KSA Description	Data Management Cross-Cut	Netowrking Cross-Cut	Software Development Cross-Cut	Generalist Cross-Cut	Machine Learning Cross-Cut	Data Analytics Cross-Cut	Cybersecurity Cross-Cut
Differentiate common data typologies, including structured vs. unstructured, numeric vs. text, root vs. derived.				1b		1d	
Explain and demonstrate how differences in data and desired outcomes impact the appropriateness of data analysis techniques (e.g., descriptive vs. diagnostic vs. predictive vs. prescriptive).				1e	1b	5c	
Demonstrate knowledge of probability and standard statistical distributions.				2a		5a	
Demonstrate and explain the role and importance of model validation and accuracy metrics in analytics projects, hypothesis testing, and information retrieval.				2c		5d	
Perform basic data manipulation and exploration using appropriate tools and software, including use of key Excel functions.				3a	4f	4c	
Create and edit simple data structures and storage, understanding how version control affects each.				3b		4d	
Explain the role of data visualization in discovery, communication, and decision-making.				4a	3a	6a	
Evaluate data visualization options for proper application in various situations.				4b	3b	6c	
Create effective static and interactive data visualizations or storytelling that employ analytics and visualization software and strategies for various audiences.				4c	3c	6e	
Visualize data using various types of displays including tables, dashboards, graphs, maps, and trees.				4d	3d	6d	
Distinguish between advanced visualizations and explain the advantages of each.				4e	3e		
Discuss techniques for creating advanced data visualizations.				4f	3f		
Apply the principles of color, composition, and hierarchy to design.				4g	3g		
Properly define a problem in context, use appropriate data, and deliver a compelling visualization to explain or answer a question.				4h	3h	6f	
Understanding of ADA/508 compliance for accessibility.				4i	3i		
Identify how global legal, policy and/or ethical constraints might impact data analyses.				5a	5a	8a	
Identify the established ethical and legal issues in data management facing organizations.	3e			5b	5b	8b	
Explain how ethical, compliance, and legal issues should/must be considered in data driven decision making.				5c	5c	8c	
Explain the importance of personal privacy issues related to the collection and usage of data.	3f			5d	5g	8i	
Explain the important issues around data governance.				5e	5d	1b	
Demonstrate an understanding of cloud architecture and the capabilities of services such as AWS, Azure, IBM, Oracle and Google.	1p	1a	1g		1i		4d
Describe the fundamental cloud components (e.g., shared or dedicated processing, storage, memory, networking, hypervisor).		1b					4a
Differentiate between public, private, and hybrid clouds.		1c					4b
Identify common breaches and threats in the cloud environment.		1d					4f
Instantiate a small computing environment in a cloud service.		1e					4e
Explain the pros and cons of on-premises vs cloud-based analytics solutions.		1f				2c	
Understand how to set security configurations in a cloud environment.		1h					4g
Understand the concept of opening/extending the network perimeter and the role of a cloud access security broker (CASB).		1i					8u

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Identify and apply Transmission Control Protocol and Internet Protocol (TCP/IP), Internet Protocol Version 4 (IPv4), Internet Protocol Version 6 (IPv6) applications and services (e.g., rlogin, Simple Mail Transfer Protocol [SMTP], Telecommunications Network [Telnet], File Transfer Protocol [FTP], Domain Name System [DNS], Network File System [NFS], Voice over Internet Protocol [VoIP], Internet Control Message Protocol [ICMP]).		2h	1n				
Explain DNS traffic.		3a					2k
Identify the layers of the OSI Model.		3c					2c
Summarize the responsibilities of each layer of the OSI Model.		3d					2d
Explain how the OSI Model is applied in networking.		3e					2e
Configure IPv4 and IPv6 classful subnets.		3f					2f
Compare public IP addresses and private IP addresses.		3g					2g
Identify IPv4 address network ID (Class A, Class B, Class C).		3h					2h
Interpret classless network ID (CIDR block notation).		3i					2i
Explain domain naming conventions (UNC path, FQDN, host name).		3j					2l
Compare Network Address Translation and Port Address Translation (NAT vs PAT).		3k					2n
Draw a network diagram.		3l					2o
Analyze the output from networking utilities (e.g. Netstat, Tracert, Traceroute, Ping IPConfig, IFConfig).		3m					2p
Discuss network software integration (client software (e.g. Windows 10 or Ubuntu) and server software).		3n					2q
Discuss network hardware integration (workstations, desktop, mobile devices).		3o					2r
Communicate best practices for troubleshooting networking issues (layers 1-2 at HS level) (7-step model).		3p					2s
Explain data security in terms of authentication, authorization, access and auditing.		4g	1l				
Ability to install and configure software.	1s	5a	1h				1d
Identify and describe basic file types and demonstrate fundamental file management.	1r	5f	1k				1g
Identify common coding errors that lead to insecure programs (e.g., buffer overflows, memory leaks, malicious code) and apply strategies for avoiding such errors.			10a				11d
Apply the principles of least privilege, defensive programming, and fail-safe defaults.			10d				11e
Write code with logging capabilities.			10f				11f
Understand basics of securing web apps - SQL Injection and other input validation.			10h				11i
Ability to normalize a database through 3rd normal form.	2j		1a				
Apply SQL data manipulation language such as Select (From), Insert, Update, Delete, JOIN (inner, outer, full, left, right), Where, Group By, Order By, etc.	1l		1d				
Identify and differentiate structured vs unstructured data.	1g		1o				
Demonstrate fundamental programming skills including the use of variables, loops, conditional branching, and program logic.	1m		2c				3a
Design, implement, test, and debug a program that uses each of the following fundamental programming constructs: basic computation, simple I/O, standard conditional and iterative structures.			2d				3b
Write a program that uses file I/O to provide persistence across multiple executions.			2g				3c
Write programs that use each of the following data structures: arrays, records/structs, strings, linked lists, stacks, queues, sets, and maps.			3c				3f
Choose the appropriate data structure for modeling a given problem.			3f				11a
Implement a divide-and-conquer algorithm for solving a problem.			5g				11b

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Implement a coherent abstract data type, with loose coupling between components and behaviors.			5i				11c
Explain core statistical inference concepts (for example, deriving relevant hypotheses, evaluating the hypotheses, and prediction with uncertainty).					1a	5b	
Explain core probability concepts (e.g., random variables, key distributions, conditional probability, Bayes theorem).					1c	5e	
Identify and describe several SDLC models (e.g., waterfall, Agile).					1f	7c	
Provide rationale for selecting the appropriate sampling methodology.					4g	5j	
Present real world examples of data bias and the unintended consequences of using analytics, machine learning, and AI in making decisions.					5e	8e	
Discuss the importance of provenance, transparency, and explainability in data analysis and the ability to build trust.					5f	8d	
Explain the limitations and potential unintended effects of data analysis when such algorithms encounter new scenarios.					5i	8j	
Explain individual and data bias and the implications each has in data analysis.	3j			5f	5k		
Describe the implications of data architecture on data processing such as data fabric.	1n					2d	