PLTW Gateway

Automation and Robotics | Unit Outline

Learn how creative thinking and problem solving can change your world!

Build, program, and exercise creative problem solving to innovate and design automated solution prototypes for various users.

Students explore robotics and automation as they take on the role of interns, and work in teams to create prototypes to meet the needs of clients. They build and analyze mechanical systems and automate them with programmed input and output devices.

Automation and Robotics Lesson Summary

Lesson 1	Automating Mechanisms
Lesson 2	Sensors and Systems
Lesson 3	Create and Automate

Lesson 1: Automating Mechanisms

Students explore how gear trains and other mechanisms transfer movement in mechanical systems and design, build, and program automated systems to meet the needs of clients. In the end-of-lesson project, students can choose to design an interactive device to keep pets physically and mentally active, a spinning street sign to warn drivers to slow down and stop, or a high-speed dragster.

Lesson 2: Sensors and Systems

Students investigate the versatility of an optical sensor as a programmed input device. Students extend their knowledge of mechanisms as they design increasingly complex prototypes to serve the needs of users. In the end-of-lesson project, students connect inputs to outputs through programming to create effective solutions that help their communities.

Lesson 3: Create and Automate

Students design solutions using an automated mechanical system and the programming necessary for communication between the sensors, motors, and building components. Students pick their own problems or select problems that highlight their creativity and are of service to others. Throughout the unit students reflect on their growing skills and interests and explore careers in the field.

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Common Core College and Career Readiness Anchor Standards

PLTW Gateway Standards Connection Automation and Robotics

Connections to Standards in PLTW Gateway

PLTW curriculum is designed to empower students to thrive in an evolving world. As a part of the design process when developing and updating our curriculum, we focus on connections to a variety of standards. PLTW Automation and Robotics connects to standards in the following:

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Reading

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.CCRA.R.10

Read and comprehend complex literary and informational texts independently and proficiently.

☑ 1	☑ 1	☑ 1	☑ 1	☑ 1	☑ 1	☑ 1	☑ 1	☑ 1
☑ 2	☑ 2	☑ 2	☑ 2	☑ 2	☑ 3			

Writing

Text Types and Purposes

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CCSS.ELA-LITERACY.CCRA.W.2

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ ☑

2.12.22.32.42.53.1

CCSS.ELA-LITERACY.CCRA.W.4

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

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ ☑

2.12.22.32.42.53.1

CCSS.ELA-LITERACY.CCRA.W.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☑

2.12.22.32.42.53.1

CCSS.ELA-LITERACY.CCRA.W.10

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

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑

2.12.22.32.42.53.1

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.CCRA.SL.1

Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑

2.12.22.32.42.53.1

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CCSS.ELA-LITERACY.CCRA.SL.2

Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ | ☑

2.12.22.32.42.53.1

CCSS.ELA-LITERACY.CCRA.SL.4

Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ | ☑

2.12.22.32.42.53.1

CCSS.ELA-LITERACY.CCRA.SL.5

Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ | ☑

2.12.22.32.42.53.1

CCSS.ELA-LITERACY.CCRA.SL.6

Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ | ☑

2.12.22.32.42.53.1

Language

Conventions of Standard English

CCSS.ELA-LITERACY.CCRA.L.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ | ☑

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2.12.22.32.42.53.1

CCSS.ELA-LITERACY.CCRA.L.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑

2.12.22.32.42.53.1

CCSS.ELA-LITERACY.CCRA.L.4

Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑

2.12.22.32.42.53.1

CCSS.ELA-LITERACY.CCRA.L.5

Demonstrate understanding of word relationships and nuances in word meanings.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑

2.12.22.32.42.53.1

CCSS.ELA-LITERACY.CCRA.L.6

Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑

2.12.22.32.42.53.1

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Common Core State Standards for English Language Arts 6–8 Literacy Standards for History/Social Studies, Science, and Technical Subjects

Reading History/Social Studies

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RH.6-8.7

Integrate visual information (e.g., in charts, graphs, photographs, videos, or maps) with other information in print and digital texts.

☐ 1	☐ 1	☑ 1	☐ 1	☐ 1	☐ 1	☐ 1	☑ 1	☐ 1
☑ 2	☑ 2	☐ 2	☐ 2	☐ 2	☑ 3			

Reading Science/Technical

Key Ideas and Details

CCSS.ELA-LITERACY.RST.6-8.3

Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

☑ 1.1	☑ 1.2	☑ 1.3	☑ 1.4	☑ 1.5	☑ 1.6	☑ 1.7	☑ 1.8	☑ 1.9	
☑	☑	☑	☑	☑	☑ 2.12.22.32.42.53.1				

Craft and Structure

CCSS.ELA-LITERACY.RST.6-8.4

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.

☑ 1.1	☑ 1.2	☑ 1.3	☑ 1.4	☑ 1.5	☑ 1.6	☑ 1.7	☑ 1.8	☑ 1.9	
☑	☑	☑	☑	☑	☑ 2.12.22.32.42.53.1				

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RST.6-8.7

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).

☐ 1.1	☐ 1.2	☐ 1.3	☑ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☐ 1.8	☑ 1.9	
☑	☑	☐	☐	☑	☑ 2.12.22.32.42.53.1				

Range of Reading and Level of Text Complexity

CCSS.ELA-LITERACY.RST.6-8.10

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Common Core State Standards for English Language Arts 6th Grade

By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ | ☑ 2.12.22.32.42.53.1

Common Core State Standards for English Language Arts 6–8 Literacy Standards for History/Social Studies, Science, and Technical Subjects

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Writing in History/social Studies, Science, and Technical Subjects

Text Types and Purposes

CCSS.ELA-LITERACY.WHST.6-8.2

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

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ | ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.WHST.6-8.2.d

Use precise language and domain-specific vocabulary to inform about or explain the topic.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ | ☑ 2.12.22.32.42.53.1

Production and Distribution of Writing

CCSS.ELA-LITERACY.WHST.6-8.4

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

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ | ☑ 2.12.22.32.42.53.1

Range of Writing

CCSS.ELA-LITERACY.WHST.6-8.10

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.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ | ☑ 2.12.22.32.42.53.1

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Reading Informational

Craft and Structure

CCSS.ELA-LITERACY.RI.6.4

Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ | ☑ 2.12.22.32.42.53.1

Integration of Knowledge and Ideas

CCSS.ELA-LITERACY.RI.6.7

Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1

☑ 2 ☑ 2 ☑ 2 ☑ 2 ☑ 2 | ☑ 3

Writing

Text Types and Purposes

CCSS.ELA-LITERACY.W.6.1.c

Use words, phrases, and clauses to clarify the relationships among claim(s) and reasons.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.W.6.2

Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ | ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.W.6.2.d

Use precise language and domain-specific vocabulary to inform about or explain the topic.

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☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.W.6.3.d

Use precise words and phrases, relevant descriptive details, and sensory language to convey experiences and events.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ ☑ 2.12.22.32.42.53.1

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Production and Distribution of Writing

CCSS.ELA-LITERACY.W.6.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3.)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ | ☑ 2.12.22.32.42.53.1

Research to Build and Present Knowledge

CCSS.ELA-LITERACY.W.6.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☑ 2.12.22.32.42.53.1

Range of Writing

CCSS.ELA-LITERACY.W.6.10

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

☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1

☑ 2 ☑ 2 ☑ 2 ☑ 2 ☑ 2 | ☑ 3

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.6.1

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 others' ideas and expressing their own clearly.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ | ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.SL.6.1.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.

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☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.SL.6.1.b

Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.SL.6.1.c

Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.SL.6.2

Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.6.5

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

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.SL.6.6

Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☑ 1

☐ 2 ☐ 2 ☐ 2 ☐ 2 ☑ 2 ☑ 3

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Common Core State Standards for English Language Arts 6th Grade

Language

Conventions of Standard English

CCSS.ELA-LITERACY.L.6.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.L.6.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

Knowledge of Language

CCSS.ELA-LITERACY.L.6.3

Use knowledge of language and its conventions when writing, speaking, reading, or listening.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.6.4

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 6 reading and content, choosing flexibly from a range of strategies.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.L.6.6

Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

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Common Core State Standards for English Language Arts 7th Grade

Reading Literature

Key Ideas and Details

CCSS.ELA-LITERACY.RL.7.2

Determine a theme or central idea of a text and analyze its development over the course of the text; provide an objective summary of the text.

☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1

☐ 2 ☐ 2 ☑ 2 ☐ 2 ☐ 2 | ☐ 3

Writing

Text Types and Purposes

CCSS.ELA-LITERACY.W.7.2.a

Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.W.7.2.d

Use precise language and domain-specific vocabulary to inform about or explain the topic.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ | ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.W.7.3.d

Use precise words and phrases, relevant descriptive details, and sensory language to capture the action and convey experiences and events.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ | ☑ 2.12.22.32.42.53.1

Range of Writing

CCSS.ELA-LITERACY.W.7.10

Write routinely over extended time frames (time for research, 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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☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.7.1

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.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☐ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.SL.7.1.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.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.SL.7.1.b

Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.SL.7.1.c

Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.SL.7.1.d

Acknowledge new information expressed by others and, when warranted, modify their own views.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ ☑ 2.12.22.32.42.53.1

Presentation of Knowledge and Ideas

CCSS.ELA-LITERACY.SL.7.4

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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.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ | ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.SL.7.6

Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☑ 1

☐ 2 ☐ 2 ☐ 2 ☐ 2 ☑ 2 | ☑ 3

Language

Knowledge of Language

CCSS.ELA-LITERACY.L.7.3.a

Choose language that expresses ideas precisely and concisely, recognizing and eliminating wordiness and redundancy.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ | ☑ 2.12.22.32.42.53.1

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.7.4

Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, choosing flexibly from a range of strategies.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ | ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.L.7.6

Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ | ☑ 2.12.22.32.42.53.1

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Writing

Text Types and Purposes

CCSS.ELA-LITERACY.W.8.1.c

Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.W.8.2.a

Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.W.8.2.d

Use precise language and domain-specific vocabulary to inform about or explain the topic.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

CCSS.ELA-LITERACY.W.8.3.d

Use precise words and phrases, relevant descriptive details, and sensory language to capture the action and convey experiences and events.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ ☑ 2.12.22.32.42.53.1

Production and Distribution of Writing

CCSS.ELA-LITERACY.W.8.4

Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3.)

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

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Range of Writing

CCSS.ELA-LITERACY.W.8.10

Write routinely over extended time frames (time for research, 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.

☑ 1	☑ 1	☑ 1	☑ 1	☑ 1	☑ 1	☑ 1	☑ 1	☑ 1
☑ 2	☑ 2	☑ 2	☑ 2	☑ 2	☑ 3			

Speaking and Listening

Comprehension and Collaboration

CCSS.ELA-LITERACY.SL.8.1

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

☑ 1.1	☑ 1.2	☑ 1.3	☑ 1.4	☑ 1.5	☑ 1.6	☑ 1.7	☑ 1.8	☑ 1.9
☑	☑	☑	☑	☑	☑ 2.12.22.32.42.53.1			

CCSS.ELA-LITERACY.SL.8.1.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.

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☐ 1.8	☑ 1.9
☐	☐	☐	☐	☑	☑ 2.12.22.32.42.53.1			

CCSS.ELA-LITERACY.SL.8.1.b

Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed.

☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☑ 1
☐ 2	☐ 2	☐ 2	☐ 2	☑ 2	☑ 3			

Language

Vocabulary Acquisition and Use

CCSS.ELA-LITERACY.L.8.6

Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

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Common Core State Standards for English Language Arts 8th Grade

☑	1.1	☑	1.2	☑	1.3	☑	1.4	☑	1.5	☑	1.6	☑	1.7	☑	1.8	☑	1.9		
☑		☑		☑		☑		☑		☑	2.12.22.32.42.53.1								

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Ratios And Proportional Relationships

Understand Ratio Concepts And Use Ratio Reasoning To Solve Problems.

CCSS.MATH.CONTENT.6.RP.A.1

Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☑ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☐ 2.12.22.32.42.53.1

CCSS.MATH.CONTENT.6.RP.A.2

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☑ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☐ 2.12.22.32.42.53.1

CCSS.MATH.CONTENT.6.RP.A.3

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

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☑ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☐ 2.12.22.32.42.53.1

CCSS.MATH.CONTENT.6.RP.A.3.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.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☑ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☐ 2.12.22.32.42.53.1

CCSS.MATH.CONTENT.6.RP.A.3.d

Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

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☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☑ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☐ 2.12.22.32.42.53.1

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Common Core State Standards for Mathematics 7th Grade

Ratios And Proportional Relationships

Analyze Proportional Relationships And Use Them To Solve Real-World And Mathematical Problems.

CCSS.MATH.CONTENT.7.RP.A.2

Recognize and represent proportional relationships between quantities.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☑ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☐ 2.12.22.32.42.53.1

CCSS.MATH.CONTENT.7.RP.A.2.b

Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☑ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☐ 2.12.22.32.42.53.1

CCSS.MATH.CONTENT.7.RP.A.2.c

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.

☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☑ 1 ☐ 1 ☐ 1 ☐ 1

☐ 2 ☐ 2 ☐ 2 ☐ 2 ☐ 2 | ☐ 3

The Number System

Apply And Extend Previous Understandings Of Operations With Fractions To Add, Subtract, Multiply, And Divide Rational Numbers.

CCSS.MATH.CONTENT.7.NS.A.3

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

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☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☑ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☐ 2.12.22.32.42.53.1

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International Society for Technology in Education

Knowledge Constructor

3d

Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☑ 1 ☑ 1

☐ 2 ☐ 2 ☐ 2 ☑ 2 ☑ 2 ☑ 3

Innovative Designer

4a

Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ ☑ 2.12.22.32.42.53.1

4c

Students develop, test and refine prototypes as part of a cyclical design process.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ ☑ 2.12.22.32.42.53.1

4d

Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☑ 1

☐ 2 ☐ 2 ☐ 2 ☐ 2 ☑ 2 ☑ 3

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Computational Thinker

5b

Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.

☐	1.1	☑	1.2	☑	1.3	☑	1.4	☑	1.5	☐	1.6	☐	1.7	☐	1.8	☑	1.9		
☑		☑		☑		☑		☑		☑	2.12.22.32.42.53.1								

5c

Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

☐	1.1	☐	1.2	☐	1.3	☐	1.4	☐	1.5	☐	1.6	☐	1.7	☑	1.8	☑	1.9		
☐		☐		☐		☑		☑		☑	2.12.22.32.42.53.1								

5d

Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☑ 1	
☐ 2	☐ 2	☐ 2	☑ 2	☑ 2	☑ 3				

Creative Communicator

6a

Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.

☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	
☐ 2	☐ 2	☐ 2	☐ 2	☐ 2	☑ 3				

Global Collaborator

7c

Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

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☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ ☑ 2.12.22.32.42.53.1

Standards for Technological and Engineering Literacy

Nature and Characteristics of Technology and Engineering

STEL-1J

Develop innovative products and systems that solve problems and extend capabilities based on individual or collective needs and wants.

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☐ 1.8	☑ 1.9
☐	☐	☐	☑	☑	☑ 2.12.22.32.42.53.1			

STEL-1M

Apply creative problem-solving strategies to the improvement of existing devices or processes or the development of new approaches.

☐ 1	☐ 1	☐ 1	☐ 1	☑ 1	☐ 1	☐ 1	☑ 1	☑ 1
☐ 2	☐ 2	☑ 2	☑ 2	☑ 2	☑ 3			

Core Concepts of Technology and Engineering

STEL-2M

Differentiate between inputs, processes, outputs, and feedback in technological systems.

☐ 1.1	☑ 1.2	☐ 1.3	☑ 1.4	☐ 1.5	☑ 1.6	☐ 1.7	☑ 1.8	☑ 1.9
☑	☑	☑	☑	☑	☑ 2.12.22.32.42.53.1			

STEL-2N

Illustrate how systems thinking involves considering relationships between every part, as well as how the system interacts with the environment in which it is used.

☐ 1.1	☑ 1.2	☐ 1.3	☑ 1.4	☐ 1.5	☑ 1.6	☑ 1.7	☑ 1.8	☑ 1.9
☑	☑	☑	☑	☑	☑ 2.12.22.32.42.53.1			

STEL-2S

Defend decisions related to a design problem.

☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☑ 1	☑ 1
☐ 2	☐ 2	☐ 2	☑ 2	☑ 2	☑ 3			

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Standards for Technological and Engineering Literacy

Integration of Knowledge, Technologies, and Practices

STEL-3F

Apply a product, system or process developed for one setting to another setting.

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
☐	☐	☐	☐	☑	☑ 2.12.22.32.42.53.1			

Impacts of Technology

STEL-4K

Examine the ways that technology can have both positive and negative effects at the same time.

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
☐	☑	☐	☐	☐	☐ 2.12.22.32.42.53.1			

STEL-4N

Analyze examples of technologies that have changed the way people think, interact, and communicate.

☐ 1	☑ 1	☑ 1	☐ 1	☐ 1	☐ 1	☐ 1	☑ 1	☐ 1
☐ 2	☑ 2	☐ 2	☐ 2	☑ 2	☐ 3			

Influence of Society on Technological Development

STEL-5F

Analyze how an invention or innovation was influenced by its historical context.

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
☐	☑	☐	☐	☐	☐ 2.12.22.32.42.53.1			

STEL-5G

Evaluate trade-offs based on various perspectives as part of a decision process that recognizes the need for careful compromises among competing factors.

☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☑ 1
☐ 2	☐ 2	☐ 2	☐ 2	☑ 2	☑ 3			

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Standards for Technological and Engineering Literacy

History of Technology

STEL-6C

Compare various technologies and how they have contributed to human progress.

☐ 1	☐ 1	☑ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
☐ 2	☑ 2	☐ 2	☐ 2	☐ 2	☐ 3			

Design in Technology and Engineering Education

STEL-7Q

Apply the technology and engineering design process.

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☑ 1.8	☑ 1.9
☐	☐	☐	☑	☑	☑ 2.12.22.32.42.53.1			

STEL-7R

Refine design solutions to address criteria and constraints.

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☐ 1.8	☑ 1.9
☐	☐	☐	☐	☑	☑ 2.12.22.32.42.53.1			

STEL-7S

Create solutions to problems by identifying and applying human factors in design.

☐ 1.1	☑ 1.2	☑ 1.3	☑ 1.4	☑ 1.5	☐ 1.6	☑ 1.7	☑ 1.8	☑ 1.9
☑	☑	☑	☑	☑	☑ 2.12.22.32.42.53.1			

STEL-7T

Assess design quality based upon established principles and elements of design.

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☐ 1.8	☑ 1.9
☐	☐	☐	☐	☑	☑ 2.12.22.32.42.53.1			

STEL-7U

Evaluate the strengths and weaknesses of different design solutions.

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☑ 1.8	☑ 1.9
☐	☐	☐	☑	☑	☑ 2.12.22.32.42.53.1			

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STEL-7V

Improve essential skills necessary to successfully design.

☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☑ 1	☑ 1
☐ 2	☐ 2	☐ 2	☑ 2	☑ 2	☑ 3			

Applying, Maintaining, and Assessing Technological Products and Systems

STEL-8I

Use tools, materials, and machines to safely diagnose, adjust, and repair systems.

☐ 1.1	☐ 1.2	☑ 1.3	☑ 1.4	☑ 1.5	☐ 1.6	☐ 1.7	☐ 1.8	☐ 1.9	
☐	☐	☐	☐	☐	☐ 2.12.22.32.42.53.1				

STEL-8J

Use devices to control technological systems.

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☐ 1.8	☑ 1.9	
☐	☐	☐	☐	☑	☑ 2.12.22.32.42.53.1				

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Fostering an Inclusive Computing Culture

P1.FICC.1

Include the unique perspectives of others and reflect on one's own perspectives when designing and developing computational products.

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
☐	☑	☐	☐	☐	☑ 2.12.22.32.42.53.1			

P1.FICC.2

Address the needs of diverse end users during the design process to produce artifacts with broad accessibility and usability

1	1	1	1	1	1	1	1	1
☑ 2	☑ 2	☑ 2	☑ 2	☑ 2	☑ 3			

Collaborating Around Computing

P2.CAC.1

Cultivate working relationships with individuals possessing diverse perspectives, skills, and personalities.

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
☐	☐	☐	☑	☑	☑ 2.12.22.32.42.53.1			

P2.CAC.2

Create team norms, expectations, and equitable workloads to increase efficiency and effectiveness.

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
☐	☐	☐	☑	☑	☑ 2.12.22.32.42.53.1			

P2.CAC.3

Solicit and incorporate feedback from, and provide constructive feedback to, team members and other stakeholders.

1	1	1	1	1	1	1	1	1
☐ 2	☐ 2	☐ 2	☑ 2	☑ 2	☑ 3			

Recognizing and Defining Computational Problems

P3.RDCP.2

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Decompose complex real-world problems into manageable subproblems that could integrate existing solutions or procedures

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☑ 1.8	☑ 1.9	
☐	☐	☐	☑	☑	☑ 2.12.22.32.42.53.1				

Developing and Using Abstractions

P4.DUA.4

Model phenomena and processes and simulate systems to understand and evaluate potential outcomes.

☐ 1	☐ 1	☑ 1	☐ 1	☐ 1	☐ 1	☐ 1	☑ 1	☑ 1
☑ 2	☑ 2	☐ 2	☑ 2	☑ 2	☑ 3			

Creating Computational Artifacts

P5.CCA.1

Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☐ 1.8	☐ 1.9
☐	☐	☐	☐	☐	☑ 2.12.22.32.42.53.1			

P5.CCA.2

Create a computational artifact for practical intent, personal expression, or to address a societal issue.

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☐ 1.8	☐ 1.9
☐	☐	☐	☐	☐	☑ 2.12.22.32.42.53.1			

P5.CCA.3

Modify an existing artifact to improve or customize it.

☐ 1	☐ 1	☐ 1	☑ 1	☑ 1	☐ 1	☐ 1	☑ 1	☑ 1
☐ 2	☐ 2	☐ 2	☐ 2	☑ 2	☑ 3			

Testing and Refining Computational Artifacts

P6.TRCA.1

Systematically test computational artifacts by considering all scenarios and using test cases.

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The Computer Science Teachers Association Standards

In Spring 2023 PLTW submitted all necessary documentation required by the Computer Science Teachers Association (CSTA) for a crosswalk review of our Launch and Gateway curricula by the CSTA Standards Review Team. While we anticipate approval and validation by CSTA, the review is pending.

Computing Systems

Devices

2-CS-01

Recommend improvements to the design of computing devices, based on an analysis of how users interact with the devices. [C] CS: Devices [P] Computational Problems (3.3)

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☑ 1.8	☐ 1.9
☐	☐	☐	☐	☑	☑ 2.12.22.32.42.53.1			

Hardware & Software

2-CS-02

Design projects that combine hardware and software components to collect and exchange data. [C]

CS: Hardware & Software [P] Creating (5.1)

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☑ 1.8	☐ 1.9
☐	☐	☐	☑	☑	☑ 2.12.22.32.42.53.1			

Troubleshooting

2-CS-03

Systematically identify and fix problems with computing devices and their components. [C] CS:

Troubleshooting [P] Testing (6.2)

☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☑ 1	☐ 1	☑ 1	☐ 1
☐ 2	☐ 2	☐ 2	☐ 2	☑ 2	☑ 3			

Networks & the Internet

Cybersecurity

2-NI-05

Apply multiple methods of encryption to model the secure transmission of information. [C] NI:

Cybersecurity [P] Abstraction (4.4)

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☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☑ ☐ ☑ 2.12.22.32.42.53.1

Data & Analysis

Collection Visualization & Transformation

2-DA-08

Collect data using computational tools and transform the data to make it more useful and reliable. [C]

DA: Collection; Visualization & Transformation [P] Testing (6.3)

☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1

☐ 2 ☐ 2 ☐ 2 ☑ 2 ☑ 2 ☐ 3

Algorithms & Programming

Algorithms

2-AP-10

Use flowcharts and/or pseudocode to address complex problems as algorithms. [C] AP: Algorithms [P] Abstraction (4.4, 4.1)

☐ 1.1 ☑ 1.2 ☐ 1.3 ☑ 1.4 ☑ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☑ 2.12.22.32.42.53.1

Variables

2-AP-11

Create clearly named variables that represent different data types and perform operations on their values. [C] AP: Variables [P] Creating (5.1, 5.2)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☑ 1.4 ☑ 1.5 ☐ 1.6 ☑ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☑ 2.12.22.32.42.53.1

Control

2-AP-12

Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. [C] AP: Control [P] Creating (5.1, 5.2)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☑ 1.7 ☐ 1.8 ☐ 1.9

☑ ☑ ☐ ☐ ☐ ☐ 2.12.22.32.42.53.1

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Modularity

2-AP-13

Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs. [C] AP: Modularity [P] Computational Problems (3.2)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☐ 1.9

☐ ☐ ☐ ☑ ☑ ☑ 2.12.22.32.42.53.1

Program Development

2-AP-15

Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts. [C] AP: Program Development [P] Collaborating (2.2)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☑ ☑ 2.12.22.32.42.53.1

2-AP-16

Seek and incorporate feedback from team members and users to refine a solution that meets user needs. [C] AP: Program Development [P] Collaborating (2.3), Inclusion (1.1)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☑ 2.12.22.32.42.53.1

2-AP-17

Incorporate existing code, media, and libraries into original programs, and give attribution. [C] AP: Program Development [P] Abstraction (4.2), Creating (5.2), Communicating (7.3)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☑ ☑ 2.12.22.32.42.53.1

2-AP-18

Systematically test and refine programs using a range of test cases. [C] AP: Program Development [P] Testing (6.1)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☑ ☑ 2.12.22.32.42.53.1

2-AP-19

Document programs in order to make them easier to follow, test, and debug. [C] AP: Program

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The Computer Science Teachers Association Standards

Development [P] Communicating (7.2)

☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☑ 1	☐ 1
☐ 2	☐ 2	☐ 2	☐ 2	☑ 2	☑ 3			

Impacts of Computing

Culture

2-IC-20

Discuss issues of bias and accessibility in the design of existing technologies. [C] IC: Culture [P] Inclusion (1.2)

☐ 1.1	☐ 1.2	☐ 1.3	☐ 1.4	☐ 1.5	☐ 1.6	☐ 1.7	☐ 1.8	☐ 1.9
☐	☐	☐	☐	☐	☑ 2.12.22.32.42.53.1			

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2-IC-21

Compare trade-offs associated with computing technologies that affect people's everyday activities and career options. [C] IC: Culture [P] Communicating (7.2)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☑ 2.12.22.32.42.53.1

Social Interactions

2-IC-22

Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact. [C] IC: Social Interactions [P] Collaborating (2.4), Creating (5.2)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☑ ☐ ☐ 2.12.22.32.42.53.1

Safety Law & Ethics

2-IC-23

Describe trade-offs between allowing information to be public and keeping information private and secure. [C] IC: Safety, Law, & Ethics [P] Communicating (7.2)

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ ☑ 2.12.22.32.42.53.1

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Engineering Design

NGSS.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.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ ☑ 2.12.22.32.42.53.1

NGSS.MS-ETS1-2

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

☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☑ 1

☐ 2 ☐ 2 ☐ 2 ☐ 2 ☑ 2 ☑ 3

Science and Engineering Practices

Developing and Using Models

NGSS.P2

Modeling in 6-8 builds on K-5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ ☑ 2.12.22.32.42.53.1

Using Mathematics and Computational Thinking

NGSS.P5

Create algorithms (a series of ordered steps) to solve a problem.

☐ 1.1 ☐ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ ☑ 2.12.22.32.42.53.1

NGSS.P5

Apply mathematical concepts and/or processes (e.g., ratio, rate, percent, basic operations, simple algebra) to scientific and engineering questions and problems.

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☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☑ 1.6 ☐ 1.7 ☐ 1.8 ☐ 1.9

☐ ☐ ☐ ☐ ☐ | ☐ 2.12.22.32.42.53.1

Constructing Explanations and Designing Solutions

NGSS.P6

Constructing explanations and designing solutions in 6-8 builds on K-5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☐ ☐ ☐ ☑ ☑ | ☑ 2.12.22.32.42.53.1

NGSS.P6

- Construct an explanation using models or representations.

☐ 1.1 ☐ 1.2 ☑ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☐ ☑ ☑ | ☑ 2.12.22.32.42.53.1

NGSS.P6

- Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ | ☑ 2.12.22.32.42.53.1

NGSS.P6

- Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and retesting.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ | ☑ 2.12.22.32.42.53.1

NGSS.P7

- Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ | ☑ 2.12.22.32.42.53.1

NGSS.P7

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• Make an oral or written argument that supports or refutes the advertised performance of a device, process, or system based on empirical evidence concerning whether or not the technology meets relevant criteria and constraints.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ | ☑ 2.12.22.32.42.53.1

NGSS.P7

• Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.

☐ 1.1 ☐ 1.2 ☐ 1.3 ☐ 1.4 ☐ 1.5 ☐ 1.6 ☐ 1.7 ☐ 1.8 ☑ 1.9

☐ ☐ ☐ ☐ ☑ | ☑ 2.12.22.32.42.53.1

Obtaining, Evaluating, and Communicating Information

NGSS.P8

Obtaining, evaluating, and communicating information in 6-8 builds on K-5 experiences and progresses to evaluating the merit and validity of ideas and methods.

☑ 1.1 ☑ 1.2 ☑ 1.3 ☑ 1.4 ☑ 1.5 ☑ 1.6 ☑ 1.7 ☑ 1.8 ☑ 1.9

☑ ☑ ☑ ☑ ☑ | ☑ 2.12.22.32.42.53.1

NGSS.P8

• Communicate scientific and/or technical information (e.g. about a proposed object, tool, process, system) in writing and/or through oral presentations.

☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1

☑ 2 ☑ 2 ☑ 2 ☑ 2 ☑ 2 | ☑ 3

Crosscutting Concepts

Structure and function

6

The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.

☑ 1 ☑ 1 ☑ 1 ☑ 1 ☑ 1 ☐ 1 ☑ 1 ☑ 1 ☑ 1

☐ 2 ☐ 2 ☑ 2 ☑ 2 ☑ 2 | ☑ 3

Nature of Science

Science is a Human Endeavor

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Next Generation Science Standards

- Men and women from different social, cultural, and ethnic backgrounds work as scientists and engineers.

☑	1.1	☑	1.2	☑	1.3	☑	1.4	☑	1.5	☑	1.6	☑	1.7	☑	1.8	☑	1.9		
☑		☑		☑		☑		☑		☑	2.12.22.32.42.53.1								

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Next Generation Science Standards

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