



MIDLAND PARK PUBLIC SCHOOLS
Midland Park, New Jersey
CURRICULUM

Introduction to Computers

Prepared by:
Danielle Vandenberghe

Superintendent of Schools:
Marie C. Cirasella, Ed.D.

Intro to Computers

Course Description:

Intro to Computers is an entry-level Computer Science course. This class is designed to teach students about computational thinking, problem solving, and the design process. Students will learn basic computer programming as well as basic game design, app design and web design. The beginning of the class will look at appropriate use of the internet, cybersecurity, and ethical matters in Computer Science. Throughout the year we will also look at the global impact of advancements in Computer Science. By the end of the course students will have a better idea of a computer's limitations and how to use them in an ethical and responsible way. Students will also have a general understanding of basic programming, giving them a good foundation for future programming classes.

Suggested Course Sequence:

Unit 1: Appropriate Use of the Internet - about 2 weeks

Unit 2: Data Security and Prevention of Data Breaches: Networks - about 2 weeks

Unit 3: Data Security and Prevention of Data Breaches: Cybersecurity - about 4 weeks

Unit 4: Ethical Matters in Computer Science - about 2 weeks

Unit 5: Problem Solving - about 5 weeks

Unit 6: Programming - about 9 weeks

Unit 7: Game Design - about 3 weeks

Unit 8: Web Development - about 4 weeks

Unit 9: The Design Process / App Design - about 5 weeks

Prerequisite : None

Content Area: Computer Science	
Unit Title: Intro to Computers - Unit 1 - Appropriate Use of the Internet	
Grade Level: 9-12	
Unit Summary: Students will learn about appropriate online behavior	
Interdisciplinary Connections: English: connections to basic forms of speech (nouns, verbs, adjectives), vocabulary, connections also to how films are created.	
21st Century Themes and Skills: Creativity and Innovation, Communication and Collaboration, Critical Thinking & Problem Solving, Information, Media, and Technology Skills, Life and Career Skills. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively CRP5. Consider the environmental, social and economic impacts of decisions CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.	
Standards (Content and Technology):	
CPI#:	Statement:
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources
8.1.12.D.2	Evaluate consequences of unauthorized electronic access (e.g. hacking) and disclosure, and on dissemination of personal information.
8.1.12.D.4	Research and understand the positive and negative impact of one's digital footprinting
8.1.12.D.5	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.
8.1.12.E.2	Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.
8.1.12.B.3	Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.
8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world
Unit Essential Question(s): <ul style="list-style-type: none"> • What is the place of digital media in our lives? • What are the consequences of oversharing online? • What are the risks and responsibilities when you share online in a relationship? • How do websites collect your personal information? • How can information you post on the Internet affect your future opportunities? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • How to use digital media appropriately • How to keep one's personal information safe • Students will have a better understanding of the impact of computers and the internet on society.
Unit Learning Targets/Objectives: <i>Students will...</i> <ul style="list-style-type: none"> • Explore the role that media plays in their lives • Reflect on the positive and negative impact digital media has on them and on society 	

- Identify some of the benefits of sharing information online .
- Reflect on the risks of sharing inappropriate information online
- Think critically about what they choose to post and share about themselves online
- Analyze risky forms of self-disclosure and their possible consequences
- Learn guidelines for determining safe online relationships, especially with strangers or casual acquaintances.
- Explore the concept of privacy in both a real-world setting and online
- Understand how and why companies collect information about visitors to their websites.
- Learn and use online privacy terms
- Learn that they have a public presence online called a digital footprint
- Recognize that any information they post online can help or hurt their image and future opportunities, including their chances for college admission or employment

Formative Assessments:

- Teacher observations
- Discussions

Summative/Benchmark Assessment(s):

- Quizzes
- Classwork/Homework
- Projects

Resources/Materials (copy hyperlinks for digital resources):

Common Sense Media: <https://www.commonsense.org/education/scope-and-sequence>

Modifications:

Special Education Students

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

English Language Learners

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/ Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Digital Life 102	<ul style="list-style-type: none"> ● Learn basic statistics about the current digital landscape ● Explore the role that media plays in their lives ● Reflect on the positive and negative impact digital media has on them and on society 	1 day
Oops! I Broadcast It on the Internet	<ul style="list-style-type: none"> ● Identify some of the benefits of sharing information online ● Reflect on the risks of sharing inappropriate information online ● Think critically about what they choose to post and share about themselves online. 	1 day
Overexposed: Sexting and Relationships	<ul style="list-style-type: none"> ● Explore the role of digital technologies in romantic relationships ● Analyze risky forms of self-disclosure and their possible consequences ● Identify strategies for avoiding sexting while enhancing positive relationships 	1 day
Risky Online Relationships	<ul style="list-style-type: none"> ● Compare and contrast stereotypes and realities when it comes to Internet "stranger danger" ● Learn guidelines for determining safe online relationships, especially with strangers or casual acquaintances ● Brainstorm ways to help teens avoid risky online behavior 	1 day
What's the Big Deal About Internet Privacy?	<ul style="list-style-type: none"> ● Explore the concept of privacy in both a real-world setting and online ● Understand how and why companies collect information about visitors to their website ● Learn and use online privacy terms ● Learn that websites are required to post privacy policies 	1 day
College Bound	<ul style="list-style-type: none"> ● Learn that they have public presence online called a digital footprint 	4 days

	<ul style="list-style-type: none">● Recognize that any information they post online can help or hurt their image and future opportunities, including their chances for college admission or employment● Consider how to present an authentic and positive image of themselves online	
--	---	--

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

Content Area: Computer Science	
Unit Title: Introduction to Computers - Unit 2 - Data Security and Prevention of Data Breaches: Networks	
Grade Level: 9-12	
Unit Summary: Students will get an introductory look into networks.	
Interdisciplinary Connections: Math: integers, decimals, and Boolean numbers, X, Y, and Z, axis, coordinate plane and other mathematical references and connections. English: connections to basic forms of speech (nouns, verbs, adjectives), vocabulary, connections also to how films are created.	
21st Century Themes and Skills: Creativity and Innovation, Communication and Collaboration, Critical Thinking & Problem Solving, Information, Media, and Technology Skills, Life and Career Skills. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.	
Standards (Content and Technology):	
CPI#:	Statement:
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources
8.1.12.D.2	Evaluate consequences of unauthorized electronic access (e.g. hacking) and disclosure, and on dissemination of personal information.
8.1.12.D.4	Research and understand the positive and negative impact of one's digital footprinting
8.1.12.D.5	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.
8.1.12.E.2	Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.
8.1.12.B.3	Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.
8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world
8.2.12.E.4	Use appropriate terms in conversation (e.g. troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types, and conditional statements).
Unit Essential Question(s): <ul style="list-style-type: none"> ● How are we connected through networking? 	Unit Enduring Understandings: <ul style="list-style-type: none"> ● Students will develop a basic knowledge of networking
Unit Learning Targets/Objectives: <i>Students will</i> <ul style="list-style-type: none"> ● Understand the basic safety issues of public Wi-Fi ● Identify threats and explain the difference between attacks and exploits ● Understand the issue of "trust" as it applies to networks ● Understand the different types of cyber attacks 	

Formative Assessments:

- Teacher observations
- Practice programs

Summative/Benchmark Assessment(s):

- Quizzes
- Classwork/Homework
- Projects

Resources/Materials (copy hyperlinks for digital resources):

- Teach Cyber - <https://teachcyber.org/grade-level/grades-9-12/>

Modifications:

Special Education Students

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

English Language Learners

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/ Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Wi-Fi: How Safe is that "Free" Public Wi-Fi	<ul style="list-style-type: none"> • Students will present the basic safety issues of public Wi-Fi • Students will determine the safety of different Wi-Fi settings 	1 day
"Man in the Middle" Attacks	<ul style="list-style-type: none"> • Students will identify threats and explain the difference between attacks and exploits • Students will recognize the dangers of MITM and similar exploits and understand ways to avoid being a victim 	1 day

Networking 101	<ul style="list-style-type: none"> • Students will demonstrate a basic knowledge of the history and workings of the internet as a means of mass communication and a network of connected users. • Students will understand the issue of “trust” as it applies to networks • Students will understand and be able to verbalize basic networking vocabulary 	2 day
Types of Attacks and Malicious Software	<ul style="list-style-type: none"> • Students will understand the different types of cyber attacks and malicious software that exist 	5 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

<https://code.org/>

<http://www.i-programmer.info/news.html>

<http://www.computerscienceonline.org/cs-programs-before-college/>

Content Area: Computer Science	
Unit Title: Introduction to Computers - Unit 3 - Data Security and Prevention of Data Breaches: Cybersecurity	
Grade Level: 9-12	
Unit Summary: Students will get an introductory look into cybersecurity.	
Interdisciplinary Connections: Math: integers, decimals, and Boolean numbers, X, Y, and Z, axis, coordinate plane and other mathematical references and connections. English: connections to basic forms of speech (nouns, verbs, adjectives), vocabulary, connections also to how films are created.	
21st Century Themes and Skills: Creativity and Innovation, Communication and Collaboration, Critical Thinking & Problem Solving, Information, Media, and Technology Skills, Life and Career Skills. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.	
Standards (Content and Technology):	
CPI#:	Statement:
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources
8.1.12.D.2	Evaluate consequences of unauthorized electronic access (e.g. hacking) and disclosure, and on dissemination of personal information.
8.1.12.D.4	Research and understand the positive and negative impact of one’s digital footprinting
8.1.12.D.5	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.
8.1.12.E.2	Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.
8.1.12.B.3	Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.
8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world
8.2.12.E.4	Use appropriate terms in conversation (e.g. troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types, and conditional statements).
Unit Essential Question(s): <ul style="list-style-type: none"> • What is Cybersecurity? • How is information encrypted? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • Students will understand the basics of Cybersecurity • Students will have a basic understanding of encryption
Unit Learning Targets/Objectives: <i>Students will</i> <ul style="list-style-type: none"> • Understand the FIRST principles of cybersecurity • Understand cryptography • Understand blockchain • Understand how TLS works • Understand what cyberwar is and if it is a real threat • Understand laws of cybersecurity 	

Formative Assessments:

- Teacher observations
- Practice programs

Summative/Benchmark Assessment(s):

- Quizzes
- Classwork/Homework
- Projects

Resources/Materials (copy hyperlinks for digital resources):

- Teach Cyber - <https://teachcyber.org/grade-level/grades-9-12/>
- PBS CyberSecurity Lab - <http://www.pbs.org/wgbh/nova/labs/lab/cyber/>
- Khan Academy - <https://www.khanacademy.org/computing/computer-science/cryptography>

Modifications:

Special Education Students

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

English Language Learners

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/ Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Cybersecurity Lab	<ul style="list-style-type: none"> • Students will be able to explain computer science terminology related to coding, password protection, social engineering, and network security • Students will be able to describe how encryption works to protect privacy 	2 days

	<ul style="list-style-type: none"> • Students will be able to describe recent network security breaches and how companies defend against them • Students will be able to explain why the term “hacker” is extremely flexible and the variety of roles that hackers play • Students will be able to analyze reports of unfolding security breaches and apply their understand of security networks to them 	
FIRST Principles of Cybersecurity	<ul style="list-style-type: none"> • Students will explore the FIRST principles of cybersecurity • Students will review vocabulary 	1 day
An Introduction to Public Key Cryptography	<ul style="list-style-type: none"> • Students will define encryption and understand the necessity of protecting data on the internet • Students will learn why and when public key cryptography is used 	1 day
Cryptography	<ul style="list-style-type: none"> • Students will learn different methods of cryptography 	4 days
Espionage and Survival	<ul style="list-style-type: none"> • Students will define cryptography and show a general knowledge of the advancement of methodology • Students will learn the importance of encrypting information 	4 days
Understanding Blockchain	<ul style="list-style-type: none"> • Students will define software as the instructions given to a computer to perform a task • Students will display knowledge of the difference between hardware and software and what an algorithm is 	1 day
Understanding How TLS Works	<ul style="list-style-type: none"> • Students will apply understanding of public key encryption to the process of safe e-commerce transactions 	1 day
Cybersecurity Breakout Game	<ul style="list-style-type: none"> • Students will work collaboratively to solve problems and complete a breakout scenario 	1 day
Cyber War: Fact or Fiction	<ul style="list-style-type: none"> • Students will examine the history and reality of cyber war and determine whether cyberwar is a viable threat to the US 	2 days
The Immutable Laws of Cybersecurity	<ul style="list-style-type: none"> • Students will read and analyze the “Immutable Laws of Cybersecurity” and notice how language has changed from the 	1 day

	original version to the one we have today	
--	---	--

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

<https://code.org/>

<http://www.i-programmer.info/news.html>

<http://www.computerscienceonline.org/cs-programs-before-college/>

Content Area: Computer Science	
Unit Title: Introduction to Computers - Unit 4 - Ethical Matters in Computer Science	
Grade Level: 9-12	
Unit Summary: Students will look at ethical matters in computer science	
Interdisciplinary Connections: English: connections to basic forms of speech (nouns, verbs, adjectives), vocabulary, connections also to how films are created.	
21st Century Themes and Skills: Creativity and Innovation, Communication and Collaboration, Critical Thinking & Problem Solving, Information, Media, and Technology Skills, Life and Career Skills. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.	
Standards (Content and Technology):	
CPI#:	Statement:
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources
8.1.12.D.2	Evaluate consequences of unauthorized electronic access (e.g. hacking) and disclosure, and on dissemination of personal information.
8.1.12.D.4	Research and understand the positive and negative impact of one's digital footprinting
8.1.12.D.5	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.
8.1.12.E.2	Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.
8.1.12.B.3	Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.
8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world
8.2.12.E.4	Use appropriate terms in conversation (e.g. troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types, and conditional statements).
Unit Essential Question(s): <ul style="list-style-type: none"> • What is considered security and what is considered privacy • When is technology too much? 	Unit Enduring Understandings: <ul style="list-style-type: none"> • Students will form an opinion in the debate of security vs privacy • Students will understand the global impact that technology has
Unit Learning Targets/Objectives: <i>Students will</i> <ul style="list-style-type: none"> • Debate security vs privacy • Become aware of the different types of cyber threats • Look at how ethical some technology is • Look at the global impact of advancements in computer science 	

Formative Assessments:

- Teacher observations
- Practice programs

Summative/Benchmark Assessment(s):

- Quizzes
- Classwork/Homework
- Projects

Resources/Materials (copy hyperlinks for digital resources):

- Teach Cyber - <https://teachcyber.org/grade-level/grades-9-12/>

Modifications:

Special Education Students

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

English Language Learners

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/ Topic	Lesson Objective(s)	Time frame (day(s) to complete)
A Debate: Security vs. Privacy	<ul style="list-style-type: none"> • Students will be able to articulate the opposing views in the security vs privacy debate • Students will develop an opinion on this ongoing debate • Students will look at the difficulty in establishing privacy standards • Students will consider personal views on privacy and security and begin to develop personal beliefs concerning the ethical 	3 days

	responsibilities of companies and government entities.	
Cybersecurity Awareness	<ul style="list-style-type: none"> Students will research/analyze one specific cyber threat and develop a PSA on the information gathered 	4 days
The "Smart" Home	<ul style="list-style-type: none"> Students will work together to design a "smart" home Students will have to consider advancements in technology and the vulnerabilities of those advancements Students will critically analyze emerging technologies and develop and defend an ethical decision 	4 days
Global Impact of Advancements in CS	<ul style="list-style-type: none"> Students will create an ethical opinion about new or recent technology and look at its global impact 	Once a month in a journal

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

<https://code.org/>

<http://www.i-programmer.info/news.html>

<http://www.computerscienceonline.org/cs-programs-before-college/>

Content Area: Computer Science	
Unit Title: Introduction to Computers - Unit 5 - Problem Solving	
Grade Level: 9-12	
Unit Summary: Students will become familiar with the problem solving process and how it relates to computer science	
Interdisciplinary Connections: Math: integers, decimals, and Boolean numbers, X, Y, and Z, axis, coordinate plane and other mathematical references and connections. English: connections to basic forms of speech (nouns, verbs, adjectives), vocabulary, connections also to how films are created.	
21st Century Themes and Skills: Creativity and Innovation, Communication and Collaboration, Critical Thinking & Problem Solving, Information, Media, and Technology Skills, Life and Career Skills. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.	
Standards (Content and Technology):	
CPI#:	Statement:
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources
8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial
8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.
8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g. robotic functions, website designs, applications, and games)
8.2.12.E.4	Use appropriate terms in conversation (e.g. troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types, and conditional statements).
Unit Essential Question(s): <ul style="list-style-type: none"> What strategies and processes can be used to become a more effective problem solver? How is problem solving used in computer science? 	Unit Enduring Understandings: <ul style="list-style-type: none"> Students will understand how to use problem solving in computer science Students will start to understand computational thinking
Unit Learning Targets/Objectives: <i>Students will</i> <ul style="list-style-type: none"> Learn creative problem solving strategies Explore problem solving Learn about different types of computers Learn the basic concept of processing and algorithms 	

Formative Assessments:

- Teacher observations
- Practice programs

Summative/Benchmark Assessment(s):

- Quizzes
- Classwork/Homework
- Projects

Resources/Materials (copy hyperlinks for digital resources):

- Code.org - www.code.org
- Cubelets - <https://www.modrobotics.com/education/lesson-plans/cubelets-grab-bag/>

Modifications:

Special Education Students

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

English Language Learners

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/ Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Intro to Problem Solving	<ul style="list-style-type: none"> • Communicate and collaborate with classmates in order to solve problems • Iteratively improve a solution to a problem • Identify different strategies used to solve a problem 	1 day
The Problem Solving Process	<ul style="list-style-type: none"> • Identify the four steps of the problem solving process 	2 days

	<ul style="list-style-type: none"> Given a problem, identify individual actions that would fall within each step of the problem solving process Identify useful strategies within each step of the problem solving process Apply the problem solving process to approach a variety of problems 	
What is a Computer	<ul style="list-style-type: none"> Identify a computer as a machine that processes information Provide a high level description of the different parts of the Input - Output - Store - Process model of a computer Identify the inputs and outputs of common computing devices 	1 day
Processing	<ul style="list-style-type: none"> Define processing as the work done to turn an input into an output Define an algorithm as the series of commands a computer uses to process information Develop and iteratively improve an algorithm for processing information based on given constraints 	1 day
Apps and Storage	<ul style="list-style-type: none"> Describe how information can be processed to solve a particular problem Identify a possible source of a given input Determine what information should be stored on a device for later 	1 day
Project - Propose and App	<ul style="list-style-type: none"> Identify and define a problem that could be solved using computing Design an app that inputs, outputs, stores and processes information in order to solve a problem Provide and incorporate targeted peer feedback to improve a computing artifact 	4 days
Cubelets	<ul style="list-style-type: none"> Students will use their new problem solving skills to discover how cubelets work Students will be able to create different robots using the cubelets 	15 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

<http://www.i-programmer.info/news.html>

<http://www.computerscienceonline.org/cs-programs-before-college/>

Content Area: Computer Science	
Unit Title: Introduction to Computers - Unit 6 - Programming	
Grade Level: 9 - 12	
Unit Summary: Students will learn the basics of programming through game play.	
Interdisciplinary Connections: Math: integers, decimals, and Boolean numbers, X, Y, and Z, axis, coordinate plane and other mathematical references and connections. English: connections to basic forms of speech (nouns, verbs, adjectives), vocabulary, connections also to how films are created.	
21st Century Themes and Skills: Creativity and Innovation, Communication and Collaboration, Critical Thinking & Problem Solving, Information, Media, and Technology Skills, Life and Career Skills. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.	
Standards (Content and Technology):	
CPI#:	Statement:
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources
8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial
8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.
8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g. robotic functions, website designs, applications, and games)
8.2.12.E.4	Use appropriate terms in conversation (e.g. troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types, and conditional statements).
Unit Essential Question(s): <ul style="list-style-type: none"> ● What is programming? ● What are programming basics? 	Unit Enduring Understandings: <ul style="list-style-type: none"> ● Students will understand the basics of programming
Unit Learning Targets/Objectives: <i>Students will</i> <ul style="list-style-type: none"> ● Use Ozobots to learn about programming essentials ● Learn about basic programming syntax ● Learn about loops and variables ● Learn about conditionals, functions and events ● Learn about Strings and arithmetic ● Learn about Boolean values 	

Formative Assessments:

- Teacher observations
- Practice programs

Summative/Benchmark Assessment(s):

- Quizzes
- Classwork/Homework
- Projects

Resources/Materials (copy hyperlinks for digital resources):

- CodeCombat - <https://codecombat.com/>
- Ozobots - <http://portal.ozobot.com/lessons>

Modifications:

Special Education Students

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

English Language Learners

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/ Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Ozobot	<ul style="list-style-type: none"> • To learn the basics of coding through Ozobots • To see how programming can control / change what something does 	10 days
Introduction to Computer Science	<ul style="list-style-type: none"> • Students will learn basic programming syntax • Students will learn about loops in programming 	5 days

	<ul style="list-style-type: none"> • Students will learn about variables in programming 	
Computer Science 2	<ul style="list-style-type: none"> • Students will learn about conditionals in programming • Students will learn about functions in programming • Students will learn about events in programming 	10 days
Computer Science 3	<ul style="list-style-type: none"> • Students will learn about String concatenation • Students will learn about computer arithmetic • Students will learn about properties in programming • Students will learn about not equals in programming • Students will learn about Boolean values in programming • Students will learn about relative movement • Students will learn about break and continue in programming 	20 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

<http://www.alice.org/index.php>

<https://code.org/>

<http://www.i-programmer.info/news.html>

<http://www.computerscienceonline.org/cs-programs-before-college/>

Content Area: Computer Science	
Unit Title: Introduction to Computers - Unit 7 - Game Design	
Grade Level: 9 - 12	
<p>Unit Summary: Students will learn the basics of game design.</p> <p>Interdisciplinary Connections: Math: integers, decimals, and Boolean numbers, X, Y, and Z, axis, coordinate plane and other mathematical references and connections. English: connections to basic forms of speech (nouns, verbs, adjectives), vocabulary, connections also to how films are created.</p> <p>21st Century Themes and Skills: Creativity and Innovation, Communication and Collaboration, Critical Thinking & Problem Solving, Information, Media, and Technology Skills, Life and Career Skills.</p> <ul style="list-style-type: none"> CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity. 	
Standards (Content and Technology):	
CPI#:	Statement:
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources
8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial
8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.
8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g. robotic functions, website designs, applications, and games)
8.2.12.E.4	Use appropriate terms in conversation (e.g. troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types, and conditional statements).
<p>Unit Essential Question(s):</p> <ul style="list-style-type: none"> ● How is a game developed? ● How is a game programmed? 	<p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> ● Students will understand the basics of game design ● Students will develop their own basic game
<p>Unit Learning Targets/Objectives:</p> <p><i>Students will</i></p> <ul style="list-style-type: none"> ● Learn the basics of game design ● Design and implement their own game 	

Formative Assessments:

- Teacher observations
- Practice programs

Summative/Benchmark Assessment(s):

- Quizzes
- Classwork/Homework
- Projects

Resources/Materials (copy hyperlinks for digital resources):

- CodeCombat - <https://codecombat.com/>

Modifications:

Special Education Students

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

English Language Learners

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/ Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Game Development 1	<ul style="list-style-type: none"> • Students will learn the basic concept of game design • Students will design and implement their own game 	5 days
Game Development 2	<ul style="list-style-type: none"> • Students will learn the mechanics of using spawns and having goals • Students will learn the mechanics of time, randomness, and defeat • Students will learn the mechanics of goals and events 	10 days

- | | | |
|--|---|--|
| | <ul style="list-style-type: none">• Students will create and arcade style game. | |
|--|---|--|

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

<https://code.org/>

<http://www.i-programmer.info/news.html>

<http://www.computerscienceonline.org/cs-programs-before-college/>

Content Area: Computer Science	
Unit Title: Introduction to Computers - Unit 8 - Web Development	
Grade Level: 9 - 12	
Unit Summary: Students will learn the basics of website design	
<p>Interdisciplinary Connections: Math: integers, decimals, and Boolean numbers, X, Y, and Z, axis, coordinate plane and other mathematical references and connections. English: connections to basic forms of speech (nouns, verbs, adjectives), vocabulary, connections also to how films are created.</p> <p>21st Century Themes and Skills: Creativity and Innovation, Communication and Collaboration, Critical Thinking & Problem Solving, Information, Media, and Technology Skills, Life and Career Skills.</p> <p>CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.</p>	
Standards (Content and Technology):	
CPI#:	Statement:
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources
8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial
8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.
8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g. robotic functions, website designs, applications, and games)
8.2.12.E.4	Use appropriate terms in conversation (e.g. troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types, and conditional statements).
Unit Essential Question(s): <ul style="list-style-type: none"> ● How is a website created? ● How do you program a website? 	Unit Enduring Understandings: <ul style="list-style-type: none"> ● Students will understand the basics of website design
Unit Learning Targets/Objectives: <i>Students will</i> <ul style="list-style-type: none"> ● Learn basic HTML ● Learn about heading and lists ● Learn about CSS ● Create their own website 	

Formative Assessments:

- Teacher observations
- Practice programs

Summative/Benchmark Assessment(s):

- Quizzes
- Classwork/Homework
- Projects

Resources/Materials (copy hyperlinks for digital resources):

- Code.org - www.code.org

Modifications:

Special Education Students

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

English Language Learners

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/ Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Exploring Websites / Websites for Expression	<ul style="list-style-type: none"> • Identify the reasons someone might visit a given website • Identify the reasons someone might create a website • Identify websites as a form of personal expression 	1 day
Intro to HTML	<ul style="list-style-type: none"> • Explain that HTML allows a programmer to communicate the way content should be structured on a web page 	1 day

	<ul style="list-style-type: none"> Write a simple HTML document that uses opening and closing tags to structure content 	
Headings	<ul style="list-style-type: none"> Use heading tags to change the appearance of text on a web page Structure content into headings, subheadings, and paragraphs 	1 day
Lists	<ul style="list-style-type: none"> Use the , , and tags to create ordered and unordered lists in an HTML page. Create and name a new HTML page 	1 day
Intellectual Property and Images	<ul style="list-style-type: none"> Explain the purpose of copyright Identify the rights and restrictions granted by various Creative Commons licenses Add an image to a web page 	1 day
Clean Code and Debugging	<ul style="list-style-type: none"> Describe why using whitespace, indentation, and comments makes your code easier to maintain Develop a set of techniques for preventing bugs in HTML code and finding them when they occur 	1 day
Multi-Page Websites	<ul style="list-style-type: none"> Connect multiple web pages into one website using hyperlinks 	4 days
Styling Text with CSS	<ul style="list-style-type: none"> Use CSS selectors to style HTML text elements Create and link to an external style sheet Explain the difference between HTML and CSS in both use and syntax 	1 day
Styling Elements with CSS	<ul style="list-style-type: none"> Use CSS properties to change the size, position, and borders of elements Create a CSS rule-set for the body element that impacts all elements on the page 	1 day
RGB Colors and Classes	<ul style="list-style-type: none"> Group elements using classes in order to create more specific styles on their websites Apply the rgb() color function to add custom colors to their website 	1 day
Project - Personal Portfolio Website	<ul style="list-style-type: none"> Apply CSS styles across an entire website Explain the design choices they made on their website to other people Prioritize and implement incremental improvements 	5 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

<https://codecombat.com/>

<http://www.i-programmer.info/news.html>

<http://www.computerscienceonline.org/cs-programs-before-college/>

Content Area: Computer Science	
Unit Title: Introduction to Computers - Unit 9 - The Design Process / App Design	
Grade Level: 9 - 12	
<p>Unit Summary: Students will learn the how the design process can be used to solve problems. Students will also create an App.</p> <p>Interdisciplinary Connections: Math: integers, decimals, and Boolean numbers, X, Y, and Z, axis, coordinate plane and other mathematical references and connections. English: connections to basic forms of speech (nouns, verbs, adjectives), vocabulary, connections also to how films are created.</p> <p>21st Century Themes and Skills: Creativity and Innovation, Communication and Collaboration, Critical Thinking & Problem Solving, Information, Media, and Technology Skills, Life and Career Skills. CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively CRP6. Demonstrate creativity and innovation. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.</p>	
Standards (Content and Technology):	
CPI#:	Statement:
8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
8.1.12.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources
8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial
8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.
8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g. robotic functions, website designs, applications, and games)
8.2.12.E.4	Use appropriate terms in conversation (e.g. troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types, and conditional statements).
<p>Unit Essential Question(s):</p> <ul style="list-style-type: none"> • How can we use the design process to solve problems? • How do you create an App? 	<p>Unit Enduring Understandings:</p> <ul style="list-style-type: none"> • How to use the design process to solve problems. • How to create a basic App
<p>Unit Learning Targets/Objectives:</p> <p><i>Students will</i></p> <ul style="list-style-type: none"> • Learn how research is used to design products and technology • Use research to drive their own creation • Create a useful App 	

Formative Assessments:

- Teacher observations
- Practice programs

Summative/Benchmark Assessment(s):

- Quizzes
- Classwork/Homework
- Projects

Resources/Materials (copy hyperlinks for digital resources):

- Code.org - www.code.org

Modifications:

Special Education Students

- Allow errors
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Accept participation at any level, even one word
- Consult with Case Managers and follow IEP accommodations/modifications

At-Risk Students

- Provide extended time to complete tasks
- Consult with Guidance Counselors and follow I&RS procedures/action plans
- Consult with classroom teacher(s) for specific behavior interventions
- Provide rewards as necessary

English Language Learners

- Assign a buddy, same language or English speaking
- Allow errors in speaking
- Rephrase questions, directions, and explanations
- Allow extended time to answer questions
- Accept participation at any level, even one word

Gifted and Talented Students

- Provide extension activities
- Build on students' intrinsic motivations
- Consult with parents to accommodate students' interests in completing tasks at their level of engagement

Lesson Name/ Topic	Lesson Objective(s)	Time frame (day(s) to complete)
Analysis of Design	<ul style="list-style-type: none"> • Express opinions respectfully and effectively • Critically evaluate an object for how well its design meets a given set of needs • Identify empathy for the user as an important component of the design process 	1 day
Under-	<ul style="list-style-type: none"> • Distinguish between their own needs and the needs of their users 	1 day

standing the user	<ul style="list-style-type: none"> ● Critique a design through the perspective of user profile ● Design improvements to a product based on a user profile (not personal opinions) 	
User-Centered Design Micro Activity	<ul style="list-style-type: none"> ● Empathize with a user's needs to design an object ● Create meaningful categories from a collection of ideas, specifically in the context of brainstorm 	1 - 2 days
User Interfaces	<ul style="list-style-type: none"> ● Use a paper prototype to test out an app before programming it ● Identify the user needs a prototype was designed to address 	1 day
Feedback and Testing	<ul style="list-style-type: none"> ● Translate user needs into changes and improvements in the user interface of an app ● Categorize and prioritize user feedback for an app ● Create a paper prototype for the screens of an app 	1 day
Identifying User Needs	<ul style="list-style-type: none"> ● Interview a peer to learn about their needs ● Analyze interview notes to develop follow-up questions ● Brainstorm potential solutions to a specific problem 	1 day
Project - Paper Prototype	<ul style="list-style-type: none"> ● Design the functionality of an app to address the specific needs of a user ● Identify improvements to an app based on user testing ● Design the user interface of an app 	2 days
Designing Apps for Good	<ul style="list-style-type: none"> ● Identify ways in which apps can effect social change 	1 day
Market Research	<ul style="list-style-type: none"> ● Locate apps that address a specific user group or need ● Identify the user needs being addressed by an app 	1 day
Paper Prototype	<ul style="list-style-type: none"> ● Communicate the design and intended use of program ● Demonstrate the user flow through an app's design using a paper prototype 	2 days
Prototype Testing	<ul style="list-style-type: none"> ● Test a prototype with a user, recording the results ● Analysing a user test to identify potential issues or improvements 	1 day
Digital Design	<ul style="list-style-type: none"> ● Translate a paper prototype into a digital format 	1 - 2 days

	<ul style="list-style-type: none"> • Select the appropriate input element for a given type of information 	
Linking Screens	<ul style="list-style-type: none"> • Write programs that respond to user input • Integrate screens designed by others into an app of their own • Collaborate with others to develop an interactive prototype 	1 - 2 days
Testing the App	<ul style="list-style-type: none"> • Write out a detailed plan for how they will test their low fidelity prototype with other people • Run a user test on an app and record what users say about their minimum viable product 	1 day
Improving and Iterating	<ul style="list-style-type: none"> • Analyze the user feedback from the previous lesson and determine a list of bugs (flaws) that need to be fixed and features that could be added to the app • Prioritize the bugs and features according to impact and ease of implementation 	2 days
Project - App Presentation	<ul style="list-style-type: none"> • Present technical information clearly to nontechnical users • Reflect on the development of an ongoing project 	2 days

Teacher Notes:

Additional Resources

Click links below to access additional resources used to design this unit:

<http://www.i-programmer.info/news.html>

<http://www.computerscienceonline.org/cs-programs-before-college/>