## 1. SSH and Domain Setup (Secure Remote Access)

❓ Example Question: How do you configure a router for secure SSH access using a domain name, RSA key, and local user login?

|  |  |
| --- | --- |
| **Router(config)#** | **hostname S1** |
| **Router(config)#** | **ip domain-name cisco.com** |
| **Router(config)#** | **crypto key generate rsa general-keys modulus 1024** |
| **Router(config)#** | **ip ssh version 2** |
| **Router(config)#** | **ip ssh time-out 60** |
| **Router(config)#** | **ip ssh authentication-retries 2** |
| **Router(config)#** | **username admin secret P@ssword123** |
| **Router(config)#** | **line vty 0 15** |
| **Router(config-line)#** | **transport input ssh** |
| **Router(config-line)#** | **login local** |
|  |  |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router#** **show ip ssh**

**Router# show running-config | include username|domain|crypto**

**Router# show ssh**

## 2. Console and VTY Line Security

❓ Example Question: How do you set up password authentication for console and vty lines?

|  |  |
| --- | --- |
| **Router(config)#** | **line console 0** |
| **Router(config-line)#** | **password cisco** |
| **Router(config-line)#** | **login** |
| **Router(config)#** | **line vty 0 15** |
| **Router(config-line)#** | **password cisco** |
| **Router(config-line)#** | **login** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router#** **show running-config | section line**

**Router#** **show login**

## 3. Enabling and Encrypting Passwords

❓ Example Question: What are the steps to enable encrypted privileged mode access and encrypt all plaintext passwords?

|  |  |
| --- | --- |
| **Router(config)#** | **enable secret class** |
| **Router(config)#** | **service password-encryption** |
|  |  |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router# show running-config | include enable**

**Router# show running-config | include service password**

## 4. VLAN Configuration and Port Assignment

❓ Example Question: How do you create VLANs and assign ports to them on a switch?

|  |  |
| --- | --- |
| **Switch(config)#** | **vlan 20** |
| **Switch(config-vlan)#** | **name Management** |
| **Switch(config)#** | **int fa0/1** |
| **Switch(config-if)#** | **switchport mode access** |
| **Switch(config-if)#** | **switchport access vlan 10** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Switch# show vlan brief**

**Switch# show interfaces status**

## 5. Trunk Port Configuration

❓ Example Question: How do you configure a trunk link between two switches?

|  |  |
| --- | --- |
| **Switch(config)#** | **int fa0/1** |
| **Switch(config-if)#** | **switchport mode trunk** |
| **Switch(config-if)#** | **switchport trunk vlan 100** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Switch# show interfaces trunk**

**Switch# show running-config interface fa0/1**

## 6. Router-on-a-Stick (Inter-VLAN Routing)

❓ Example Question: How do you configure a router to perform inter-VLAN routing on a trunk link?

|  |  |
| --- | --- |
| **Router(config)#** | **int g0/0/0** |
| **Router(config-if)#** | **no shut** |
| **Router(config)#** | **int g0/0/0.10** |
| **Router(config-subif)#** | **encapsulation dot1q 10 native** |
| **Router(config-subif)#** | **ip address 192.168.10.1 255.255.255.0** |
| **Router(config)#** | **int g0/0/0.20** |
| **Router(config-subif)#** | **encapsulation dot1q 20** |
| **Router(config-subif)#** | **ip address 192.168.20.1 255.255.255.0** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router# show ip interface brief**

**Router# show running-config interface g0/0/0.10**

**Router# show running-config interface g0/0/0.20**

## 7. Configuring Standard ACLs (Access Control Lists)

❓ Example Question: How do you permit traffic from a specific network and apply that rule to an interface?

|  |  |
| --- | --- |
| **Router(config)#** | **access-list 10 permit 192.168.30.0 0.0.0.255** |
| **Router(config)#** | **access-list 10 deny any** |
| **Router(config)#** | **interface s0/0/0** |
| **Router(config-if)#** | **ip access-group 10 in** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router# show access-lists**

**Router# show ip interface s0/0/0**

## 8. Configuring Extended ACLs (Filter by Protocol and Ports)

❓ Example Question: How do you restrict Telnet/SSH access to a device from specific hosts using extended ACLs?

|  |  |
| --- | --- |
| **Router(config)#** | **ip access-list extended VTY** |
| **Router(config-ext-nacl)#** | **permit tcp host 172.16.1.100 host 192.168.2.1 eq 22** |
| **Router(config-ext-nacl)#** | **permit tcp host 172.16.1.100 host 192.168.2.1 eq 23** |
| **Router(config-ext-nacl)#** | **deny tcp any any eq 22** |
| **Router(config-ext-nacl)#** | **deny tcp any any eq 23** |
| **Router(config-ext-nacl)#** | **permit ip any any** |
| **Router(config)#** | **interface g0/0/1** |
| **Router(config-if)#** | **ip access-group VTY in** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router# show ip access-lists**

**Router# show running-config | section access-list**

**Router# show ip interface g0/0/1**

## 9. NTP and Clock Configuration

❓ Example Question: How do you set the time, timezone, and synchronize a router with an NTP server?

|  |  |
| --- | --- |
| **Router(config)#** | **clock timezone EST -5** |
| **Router(config)#** | **clock summer-time EDT recurring** |
| **Router# (exec)** | **clock set 20:52:49 21 October 201** |
| **Router(config)#** | **ntp authenticate** |
| **Router(config)#** | **ntp trusted-key 1** |
| **Router(config)#** | **ntp authentication-key 1 md5 NTPpa55** |
| **Router(config)#** | **ntp master 2** |
| **Router(config)#** | **ntp server 172.16.2.2** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router# show clock**

**Router# show ntp associations**

**Router# show ntp status**

## 10. AAA Configuration with RADIUS and TACACS+

❓ Example Question: How do you configure centralized authentication using RADIUS and TACACS+ servers?

|  |  |
| --- | --- |
| **Router(config)#** | **aaa new-model** |
| **Router(config)#** | **aaa authentication login default local** |
| **Router(config)#** | **radius server SERVER-R** |
| **Router(config-radius-server)#** | **address ipv4 10.0.0.2 auth-port 1645** |
| **Router(config-radius-server)#** | **key c1sc0** |
| **Router(config)#** | **tacacs-server host 10.0.0.2 key c1sc0** |
| **Router(config)#** | **aaa authentication login default group tacacs+** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router# show aaa servers**

**Router# show running-config | section aaa**

## 11. Logging and Syslog Configuration

❓ Example Question: How do you configure a router to send system logs to a remote syslog server?

|  |  |
| --- | --- |
| **Router(config)#** | **logging console 3** |
| **Router(config)#** | **logging buffered 2** |
| **Router(config)#** | **logging host 172.16.3.9** |
| **Router(config)#** | **logging trap 1** |
| **Router(config)#** | **service timestamps log datetime** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router# show logging**

**Router# show running-config | include logging**

## 12. OSPF with MD5 Authentication

❓ Example Question: How do you enable MD5 authentication for OSPF on a specific router interface?

|  |  |
| --- | --- |
| **Router(config)#** | **router ospf 10** |
| **Router(config-router)#** | **area 0 authentication message-digest** |
| **Router(config)#** | **interface g0/0/0** |
| **Router(config-if)#** | **ip ospf message-digest-key 1 md5 cisco123** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router# show ip ospf interface**

**Router# show running-config | section ospf**

## 13. Port Security on Switch Interfaces

❓ Example Question: How do you enable port security on a switch and limit the number of MAC addresses?

|  |  |
| --- | --- |
| **Switch(config)#** | **interface fa0/1** |
| **Switch(config-if)#** | **switchport mode access** |
| **Switch(config-if)#** | **switchport port-security** |
| **Switch(config-if)#** | **switchport port-security maximum 3** |
| **Switch(config-if)#** | **switchport port-security mac-address sticky** |
| **Switch(config-if)#** | **switchport port-security violation protect** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Switch# show port-security interface fa0/1**

**Switch# show port-security**

## 14. Zone-Based Policy Firewall (ZBF)

❓ Example Question: How do you define security zones and apply firewall policies using Cisco ZBF?

|  |  |
| --- | --- |
| **Router(config)#** | **zone security INSIDE** |
| **Router(config)#** | **zone security OUTSIDE** |
| **Router(config)#** | **interface g0/0/0** |
| **Router(config-if)#** | **zone-member security INSIDE** |
| **Router(config)#** | **interface g0/0/1** |
| **Router(config-if)#** | **zone-member security OUTSIDE** |
| **Router(config)#** | **class-map type inspect match-any HTTP-TRAFFIC** |
| **Router(config-cmap)#** | **match protocol http** |
| **Router(config)#** | **policy-map type inspect POLICY-1** |
| **Router(config-pmap)#** | **class type inspect HTTP-TRAFFIC** |
| **Router(config-pmap-c)#** | **inspect** |
| **Router(config)#** | **zone-pair security ZP-INSIDE-OUTSIDE source INSIDE destination OUTSIDE** |
| **Router(config-sec-zone-pair)#** | **service-policy type inspect POLICY-1** |
|  |  |

### 📋 Verification and Troubleshooting Commands:

**Router# show zone security**

**Router# show policy-map type inspect zone-pair**

**Router# show class-map type inspect**

**Router# show policy-map type inspect**

**15. RADIUS Server Configuration for AAA Authentication**

***❓ Example Question: How do you define and configure a named RADIUS server and use it for login authentication?***

|  |  |
| --- | --- |
| **Router(config)#** | **radius server SERVER-R** |
| **Router(config-radius-server)#** | **address ipv4 10.0.0.2 auth-port 1645** |
| **Router(config-radius-server)#** | **key c1sc0** |
| **Router(config)#** | **aaa new-model** |
| **Router(config)#** | **aaa authentication login default group radius local** |
|  |  |

**📋 Verification and Troubleshooting Commands:**

**Router# show running-config | section radius**

**Router# show aaa servers**

**Router# show running-config | section aaa**