# Tracer for Dummies: Complete Cisco IOS Master Guide (With Verification)

## 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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?

|  |  |
| --- | --- |
| Command Prompt | Command |
| 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