**Competency Cross-Reference –**

**Computer Servicing Technology Competencies Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Directions:** Evaluate the student by recording the appropriate number to indicate the degree of competency. The rating for each task should reflect employability readiness rather than the grades given in class.

**Cross References:** Using CSTA standards and TestOut (TO) cross-reference with CompTia A+ (CT); TON+ cross references with Network +

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| **Rating Scale (0-6):** | |
| 0 | **No Exposure -** no experience /knowledge in this area; program / course did not provide instruction in this area |
| 1 | **Unsuccessful Attempt -** unable to meet knowledge or performance criteria and /or required significant assistance |
| 2 | **Partial Demonstration** - met some of the knowledge or performance criteria with or without minor assistance |
| 3 | **Knowledge Demonstrated** - met knowledge criteria without assistance at least once |
| 4 | **Performance Demonstrated** - met performance criteria without assistance at least once |
| 5 | **Repetitive Demonstration** - met performance and /or knowledge criteria without assistance on multiple occasions |
| 6 | **Mastered** - successfully applied knowledge or skills in this area to solve related problems independently |
| N /A | Not observed or does not apply |

| ***Score*** | ***No.*** | ***Competency*** | ***Academic / Technical Standards***  ***STANDARDS LINK:***  [***Network***](https://drive.google.com/file/d/1eTBvP5jPyAZQu36GLy1enyU_U-w7nqiS/view?usp=sharing)  [**PC Pro**](https://drive.google.com/file/d/1rQQt1XS8Rix5h5syUufo3Mw9TW90AM4s/view?usp=sharing) | ***SkillsUSA Framework*** | ***Instructional Strategy*** | ***Assessment(s)*** |
| --- | --- | --- | --- | --- | --- | --- |
| **Workplace Safety** *(to be integrated throughout the program)* | | | | |  |  |
|  | 1 | Comply with federal and state regulations (e.g., handling, storing, and disposing of hazardous materials). | RI.1.A-D; A2.DS.A.6-7; TO 2.1 | Personal Skills: Responsibility Technical Skills: Safety & Health | Define hazardous materials, why they are hazardous, and how to dispose of them. | Vocabulary exam  Formative assessment during lab times.  A summative safety exam requires 100% |
|  | 2 | Recognize when first aid is needed for occupational injuries and follow proper procedures. | RI.1.A-D; A2.DS.A.6-7; TO 2.1 | Personal Skills: Responsibility Technical Skills: Safety & Health | Review basic first aid and safe care of wounds and injuries. |
|  | 3 | Identify types, purposes, and the operation of fire extinguishers and suppression resources. | RI.1.A-D, SL.2.A-C; A2.DS.A.6-7; TO 2.2, CT 2.5 | Personal Skills: Responsibility Technical Skills: Safety & Health | Identify and explain safety measures throughout the lab and classroom (fire extinguishers, power shut off, storage locations, etc.) |
|  | 4 | Demonstrate appropriate workplace safety practices, (e.g., electrical, hand tools, power tools, fall protection, eye protection, PPE, and environmental hazards). | RI.1.A-D, SL.2.A-C; A2.DS.A.6-7; TO 2.1 | Personal Skills: Responsibility Technical Skills: Safety & Health | Demonstrate proper handling of glass and sharp materials whether for fiber networking or screen repairs Explain the dangers of mishandling. Demonstrate proper PPE and ESD protocols. |
|  | 5 | Identify the hazard of RF radiation devices. | RI.1.A-D, SL.2.A-C; A2.DS.A.6-7; TO 2.1 | Personal Skills: Responsibility Technical Skills: Safety & Health | Define RF radiation and what devices contain RF. Explain the RF effect on computer and networking devices. |
|  | 6 | Operate line-operated equipment safely (e.g., surge protectors, grounding, and UPS.) | SL.2.A-C; A2.DS.A.6-7; CT 2.5.3 | Personal Skills: Responsibility Technical Skills: Safety & Health | Explain the basics of electricity, UPS, proper grounding and power distribution, and how to handle electricity safely. |
|  | 7 | Practice accepted anti-static (ESD) procedures. | A2.DS.A.6-7; TO 2.2 | Personal Skills: Responsibility Technical Skills: Safety & Health | Demonstrate proper PPE and ESD protocols. Explain the effects of ESD on various electronic components. Define situations that may cause ESD. |
|  | 8 | Identify electrical, mechanical, chemical, and environmental hazards. | A2.DS.A.6-7; TO 2.2 | Personal Skills: Responsibility Technical Skills: Safety & Health | TestOut Chapter 2 provides videos and formative assessments to guide students through basic safety and protection. Supplement with career experiences. |
| **I** | **Technology Interaction & Professionalism** | | | |  |  |
|  | 1 | Describe computer evolution (e.g., microcomputers and their relationship to current computing). | RI.1.A-D, RI.3.B-D, SL.2.A-C | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills, | Provide and demonstrate (where possible) older forms of technology to help students see the dynamic growth that has occurred. | Quizzes within TestOut as students continue working through the labs and information from the website.  Formative assessment throughout.  Simple research paper. |
|  | 2 | Compare and contrast servers and different form factor clients to include mobile and personal devices. | RI.1.A-D, RI.3.B-D; TO 1.6, 3.2 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills, | Open up and display various sizes and types of computers (smartphone, Raspberry Pi, desktop, laptop, server, etc.) pointing out that they each contain universal components, just in different forms, that make them a computer. |
|  | 3 | Compare and contrast local and network/cloud-based computing. | RI.3.B-D, SL.2.A-C, W.1.A; TO 2.7 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills, | Show the website of AWS or any other cloud service. If the district has an account log in to show different options available. Define and explain that the cloud is someone else’s computer. Explain the different types of cloud access. Point out that multiple web-based applications are actually cloud-based. |
|  | 4 | Identify information system components (e.g., software, hardware, input, process, and output). | RI.3.B-D; TO 1.1, 1.3 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills, | Identify the basic components in every computing device (input, process, storage, output). Have students identify examples of each component in various situations or devices. |
|  | 5 | Conduct everyday procedures ethically (e.g., piracy, licensing, intellectual property, standards of conduct, privacy, organizational policies and procedures, and unauthorized access). | RI.1.A-D; TO 5.1 | Personal Skills: Integrity, Work Ethic, Professionalism, Responsibility Workplace Skills: Decision Making | Investigate different forms of documentation and policies, using those documents and policies to help define procedures and steps involved in completing projects. |
|  | 6 | Communicate technical terms, solutions, and procedures to non-technical users. | RI.1.A-D, SL.2.A-C | Workplace Skills: Communication, Teamwork, Multicultural Sensitivity & Awareness | Define Professionalism using the SkillsUSA Framework to reinforce career experiences instructor has demonstrated professionalism and employability skills. |
|  | 7 | Explain how software and hardware support individuals with disabilities. | SL.2.A-C, W.1.A; TO 4.1, TO 4.2, TO 1.5 | Workplace Skills: Communication, Teamwork, Multicultural Sensitivity & Awareness | Have students research and present an example of assisted computing for individuals with special needs. |
|  | 8 | Create oral communication, technical correspondence, and technical reporting. | SL.2.A-C; TO 4.4 | Workplace Skills: Communication, Planning, Organizing & Management | Demonstrate the importance of communication, written and oral, and how constant reading and research are required to keep up with technology. |
|  | 9 | Demonstrate basic productivity software skills (e.g., word processing, spreadsheets, slide presentations, databases, and Internet). | RI.1.A-D, RI.3.B-D, W.1.A | Workplace Skills: Communication, Planning, Organizing & Management | Explain basic applications and how to troubleshoot the effective use of those applications. |
| **II** | **Basic Electronics** | | | |  |  |
|  | 1 | Evaluate and test the source of DC and AC signals and power. | RI.1.A-D; A2.DS.A.6-7; TO 1.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Provide an overview of electrical terms. | Vocabulary terms and quizzes.  Formative assessment through labs, involving testing and identification |
|  | 2 | Apply Ohm’s law by evaluating series and parallel circuits. | RI.1.A-D, SL.2.A-C; A2.BF.A.1-2; TO 4.1, 4.2 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Explain the proper usage of a multimeter. |
|  | 3 | Measure voltage, current, and resistance using multimeters (e.g., VOM, EVM, and DVM). | RI.1.A-D; TO 4.1, TO 4.2 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Using a multimeter, demonstrate Ohm’s law and how it can be used to test resistance on small components. |
|  | 4 | Make recommendations for computer device-related power sources and power supplies. | RI.1.A-D, SL.2.A-C; TO 1.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Explain the markings on power supplies for desktop computers and laptops, emphasizing the importance of matching proper wattage to individual components and laptops. |
|  | 5 | Discuss digital logic. | RI.1.A-D; A1.NQ.B.3-5 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define the basics of Boolean logic and how it applies to circuits and carries over to binary counting. |
| **III** | **Computer Hardware** | | | |  |  |
|  | 1 | Describe computer parts and functions. | RI.1.A-D, SL.2.A-C; TO 1.1 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define what makes a computer: input, process, storage, output. Outline the functions of those conceptual components. | Quizzes and summative assessment for identification of components and their specifications.  Formative assessments.  Labs identifying and installing components. |
|  | 2 | Design, assemble, and configure a computer to include BIOS and UEFI. | SL.2.A-C; G.GMD.B.3-4; TO 1.2 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Converse BIOS and UEFI. Demonstrate configuring of both. Explain the importance of a properly configured BIOS. |
|  | 3 | Compare and contrast the compatibility, purpose, and merits of various microprocessors for various architectures. | RI.1.A-D, SL.1.A-C; TO 1.1 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Provide a historical overview of Microprocessors and how CPUs have developed over the last few decades, increasing in throughput and power. Discuss the various architectures present and how many have consolidated, but still exist in real-world situations. |
|  | 4 | Compare and contrast current industry-standard buses. | RI.1.A-D; TO 1.1, TO 4.1 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Consider the various bus types, their growth and failure over the years according to motherboard architecture, and address current generation benefits and problems. |
|  | 5 | Identify industry-standard workstation, server, mobile, and personal hardware systems. | RI.1.A-D; TO 1.1 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Differentiate various computer types: server, PC, workstation, mobile system, embedded systems, gaming, etc. What differences separate the architecture of each type and why? |
|  | 6 | Install and remove common peripherals. | TO 1.1, TO 1.3 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Demonstrate installation and configuration of various peripherals and cards as well as their removal and software configuration changes. |
|  | 7 | Verify the operation of common peripherals. | W.1.A; TO 4.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Verify and troubleshoot common peripherals. Outline proper configuration and utilities to use. |
|  | 8 | Install and verify device drivers. | W.1.A; TO 2.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Investigate device driver updating and configuration. Troubleshoot how to find proper drivers and their configuration. |
|  | 9 | Perform burn-in/diagnostics. | W.1.A; TO 2.2 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Outline the purpose and functionality of burn-in tests and how to interpret the post-burn-in diagnostics. |
|  | 10 | Troubleshoot and repair subsystems. | W.1.A; TO 4.1, TO 4.2 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Troubleshoot and repair various computer subsystems (graphics/display, storage, sound, etc.). |
|  | 11 | Troubleshoot electromagnetic interference problems (EMI). | SL.1.A-C, SL.2.A-C; TO 4.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Explain EMI and its impact on computer and network equipment. Discuss remediation options to reduce EMI. |
|  | 12 | Adapt hardware for people with special needs. | SL.1.A-C; TO 2.2 | Workplace Skills: Multicultural Sensitivity & Awareness, Planning Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Discuss adaptive hardware for special needs users (controllers, braille displays, screen readers, etc.) |
|  | 13 | Compare and contrast standard memory types. | RI.1.A-D; TO 1.1, TO 4.1 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Elucidate memory standards and types, outlining the history and evolution of the size and speed of memory. Consider the continually growing need for memory. |
|  | 14 | Perform preventive maintenance on computer/network systems and peripherals. | SL.2.A-C; TO 1.1, TO 4.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Expound the benefits of preventative maintenance and its potential to eliminate expensive repair bills not only for computers but for peripherals and network equipment as well. |
|  | 15 | Identify and diagnose current printing technology problems. | W.1.A; TO 1.4 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Analyze basic printing equipment types and how to troubleshoot mechanical failures as well as driver and configuration errors. |
|  | 16 | Compare and contrast digital storage types. (eg., HDD vs SSD, Cloud-based, Flash). | RI.1.A-D; TO 1.3 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Decipher various forms of digital storage, from floppy disks to cloud storage. Compare and contrast the amount of storage, flexibility, longevity, and ease of use for each type. |
| **IV** | **Software** | | | |  |  |
|  | 1 | Identify, install, and configure common client and server operating systems. | SL.1.A-C, SL.2.A-C; TO 2.1, 2.2 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Discuss Operating Systems and how to install and configure them. Using either an online lab or virtual machines provides students the opportunity to configure and install Windows as well as either one or multiple Linux distros. | Formative assessment  Labs practicing installation and configuration of OSes.  Summative Quizzes and tests |
|  | 2 | Analyze and modify system configuration files. | SL.1.A-C; TO 2.2, TO 2.3, TO 2.4 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Point out various configuration files that may arise during an OS install. Discuss common adjustments made to those files and when to leave the file as default. |
|  | 3 | Perform diagnostics and troubleshooting procedures, analyze results and perform corrective actions. | W.1.A, W.2.A; TO 4.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Dialog various troubleshooting and diagnostics needed when working with software problems, whether they are OS issues or regular application issues. Outline steps to take to correct issues that are encountered. |
|  | 4 | Support accessibility (install hardware, software, and system settings). | RI.1.A-D; TO 2.2 | Workplace Skills: Multicultural Sensitivity & Awareness, Planning Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Highlight common utilities used within an OS or as a third-party utility to help with accessibility as well as hardware options users may observe. |
|  | 5 | Utilize existing technical resources for problem resolution (e.g. forums, online references, online manuals, and documentation). | SL.2.A-C; TO 4.1, TO 4.4 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Educate users on various resources available online for troubleshooting and issue resolution as well as how to differentiate reliable information versus potential security risk sites and information. |
|  | 6 | Use file compression programs. | SL.2.A-C; TO 1.3 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Demonstrate file compression and its application in real-world computing. Point out reliable tools to work with compressed files and images. |
|  | 7 | Summarize basic system and network security practices (e.g., passwords, user accounts, and design and implementation of policies). | W.1.A; TO 2.1, TO 2.3, TO 3.3 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Review common security practices and protocols. Outline safe password concepts, use least privilege for user accounts, enact a zero trust model, and outline best practices for a secure network. |
|  | 8 | Implement connectivity (e.g., Internet, Intranet). | RI.1.A-D, SL.1.A-C; TO 1.5, 2.4 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define Intranet versus Internet. Discuss scenarios when each would be needed. |
|  | 9 | Install/deploy application software and suites successfully. | W.1.A; TO 2.2 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Practice safely installing software applications, utilities, and suites. Configure as needed for security and safe usage. |
|  | 10 | Troubleshoot software integration problems. | W.1.A; A2.DS.A.6-7; TO 4.2 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Outline best practices for troubleshooting software integration issues that may arise after software is installed. |
| **V** | **Connectivity** | | | |  |  |
|  | 1 | Discuss network wiring systems capabilities. | RI.1.A-D, W.1.A; TON+ 1.1, TON+ 1.2 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Investigate how networks can be connected and what allows computers to share information. Explain sneakernet versus ethernet and why ethernet is so successful. | Labs practicing making and certifying cables  Labs (simulated or live) configuring switches, routers, VLANs, etc.  Vocabulary quizzes  Formative assessment in networking capabilities  Quizzes and summative assessments |
|  | 2 | Explain current wiring technologies (copper and fiber) according to current standards (e.g., TIA/EIA, IEEE, and ANSI). | RI.1.A-D, SL.1.A-C, SL.2.A-C; TON+ 1.1 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define the CAT system of wire classification and the history of its development to current standards. Discuss the differences between copper and fiber, advantages and disadvantages according to the use case. Point out the speed changes within networking over the past 40 years. |
|  | 3 | Explain wireless technologies' advantages and disadvantages. | RI.1.A-D; TON+ 1.2, TON+ 2.3 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define wireless communications within a network. Compare and contrast use cases and how to determine best-case scenarios for wireless versus wired connections. Review the history and speed changes that have occurred with wireless connections. |
|  | 4 | Explain network communication equipment functions (e.g., modems, access points, bridges, switches, routers, and hubs). | RI.1.A-D; TON+ 2.2, TON+ 3.3 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Demonstrate and diagram network equipment within a topology. Point out single-job devices versus multi-job devices (modem and switch versus a wireless router that is a router, switch, and wifi access point). Connect their functionality within the topology with their place within the OSI model. |
|  | 5 | Install and configure networking devices. | RI.1.A-D; TON+ 1.1, TON+ 2.2, TON+ 5.2 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Practice configuring network devices. Point out common mistakes and how to prevent them within the configuration process. |
|  | 6 | Troubleshoot basic network problems. | W.1.A; TON+ 5.1, TON+ 5.2 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Outline basic troubleshooting procedures within a network. Point out common errors and faults and how to correct them and prevent them. |
|  | 7 | Trace wiring and repair defects. | RI.1.A-D; TON+ 1.1, TON+ 1.2 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Demonstrate usage of network wiring tools, how to track termination errors or wire breaks as well as how to repair or replace those errors. |
|  | 8 | Certify wiring infrastructure to standards. | RI.1.A-D; TON+ 1.1, TON+ 1.2, TON+ 5.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Explain wire and fiber certification as well as wiring infrastructure standards and why certification according to standards is important. |
| **VI** | **Networking Basics, Protocols, and Standards** | | | |  |  |
|  | 1 | Explain network infrastructure. | RI.1.A-D; TON+ 1.1, TON+ 1.2 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Introduce the OSI and TCP/IP network models. Compare and contrast their structures and how they segregate network communication. | Labs (simulated or live) configuring switches, routers, VLANs, etc.  Vocabulary quizzes  Formative assessment in networking capabilities  Quizzes and summative assessments |
|  | 2 | Differentiate areas of responsibilities between the service provider and their clients. | RI.1.A-D; TON+ 2.2, TON+ 5.2 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define a demarcation and its purpose in defining areas of connectivity responsibility. Point out its location within a site MDF. |
|  | 3 | Explain current network standards and pseudo-standards (e.g., IEEE, RFCs, and ISO). | RI.1.A-D, SL.2.A-C; TON+ 1.1, TON+ 1.2 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Explain the importance of network standards and present an overview of how they have changed and grown over the years. |
|  | 4 | Draw, label, and explain networking layers (e.g., OSI, TCP/IP models, IP addressing, and MAC addressing). | RI.1.A-D; G.GMD.B.3-4, G.MG.A.1-3; TON+ 1.1, TON+ 1.2, TON+ 2.2 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Reviewing SLO 1, point out how MAC addressing and IP addressing occur within the OSI and TCP/IP layers. Emphasize the uniqueness of MAC addresses within the world, versus the uniqueness of IP addresses within a network. This would be an excellent time for a math unit on binary numbers and how to calculate IP addresses within a network topology that could help segregate a network based on which class of IP addressing is used and octets used within individual VLANs or network segments. Conversely, demonstrates how converting IP addresses from decimal to binary helps to visually see how to calculate CIDR notation when configuring a network with a service provider. |
|  | 5 | Compare and contrast network topologies (e.g., star, bus, ring, broadband, and baseband). | RI.1.A-D, SL.1.A-C, W.1.A; TON+ 1.1, TON+ 1.2 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Discuss the history of network development topologies of bus and ring and their advantages and drawbacks. Add into the discussion star and mesh topologies as well as baseband and broadband. Point out how star and bus still exist within switches and how switches and wifi create mesh connectivity in a network. This would also be a good time to discuss the generational changes in network speed over the last 40 years to our current bandwidth speeds. |
|  | 6 | Diagram and explain network topologies. | RI.1.A-D; TON+ 1.1, TON+ 1.2 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Practice diagramming and labeling the topologies in SLO 5 and how they meet the needs of network connectivity. |
|  | 7 | Summarize and implement protocols (e.g., TCP/IP, IPv4, IPv6, and DHCP). | W.1.A; TON+ 2.1, TON+ 3.1, TON+ 3.2 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Provide an overview of TCP/IP protocols and ports used as well as how to safely implement and configure a network to function properly with those protocols. Review redundancy and security needs with functionality. |
|  | 8 | Differentiate between routing and switching/bridging. | RI.1.A-D, SL.1.A-C; TON+ 2.1, TON+ 2.2, TON+ 3.3, TON+ 4.2 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Compare and contrast a hub with a switch, and a switch with a router, and how a network bridge fits in. Discuss which OSI layer each of the above works and functions. |
|  | 9 | Explain basic network security principles (e.g., IP spoofing, packet sniffing, password compromise, and encryption). | RI.1.A-D, W.1.A; TON+ 1.1, TON+ 3.1, TON+ 4.5 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Demonstrate and explain packet sniffing, and spoofing using tools such as Wireshark, Burp Suite, etc. Contrast the benefits of Whitehat Penetration Testing versus Hacking, password cracking versus strengthening passwords, and basic encryption algorithms. This would be an excellent opportunity to discuss Linux in depth, especially Kali Linux, and how it can be used as part of a suite of tools for penetration testing. This would also be an opportunity for an in-depth math unit discussing large prime numbers and their use within various encryption algorithms, such as Diffie-Hellman, RSA, and Personal Key Infrastructure. |
| **VII** | **Network Operating Systems and Protocols** | | | |  |  |
|  | 1 | Specify network server internal components. | RI.1.A-D; TO 1.5 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define basic server components. Compare and contrast desktops and servers. Introduce servers, firewalls, security devices, etc. | Labs (simulated or live) configuring servers (DNS, AD, etc.)  Vocabulary quizzes  Formative assessment in networking capabilities  Quizzes and summative assessment |
|  | 2 | Install and configure server operating systems. | RI.1.A-D; TO 2.3, TO 2.4 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Demonstrate and provide opportunities for students to install server OS into a virtual machine. |
|  | 3 | Install and configure network hardware (e.g., NICs). | RI.1.A-D; TO 1.5, TO 2.4 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Explain the different types and speeds for network cards, wired and wireless. Demonstrate proper installation of those NICs. |
|  | 4 | Establish client environments and network resources. | W.1.A; TO 1.5, TO 2.3, TO 2.4 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Outline the basics of networking topology and how to segregate public side and private side of client environments as well as server and printer shares using VLANs |
|  | 5 | Describe policies and procedures that are executed through login scripts. | SL.1.A-C, W.1.A; TO 2.2 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Expound upon enforcing network policies and procedures as demarcated through rights and privileges through login scripts. Point out cybersecurity enforcement through these automated scripts occurring on login and logout. |
|  | 6 | Verify client access to network resources. | SL.1.A-C, W.1.A; TO 4.3, TO 4.4 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Continuing with SLO 5, ensure and verify resource access post login, to further underline the importance of network security through login access. |
|  | 7 | Provide secured access to network resources. | SL.1.A-C, W.1.A; TO 2.2, TO 2.3, TO 2.4 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Ensure enhanced security is in place for higher-level access resources. NO ONE SHOULD USE ROOT ACCESS. |
|  | 8 | Summarize the importance of basic network security (e.g., passwords, MFA, user accounts). | SL.1.A-C, W.1.A; TO 3.3 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Deliberate the importance of secondary authorization, fine-grained password policies, zero trust, least privilege policy, etc. in helping reinforce security within a network. |
| **VIII** | **Risk Management & Security** | | | |  |  |
|  | 1 | Perform site survey. | RI.1.A-D, SL.1.A-C; TON+ 1.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define and explain the site survey. Point out resources and items to look for when doing a site survey. | Labs (simulated or live) hardening switches, routers, and servers.  Vocabulary quizzes  Formative assessment in networking capabilities  Quizzes and summative assessment |
|  | 2 | Recommend comprehensive security procedures and technologies to protect systems and data based on best practices and organizational requirements. | RI.1.A-D; TON+ 4.1, TON+ 4.3, TON+ 4.5 | Workplace Skills: Communication, Decision Making Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Review forms of security used to access secure buildings and/or secure rooms. |
|  | 3 | Verify secured access to network resources. | RI.1.A-D, SL.1.A-C; TON+ 4.3 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | A tour of a secure networking facility or data center would be very advantageous, whether in a district or a commercial site. Point out various security access technologies during the tour. |
|  | 4 | Configure firewall rules, DMZs, and VPN concentrators. | W.1.A; TON+ 4.1, TON+ 4.5 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Study and configure a switch. If possible, be brand agnostic. Possibly using hardware or software switch (pf sense, etc.) to allow experimentation. |
|  | 5 | Formulate integrative backup, redundancy, and business continuity plans to enable resilient IT operations. | SL.1.A-C; TON+ 1.1, TON+ 1.2, TON+ 3.4 | Workplace Skills: Planning, Organizing & Management Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Discuss the importance of redundancy and backups (data and hardware) to maintain business continuity. Review needs during a system-down situation, causes of a system-down situation, and steps of recovery afterward. |
|  | 6 | Construct access control lists, port security protocols, and VLAN schemes to segment and restrict network access. | W.1.A; TON+ 3.3, TON+ 4.1, TON+ 4.3 | Workplace Skills: Planning, Organizing & Management Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Plan out what is needed in configuring network and user access within that network, recognizing various security aspects through ACLs, VLANs, and port security protocols (blocking and permitting) to maintain a protected network. |
|  | 7 | Develop encryption strategies utilizing technologies such as VPNs, SSH, and TLS to safeguard sensitive data. | RI.1.A-D; TON+ 2.3, TON+ 4.1, TON+ 4.2, TON+ 4.4 | Workplace Skills: Planning, Organizing & Management Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Educate students regarding various encryption models and how to engage those models to secure VPNs, SSH, and TLS connections. Point out how Kerberos uses some of those encryption models to secure connections. |
|  | 8 | Discuss and implement virus protection and removal procedures (e.g., workstations and networks). | W.1.A; TO 3.1, TO 3.3; TON+ 4.5, TON+ 4.3, TON+ 5.1 | Workplace Skills: Planning, Organizing & Management Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Investigate various forms of viral infection and how to safely remove and recover after infection. Discuss preventative measures to help reduce infection. |
|  | 9 | Implement different levels of fault tolerance [e.g., transaction tracking and logging, auditing, uninterruptible power sources (UPS), mirroring, duplexing, and redundant array of inexpensive disks (RAID)]. | RI.1.A-D; TO 1.3, TO 2.5; TON+ 1.1, TON+ 1.2 | Workplace Skills: Planning, Organizing & Management Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Review SLO 5, identifying “non-ethernet” components needed for redundancy and fault tolerance such as; RAID for storage tolerance, UPS and proper wattage needed for uninterruptible power as well as power conditioning options. |
|  | 10 | Identify common attack vectors like malware, social engineering, and unsecured ports. | W.1.A; TO 3.1, TO 3.2, TO 3.3; TON+ 4.5, TON+ 3.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Identify and quantify attack vectors possible within a network. Evaluate ways to protect and secure those vectors. |
|  | 11 | Perform post-incident recovery procedures. | RI.1.A-D; TON+ 4.5, TON+ 5.1 | Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Explain the importance of a post-mortem for security incidents. Discuss legal as well as business ramifications. |
| **IX** | **End User Support** | | | |  |  |
|  | 1 | Document cable infrastructure. | TO 1.5,TO 2.4 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Review the importance of documenting everything. Including where network cable trays or runs are located in the ceilings and walls (or floors). | Vocabulary quizzes  Formative assessment  Scenario practices and assessments  Quizzes and summative assessments |
|  | 2 | Document network configurations (e.g., workstation, server, and router). | W.3.A-B; G.GMD.B.3-4, G.MG.A.1-3 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Review the importance of documenting! When documenting devices and network structure, the end user can end up being you. Have students present an example of a network map. |
|  | 3 | Document detailed problem symptoms, troubleshooting steps, and solutions in tickets. | W.2.A; TO 4.4 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Have students design a diagnostics and procedure document for use in working on Chromebooks or computers in general. Compare how that document may vary for network troubleshooting. |
|  | 4 | Specify security procedures. | RI.1.A-D; TO 2.1, TO 2.3, TO 3.3 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define basic security procedures within a network. Compare how that matches with the school district network security. Examine how network policy is defined by the security needed. |
|  | 5 | Analyze system log files. | RI.1.A-D; TO 2.2, TO 4.2 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Show examples of various system logs and help students glean usable information from the logs. |
|  | 6 | Document network policy. | RI.1.A-D; TO 4.4 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define basic security procedures within a network. Compare how that matches with the school district network security. Examine how network policy is defined by the security needed. |
|  | 7 | Compile knowledge base articles and technical documentation to serve as references for end users and/or administrators. | RI.1.A-D; TO 4.4 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Define FAQ and Knowledge Base. How have students interacted with them? Provide examples of using either in everyday life. |
|  | 8 | Practice constructive problem-solving with customers. | SL.1.A-C, SL.2.A-C; TO 3.1, TO 3.2, TO 3.3 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Present opportunities for students to role-play active listening, patience, and empathy. Have them role-play as a helpdesk technician, troubleshooting a customer issue over the phone. Provide real-life examples where out-of-the-box thinking resolved an issue. |
|  | 9 | Explain remote access and phone support concepts. | W.1.A; TO 2.6 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Demonstrate the effectiveness of remote access in resolving client issues. What ethical ramifications may arise from remote support? |
|  | 10 | Implement customer support remote access. | W.1.A; TO 2.6 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Demonstrate the effectiveness of remote access in resolving client issues. What ethical ramifications may arise from remote support? |
|  | 11 | Troubleshoot hardware and software. | SL.1.A-C; A2.DS.A.6-7; TO 4.1, TO 4.2, TO 4.3, TO 4.4 | Workplace Skills: Communication Technical Skills: Computer & Technology Literacy, Job-Specific Skills | Inquire from students on how they would troubleshoot specific computer errors or situations. |
| **Leadership Skills and Professionalism** *(to be integrated throughout the program)* | | | | |  |  |
|  | 1 | Demonstrate an understanding of SkillsUSA, its structure, and activities. | RI.3.B-D | Personal Skills: All Workplace Skills: All Technical Skills: All | Review the promotional materials and Opening meeting for SkillsUSA to understand its purpose and applicability within CTE. | Students complete the SkillsUSA Framework Assessment  Formative assessment ensures students are grasping concepts |
|  | 2 | Demonstrate an understanding of one’s values. | RI.1.A-D, SL.2.A-C | Personal Skills: Integrity, Work Ethic, Self-Motivation | Define and explain the concept of personal values. Have students complete the Framework Assessment to help them recognize their values. Develop a culture of personal & professional growth and continuous improvement by seeking out learning opportunities and skills training |
|  | 3 | Perform tasks related to effective personal management skills. | RI.1.A-D, SL.2.A-C | Personal Skills: Integrity, Work Ethic, Professionalism, Responsibility, Adaptability/Flexibility, Self-Motivation | Guide students in setting alarms, writing checklists, or whatever they need to organize themselves for the school year. |
|  | 4 | Demonstrate interpersonal skills through active listening, patience, and empathy. | SL.1.A-C | Workplace Skills: Communication, Decision Making, Teamwork, Multicultural Sensitivity & Awareness | Present opportunities for students to role-play active listening, patience, and empathy. Have them role-play as a helpdesk technician, troubleshooting a customer issue over the phone. |
|  | 5 | Demonstrate etiquette and courtesy. | SL.1.A-C | Workplace Skills: Communication, Decision Making, Teamwork, Multicultural Sensitivity & Awareness | Present opportunities for students to role-play active listening, patience, and empathy. Have them role-play as a helpdesk technician, troubleshooting a customer issue over the phone. |
|  | 6 | Demonstrate effectiveness in oral and written communication. | SL.1.A-C, SL.2.A-C, W.1.A, W.2.A, W.3.A-B | Workplace Skills: Communication, Decision Making, Teamwork, Multicultural Sensitivity & Awareness | Oral and written communication will be occurring throughout the program. Monitor and correct, emphasizing the importance of professionalism.  Demonstrate effective teamwork and communication skills, seek regular feedback to enhance teamwork and communication skills, delegate tasks appropriately based on team members' strengths and development goals |
|  | 7 | Develop and maintain a code of professional ethics. | RI.1.A-D, RI.3.B-D | Personal Skills: Integrity, Work Ethic, Self-Motivation | Investigate the concept of ethics in computing and how to address professional ethics within the workplace. |
|  | 8 | Maintain an appropriate professional appearance. | SL.2.A-C | Personal Skills: Professionalism | Demonstrate proper IT Hygiene and its effect on customers as well as successfully retaining employment. |
|  | 9 | Perform basic tasks related to securing and terminating employment. | SL.1.A-C | Workplace Skills: Communication, Decision Making, Organizing & Management Technical Skills: Job-Specific Skills, Professional Development | Outline what is involved in securing a job, filling out an application, and writing a job resume. Review how to end employment without burning bridges. |
|  | 10 | Perform basic parliamentary procedures in a group meeting | SL.1.A-C, SL.2.A-C | Workplace Skills: Communication, Decision Making, Organizing & Management | Define Robert’s Rules of Order and how it applies to basic committee meetings and why it is used. |
| **Academic Skills** | | |  |  |  |  |
|  | **English/Language Arts** | |  |  |  |  |
|  | 1 | Analyze text and visual elements to create an objective and concise summary that includes analysis of what is said or shown and inferences or conclusions that can be drawn, including where the text or visual elements leave matters uncertain. | RI.1.A-D | **Workplace Skills:** Communication | Included in lessons |  |
|  | 2 | Read and comprehend informational text independently and proficiently and synthesize information from two or more texts to articulate complexity. | RI.3.B-D |
|  | 3 | Work with peers to promote discussions and decision-making, set clear goals, and establish individual roles. Evaluate a speaker’s point of view by posing and responding to questions and evidence. Consider and respond thoughtfully to diverse perspectives. | SL.1.A-C |
|  | 4 | Speak audibly using conventions of language, eye contact, gestures, and movement appropriate to task, purpose and audience. | SL.2.A-C |
|  | 5 | Gather relevant information from multiple authoritative print and digital sources to conduct research to answer a question or solve a problem. | W.1.A |
|  | 6 | Follow a writing process to produce clear and coherent writing appropriate to the task, purpose and audience using a variety of writing techniques. | W.2.A |
|  | 7 | Organize writing content in a format that achieves the writer's purpose and enhances the reader's understanding of and experience with the text uses precise language, reflects syntactical understanding of language function, and follows conventions of standard English usage. | W.3.A-B |
|  | **Mathematics** | |  |  |  |  |
|  | 1 | Use units of measure to solve problems involving quantities using appropriate units and labels, converting units and rates, using graphical representation as needed. | A1.NQ.B.3-5 | **Workplace Skills:** Planning, Organizing, & Management  **Technical Skills:** Computer & Technology Literacy | Included in lessons |  |
|  | 2 | Create new functions by applying the four arithmetic operations and composition of functions, including deriving and composing inverses with the original function. | A2.BF.A.1-2 |
|  | 3 | Evaluate reports based on data to analyze decisions and strategies using probability concepts. | A2.DS.A.6-7 |
|  | 4 | Identify the shapes of two-dimensional cross-sections of three-dimensional objects and vice versa. | G.GMD.B.3-4 |
|  | 5 | Use geometric shapes, their measures and their properties to describe objects in terms of using density, area, volume using mathematical modeling. | G.MG.A.1-3 |