>ix-x, 57, 89, 113, 124-126, 245-246 | 22. integrate laboratory safety practices within learning experiences. | | | | | | | |
| **Assessment**<br>*The materials provide:* | | | | | | | | |
| **SE/TE:**<br>**Lesson Check:** 296, 461, 553, 689, 887<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**Practice Problems**: 60, 214, 455, 678, 921<br>**Physics Lab:** 103, 258, 376, 696, 874<br><br>**Lab Manual:**<br>13-14, 83-84 | 23. ongoing diagnostic formative and summative assessments. | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| **SE/TE:**<br>**Lesson Check**: 296, 461, 553, 689, 887<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**Practice Problems:** 60, 214, 455, 678, 921<br>**Physics Lab:** 103, 258, 376, 696, 874<br>**Standardized Test Prep:** 71, 149, 227, 341, 491, 635<br><br>**TE Only:**<br>**Teach: (Reading)** 452B<br><br>**Lab Manual:**<br>13-14, 23-24, 45-46, 63-64, 83-84 | 24. a variety of assessment formats, including performance tasks as well as multimedia simulations, portfolio evaluations, and data-dependent and open-ended questions. | | | | | | | |
| ***Pearson Physics*** and ***MasteringPhysics*** provide students entry points to access and apply concepts. Four distinct example types- Quick Examples, Conceptual Examples, Active Examples, and Guided Examples- support different learning styles. ***MasteringPhysics*** has rubrics embedded. Additionally, diagnostics in ***MasteringPhysics*** provide detailed review of all students' work. Students and parents also have access to the Gradebook page to make it easier to understand a student's grade and how it is calculated. | 25. rubrics wherein all learners demonstrate progress toward mastery. | | | | | | | |

| **Organization, Presentation and Format**<br>*The materials:* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Lesson Assessments:** Chapters 1-27<br>**Chapter Assessments:** Chapters 1-27<br>**Contents:** x-xii<br>**Appendices:** R26-R71<br><br>**TE Only:**<br>**Inquiry Labs:** xiv<br>**Physics Labs:** xiv<br>**Physics & You Feature Pages:** xv<br>**Physics & You Technology:** xv<br>**Guide to Examples:** xvi-xxi<br>**Standards at a Glance:** T8-T10<br>**Lesson-by-Lesson Correlation:** T11-T21<br><br>**Lab Manual:**<br>Contents: Chapters 1-27<br>Labs: Purpose, Discuss, Materials, Procedure | 26. are organized in logical sequence to optimize instructional effectiveness and efficiency. | | | | | | | |
| **SE/TE:**<br>**Lesson Check**: 9<br>**Science and Modern Society:** 11<br>**Areas of Physics Research:** 12-13<br>**Connecting Ideas**: 473, 683, 895<br>**Technology and Society:** 35, 141, 333<br>**Mixed Review:** 489 | 27. connect common themes across multiple science disciplines.<br>. | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| **SE/TE:**<br>**Inquiry Lab:** 229, 343, 529, 675, 949<br>**Physics and the Scientific Method:** 3-9<br>**Adding and Subtracting Vectors**: 121-126<br>**Planetary Motion and Orbits:** 327-341<br>**Math Review:** R1-R25<br>**Writing About Science & Read, Reason, and Respond:** 40, 70, 110, 148, 186, 226, 264, 303-304, 340, 449-450, 561-562702, 779-780, 880, 946<br><br>**TE Only:**<br>**Teach:** 112B, 266B, 342B, 452B, 528B<br>**NGSS Science and Engineering Practices; Using Mathematics and Computational Thinking:** 282, 330, 939<br>**Analyzing and Interpreting Data:** 324<br><br>**Lab Manual:**<br>25-30, 57-62, 151-1561, 75-176 | 28. integrate cross-curricular connections. | | | | | | | |
| **TE Only:**<br>**NGSS Teacher Guide:** 2A-2B, 112A-112B, 228A-228B, 342A-342B, 564A-564B, 816A-816B<br>**Differentiated Instruction:** 361, 659, 693, 767<br>**Common Misconceptions:** 249, 387, 473, 963<br>In the ***MasteringPhysics*** Instructor Resources, a Physics Refresher for every chapter covers knowledge, pedagogy, and suggestions to enhance learning. | 29. provide educators necessary science content knowledge, pedagogy, and management techniques to guide learning experiences. | | | | | | | |

| **Life Skills**<br>*For student mastery of content standards and objectives, the instructional materials will provide students with opportunities to:* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **SE/TE:**<br>**Inquiry Activity:** 3, 151, 415, 529<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**How Things Work:** 102, 257, 520, 554, 665, 735, 841<br>**Technology and Society**: 141, 217, 333, 554, 903<br><br>**Lab Manual:**<br>1-5, 25-29, 37-40, 65-69, 101-104, 113-116, 123-126, 135-137, 147-150, 159-163 | 30. persevere to complete a task. | | | | | | | |
| **SE/TE:**<br>**Technology and Society:** 333<br>**Careers:** 772<br>**Grand Unified Theory:** 937<br>**Theory of Everything:** 937-938 | 31. be exposed to varying viewpoints. | | | | | | | |
| **SE/TE:**<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 43, 229, 267, 343, 529, 745<br><br>**Lab Manual:**<br>19-22, 79-82, 89-92, 139-144, 189-194, 259-262 | 32. engage in physical activity to promote the understanding of science content. | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Connecting Ideas:** 473, 637, 679, 683, 895<br>**Cool Physics:** 18, 321, 399, 421, 455, 469, 503, 517<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 43, 229, 267, 343, 529, 745<br>**Technology and Society**: 141, 217, 333, 554, 903<br><br>**Lab Manual:**<br>57-63, 93-94, 145-146, 147-149, 263-265 | 33. investigate the natural world and universe. | | | | | | | |
| **SE/TE:**<br>**Inquiry Activity:** 3, 415<br>**How Things Work:** 102<br>**Technology and Society:** 141, 217 | 34. practice situational language (e.g., presentations, debates, speeches, collaborative discussions, social media) in real-world activities. | | | | | | | |
| **SE/TE:**<br>Supporting content on the following pages introduces global scientific and technological issues.<br>**Technology and Society**: 217, 554, 903<br>**Physics & You Technology:** 928<br>**Radioactivity:** 917-924<br>**Application of Nuclear Physics:** 925-935 | 35. understand the impact of global issues and events on their lives, communities, and greater society. | | | | | | | |
| **SE/TE:**<br>**Physics Lab:** 335, 377, 408, 484, 521, 588, 666, 904<br>**Science Safety:** R72-R73<br><br>**Lab Manual:**<br>13, 15, 25, 57-63, 93-94, 117, 139, 145-146, 147-149, 263-265 | 36. use laboratory equipment properly. | | | | | | | |

# SPECIFIC EVALUATION CRITERIA

## 2016-2022
## Group IV – Science
## Physics

Physics is an advanced elective course designed for students pursuing Science Technology Engineering Mathematics (STEM) education and careers. The course emphasizes a mathematical approach to the topics of Forces & Interactions; Energy, and Waves and Electromagnetic Radiation and prepares student for college physics. The physics course prepares high school students to explain more in-depth phenomena central not only to the physical sciences, but to life and earth and space sciences, as well. These objectives blend the core ideas with scientific and engineering practices and crosscutting concepts to support students in developing useable knowledge to explain ideas across the science disciplines. There is a focus on several scientific practices which include developing and using models, planning and conducting investigations, analyzing and interpreting data, using mathematical and computational thinking, and constructing explanations. Students will use these practices to demonstrate understanding of the core ideas as well as demonstrate understanding of several engineering practices, including design and evaluation. Students will engage in active inquiries, investigations, and hands-on activities as they develop and demonstrate conceptual understandings and research and laboratory skills described in the objectives. Safety instruction is integrated in all activities, and students will implement safe procedures and practices when manipulating equipment, materials, organisms, and models.

All West Virginia teachers are responsible for classroom instruction that integrates content literacy and *21st Century Learning Skills and Technology Tools.*

**General Science Content**
The General Science Standard is a content standard that provides an integrated approach to science instruction that is arranged in a coherent manner, follows the logic of learning progressions and spans kindergarten through middle school. The three disciplines of science--Physical Science, Life Science, and Earth and Space Science--are limited to the major topics in the core ideas from each discipline. From the Life Science discipline the core ideas are the following: From Molecules to Organisms: Structures and Processes; Ecosystems: Interactions, Energy, and Dynamics; Heredity: Inheritance and Variation of Traits Across Generations; and Biological Evolution: Unity and Diversity. From the Physical Science discipline, the topics are the following: Matter and Its Interactions; Motion and Stability, Forces and Interactions; Energy; and Waves and Their Applications in Technologies for Information Transfer. Earth's Place in the Universe; Earth's Systems; and Earth and Human Activity are the topics from the Earth and Space Science discipline. Limiting instruction to the main topics of core ideas allows opportunities for deep exploration of important concepts and provides time for students to develop meaningful understandings, engage in science and engineering practices, and reflect on crosscutting concepts and the nature of science. The foundation not only provides an organizational structure for the acquisition of new knowledge, it prepares students to engage in deeper levels of scientific and engineering practices as they continue to high school, college, and beyond.

**Earth and Space Science Content**
The Earth and Space Standard is a content standard which spans kindergarten through high school and provides opportunities for students to investigate processes that operate on Earth and also address its place in the solar system and the galaxy. The standard encompasses three core ideas: Earth's Place in the Universe; Earth's Systems; and Earth and Human Activity. Beginning in kindergarten, students make observations, ask questions, and make predictions as they describe patterns in their local Weather and Climate. In later grades, the content progresses to include these topics: Space Systems: Patterns and Functions; Earth Systems: Processes that Shape the Earth; Earth's Systems: Space Systems: Stars and the Solar System; History of Earth; and Human Impacts. Elementary students observe and investigate matter and processes in their own yards and neighborhoods with their own eyes; the content continues in the grades that follow to include investigations of invisibly small phenomena to the unimaginably large and distant. As students investigate the atmosphere, hydrosphere, geosphere, and biosphere, they gain understanding of the differing sources of energy, matter cycles, multiple systems' interconnections, and feedbacks which cause Earth to change over time.

**Life Science Content**

The Life Science Standard is a content standard which spans kindergarten through high school and focuses on patterns, processes, and relationships of living organisms. The standard includes four core ideas: From Molecules to Organisms: Structures and Processes; Ecosystems: Interactions, Energy, and Dynamics; Heredity: Inheritance and Variation of Traits across Generations; and Biological Evolution: Unity and Diversity. These four core ideas, which represent basic life science fields of investigation—structures and processes in organisms, ecology, heredity, and evolution—have a long history and solid foundation based on the research evidence established by many scientists working across multiple fields. Beginning in kindergarten, curious learners explore Animals, Plants, and Their Environment as they learn of the Interdependent Relationships in Ecosystems. In the grades which follow, the inquiry continues as the standards encompass these topics: Structure, Function, and Information Processing; Inheritance and Variation of Traits: Life Cycles and Traits; Matter and Energy in Organisms and Ecosystems; and Growth, Development, and Reproduction of Organisms. Investigations include single molecules, organisms, ecosystems, and the entire biosphere that is all life on Earth. Students examine processes that occur on time scales from the blink of an eye to those that happen over billions of years. As they make observations, construct hypotheses, perform experiments, evaluate evidence, build models, and use technology to explore how life works, they prepare to answer questions about themselves and the world around them.

**Physical Science Content**

The Physical Science Standard is a content standard which spans kindergarten through high school as two subjects, physics and chemistry, are presented in a coherent approach which addresses four core ideas: Matter and Its Interactions; Motion and Stability, Forces and Interactions; Energy; and Waves and Their Applications in Technologies for Information Transfer. Beginning in kindergarten, students explore pushes and pulls as an introduction to the Forces and Interactions Topic. The inquiry continues through each programmatic level and includes the following topics: Light and Sound, Structure and Properties of Matter, Forces and Interactions, Energy, Waves and Information, Matter and Energy in Organisms and Ecosystems, Waves and Electromagnetic Radiation, and Chemical Reactions. An understanding of these topics allows students to answer two fundamental questions- “What is everything made of?’ and “Why do things happen?” Students apply these core ideas to explain and predict a wide variety of phenomena, such as the evaporation of water, the transmission of sound, the digital storage and transmission of information, the tarnishing of metals, and photosynthesis, to name just a few. Because such explanations and predictions rely on a basic understanding of matter and energy, students’ abilities to conceive the interactions of matter and energy are central to their science education.

**Chemistry Content**

The Chemistry Standard is a content standard which focuses on the core concepts: Structure and Properties of Matter and Chemical Reactions. Opportunities are provided for studying in-depth phenomena central not only to the physical sciences, but to life science and earth and space science, as well. The standard includes the chemistry concepts found in the Physical Science Standard, but *not* those emphasizing Forces & Interactions, Energy, and Waves and Electromagnetic Radiation. Instead the standard goes into greater depth in the study of matter, its composition, and its changes by including concepts such as the periodic table and modern theories of bonding, the effects of temperature, concentration, and vapor pressure on solubility, types of chemical reactions, stoichiometry, molarity, and gas laws. The standard blends the core ideas with scientific and engineering practices and crosscutting concepts to support students in developing useable knowledge to explain ideas across the science disciplines. There is an emphasis on several scientific practices which include developing and using models, planning and conducting investigations, analyzing and interpreting data, using mathematical and computational thinking and constructing explanations.

**Physics Content**

The Physics Standard is a content standard which focuses on the core concepts: Forces and Interactions, Energy, and Waves and Electromagnetic Radiation. Opportunities are provided for studying in-depth phenomena central not only to the physical sciences, but to life science and earth and space science, as well. The standard includes the physics concepts found in the Physical Science Standard, but *not* those emphasizing Structure and Properties of Matter and Chemical Reactions. Instead the standard goes into greater depth in the studies of elastic and inelastic collisions, buoyancy and fluid dynamics, projectile motion, vectors, circuits and currents, and optics. The standard blends the core ideas with scientific and engineering practices and crosscutting concepts to support students in developing useable knowledge to explain ideas across the science disciplines. There is an emphasis on several scientific practices which include developing and using models, planning and conducting investigations, analyzing and interpreting data, using mathematical and computational thinking and constructing explanations.

**Environmental Content**

The Environmental Standard is a content standard which focuses on chemical, physical, biological, and geological processes and the interdependent relationships in the natural world. Concepts from the major science disciplines—Life Science, Physical Science, and Earth and Space Science—are integrated into six environmental topics which include: Biogeochemical cycles, Energy Conservation, Ecosystems, Oceans and Climate, Water Management, Land Use. There is an emphasis on several scientific practices that include developing and using models; planning and conducting investigations; analyzing and interpreting data; constructing explanations; engaging in arguments from evidence; obtaining, evaluating, and communicating information; and synthesizing concepts across various science disciplines. The standard provides opportunities for students to develop an understanding of systems of a complex world and the interdependence of organisms as well as an appreciation of the ecosystem in which they live. As students develop an awareness of the environment and its associated problems, they acquire knowledge and skills of how to work individually and collectively toward solutions of current problems and the prevention of new ones.

**Forensic Science Content**

The Forensic Science Standard is a content standard which applies the knowledge and technology of science to criminal and civil law. Concepts from the three major disciplines--Life Science, Physical Science, and Earth and Space Science--are reinforced and made relevant and pertinent to students as they acquire techniques and skills and learn the limitations of the modern crime laboratories. There is an emphasis on several scientific practices which include planning and carrying out investigations; analyzing and interpreting data; obtaining, evaluating and communicating information; and using mathematics and computations. Students must address the attention to detail and protocol that are necessary for providing impartial scientific evidence that may be used in courts of law to support the prosecution or defense in criminal and civil investigations. These skills and attitudes transfer readily to other areas of science.

**Human Anatomy and Physiology Content**

Human Anatomy and Physiology is a content standard which addresses the structures and functions of the human body. While concepts from the Life Science discipline are the major focus of study, concepts from the Physical Sciences are incorporated to explain processes and mechanisms of the human body. The interdisciplinary nature of the sciences is revealed through the interdependency of body systems. There is an emphasis on several scientific practices which include asking questions, developing and using models, constructing explanations, and obtaining and communicating information. Engineering Design Standards are integrated throughout instruction as students define problems and design solutions related to the course objectives. The standard encompasses gross and microscopic an atom, basic biochemistry and physiological concepts which are foundational to medical fields of study and useful as students make health related decisions.

**Engineering, Technology, and Applications of Science**

Engineering, Technology, and Applications of Science Standards (ETS) are included in science instruction, kindergarten through high school, and provide opportunities for students to utilize science and appreciate the distinctions and relationships between engineering, technology, and applications of science. The ETS are in programmatic levels- Kindergarten through Second Grade, Third through Fifth Grade, Middle School, and High School. As Engineering, Technology, and the Application of Science objectives are integrated with content from the three major strands of science- life science, physical science, and earth and space science- students develop understandings of how scientific knowledge is acquired, scientific explanations are developed, and science is applied in the world around us. The interactive cycle of design offers potential in applying science knowledge and engaging in engineering practices. Students gain experiences and understandings about the following: 1.) using technology to modify the natural world to fulfill human needs or desires; 2.) using an engineering approach to design objects, use processes, or construct systems to meet human needs and wants; and 3.) applying scientific knowledge for a specific purpose, whether to do more science, design a product, process, or medical treatment, develop a new technology, or to predict the impacts of human actions.

**Literacy**

Literacy Standards span middle and high school and address skills which are critical to building knowledge in science. The standards work in tandem with the specific content standard demands outlined in the West Virginia Next Generation Science Standards and Objectives. Reading in science requires an appreciation

of the norms and conventions of the sciences which includes a working knowledge of domain-specific words, phrases, and symbols; an understanding of the nature of evidence used to support claims; an attention to precision and detail; and the capacity to make and assess intricate arguments, synthesize complex information often presented qualitatively and quantitatively in tables and graphs, and follow detailed procedures and accounts of events and concepts. Students also need to be able to gain knowledge from elaborate diagrams and data that convey information and illustrate scientific concepts. Likewise, writing and presenting information orally are key means for students to assert and defend claims in science, demonstrate what they know about a concept, and convey what they have experienced, imagined, thought, and learned. The skills and understandings students are expected to demonstrate in both reading and writing have a wide applicability outside the classroom and workplace and serve students as they address public and private responsibilities and interests.

**For student mastery of content standards and objectives, the instructional materials will provide students with the opportunity to**

| (Vendor/Publisher) SPECIFIC LOCATION OF CONTENT WITHIN PRODUCTS | (IMR Committee) Responses | | | | | | | |
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| | **I**=In-depth, **A**=Adequate, **M**=Minimal, **N**=Nonexistent | **I** | | **A** | | **M** | | **N** |
| **Physics Content** | | | | | | | | |
| Force & Interactions | | | | | | | | |
| **SE/TE:**<br>**Newton's Second Law:** 153-157<br>**Practice Problems:** 155, 158<br>**Study Guide:** 179<br>**Chapter Assessment:** 180-186<br>**Standardized Test Prep:** 187<br><br>**Lab Manual:**<br>75-78, 79-81 | 1. analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. | | | | | | | |
| **SE/TE:**<br>**Standardized Test Prep:** 187<br>**Conservation of Momentum:** 242-247<br>**Lesson Check:** 247<br><br>**Lab Manual:**<br>95-98, 99-100 | 2. use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. | | | | | | | |
| **SE/TE:**<br>**Conservation of Energy:** 206-210<br>**Collisions:** 248-256<br>**Lesson Check:** 256<br>**How Things Work**: 257<br>**Physics Lab:** 258<br>**Study Guide:** 259<br>**Chapter Assessment:** 260-264<br>**Standardized Test Prep:** 265<br><br>**Lab Manual:**<br>85-88, 95-98, 99-100 | 3. evaluate the conservation of energy and momentum and deduce solutions for elastic and inelastic collisions. | | | | | | | |

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| **SE/TE:**<br>Supporting content for this practice appears in the following ***MasteringPhysics*** items:<br>Chapter 7 Conceptual Question 10<br>Pre-Lecture Concept Question 7.03<br>**Lesson Check**: 7.27<br>**Tutorial:** A Superball Collides Inelastically with a Table | 4. apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during collision.* | | | | | | | |
| **SE/TE:**<br>**Newton's Law of Universal Gravity**: 307-312<br>**Practice Problems:** 309<br>**Lesson Check:** 312, 689<br>**Chapter Assessment:** 336-340<br>**Electric Force:** 683-688<br>**Physics Lab:** 696<br><br>**Lab Manual:**<br>65-69 | 5. use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. | | | | | | | |
| **SE/TE:**<br>**Magnetism and Electric Currents:** 789-795<br>**Practice Problems:** 794<br>**Lesson Check**: 795, 827<br>**Electricity from Magnetism:** 817-825<br>**How Things Work:** 841<br>**Physics Lab:** 842<br>**Standardized Test Prep:** 849<br><br>**Lab Manual:**<br>243-247, 249-252 | 6. plan and conduct an investigation to produce evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. | | | | | | | |

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| **SE/TE:**<br>**Archimedes' Principle:** 432-433<br>***Mastering Physics:***<br>**Chapter 12 Video Tutor**<br>**Demonstration:** Weighing Weights in Water<br>**Chapter 12 Tutorials:** A Submerged Ball, Crown of Gold? | 7. assess the magnitude of buoyant force on submerged and floating objects. | | | | | | | |
| **SE/TE:**<br>**Fluids in Motion**: 437-438<br>**Lesson Check:** 439<br>**Chapter Assessment:** 446-450<br><br>**Lab Manual:**<br>57-61 | 8. anticipate the effects of Bernoulli's principle on fluid motion. | | | | | | | |
| **SE/TE:**<br>**Projectile Motion:** 131-140<br>**Practice Problems:** 133, 135, 138<br>**Lesson Check:** 140<br>**Physics Lab:** 142<br>**Chapter Assessment:** 144-148<br>**Standardized Test Prep:** 149<br><br>**Lab Manual:**<br>57-61 | 9. analyze the motion of a projectile; appraise data, either textbook generated or laboratory collected, for motion in one and/or two dimensions, then select the correct mathematical method for communicating the value of unknown variables. | | | | | | | |
| **SE/TE:**<br>**Vectors in Physics:** 115-117<br>**Practice Problems**: 117, 119<br>**Adding and Subtracting Vectors:** 121-126<br>**Lesson Check**: 120, 126<br>**Chapter Assessment:** 144-148<br>**Standardized Test Prep:** 149<br><br>**Lab Manual:**<br>47-50 | 10. interpret graphical, algebraic and/or trigonometric solutions to prove the values for vector components and resultants.. * | | | | | | | |

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| Energy | | | | | | | | |
| **SE/TE:**<br>**Conservation of Energy**: 206-210<br>**Practice Problems**: 209, 365<br>**Heat Capacity:** 358-364<br>**Phase Changes and Latent Heat**: 366-373<br><br>**Lab Manual:**<br>85-88, 235-237, 249-252 | 11. create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. | | | | | | | |
| **SE/TE:**<br>**Conservation of Energy:** 206-210<br>**Collisions:** 248-256<br>**Lesson Check:** 256<br>**How Things Work**: 257<br>**Physics Lab:** 258<br>**Study Guide:** 259<br>**Chapter Assessment:** 260-264<br>**Standardized Test**: Prep: 265<br><br>**Lab Manual:**<br>85-88, 95-98, 99-100 | 12. evaluate the conservation of energy and momentum and deduce solutions for elastic and inelastic collisions. | | | | | | | |
| **SE/TE:**<br>**Phase Changes and Latent Heat:** 366-373<br>**Lesson Check** 374, 475, 727<br>**Wave Properties and Behavior:** 473-475<br>**Electric Energy and Electric Potential**: 718-726<br><br>**Lab Manual:**<br>93-94 | 13. develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects). | | | | | | | |
| **SE/TE:**<br>**Physics Lab:** 773<br>**How Things Work:** 257<br><br>**Lab Manual:**<br>93-94 | 14. design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.* | | | | | | | |

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| **SE/TE:**<br>**The Second and Third Laws of Thermodynamics:** 400-406<br>**Guided Example:** 404<br>**How Things Work:** 407<br>**Physics Lab:** 408<br><br>**Lab Manual:**<br>123-126 | 15. plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics). | | | | | | | |
| **SE/TE:**<br>**Electrical Energy:** 769-771<br>**Lesson Check**: 771, 827<br>**Physics Lab:** 773<br>**Chapter Assessment:** 775-779, 847<br>**Standardized Test Prep:** 781, 849<br>**Electricity from Magnetism:** 817-826<br><br>**Lab Manual:**<br>243-247, 253-256 | 16. develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. | | | | | | | |
| **SE/TE:**<br>**Physics Lab:** 773<br>**Practice Problems:** 751, 762<br>**Electric Circuits:** 757-760<br>**Power and Energy in Electric Circuits:** 765-768<br>**Guided Example:** 761<br>**Lesson Check**: 765<br>**Chapter Assessment:** 775-777<br><br>**Lab Manual:**<br>225-228, 235-237, 239-240 | 17. construct and analyze electrical circuits and calculate Ohm's law problems for series and parallel circuits. | | | | | | | |
| **SE/TE:**<br>**Electric Current, Resistance, and Semiconductors:** 745-749<br>**Lesson Check**: 757, 840<br>**AC Circuits and Transformers**: 832-840<br>**How Things Work:** 841<br>**Physics Lab:** 842 | 18. distinguish between direct and alternating current and identify ways of generating each type. | | | | | | | |

| Waves & Electromagnetic Radiation | | | | | | | | |
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| **SE/TE:**<br>**Waves Properties and Behavior:** 473-475<br>**Interacting Waves**: 477-482<br>**Lesson Check:** 475, 482, 512<br>**Physics Lab**: 521<br>**Chapter Assessment:** 524<br><br>**Lab Manual:**<br>151-155 | 19. use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. | | | | | | | |
| **SE/TE:**<br>Supporting content for understanding how digital storage and transmission devices are made appears on pages 756 and 777. | 20. evaluate questions about the advantages of using a digital transmission and storage of information. | | | | | | | |
| **SE/TE:**<br>**Quantized Light:** 857-861<br>**Wave-Particle Duality:** 864-867<br>**Read, Reason, and Respond:** 880<br>***Mastering Physics* Tutorial:** The Photoelectric Effect Experiment | 21. evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. | | | | | | | |
| **SE/TE:**<br>**Color and the Electromagnetic Spectrum:** 539-541<br>**Guided Example:** 858<br>**Chapter 24 Assessment:** 876, #41<br>**Atomic Line Spectra:** 886-887<br>**Lasers**: 898-900<br>**Fluorescence:** 901-902<br>**Radiation in Medicine:** 934-935 | 22. evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. | | | | | | | |

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| **SE/TE:**<br>**Waves Properties and Behavior:** 473-475<br>**Interacting Waves**: 477-482<br>**Lesson Check:** 482, 512<br>**Physics Lab:** 484<br>**Chapter Assessment:** 486, 489, 525<br>**Sound Waves and Beats:** 493-500<br>**The Doppler Effect:** 507-509<br>**How Things Work:** 520 | 23. communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.* | | | | | | | |
| **SE/TE:**<br>**Ray Tracing:** 577-580<br>**The Mirror Equation:** 581-585<br>**Lesson Check:** 586, 618, 625<br>**How Things Work:** 587<br>**Physics Lab:** 588, 627<br>**Chapter Assessment:** 590-594, 629-634<br>**Standardized Test Prep:** 595, 635<br>**Lenses:** 612-618<br>**Application of Lenses:** 619-624<br><br>**Lab Manual:**<br>183-185, 187-188, 195-197 | 24. apply ray optics diagrams to lenses and mirrors; use the lens/mirror equation and the magnification equation to solve optics problems; justify the image results obtained by diagramming the ray optics of lenses and mirrors and/or by deducing the image information from the lens/mirror equation. | | | | | | | |
| **Engineering, Technology, and Applications of Science** | | | | | | | | |
| Engineering Design | | | | | | | | |
| **SE/TE:**<br>Supporting content that asks the student to make initial analyses of global challenges appears in “Take It Further” on the following pages.<br>**Careers:** 177<br>**Technology and Society:** 217, 554, 903 | 25. analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. | | | | | | | |

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| As ***Pearson Physics*** takes a "concepts first" approach combined with laboratory exploration to support the problem-solving process, this engineering design standard falls outside the scope of the program. | 26. design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. | | | | | | | |
| **SE/TE:**<br>Supporting content that asks the student to examine potential solutions to global energy challenges appears in "Take It Further" the following pages.<br>**Technology and Society:** 333, 554, 903 | 27. evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. | | | | | | | |
| As ***Pearson Physics*** takes a "concepts first" approach combined with laboratory exploration to support the problem-solving process, this computer simulation and modeling standard falls outside the scope of the program. | 28. use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. | | | | | | | |
| **Science Literacy** | | | | | | | | |
| Reading- Key Ideas and Details | | | | | | | | |
| **TE Only:**<br>**Teacher Guide**: 42A, 112A, 636A, 674A, 816A, 850A, 910A, 948A | 29. cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. | | | | | | | |
| **SE/TE:**<br>**Lesson Check:** 312, 349, 392, 475, 586, 689<br>**Big Idea:** 259, 335, 485, 628, 809<br>**Careers:** 63, 443<br>**How Things Work:** 968 | 30. determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. | | | | | | | |

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| **SE/TE:**<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br><br>**Lab Manual:**<br>1-5, 7-8, 9-11, 37-39, 57-61, 99-100, 131-132, 179-182 | 31. follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. | | | | | | | |
| Reading- Craft and Structure | | | | | | | | |
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Lesson Check**: 296, 461, 553, 689, 887, 935<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**How Things Work:** 257, 375, 520, 587, 968<br>**The Nucleus:** 911-916<br>**Applications of Nuclear Physics**: 925-927<br>**Quick Example – What's the Symbol?:** 913<br><br>**Lab Manual:**<br>x, 25, 41, 49, 57, 81, 101, 117, 143, 173, 207 | 32. 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 11–12 texts and topics. | | | | | | | |

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| **SE/TE:**<br>**Visual Summary: Areas of Physics**<br>**Research:** 12-13<br>**Contents:** x-xii<br>**Appendices:** R26-R71<br><br>**TE Only:**<br>**Inquiry Labs:** xiv<br>**Physics Labs:** xiv<br>**Physics & You Feature Pages:** xv<br>**Physics & You Technology:** xv<br><br>**Lab Manual:**<br>Contents: iii-vi | 33. analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas. | | | | | | | |
| **SE/TE:**<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**Analyzing the Beanbag Experiment**: 231<br>**Guided Example:** 315, 395, 733<br>**Schrödinger's Equation:** 897 | 34. analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. | | | | | | | |
| Reading- Integration of Knowledge and Ideas | | | | | | | | |
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Careers**: 63, 177, 297, 695, 873<br>**Technology and Society**: 141, 217, 333, 554, 903<br>**How Things Work**: 102, 257, 375, 407, 520, 587, 968<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672 | 35. integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. | | | | | | | |
| **SE/TE:**<br>**Technology and Society:** 35, 141, 217, 554, 903<br>**Physics Lab:** 696 | 36. evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. | | | | | | | |

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| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Careers:** 63, 177, 297, 695, 873<br>**Technology and Society**: 141, 217, 333, 554, 903<br>**How Things Work**: 102, 257, 375, 407, 520, 587, 968<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br><br>**Lab Manual:**<br>24, 64, 94, 112, 132, 170, 200 | 37. synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. | | | | | | | |
| Reading- Range of Reading and Level of Text Complexity | | | | | | | | |
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Lesson Check:** 296, 461, 553, 689, 887<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**Practice Problems:** 60, 214, 455, 678, 921<br>**Physics Lab:** 103, 258, 376, 696, 874<br>**Standardized Test Prep:** 71, 149, 227, 341, 491, 635<br>**Careers:** 63, 177, 297, 695, 873<br>**Technology and Society**: 141, 217, 333, 554, 903<br>**How Things Work**: 102, 257, 375, 520, 587, 968 | 38. by the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently. | | | | | | | |

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| Writing- Text Types and Purposes | | | | | | | | |
| **SE/TE:**<br>**Technology and Society:** 141, 217, 333, 554<br>**How Things Work**: 841<br><br>**TE Only:**<br>**Teach: (Writing)** 188B, 910B | 39. write arguments focused on *discipline-specific content.*<br>• introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons and evidence.<br>• develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values and possible biases.<br>• use words, phrases and clauses, as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.<br>• establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.<br>• provide a concluding statement or section that follows from or supports the argument presented. | | | | | | | |

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| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**How Things Work**: 102, 257, 375, 407, 520, 587, 841, 968<br><br>**TE Only:**<br>**Teach: (Writing)** 112B, 306B, 342B, 782B, 882B<br><br>**Lab Manual:**<br>13-14, 23-24, 35-36, 63-64, 83-84, 111-112, 145-146, 187-188 | 40. write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.<br>• introduce a topic and organize complex ideas, concepts and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures and tables), and multimedia when useful to aid comprehension.<br>• develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.<br>• use varied transitions and sentence structures to link the major sections of the text, create cohesion and clarify the relationships among complex ideas and concepts.<br>• use precise language, domain-specific vocabulary and techniques such as metaphor, simile and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.<br>• provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic). | | | | | | | |

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| Writing- Production and Distribution of Writing | | | | | | | | |
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Technology and Society:** 35, 141, 217, 333, 554, 903<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**How Things Work**: 841<br><br>**TE Only:**<br>**Teach: (Writing)** 188B, 910B<br><br>**Lab Manual:**<br>13-14, 23-24, 35-36, 63-64, 83-84, 111-112, 145-146, 187-188 | 41. produce clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. | | | | | | | |
| **SE/TE:**<br>**Technology and Society**: 141, 217, 333, 554, 903<br>**How Things Work**: 102, 257, 375, 520, 587, 968<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**Careers:** 63, 177, 297, 695, 873<br><br>**TE Only:**<br>**Teach: (Writing)** 188B, 910B<br>**Assess and Remediate: (Planning and Carrying Out Investigations)** 744B | 42. develop and strengthen writing as needed by planning, revising, editing, rewriting or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. | | | | | | | |

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| **SE/TE:**<br>**Technology and Society:** 141, 217, 333, 554<br>**How Things Work**: 841<br><br>**TE Only:**<br>**Teach: (Writing)** 188B, 910B | 43. use technology, including the Internet, to produce, publish and update individual or shared writing products in response to ongoing feedback, including new arguments or information. | | | | | | | |
| Writing- Research to Build and Present Knowledge | | | | | | | | |
| **SE/TE:**<br>The "Take It Further" activities on the following pages ask the student to research questions about technological issues.<br>**Technology and Society**: 333, 554<br>**How Things Work:** 735, 807, 968<br><br>**Writing About Science:** 40, 70, 110, 226, 303, 340, 382, 412, 449, 490, 526, 561, 594, 634 | 44. conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. | | | | | | | |
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Careers:** 63, 177, 297, 695, 873<br>**Technology and Society**: 141, 217, 333, 554, 903<br>**How Things Work**: 102, 257, 375, 520, 587, 968<br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 3, 189, 343, 675, 911 | 45. gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. | | | | | | | |

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| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Careers:** 63, 177, 297, 695, 873<br>**Technology and Society**: 35, 141, 217, 333, 554, 903<br>**How Things Work**: 102, 257, 375, 520, 587, 968<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 3, 189, 343, 675, 911 | 46. draw evidence from informational texts to support analysis, reflection and research. | | | | | | | |
| Writing- Range of Writing | | | | | | | | |
| This objective is addressed throughout. See, for example:<br>**SE/TE:**<br>**Technology and Society**: 141, 217, 333, 554, 903<br>**How Things Work**: 102, 257, 375, 520, 587, 968<br>**Lesson Check**: 296, 461, 553, 689, 887, 935<br><br>**Chapter Assessment:** 180-186, 260-264, 336-340, 486-490, 668-672<br>**Physics Lab:** 103, 142, 444, 521, 696, 942<br>**Inquiry Lab:** 3, 189, 343, 675, 911<br>**Careers:** 63, 177, 297, 695, 873<br><br>**Lab Manual:**<br>13-14, 23-24, 35-36, 63-64, 83-84, 111-112, 145-146, 183-185, 187-188, 195-197 | 47. 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. | | | | | | | |