1.0 IT Concepts and Terminology

- Compare and contrast notational systems
    - Binary
    - Hexadecimal
    - Decimal
    - Data representation
        - ASCII
        - Unicode
- Compare and contrast fundamental data types and their characteristics
    - Char
    - Strings
    - Numbers
        - Integers
        - Floats
    - Boolean
- Illustrate the basics of computing and processing
    - Input
    - Output
    - Processing
    - Storage
- Explain the value of data and information
    - Data and information as assets
    - Importance of investing in security
    - Relationship of data to creating information
    - Intellectual property
        - Trademarks
        - Copyright
        - Patents
    - Digital products
    - Data-driven business decisions
        - Data capture and collection
        - Data correlation
        - Meaningful reporting
- Compare and contrast common units of measure
    - Storage unit
        - Bit
        - Byte
        - KB
        - MB
        - GB
        - TB
        - PB
    - Throughput unit
        - bps
        - Kbps
        - Mbps
        - Gbps
        - Tbps
    - Processing speed

        - MHz
        - GHz

- Explain the troubleshooting methodology
    - Identify the problem
        - Gather information
        - Duplicate the problem, if possible
        - Question users
        - Identify symptoms
        - Determine if anything has changed
        - Approach multiple problems individually
    - Research knowledge base/ Internet, if applicable
    - Establish a theory of probable cause
        - Question the obvious
        - Consider multiple approaches
        - Divide and conquer
    - Test the theory to determine the cause
        - Once the theory is confirmed (confirmed root cause), determine the next steps to resolve the problem
        - If the theory is not confirmed, establish a new theory or escalate
    - Establish a plan of action to resolve the problem and identify potential effects
    - Implement the solution or escalate as necessary
    - Verify full system functionality and, if applicable, implement preventive measures
    - Document findings/lessons learned, actions, and outcomes

2.0 Infrastructure

- Classify common types of input/output device interfaces
    - Networking
        - Wired
            - Telephone connector (RJ-11)
            - Ethernet connector (RJ-45)
        - Wireless
            - Bluetooth
            - NFC
    - Peripheral device
        - USB
        - FireWire
        - Thunderbolt
        - Bluetooth
        - RF
    - Graphic device
        - VGA
        - HDMI
        - DVI
        - DisplayPort
        - Mini DisplayPort
- Given a scenario, set up and install common peripheral devices to a laptop/PC
    - Devices
        - Printer
        - Scanner
        - Keyboard

        - Mouse
        - Camera
        - External hard drive
        - Speakers
        - Display
    - Installation types
        - Plug-and-play vs. driver installation
        - Other required steps
        - IP-based peripherals
        - Web-based configuration steps
- Explain the purpose of common internal computing components
    - Motherboard/system board
    - Firmware/BIOS
    - RAM
    - CPU
        - ARM
            - Mobile phone
            - Tablet
        - 32-bit
            - Laptop
            - Workstation
            - Server
        - 64-bit
            - Laptop
            - Workstation
            - Server
    - Storage
        - Hard drive
        - SSD
    - GPU
    - Cooling
    - NIC
        - Wired vs. wireless
        - On-board vs. add-on card
- Compare and contrast common Internet service types
    - Fiber optic
    - Cable
    - DSL
    - Wireless
        - Radio frequency
        - Satellite
        - Cellular
- Compare and contrast storage types
    - Volatile vs. non-volatile
    - Local storage types
        - RAM
        - Hard drive
            - Solid state vs. spinning disk
        - Optical
        - Flash drive

    - Local network storage types
        - NAS
        - File server
    - Cloud storage service
- Compare and contrast common computing devices and their purposes
    - Mobile phones
    - Tablets
    - Laptops
    - Workstations
    - Servers
    - Gaming consoles
    - IoT
        - Home appliances
        - Home automation devices
            - Thermostats
            - Security systems
        - Modern cars
        - IP cameras
        - Streaming media devices
        - Medical devices
- Explain basic networking concepts
    - Basics of network communication
        - Basics of packet transmission
        - DNS
            - URL-to-IP translation
        - LAN vs. WAN
    - Device addresses
        - IP address
        - MAC address
    - Basic protocols
        - HTTP/S
        - POP3
        - IMAP
        - SMTP
    - Devices
        - Modem
        - Router
        - Switch
        - Access point
        - Firewall
- Given a scenario, install, configure and secure a basic wireless network
    - 802.11a/b/g/n/ac
        - Older vs. newer standards
        - Speed limitations
        - Interference and attenuation factors
    - Best practices
        - Change SSID
        - Change default password
        - Encrypted vs. unencrypted

        - Open
            - Captive portal
        - WEP
        - WPA
        - WPA2

3.0 Applications and Software

- Explain the purpose of operating systems
    - Interface between applications and hardware
    - Disk management
    - Process management/scheduling
        - Kill process/end task
    - Application management
    - Memory management
    - Device management
    - Access control/protection
    - Types of OS
        - Mobile device OS
        - Workstation OS
        - Server OS
        - Embedded OS
            - Firmware
        - Hypervisor (Type 1)
- Compare and contrast components of an operating system
    - File systems and features
        - File systems
        - NTFS
        - FAT32
        - HFS
        - Ext4
    - Features
        - Compression
        - Encryption
        - Permissions
        - Journaling
        - Limitations
        - Naming rules
    - File management
        - Folders/directories
        - File types and extensions
        - Permissions
    - Services
    - Processes
    - Drivers
    - Utilities
        - Task scheduling
    - Interfaces
        - Console/command line
        - GUI

- Explain the purpose and proper use of software
    - Productivity software
        - Word processing software
        - Spreadsheet software
        - Presentation software
        - Web browser
        - Visual diagramming software
    - Collaboration software
        - Email client
        - Conferencing software
        - Instant messaging software
        - Online workspace
        - Document sharing
    - Business software
        - Database software
        - Project management software
        - Business-specific applications
        - Accounting software
- Explain methods of application architecture and delivery models
    - Application delivery methods
        - Locally installed
            - Network not required
            - Application exists locally
            - Files saved locally
        - Local network hosted
            - Network required
            - Internet access not required
        - Cloud hosted
            - Internet access required
            - Service required
            - Files saved in the cloud
    - Application architecture models
        - One tier
        - Two tier
        - Three tier
        - n-tier
- Given a scenario, configure and use web browsers
    - Caching/clearing cache
    - Deactivate client-side scripting
    - Browser add-ons/extensions
        - Add
        - Remove
        - Enable/disable
    - Private browsing
    - Proxy settings
    - Certificates
        - Valid
        - Invalid
    - Popup blockers
    - Script blockers

    - Compatible browser for application(s)
- Compare and contrast general application concepts and uses
    - Single-platform software
    - Cross-platform software
        - Compatibility concerns
    - Licensing
        - Single use
        - Group use/site license
        - Concurrent license
        - Open source vs. proprietary
        - Subscription vs. one-time purchase
        - Product keys and serial numbers
    - Software installation best practices
        - Reading instructions
        - Reading agreements
        - Advanced options

4.0 Software Development Concepts

- Compare and contrast programming language categories
    - Interpreted
        - Scripting languages
        - Scripted languages
        - Markup languages
    - Compiled programming languages
    - Query languages
    - Assembly language
- Given a scenario, use programming organizational techniques and interpret logic
    - Organizational techniques
        - Pseudocode concepts
        - Flow-chart concepts
        - Sequence
    - Logic components
        - Branching
        - Looping
- Explain the purpose and use of programming concepts
    - Identifiers
        - Variables
        - Constants
    - Containers
        - Arrays
        - Vectors
    - Functions
    - Objects
        - Properties
        - Attributes
        - Methods

5.0 Database Fundamentals

- Explain database concepts and the purpose of a database
    - Usage of database
        - Create
        - Import/input
        - Query
        - Reports
    - Flat file vs. database
        - Multiple concurrent users
        - Scalability
        - Speed
        - Variety of data
    - Records
    - Storage
        - Data persistence
- Compare and contrast various database structures
    - Structured vs. semi-structured vs. non-structured
    - Relational databases
        - Schema
        - Tables
        - Rows/records
        - Fields/columns
        - Primary key
        - Foreign key
        - Constraints
    - Non-relational databases
        - Key/value databases
        - Document databases
- Summarize methods used to interface with databases
    - Relational methods
        - Data manipulation
            - Select
            - Insert
            - Delete
            - Update
        - Data definition
            - Create
            - Alter
            - Drop
            - Permissions
    - Database access methods
        - Direct/manual access
        - Programmatic access
        - User interface/utility access
        - Query/report builders
    - Export/import
        - Database dump
        - Backup

6.0 Security

- Summarize confidentiality, integrity and availability concerns
    - Confidentiality concerns
        - Snooping
        - Eavesdropping
        - Wiretapping
        - Social engineering
        - Dumpster diving
    - Integrity concerns
        - Man-in-the-middle
        - Replay attack
        - Impersonation
        - Unauthorized information alteration
    - Availability concerns
        - Denial of service
        - Power outage
        - Hardware failure
        - Destruction
        - Service outage
- Explain methods to secure devices and best practices
    - Securing devices (mobile/workstation)
        - Antivirus/Anti-malware
        - Host firewall
        - Changing default passwords
        - Enabling passwords
        - Safe browsing practices
        - Patching/updates
    - Device use best practices
        - Software sources
            - Validating legitimate sources
            - Researching legitimate sources
            - OEM websites vs. third-party websites
        - Removal of unwanted software
        - Removal of unnecessary software
        - Removal of malicious software
- Summarize behavioral security concepts
    - Expectations of privacy when using:
        - The Internet
        - Social networking sites
        - Email
        - File sharing
        - Instant messaging
        - Mobile applications
        - Desktop software
        - Business software
        - Corporate network
    - Written policies and procedures
    - Handling of confidential information
        - Passwords
        - Personal information
        - Customer information
        - Company confidential information
- Compare and contrast authentication, authorization, accounting and non-repudiation concepts

    - Authentication
        - Single factor
        - Multifactor
        - Examples of factors
            - Password
            - PIN
            - One-time password
            - Software token
            - Hardware token
            - Biometrics
            - Specific location
            - Security questions
        - Single sign-on
    - Authorization
        - Permissions
        - Least privilege model
        - Role-based access
            - User account types
        - Rule-based access
        - Mandatory access controls
        - Discretionary access controls
    - Accounting
        - Logs
        - Tracking
        - Web browser history
    - Non-repudiation
        - Video
        - Biometrics
        - Signature
        - Receipt
- Explain password best practices
    - Password length
    - Password complexity
    - Password history
    - Password expiration
    - Password reuse across sites
    - Password managers
    - Password reset process
- Explain common uses of encryption
    - Plain text vs. cipher text
    - Data at rest
        - File level
        - Disk level
        - Mobile device
    - Data in transit
        - Email
        - HTTPS
        - VPN
        - Mobile application
- Explain business continuity concepts
    - Fault tolerance

        - Replication
        - Redundancy
            - Data
            - Network
            - Power
        - Backup considerations
            - Data
            - File backups
            - Critical data
            - Database
            - OS backups
        - Location
            - Stored locally
            - Cloud storage
            - On-site vs. off-site
        - Contingency plan
    - Disaster recovery
        - Data restoration
        - Prioritization
        - Restoring access