Unit 2: Big 2: Data

Content Area: **Business/Tech.**
Course(s): **Advanced Placement Computer Science Principals**
Time Period: **September**
Length: **3 weeks**
Status: **Published**

Unit Overview:

Data are central to computing innovations because they communicate initial conditions to programs and represent new knowledge. Computers consume data, transform data, and produce new data, allowing users to create new information or knowledge to solve problems through the interpretation of those data. Computers store data digitally, which means that the data must be manipulated in order to be presented in a useful way to the user.

Essential Questions:

- How can we use 1s and 0s to represent something complex like a video of the marching band playing a song?
- How can you predict the attendance at a school event using data gathered from social media?
- When is it more appropriate to use a computer to analyze data than to complete the analysis by hand?

Enduring Understandings:

- Programs can be used to process data, which allows users to discover information and create new knowledge.
- The way a computer represents data internally is different from the way the data are interpreted and displayed for the user. Programs are used to translate data into a representation more easily understood by people.

Standards/Indicators/Student Learning Objectives (SLOs):

ITEC.9-12.9.4.12.K.(1).1	Identify and analyze an individual's or a business organization's network system needs and requirements to design a network.
ITEC.9-12.9.4.12.K.(2).6	Employ knowledge of information system analysis and design to evaluate information systems.
ITEC.9-12.9.4.12.K.(4).1	Identify and analyze customer software needs and requirements to guide programming and software development.
ITEC.9-12.9.4.12.K.(4).2	Create and use information technology strategies and project plans when solving specific problems to deliver a product that meets customer specifications.
ITEC.9-12.9.4.12.K.(4).3	Identify and analyze system and software requirements to ensure maximum operating efficiency.
ITEC.9-12.9.4.12.K.(4).4	Demonstrate the effective use of software development tools to develop software

	applications.
ITEC.9-12.9.4.12.K.(4).5	Use the software development process to design a software application and deliver it to the customer.
ITEC.9-12.9.4.12.K.(4).6	Produce a computer application, in code, to demonstrate proficiency in developing an application using the appropriate programming language.
ITEC.9-12.9.4.12.K.(4).7	Implement software testing procedures to ensure quality products.
ITEC.9-12.9.4.12.K.(4).8	Perform quality assurance tasks to produce quality products.
ITEC.9-12.9.4.12.K.(4).9	Perform maintenance and customer support functions to maintain software applications.
ITEC.9-12.9.4.12.K.(4).10	Develop and maintain a database to store information.
ITEC.9-12.9.4.12.K.1	Demonstrate language arts knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
ITEC.9-12.9.4.12.K.4	Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.
ITEC.9-12.9.4.12.K.5	Demonstrate use of the concepts, strategies, and systems for obtaining and conveying ideas and information to enhance communication.
ITEC.9-12.9.4.12.K.6	Locate, organize, and reference written information from various sources to communicate with others.
ITEC.9-12.9.4.12.K.7	Evaluate and use information resources to accomplish specific occupational tasks.
ITEC.9-12.9.4.12.K.8	Use correct grammar, punctuation, and terminology to write and edit documents.
ITEC.9-12.9.4.12.K.9	Develop and deliver formal and informal presentations using appropriate media to engage and inform audiences.
ITEC.9-12.9.4.12.K.10	Interpret verbal and nonverbal cues/behaviors to enhance communication.
ITEC.9-12.9.4.12.K.11	Apply active listening skills to obtain and clarify information.
ITEC.9-12.9.4.12.K.12	Develop and interpret tables, charts, and figures to support written and oral communications.
ITEC.9-12.9.4.12.K.13	Listen to and speak with diverse individuals to enhance communication skills.
ITEC.9-12.9.4.12.K.14	Exhibit public relations skills in order to increase internal and external customer satisfaction.
ITEC.9-12.9.4.12.K.15	Demonstrate how to develop positive customer relations to build and maintain a customer base in this cluster.
ITEC.9-12.9.4.12.K.16	Demonstrate how to perform scheduling functions to meet customer needs in this cluster.
ITEC.9-12.9.4.12.K.17	Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
ITEC.9-12.9.4.12.K.18	Employ critical thinking and interpersonal skills to resolve conflicts.
ITEC.9-12.9.4.12.K.19	Identify, write, and monitor performance goals to guide progress in assigned areas of responsibility and accountability.
ITEC.9-12.9.4.12.K.20	Conduct technical research to gather information necessary for decision-making.
ITEC.9-12.9.4.12.K.21	Use information technology design processes and guidelines to produce a quality information technology product or service.
ITEC.9-12.9.4.12.K.22	Implement problem-solving processes to evaluate and verify the nature of problems in this cluster.
ITEC.9-12.9.4.12.K.23	Employ organizational and design principles to sort and group information used in this cluster.
ITEC.9-12.9.4.12.K.26	Operate Internet applications to perform tasks.

ITEC.9-12.9.4.12.K.32	Employ computer operations applications to manage tasks.
ITEC.9-12.9.4.12.K.33	Use computer-based equipment (containing embedded computers or processors) to control devices.
ITEC.9-12.9.4.12.K.45	Employ leadership skills to accomplish goals and objectives.
ITEC.9-12.9.4.12.K.47	Employ teamwork skills to achieve collective goals and use team members' talents effectively.
ITEC.9-12.9.4.12.K.48	Establish and maintain effective relationships in order to accomplish objectives and tasks.
ITEC.9-12.9.4.12.K.49	Conduct and participate in meetings to accomplish tasks.
ITEC.9-12.9.4.12.K.50	Employ mentoring skills to assist others.
ITEC.9-12.9.4.12.K.51	Apply ethical reasoning to a variety of situations in order to make ethical decisions.
ITEC.9-12.9.4.12.K.55	Develop a Personalized Student Learning Plan to meet career goals and objectives.
ITEC.9-12.9.4.12.K.57	Maintain a career portfolio to document knowledge, skills, and experience in a career field.
ITEC.9-12.9.4.12.K.66	Employ information management techniques and strategies to assist in decision-making.
ITEC.9-12.9.4.12.K.67	Employ planning and time management skills and tools to enhance results and complete work tasks.
ITEC.9-12.9.4.12.K.72	Demonstrate technical knowledge of the Internet to develop and maintain information technology systems.
TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.12.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.12.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.12.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.12.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
TECH.8.2.12.A	The Nature of Technology: Creativity and Innovation: Technology systems impact every aspect of the world in which we live.
TECH.8.2.12.B	Technology and Society: Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.
TECH.8.2.12.C	Design: The design process is a systematic approach to solving problems.
TECH.8.2.12.D	Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.
TECH.8.2.12.E	Computational Thinking: Programming: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Lesson Titles:

- Activity: Data Visualization with EarSketch
- Classwork/Homework: Exploring Innovations - Data
- Data Collection: College Nicknames
- Data Collection: Fast Food Restaurant Items
- Data collection: Field of 16
- Data Collection: Jukebox
- Data Collection: Phone Book List
- Data Collection: State Capitals

Career Readiness, Life Literacies, & Key Skills

12.9.3.IT-PRG.1	Analyze customer software needs and requirements.
12.9.3.IT-PRG.2	Demonstrate the use of industry standard strategies and project planning to meet customer specifications.
12.9.3.IT-PRG.3	Analyze system and software requirements to ensure maximum operating efficiency.
12.9.3.IT-PRG.4	Demonstrate the effective use of software development tools to develop software applications.
12.9.3.IT-PRG.5	Apply an appropriate software development process to design a software application.
12.9.3.IT-PRG.6	Program a computer application using the appropriate programming language.
12.9.3.IT-PRG.7	Demonstrate software testing procedures to ensure quality products.
12.9.3.IT-PRG.8	Perform quality assurance tasks as part of the software development cycle.
12.9.3.IT-PRG.9	Perform software maintenance and customer support functions.
12.9.3.IT-PRG.10	Design, create and maintain a database.
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
TECH.9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
TECH.9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).

Inter-Disciplinary Connections:

LA.RST.11-12.1	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.
LA.RST.11-12.2	Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LA.RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

LA.RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
LA.RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LA.RST.11-12.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LA.RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
LA.RST.11-12.8	Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
LA.RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LA.RST.11-12.10	By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
MA.A-CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.
MA.A-CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.
SCI.9-12.5.1.12.A.a	Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.
SCI.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
SCI.HS-ETS1-4	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
SCI.HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
SCI.HS-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
SOC.9-12.1.1.1	Compare present and past events to evaluate the consequences of past decisions and to apply lessons learned.
SOC.9-12.1.1.2	Analyze how change occurs through time due to shifting values and beliefs as well as technological advancements and changes in the political and economic landscape.
VPA.1.3.12.D.4	Analyze the syntax and compositional and stylistic principles of two- and three-dimensional artworks in multiple art media (including computer-assisted artwork), and interpret themes and symbols suggested by the artworks.
VPA.1.3.12.D.CS5	Two- and three-dimensional artworks can be rendered culturally specific by using the tools, techniques, styles, materials, and methodologies that are germane to a particular cultural style.
VPA.1.4.12.A.CS1	Recognition of fundamental elements within various arts disciplines (dance, music, theatre, and visual art) is dependent on the ability to decipher cultural implications

embedded in artworks.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

- Activity: Data Visualization with EarSketch
- Classwork/Homework: Exploring Innovations - Data
- Data Collection: College Nicknames
- Data Collection: Fast Food Restaurant Items
- Data collection: Field of 16
- Data Collection: Jukebox
- Data Collection: Phone Book List
- Data Collection: State Capitals
- IS: • Extra Time to complete Programs
- IS: • NHS Assistance and Tutoring
- IS: • One on One tutoring during Delsea One

Modifications

ELL Modifications:

- Choice of test format (multiple-choice, essay, true-false)
- Continue practicing vocabulary
- Provide study guides prior to tests
- Read directions to the student
- Read test passages aloud (for comprehension assessment)
- Vary test formats

IEP & 504 Modifications:

- Allow for redos/retakes
- Assign fewer problems at one time (e.g., assign only odds or evens)
- Differentiated center-based small group instruction
- Extra time on assessments
- Highlight key directions
- If a manipulative is used during instruction, allow its use on a test
- Opportunities for cooperative partner work
- Provide reteach pages if necessary

- Provide several ways to solve a problem if possible
- Provide visual aids and anchor charts
- Test in alternative site
- Tiered lessons and assignments
- Use of a graphic organizer
- Use of concrete materials and objects (manipulatives)
- Use of word processor

G&T Modifications:

- Alternate assignments/enrichment assignments .
- Enrichment projects .
- Extension activities .
- Higher-level cooperative learning activities .
- Pairing direct instruction with coaching to promote self-directed learning .
- Provide higher-order questioning and discussion opportunities .
- Provide texts at a higher reading level .
- Tiered assignments .
- Tiered centers .

At Risk Modifications

- Additional time for assignments
- Adjusted assignment timelines
- Agenda book and checklists
- Answers to be dictated
- Assistance in maintaining uncluttered space
- Books on tape
- Concrete examples
- Extra visual and verbal cues and prompts
- Follow a routine/schedule
- Graphic organizers
- Have students restate information
- No penalty for spelling errors or sloppy handwriting
- Peer or scribe note-taking
- Personalized examples
- Preferential seating
- Provision of notes or outlines
- Reduction of distractions

- Review of directions
- Review sessions
- Space for movement or breaks
- Support auditory presentations with visuals
- Teach time management skills
- Use of a study carrel
- Use of mnemonics
- Varied reinforcement procedures
- Work in progress check

Alternative Assessments

Performance tasks
Project-based assignments
Problem-based assignments
Presentations
Reflective pieces
Concept maps
Case-based scenarios
Portfolios

Benchmark Assessments

Skills-based assessment
Reading response
Writing prompt

Lab practical

Formative Assessment:

- Abstraction Journal
- Anticipatory Set
- Closure
- Pre-Programs
- Program Examples
- Teacher/Student Review

- Warm-Up

Summative Assessment:

- Alternate Assessment
- Benchmark
- Classwork/Homework
- Group Programs
- Large Programs
- Marking Period Assessment
- Small Programs

Resources & Materials:

- • Various Additional Web Sites
- • Visual Studios Express software
- Blown to Bits - Abelson, Ledeen, Lewis
- Canvas
- Class Dojo
- Code.org
- Computer Labs
- CSMatters
- Earsketch
- Microsoft Office
- Microsoft Visual Basic
- Photoshop
- Quizlet
- Repl.it
- Screen Sharing Software

Technology:

- Canvas
- Chromebooks
- Computer Lab
- Earsketch
- Google Classroom
- Photshop
- Snap!

- Visual Studios IDE
- World Wide Web

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
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