



West Windsor-Plainsboro Regional School District
AP Computer Science A Grades 9-12 Practical

Unit 0: Computer Science	
Content Area: Computer Science	
Course & Grade Level: Computer Science - Grade 12	
Summary and Rationale	
<p>The West Windsor-Plainsboro Regional School District recognizes the importance of the study 21st Century Life and Careers standards. Additionally, it is also believed this learning should not be taught in isolation and cross curricular and career ready practices are embedded in every unit of study. Unit 0 is incorporated into each unit of study of this curricular document.</p>	
Recommended Pacing:	
ELA Companion Standards and Career Ready Practices will be integrated throughout all units of study.	
Interdisciplinary Connections	
Grades 9-10	
Progress Indicators Reading Science and Technical Subjects	
<p>Key Ideas and Details</p> <p><u>RST.9-10.1.</u> Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.</p> <p><u>RST.9-10.2.</u> Determine the central ideas, themes, or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p> <p><u>RST.9-10.3.</u> Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.</p> <p>Craft and Structure</p> <p><u>RST.9-10.4.</u> 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 <i>grades 9-10 texts and topics</i>.</p> <p><u>RST.9-10.5.</u> Analyze the relationships among concepts in a text, including relationships among key terms (e.g., <i>force, friction, reaction force, energy</i>).</p> <p><u>RST.9-10.6.</u> Determine the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.</p> <p>Integration of Knowledge and Ideas</p>	

RST.9-10.7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

RST.9-10.8. Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

RST.9-10.9. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

Range of Reading and Level of Text Complexity:

RST.9-10.10. By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

Career Ready Practices

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

CRP10. Plan education and career paths aligned to personal goals.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence.

Competencies for 21st Century Learners

X	Collaborative Team Member	X	Effective Communicator
X	Globally Aware, Active, & Responsible Student/Citizen	X	Information Literate Researcher
X	Innovative & Practical Problem Solver	X	Self-Directed Learner

Unit 1: Introduction		
Content Area: Technology		
Course & Grade Level: AP Computer Science A, 9-12		
Summary and Rationale		
Advanced Placement Computer Science A is the first course of a two year college level sequence in program design, implementation, and testing using the structured language Java. It is designed for students with a minimum of one year of computer programming and a strong background in mathematics. The curriculum offers the student preparation for the AP Computer Science A Exam. Students are strongly encouraged to take the AP Computer Science A exam		
Recommended Pacing		
5 days		
State Standards		
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.		
Strand: Digital Citizenship; Critical Thinking, Problem Solving, and Decision-Making		
CPI #	Cumulative Progress Indicator (CPI)	
8.1.12.D.2	Demonstrate appropriate use of copyrights as well as fair use and Creative Commons guidelines.	
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.	
Instructional Focus		
Unit Enduring Understandings		
•		
Unit Essential Questions		
•		
Objectives		
Students will know:		
• Lab Rules/Procedures		
• Anatomy of a Computer		
• History of Computing		
• JAVA Language		
• Compilation Process		
• BlueJ IDE		
• Java Class Libraries		
Students will be able to:		
•		
Evidence of Learning		
Assessment		
Common Assessment 1.1		
Competencies for 21 st Century Learners		
	Collaborative Team Member	Effective Communicator

	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
<p>Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006.</p> <p>Suggested Resources:</p> <ul style="list-style-type: none"> • Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5) • Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home. • Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/. 			

Unit 2: Using Objects	
Content Area: Technology	
Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	
Advanced Placement Computer Science A is the first course of a two year college level sequence in program design, implementation, and testing using the structured language Java. It is designed for students with a minimum of one year of computer programming and a strong background in mathematics. The curriculum offers the student preparation for the AP Computer Science A Exam. Students are strongly encouraged to take the AP Computer Science A exam	
Recommended Pacing	
10 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving; Reasoning	
CPI #	Cumulative Progress Indicator (CPI)

4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.
4.5.D.4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> Students will understand how object oriented design leads to an understandable, reusable and maintainable program. Students will understand that object oriented design is an important part of program implementation. 	
Unit Essential Questions	
<ul style="list-style-type: none"> How and why does one abstract and encapsulate data? What are reusable components? How are class relationships defined? How are reusable components from existing class libraries re-used? 	
Objectives	
Students will know: <ul style="list-style-type: none"> Types and Variables Objects, Classes, Methods Parameters and Return Values Constructors Accessor and Mutator Methods Object References Students will be able to: <ul style="list-style-type: none"> Write programs that utilize the skills including the above. 	
Evidence of Learning	
Assessment	
Common Assessment 2.1	
Competencies for 21st Century Learners	
Collaborative Team Member	Effective Communicator
Globally Aware, Active, & Responsible Student/Citizen	Information Literate Researcher
Innovative & Practical Problem Solver	Self-Directed Learner
Resources	
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006. Suggested Resources: <ul style="list-style-type: none"> Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5) Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home. Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/. 	

Unit 3: Class Implementation	
Content Area: Technology	
Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	
Advanced Placement Computer Science A is the first course of a two year college level sequence in program design, implementation, and testing using the structured language Java. It is designed for students with a minimum of one year of computer programming and a strong background in mathematics. The curriculum offers the student preparation for the AP Computer Science A Exam. Students are strongly encouraged to take the AP Computer Science A exam	
Recommended Pacing	
10 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving	
CPI #	Cumulative Progress Indicator (CPI)

4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.		
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.		
Instructional Focus			
Unit Enduring Understandings			
<ul style="list-style-type: none">Students will understand that object oriented design is an important part of program implementation.			
Unit Essential Questions			
<ul style="list-style-type: none">How does top down development relate to encapsulation, abstraction, and object oriented development?How do systems evolve from program model via individual classes and segments?Why are objects used to encapsulate primitive data and methods?			
Objectives			
Students will know:			
<ul style="list-style-type: none">Class DesignComments and javadocImplementing Constructors and MethodsTesting constructors and methodsVariable types			
Students will be able to:			
<ul style="list-style-type: none">Utilize class design, comments, Javadoc, implement constructors and methods.Test constructors and methods.			
Evidence of Learning			
Assessment			
Common Assessment 3.1			
Competencies for 21 st Century Learners			
	Collaborative Team Member		Effective Communicator
	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006.			
Suggested Resources:			
<ul style="list-style-type: none">Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5)Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home.Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/.			

Unit 4: Fundamental Data Types	
Content Area: Technology	
Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	
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Recommended Pacing	
10 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving	
CPI #	Cumulative Progress Indicator (CPI)

4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.		
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.		
Instructional Focus			
Unit Enduring Understandings			
•			
Unit Essential Questions			
•			
Objectives			
Students will know:			
<ul style="list-style-type: none">• Number Types• Constants• Assignment, Increment, and Decrement• Arithmetic Operations• Order of Operations• Math Class• String Class			
Students will be able to:			
<ul style="list-style-type: none">• Show their proficiency of the above through coding examples.			
Evidence of Learning			
Assessment			
Common Assessment 4.1			
Competencies for 21 st Century Learners			
	Collaborative Team Member		Effective Communicator
	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006.			
Suggested Resources:			
<ul style="list-style-type: none">• Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5)• Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home.• Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/.			

Unit 5: Decisions	
Content Area: Technology	
Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	
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Recommended Pacing	
10 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving	
CPI #	Cumulative Progress Indicator (CPI)

4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.		
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.		
Instructional Focus			
Unit Enduring Understandings			
<ul style="list-style-type: none">Students will understand design methods for reusable code and ways of adapting code for reuse.			
Unit Essential Questions			
<ul style="list-style-type: none">What are the characteristics of boundary cases and how may they be tested?			
Objectives			
Students will know:			
<ul style="list-style-type: none">If StatementsComparing ValuesComplex DecisionsSwitch StatementNested If StatementsBoolean ExpressionsTruth TablesDeMorgan’s Law			
Students will be able to:			
<ul style="list-style-type: none">Utilize the above through coding examples and projects.			
Evidence of Learning			
Assessment			
Common Assessment 5.1			
Competencies for 21 st Century Learners			
	Collaborative Team Member		Effective Communicator
	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006.			
Suggested Resources:			
<ul style="list-style-type: none">Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5)Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home.Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/.			

Unit 6: Iteration	
Content Area: Technology	
Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	
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Recommended Pacing	
15 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving; Reasoning	
CPI #	Cumulative Progress Indicator (CPI)

4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.		
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.		
4.5.D.4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.		
Instructional Focus			
Unit Enduring Understandings			
<ul style="list-style-type: none">Students will understand design methods for reusable code and ways of adapting code for reuse.			
Unit Essential Questions			
<ul style="list-style-type: none">What are the characteristics of boundary cases and how may they be tested?When is it appropriate to modify existing code for new use?How is inheritance used to extend existing code?How are estimates of runtime and space needs determined and described?How are abstract and concrete data represented and interpreted by the computer?			
Objectives			
Students will know:			
<ul style="list-style-type: none">While LoopsFor LoopsNested LoopsAlgorithms/EfficiencyRandom Number Simulations			
Students will be able to:			
<ul style="list-style-type: none">Utilize the above to demonstrate mastery of the skills through projects and demonstrations.			
Evidence of Learning			
Assessment			
Common Assessment 6.1			
Competencies for 21 st Century Learners			
	Collaborative Team Member		Effective Communicator
	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
Core Text: BIG JAVA Second Edition. Cay Hortsmann. Wiley Publishing. 2006.			
Suggested Resources:			
<ul style="list-style-type: none">Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5)Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home.Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/.			

Unit 7: Arrays/ArrayLists
Content Area: Technology

Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	
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Recommended Pacing	
15 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving; Reasoning	
CPI #	Cumulative Progress Indicator (CPI)
4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.

4.5.D.4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.		
Instructional Focus			
Unit Enduring Understandings			
<ul style="list-style-type: none">Students will understand that object oriented design is an important part of program implementation.			
Unit Essential Questions			
<ul style="list-style-type: none">How are abstract and concrete data represented and interpreted by the computer?How may a structure be traversed?How may a structure be used to perform a useful task?How do you choose the correct tools for a given task?			
Objectives			
Students will know:			
<ul style="list-style-type: none">Array ConstructionArray Algorithms- Traverse, Find, Replace, Max, Min, Count, Average, TallyArrayList ConstructionArrayList Algorithms Traverse, Find, Replace, Max, Min, Count, Average, TallyWrapper Classes			
Students will be able to:			
<ul style="list-style-type: none">Utilize the above to demonstrate mastery of the skills through projects.			
Evidence of Learning			
Assessment			
Common Assessment 7.1			
Competencies for 21 st Century Learners			
	Collaborative Team Member		Effective Communicator
	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006.			
Suggested Resources:			
<ul style="list-style-type: none">Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5)Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home.Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/.			

Unit 8: Designing/Testing Classes	
Content Area: Technology	
Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	

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Recommended Pacing

15 days

State Standards

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Strand:

CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.

8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment.

Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World

CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.

Interdisciplinary Connections

Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strand: Problem Solving; Reasoning

CPI #	Cumulative Progress Indicator (CPI)
4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.
4.5.D.4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.

Instructional Focus

Unit Enduring Understandings			
<ul style="list-style-type: none"> • Student will understand how classes lead to reusable and maintainable programs. • Students will understand design methods for reusable code and ways of adapting code for reuse. 			
Unit Essential Questions			
<ul style="list-style-type: none"> • When is it appropriate to test classes in isolation? • What is the difference between an interface and a class? • Why does an interface not include implementation of methods? • What is the relationship between the interface specifications and the eventual implementation via inheritance? 			
Objectives			
Students will know: <ul style="list-style-type: none"> • Choosing Classes • Flowcharts/CRC cards • Arrays vs. ArrayLists as containers • Creating has-a relationships between classes • Preconditions/Post conditions • Cohesion and Coupling • Scope • Testing Classes • Test Case Selection • Debugging • Tracing • Errors Students will be able to: <ul style="list-style-type: none"> • Utilize the above to demonstrate mastery of the skills through projects. 			
Evidence of Learning			
Assessment			
Common Assessment 8.1			
Competencies for 21st Century Learners			
	Collaborative Team Member		Effective Communicator
	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006. Suggested Resources: <ul style="list-style-type: none"> • Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5) • Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home. • Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/. 			

Unit 9: Code Reuse	
Content Area: Technology	
Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	
Advanced Placement Computer Science A is the first course of a two year college level sequence in program design, implementation, and testing using the structured language Java. It is designed for students with a minimum of one year of computer programming and a strong background in mathematics. The curriculum offers the student preparation for the AP Computer Science A Exam. Students are strongly encouraged to take the AP Computer Science A exam	
Recommended Pacing	
15 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving; Reasoning	
CPI #	Cumulative Progress Indicator (CPI)

4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.		
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.		
4.5.D.4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.		
Instructional Focus			
Unit Enduring Understandings			
<ul style="list-style-type: none">Students will understand design methods for reusable code and ways of adapting code for reuse.			
Unit Essential Questions			
<ul style="list-style-type: none">When is it appropriate to modify existing code for new use?How is inheritance used to extend existing code?How can pre- and post-conditions and assertions be used to ease the reuse process?Why is the exception model used and how does it ease code reuse?			
Objectives			
Students will know:			
<ul style="list-style-type: none">InterfacesAbstract ClassesInheritanceObject Class			
Students will be able to:			
<ul style="list-style-type: none">Utilize the above to demonstrate mastery of the skills through projects			
Evidence of Learning			
Assessment			
Common Assessment 9.1			
Competencies for 21 st Century Learners			
	Collaborative Team Member		Effective Communicator
	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006.			
Suggested Resources:			
<ul style="list-style-type: none">Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5)Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home.Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/.			

Unit 10: Grid World Case Study
Content Area: Technology

Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	
Advanced Placement Computer Science A is the first course of a two year college level sequence in program design, implementation, and testing using the structured language Java. It is designed for students with a minimum of one year of computer programming and a strong background in mathematics. The curriculum offers the student preparation for the AP Computer Science A Exam. Students are strongly encouraged to take the AP Computer Science A exam	
Recommended Pacing	
20 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving; Reasoning	
CPI #	Cumulative Progress Indicator (CPI)
4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.

4.5.D.4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.		
Instructional Focus			
Unit Enduring Understandings			
<ul style="list-style-type: none">Students will understand how object oriented design leads to an understandable, reusable and maintainable program.Students will understand that object oriented design is an important part of program implementation.			
Unit Essential Questions			
<ul style="list-style-type: none">How does one read, understand, and specify a problem description?How does top down development relate to encapsulation, abstraction, and object oriented development?Why are objects used to encapsulate primitive data and methods?			
Objectives			
Students will know:			
<ul style="list-style-type: none">Case Study DevelopmentCase Study ExplorationsGrid InterfaceBug Class and Inheritance			
Students will be able to:			
<ul style="list-style-type: none">Utilize the above to demonstrate mastery of the skills through projects.			
Evidence of Learning			
Assessment			
Common Assessment 10.1			
Competencies for 21 st Century Learners			
	Collaborative Team Member		Effective Communicator
	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006.			
Suggested Resources:			
<ul style="list-style-type: none">Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5)Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home.Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/.			

Unit 11: Recursion	
Content Area: Technology	
Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	

Advanced Placement Computer Science A is the first course of a two year college level sequence in program design, implementation, and testing using the structured language Java. It is designed for students with a minimum of one year of computer programming and a strong background in mathematics. The curriculum offers the student preparation for the AP Computer Science A Exam. Students are strongly encouraged to take the AP Computer Science A exam

Recommended Pacing

10 days

State Standards

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Strand:

CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.

8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment.

Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World

CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.

Interdisciplinary Connections

Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas.

Strand: Problem Solving; Reasoning

CPI #	Cumulative Progress Indicator (CPI)
4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.
4.5.D.4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.

Instructional Focus

Unit Enduring Understandings			
<ul style="list-style-type: none"> Students will understand design and analysis of the underlying representations of abstract data and tools for manipulating data in complex ways. Students will understand standard algorithms and process applied to standard structures. 			
Unit Essential Questions			
<ul style="list-style-type: none"> How are abstract and concrete data represented and interpreted by the computer? How may a structure be traversed? 			
Objectives			
Students will know: <ul style="list-style-type: none"> Recursion vs. Iteration Helper Methods Efficiency of Recursion Students will be able to: <ul style="list-style-type: none"> Utilize the above to demonstrate mastery of the skills through projects. 			
Evidence of Learning			
Assessment			
Common Assessment 11.1			
Competencies for 21st Century Learners			
	Collaborative Team Member		Effective Communicator
	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006. Suggested Resources: <ul style="list-style-type: none"> Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5) Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home. Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/. 			

Unit 12: Sorting and Searching	
Content Area: Technology	
Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	
Advanced Placement Computer Science A is the first course of a two year college level sequence in program design, implementation, and testing using the structured language Java. It is designed for students with a minimum of one year of computer programming and a strong background in mathematics. The curriculum offers the student preparation for the AP Computer Science A Exam. Students are strongly encouraged to take the AP Computer Science A exam	
Recommended Pacing	
15 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving; Reasoning	
CPI #	Cumulative Progress Indicator (CPI)

4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.
4.5.D.4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> Students will understand standard algorithms and process applied to standard structures. 	
Unit Essential Questions	
<ul style="list-style-type: none"> How may a structure be traversed? How may a structure be used to perform a useful task? How do you choose the correct tools for a given task? 	
Objectives	
Students will know: <ul style="list-style-type: none"> Insert/Delete Selection Sort Insertion Sort Merge Sort Recursive Merge Sort Efficiency of/Comparison of Sorts Linear Search Binary Search Comparable Interface Students will be able to: <ul style="list-style-type: none"> Utilize the above to demonstrate mastery of the skills through projects. 	
Evidence of Learning	
Assessment	
Common Assessment 12.1	
Competencies for 21st Century Learners	
Collaborative Team Member	Effective Communicator
Globally Aware, Active, & Responsible Student/Citizen	Information Literate Researcher
Innovative & Practical Problem Solver	Self-Directed Learner
Resources	
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006. Suggested Resources: <ul style="list-style-type: none"> Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5) Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home. Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/. 	

Unit 13: AP Exam Review	
Content Area: Technology	
Course & Grade Level: AP Computer Science A, 9-12	
Summary and Rationale	
Advanced Placement Computer Science A is the first course of a two year college level sequence in program design, implementation, and testing using the structured language Java. It is designed for students with a minimum of one year of computer programming and a strong background in mathematics. The curriculum offers the student preparation for the AP Computer Science A Exam. Students are strongly encouraged to take the AP Computer Science A exam	
Recommended Pacing	
10 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving; Reasoning	
CPI #	Cumulative Progress Indicator (CPI)

4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.
4.5.D.4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> Students will understand that object oriented design is an important part of program implementation. Students will understand runtime analysis and the influence of the underlying representations on performance and accuracy in calculation. Students will understand design and analysis of the underlying representations of abstract data and tools for manipulating data in complex ways. Students will understand standard algorithms and process applied to standard structures. 	
Unit Essential Questions	
<ul style="list-style-type: none"> Utilize the above to demonstrate mastery of the skills through projects 	
Objectives	
Students will know: <ul style="list-style-type: none"> Exam Preparation Test Strategies Students will be able to: <ul style="list-style-type: none"> Utilize the above to demonstrate mastery of the skills through projects. 	
Evidence of Learning	
Assessment	
Common Assessment 13.1	
Competencies for 21st Century Learners	
Collaborative Team Member	Effective Communicator
Globally Aware, Active, & Responsible Student/Citizen	Information Literate Researcher
Innovative & Practical Problem Solver	Self-Directed Learner
Resources	
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006. Suggested Resources: <ul style="list-style-type: none"> Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5) Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home. Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/. 	

Unit 14: Programming Graphics
Content Area: Technology
Course & Grade Level: AP Computer Science A, 9-12

Summary and Rationale	
Advanced Placement Computer Science A is the first course of a two year college level sequence in program design, implementation, and testing using the structured language Java. It is designed for students with a minimum of one year of computer programming and a strong background in mathematics. The curriculum offers the student preparation for the AP Computer Science A Exam. Students are strongly encouraged to take the AP Computer Science A exam	
Recommended Pacing	
20 days	
State Standards	
8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge. Strand:	
CPI #	Cumulative Progress Indicator (CPI)
8.1.12.B.1	Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.
8.1.12.F.2	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address educational, career, personal, and social needs.
8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment. Strand: Nature of Technology: Creativity and Innovation; Resources for a Technological World; The Designed World	
CPI #	CPI #
8.2.12.A.1	Design and create a technology product or system that improves the quality of life and identify trade-offs, risks, and benefits.
8.2.12.F.1	Determine and use the appropriate application of resources in the design, development, and creation of a technological product or system.
8.2.12.G.1	Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.
Interdisciplinary Connections	
Mathematics Standard 4.5: All students will use mathematical processes of problem solving, communication, connections, reasoning, representations, and technology to solve problems and communicate mathematical ideas. Strand: Problem Solving; Reasoning	
CPI #	Cumulative Progress Indicator (CPI)
4.5.A.3	Select and apply a variety of appropriate problem-solving strategies (e.g., “try a simpler problem” or “make a diagram”) to solve problems.
4.5.A.6	Distinguish relevant from irrelevant information, and identify missing information.
4.5.D.4	Rely on reasoning, rather than answer keys, teachers, or peers, to check the correctness of their problem solutions.

Instructional Focus			
Unit Enduring Understandings			
<ul style="list-style-type: none"> Students will understand design and analysis of the underlying representations of abstract data and tools for manipulating data in complex ways. 			
Unit Essential Questions			
<ul style="list-style-type: none"> How are abstract and concrete data represented and interpreted by the computer? How do you choose the correct tools for a given task? 			
Objectives			
Students will know: <ul style="list-style-type: none"> Frame Windows Shapes Colors Graphics2D Students will be able to: <ul style="list-style-type: none"> Utilize the above to demonstrate mastery of the skills through projects 			
Evidence of Learning			
Assessment			
Common Assessment 14.1			
Competencies for 21st Century Learners			
	Collaborative Team Member		Effective Communicator
	Globally Aware, Active, & Responsible Student/Citizen		Information Literate Researcher
	Innovative & Practical Problem Solver		Self-Directed Learner
Resources			
Core Text: BIG JAVA Second Edition. Cay Hortsman. Wiley Publishing. 2006. Suggested Resources: <ul style="list-style-type: none"> Java Curriculum for Advanced Placement Computer Science. Institute of Computer Technology. (version 1.5) Resource CD-The students have received a CD with program installations, digital textbooks, activities, sample programs, and other files needed to work at home. Online Resources-There are also a number of excellent web sites that contain tutorials and sample Java programs. Information about the AP test is available at http://apcentral.collegeboard.com/. 			