CompTIA Cybersecurity Analyst (CySA+) Certification Exam Objectives

EXAM NUMBER: CS0-002

About the Exam

Candidates are encouraged to use this document to help prepare for the CompTIA Cybersecurity Analyst (CySA+) CS0-002 certification exam. With the end goal of proactively defending and continuously improving the security of an organization, CySA+ will verify the successful candidate has the knowledge and skills required to:

- Leverage intelligence and threat detection techniques
- Analyze and interpret data
- Identify and address vulnerabilities
- Suggest preventative measures
- Effectively respond to and recover from incidents

This is equivalent to 4 years of hands-on experience in a technical cybersecurity job role.

These content examples are meant to clarify the test objectives and should not be construed as a comprehensive listing of all the content of this examination.

EXAM DEVELOPMENT

CompTIA exams result from subject matter expert workshops and industry-wide survey results regarding the skills and knowledge required of an IT professional.

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PLEASE NOTE

The lists of examples provided in bulleted format are not exhaustive lists. Other examples of technologies, processes, or tasks pertaining to each objective may also be included on the exam although not listed or covered in this objectives document. CompTIA is constantly reviewing the content of our exams and updating test questions to be sure our exams are current and the security of the questions is protected. When necessary, we will publish updated exams based on testing exam objectives. Please know that all related exam preparation materials will still be valid.

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TEST DETAILS

Required exam	CS0-002
Number of questions	Maximum of 85
Type of questions	Multiple choice and performance-based
Length of test	165 minutes
Recommended experience	• 4 years of hands-on experience in a technical cybersecurity job role
	• Security+ and Network+, or equivalent knowledge and experience
Passing score	750

EXAM OBJECTIVES (DOMAINS)

The table below lists the domains measured by this examination
and the extent to which they are represented.

DOMAIN	PERCENTAGE OF EXAMINATION
1.0 Threat and Vulnerability Management	22%
2.0 Software and Systems Security	18%
3.0 Security Operations and Monitoring	25%
4.0 Incident Response	22%
5.0 Compliance and Assessment	13%
Total	**100%**

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1.0 Threat and Vulnerability Management

1.1 Explain the importance of threat data and intelligence.

- **Intelligence sources** 02
  - Open-source intelligence
  - Proprietary/closed-source intelligence
  - Timeliness
  - Relevancy
  - Accuracy
- **Confidence levels** 02
- **Indicator management** 05
  - Structured Threat Information eXpression (STIX)
  - Trusted Automated eXchange of Indicator Information (TAXII)
  - OpenIoC

- **Threat classification** 04
  - Known threat vs. unknown threat
  - Zero-day
  - Advanced persistent threat
- **Threat actors** 04
  - Nation-state
  - Hacktivist
  - Organized crime
  - Insider threat
    - Intentional
    - Unintentional
- **Intelligence cycle** 01
  - Requirements

  - Collection
  - Analysis
  - Dissemination
  - Feedback
- **Commodity malware** 04
- **Information sharing and** 03 **analysis communities**
  - Healthcare
  - Financial
  - Aviation
  - Government
  - Critical infrastructure

1.2 Given a scenario, utilize threat intelligence to support organizational security.

- **Attack frameworks** 06
  - MITRE ATT&CK
  - The Diamond Model of Intrusion Analysis
  - Kill chain
- **Threat research** 05
  - Reputational
  - Behavioral
  - Indicator of compromise (IoC)

- Common vulnerability scoring system (CVSS) 09
- **Threat modeling methodologies** 07
  - Adversary capability
  - Total attack surface
  - Attack vector
  - Impact
  - Likelihood

- **Threat intelligence sharing** 03 **with supported functions**
  - Incident response
  - Vulnerability management
  - Risk management
  - Security engineering
  - Detection and monitoring

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1.3 Given a scenario, perform vulnerability management activities.

- **Vulnerability identification**
  - Asset criticality   08
  - Active vs. passive scanning   08, 10
  - Mapping/enumeration   10
- **Validation**   09
  - True positive
  - False positive
  - True negative
  - False negative
- **Remediation/mitigation**
  - Configuration baseline   12
  - Patching   12
  - Hardening   12
  - Compensating controls   11, 51

- Risk acceptance   52
- Verification of mitigation   12
- **Scanning parameters and criteria**   08
  - Risks associated with scanning activities
  - Vulnerability feed
  - Scope
  - Credentialed vs. non-credentialed
  - Server-based vs. agent-based
  - Internal vs. external
  - Special considerations
    - Types of data
    - Technical constraints
    - Workflow

- Sensitivity levels
- Regulatory requirements
- Segmentation
- Intrusion prevention system (IPS), intrusion detection system (IDS), and firewall settings
- **Inhibitors to remediation**   14
  - Memorandum of understanding (MOU)
  - Service-level agreement (SLA)
  - Organizational governance
  - Business process interruption
  - Degrading functionality
  - Legacy systems
  - Proprietary systems

1.4 Given a scenario, analyze the output from common vulnerability assessment tools.

- **Web application scanner**   32
  - OWASP Zed Attack Proxy (ZAP)
  - Burp suite
  - Nikto
  - Arachni
- **Infrastructure vulnerability scanner**   08
  - Nessus
  - OpenVAS
  - Qualys

- **Software assessment tools and techniques**   18
  - Static analysis
  - Dynamic analysis
  - Reverse engineering
  - Fuzzing
- **Enumeration**   10
  - Nmap
  - hping
  - Active vs. passive   08, 10
  - Responder

- **Wireless assessment tools**   10
  - Aircrack-ng
  - Reaver
  - oclHashcat   10, 22
- **Cloud infrastructure assessment tools**   44
  - ScoutSuite
  - Prowler
  - Pacu

1.5 Explain the threats and vulnerabilities associated with specialized technology.

- **Mobile**   34
- **Internet of Things (IoT)**   40
- **Embedded**   40
- **Real-time operating system (RTOS)**   40
- **System-on-Chip (SoC)**   40
- **Field programmable gate array (FPGA)**   40

- **Physical access control**   40
- **Building automation systems**   40
- **Vehicles and drones**   40
  - CAN bus
- **Workflow and process automation systems**   40
- **Industrial control system**   40

- **Supervisory control and data acquisition (SCADA)**   40
  - Modbus

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1.6 Explain the threats and vulnerabilities associated with operating in the cloud.

- **Cloud service models** 44
  - Software as a Service (SaaS)
  - Platform as a Service (PaaS)
  - Infrastructure as a Service (IaaS)
- **Cloud deployment models** 44
  - Public
  - Private
  - Community
  - Hybrid
- **Function as a Service (FaaS)/** 44,45
  serverless architecture
- **Infrastructure as code (IaC)** 47
- **Insecure application** 45
  programming interface (API)
- **Improper key management** 45
- **Unprotected storage** 45
- **Logging and monitoring** 45
  - Insufficient logging and monitoring
  - Inability to access

1.7 Given a scenario, implement controls to mitigate attacks and software vulnerabilities.

- **Attack types**
  - Extensible markup
    language (XML) attack 20
  - Structured query
    language (SQL) injection 20
  - Overflow attack
    - Buffer 19
    - Integer 20
    - Heap 19
  - Remote code execution 21
  - Directory traversal 20
  - Privilege escalation 23
  - Password spraying 22
  - Credential stuffing 22
  - Impersonation 35, also 18 & 31
  - On-path attack (previously known
    as man-in-the-middle attack) 23
  - Session hijacking 21
  - Rootkit 23
  - Cross-site scripting 20
    - Reflected
    - Persistent
    - Document object model (DOM)
- **Vulnerabilities** 18
  - Improper error handling
  - Dereferencing
  - Insecure object reference
  - Race condition
  - Broken authentication
  - Sensitive data exposure
  - Insecure components
  - Insufficient logging and monitoring
  - Weak or default configurations
  - Use of insecure functions
    - strcpy

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2.0 Software and Systems Security

2.1 Given a scenario, apply security solutions for infrastructure management.

- **Cloud vs. on-premises**
- **Asset management**
  - Asset tagging
- **Segmentation**
  - Physical
  - Virtual
  - Jumpbox
  - System isolation
    - Air gap
- **Network architecture**
  - Physical
  - Software-defined
- Virtual private cloud (VPC)
- Virtual private network (VPN)
- Serverless
- **Change management**
- **Virtualization**
  - Virtual desktop infrastructure (VDI)
- **Containerization**
- **Identity and access management**
  - Privilege management
  - Multifactor authentication (MFA)
  - Single sign-on (SSO)
  - Federation
- Role-based
- Attribute-based
- Mandatory
- Manual review
- **Cloud access security broker (CASB)**
- **Honeypot**
- **Monitoring and logging**
- **Encryption**
- **Certificate management**
- **Active defense**

2.2 Explain software assurance best practices.

- **Platforms**
  - Mobile
  - Web application
  - Client/server
  - Embedded
  - System-on-chip (SoC)
  - Firmware
- **Software development life cycle (SDLC) integration**
- **DevSecOps**
- **Software assessment methods**
- User acceptance testing
- Stress test application
- Security regression testing
- Code review
- **Secure coding best practices**
  - Input validation
  - Output encoding
  - Session management
  - Authentication
  - Data protection
  - Parameterized queries
- **Static analysis tools**
- **Dynamic analysis tools**
- **Formal methods for verification of critical software**
- **Service-oriented architecture**
  - Security Assertions Markup Language (SAML)
  - Simple Object Access Protocol (SOAP)
  - Representational State Transfer (REST)
  - Microservices

2.3 Explain hardware assurance best practices.

- **Hardware root of trust**
  - Trusted platform module (TPM)
  - Hardware security module (HSM)
- **eFuse**
- **Unified Extensible Firmware Interface (UEFI)**
- **Trusted foundry**
- **Secure processing**
  - Trusted execution
  - Secure enclave
  - Processor security extensions
  - Atomic execution
- **Anti-tamper**
- **Self-encrypting drive**
- **Trusted firmware updates**
- **Measured boot and attestation**
- **Bus encryption**

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3.0 Security Operations and Monitoring

3.1 Given a scenario, analyze data as part of security monitoring activities.

- **Heuristics**
- **Trend analysis**
- **Endpoint**
  - Malware
    - Reverse engineering
  - Memory
  - System and application behavior
    - Known-good behavior
    - Anomalous behavior
    - Exploit techniques
  - File system
  - User and entity behavior
    analytics (UEBA)
- **Network**
  - Uniform Resource Locator (URL) and
    domain name system (DNS) analysis
    - Domain generation algorithm
  - Flow analysis
  - Packet and protocol analysis
    - Malware

- **Log review**
  - Event logs
  - Syslog
  - Firewall logs
  - Web application firewall (WAF)
  - Proxy
  - Intrusion detection system (IDS)/
    Intrusion prevention system (IPS)
- **Impact analysis**
  - Organization impact
    vs. localized impact
  - Immediate vs. total
- **Security information and event
  management (SIEM) review**
  - Rule writing
  - Known-bad Internet protocol (IP)
  - Dashboard
- **Query writing**
  - String search
  - Script
  - Piping

- **E-mail analysis** all in 35
  - Malicious payload
  - Domain Keys Identified Mail (DKIM)
  - Domain-based Message
    Authentication, Reporting,
    and Conformance (DMARC)
  - Sender Policy Framework (SPF)
  - Phishing
  - Forwarding
  - Digital signature
  - E-mail signature block
  - Embedded links
  - Impersonation
  - Header

3.2 Given a scenario, implement configuration changes
to existing controls to improve security.

- **Permissions**
- **Allow list (previously
  known as whitelisting)**
- **Blocklist (previously known
  as blacklisting)**
- **Firewall**
- **Intrusion prevention system (IPS) rules**

- **Data loss prevention (DLP)**
- **Endpoint detection and response (EDR)**
- **Network access control (NAC)**
- **Sinkholing**
- **Malware signatures**
  - Development/rule writing
- **Sandboxing**

- **Port security**

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3.3 ## Explain the importance of proactive threat hunting.

- **Establishing a hypothesis**
- **Profiling threat actors and activities**
- **Threat hunting tactics**
  - Executable process analysis
- **Reducing the attack surface area**

- **Bundling critical assets**
- **Attack vectors**
- **Integrated intelligence**
- **Improving detection capabilities**

3.4 ## Compare and contrast automation concepts and technologies.

- **Workflow orchestration** 45
  - Security Orchestration,
    Automation, and Response (SOAR) 42
- **Scripting** 45
- **Application programming
  interface (API) integration**
- **Automated malware signature creation**

- **Data enrichment**
- **Threat feed combination**
- **Machine learning**
- **Use of automation protocols and standards**
  - Security Content Automation
    Protocol (SCAP)
- **Continuous integration**

- **Continuous deployment/delivery**

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4.0 Incident Response

4.1 Explain the importance of the incident response process.

- **Communication plan** 53
  - Limiting communication to trusted parties
  - Disclosing based on regulatory/legislative requirements
  - Preventing inadvertent release of information
  - Using a secure method of communication
  - Reporting requirements

- **Response coordination** 53 **with relevant entities**
  - Legal
  - Human resources
  - Public relations
  - Internal and external
  - Law enforcement
  - Senior leadership
  - Regulatory bodies

- **Factors contributing to data criticality** 53
  - Personally identifiable information (PII)
  - Personal health information (PHI)
  - Sensitive personal information (SPI)
  - High value asset
  - Financial information
  - Intellectual property
  - Corporate information

4.2 Given a scenario, apply the appropriate incident response procedure. 53

- **Preparation**
  - Training
  - Testing
  - Documentation of procedures
- **Detection and analysis**
  - Characteristics contributing to severity level classification
  - Downtime
  - Recovery time
  - Data integrity
  - Economic
  - System process criticality
  - Reverse engineering
  - Data correlation
- **Containment**
  - Segmentation

  - Isolation
- **Eradication and recovery**
  - Vulnerability mitigation
  - Sanitization
  - Reconstruction/reimaging
  - Secure disposal
  - Patching
  - Restoration of permissions
  - Reconstitution of resources
  - Restoration of capabilities and services
  - Verification of logging/communication to security monitoring
- **Post-incident activities**
  - Evidence retention

  - Lessons learned report
  - Change control process
  - Incident response plan update
  - Incident summary report
  - IoC generation
  - Monitoring

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4.3 Given an incident, analyze potential indicators of compromise. 24

- **Network-related**
  - Bandwidth consumption
  - Beaconing
  - Irregular peer-to-peer communication
  - Rogue device on the network
  - Scan/sweep
  - Unusual traffic spike
  - Common protocol over
    non-standard port
- **Host-related**
  - Processor consumption

- Memory consumption
- Drive capacity consumption
- Unauthorized software
- Malicious process
- Unauthorized change
- Unauthorized privilege
- Data exfiltration
- Abnormal OS process behavior
- File system change or anomaly
- Registry change or anomaly
- Unauthorized scheduled task

- **Application-related**
  - Anomalous activity
  - Introduction of new accounts
  - Unexpected output
  - Unexpected outbound
    communication
  - Service interruption
  - Application log

4.4 Given a scenario, utilize basic digital forensics techniques. 49

- **Network**
  - Wireshark
  - tcpdump
- **Endpoint**
  - Disk
  - Memory
- **Mobile**
- **Cloud**

- **Virtualization**
- **Legal hold**
- **Procedures**
- **Hashing**
  - Changes to binaries
- **Carving**
- **Data acquisition**

5.0 Compliance and Assessment

5.1 Understand the importance of data privacy and protection. 50 & as noted additionally

- **Privacy vs. security**
- **Non-technical controls**
  - Classification
  - Ownership
  - Retention
  - Data types
  - Retention standards   also 51
  - Confidentiality

- Legal requirements
- Data sovereignty
- Data minimization
- Purpose limitation
- Non-disclosure agreement (NDA)
- **Technical controls**
  - Encryption
  - Data loss prevention (DLP)

- Data masking
- Deidentification
- Tokenization
- Digital rights management (DRM)
  - Watermarking
- Geographic access requirements
- Access controls

5.2 Given a scenario, apply security concepts in 52 unless noted otherwise support of organizational risk mitigation.

- **Business impact analysis**
- **Risk identification process**
- **Risk calculation**
  - Probability
  - Magnitude
- **Communication of risk factors**
- **Risk prioritization**
  - Security controls 11
  - Engineering tradeoffs 16
- **Systems assessment**

- **Documented compensating controls**
- **Training and exercises**
  - Red team 27
  - Blue team 27
  - White team 27
  - Tabletop exercise
- **Supply chain assessment** 38
  - Vendor due diligence
  - Hardware source authenticity

5.3 Explain the importance of frameworks, policies, procedures, and controls.

- **Frameworks** 51
  - Risk-based
  - Prescriptive
- **Policies and procedures** 51
  - Code of conduct/ethics
  - Acceptable use policy (AUP)
  - Password policy
  - Data ownership

- Data retention
- Account management
- Continuous monitoring
- Work product retention
- **Control types** 11
  - Managerial
  - Operational
  - Technical

- Preventative
- Detective
- Responsive
- Corrective
- **Audits and assessments** 51
  - Regulatory
  - Compliance

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CompTIA Cybersecurity Analyst (CySA+) Acronym List

The following is a list of acronyms that appear on the CompTIA CySA+ exam. Candidates are encouraged to review the complete list and attain a working knowledge of all listed acronyms as a part of a comprehensive exam preparation program.

ACRONYM	SPELLED OUT
3DES	Triple Data Encryption Algorithm
ACL	Access Control List
AES	Advanced Encryption Standard
API	Application Programming Interface
ARP	Address Resolution Protocol
APT	Advanced Persistent Threat
ATT&CK	Adversarial Tactics, Techniques, and Common Knowledge
AUP	Acceptable Use Policy
BEC	Business Email Compromise
BYOD	Bring Your Own Device
CA	Certificate Authority
CAN	Controller Area Network
CASB	Cloud Access Security Broker
CI/CD	Continuous Integration/Continuous Delivery
CIS	Center for Internet Security
COBIT	Control Objectives for Information and Related Technology
CPU	Central Processing Unit
CRM	Customer Relations Management
CVSS	Common Vulnerability Scoring System
DDoS	Distributed Denial of Service
DGA	Domain Generation Algorithm
DHCP	Dynamic Host Configuration Protocol
DKIM	Domain Keys Identified Mail
DLP	Data Loss Prevention
DMARC	Domain-based Message Authentication, Reporting, and Conformance
DMZ	Demilitarized Zone
DNS	Domain Name System
DNSSEC	Domain Name System Security Extensions
DOM	Document Object Model
DRM	Digital Rights Management
EDR	Endpoint Detection and Response

ACRONYM	SPELLED OUT
ELK	Elasticsearch, Logstash, Kibana
ERP	Enterprise Resource Planning
FaaS	Function as a Service
FPGA	Field-programmable Gate Array
FTK	Forensic Toolkit
FTP	File Transfer Protocol
HIDS	Host Intrusion Detection System
HIPS	Host-based Intrusion Prevention System
HSM	Hardware Security Module
HTTP	Hypertext Transfer Protocol
IaaS	Infrastructure as a Service
IaC	Infrastructure as Code
ICMP	Internet Control Message Protocol
IDS	Intrusion Detection System
IMAP	Internet Message Access Protocol
IoC	Indicator of Compromise
IoT	Internet of Things
IP	Internet Protocol
IPS	Intrusion Prevention System
ISAC	Information Sharing and Analysis Center
ISO	International Organization for Standardization
ITIL	Information Technology Infrastructure Library
LAN	Local Area Network
LDAP	Lightweight Directory Access Protocol
MaaS	Monitoring as a Service
MAC	Mandatory Access Control
MD5	Message Digest 5
MDM	Mobile Device Management
MFA	Multifactor Authentication
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MRTG	Multi Router Traffic Grapher
NAC	Network Access Control
NAS	Network-attached Storage

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ACRONYM	SPELLED OUT	ACRONYM	SPELLED OUT
NAT	Network Address Translation	TAXII	Trusted Automated eXchange of Intelligence Information
NDA	Non-disclosure Agreement		
NIC	Network Interface Card	TCP	Transmission Control Protocol
NIDS	Network Intrusion Detection Systems	TFTP	Trivial File Transfer Protocol
NIST	National Institute of Standards and Technology	TLS	Transport Layer Security
OEM	Original Equipment Manufacturer	TPM	Trusted Platform Module
OSSIM	Open Source Security Information Management	UDP	User Datagram Protocol
OVAL	Open Vulnerability and Assessment Language	UEBA	User and Entity Behavior Analytics
OWASP	Open Web Application Security Project	UEFI	Unified Extensible Firmware Interface
PaaS	Platform as a Service	UEM	Unified Endpoint Management
PAM	Pluggable Authentication Module	URL	Uniform Resource Locator
PCAP	Packet Capture	USB	Universal Serial Bus
PCI	Payment Card Industry	UTM	Unified Threat Management
PHI	Personal Health Information	VDI	Virtual Desktop Infrastructure
PID	Process Identification Number	VLAN	Virtual Local Area Network
PII	Personally Identifiable Information	VoIP	Voice over Internet Protocol
PKI	Public Key Infrastructure	VPC	Virtual Private Cloud
RADIUS	Remote Authentication Dial-in User Service	VPN	Virtual Private Network
RDP	Remote Desktop Protocol	WAF	Web Application Firewall
REST	Representational State Transfer	WAN	Wide Area Network
RTOS	Real-time Operating System	XML	Extensible Markup Language
SaaS	Software as a Service	XSS	Cross-site Scripting
SAML	Security Assertions Markup Language	ZAP	Zed Attack Proxy
SCADA	Supervisory Control and Data Acquisition		
SCAP	Security Content Automation Protocol		
SDLC	Software Development Life Cycle		
SFTP	SSH File Transfer Protocol		
SHA	Secure Hash Algorithm		
SIEM	Security Information and Event Management		
SLA	Service Level Agreement		
SMB	Server Message Block		
SOAP	Simple Object Access Protocol		
SOAR	Security Orchestration, Automation, and Response		
SOC	Security Operations Center		
SoC	System on Chip		
SPF	Sender Policy Framework		
SPI	Sensitive Personal Information		
SQL	Structured Query Language		
SSH	Secure Shell		
SSHD	Solid-state Hybrid Drive		
SSID	Service Set Identifier		
SSL	Secure Sockets Layer		
SSO	Single Sign-on		
STIX	Structured Threat Information eXpression		
TACACS+	Terminal Access Controller Access Control System Plus		

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CySA+ Proposed Hardware and Software List

CompTIA has included this sample list of hardware and software to assist candidates as they prepare for the CySA+ exam. This list may also be helpful for training companies that wish to create a lab component for their training offering. The bulleted lists below each topic are samples and are not exhaustive.

IT HARDWARE
- Workstation (or laptop) with ability to run VM
- Managed switch
- Firewall
- Mobile phones
- VoIP Phone
- WAP
- IDS/ IPS
- IoT Devices
- Servers

SOFTWARE
- VM images for attack targets
- Windows Server
- Windows Client
  - Commando VM
- Linux
  - Kali
  - ParrotOS
  - Security Onion
- Chrome OS
- UTM Appliance
- pfSense
- Metasploitable

- Access to cloud instances
  - Azure
  - AWS
  - GCP
- SIEM
  - Graylog
  - ELK
  - Splunk
- Vulnerability scanner
  - OpenVAS
  - Nessus