Networking Academy

NAME: BEATRICE ANN DAVID A23CS0055

LAB 2:
11.5.5: Packet Tracer – Subnet an IPv4 Network

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
CustomerRouter	G0/0			N/A
	G0/1			
	S0/1/0	209.165.201.2	255.255.255.252	
LAN-A Switch	VLAN1			
LAN-B Switch	VLAN1			
PC-A	NIC			
PC-B	NIC			
ISPRouter	G0/0	209.165.200.225	255.255.255.224	N/A
	S0/1/0	209.165.201.1	255.255.255.252	
ISPSwitch	VLAN1	209.165.200.226	255.255.255.224	209.165.200.225
ISP Workstation	NIC	209.165.200.235	255.255.255.224	209.165.200.225
ISP Server	NIC	209.165.200.240	255.255.255.224	209.165.200.225

Objectives

Part 1: Design an IPv4 Network Subnetting Scheme Part

2: Configure the Devices

Part 3: Test and Troubleshoot the Network

Background / Scenario

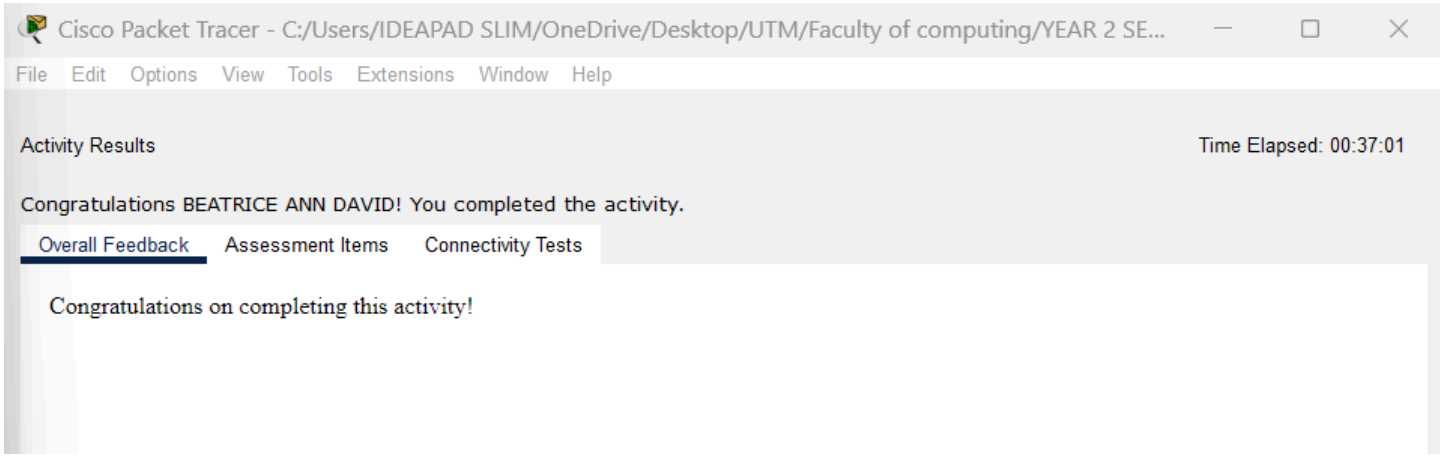
In this activity, you will subnet the Customer network into multiple subnets. The subnet scheme should be based on the number of host computers required in each subnet, as well as other network considerations, like future network host expansion.

After you have created a subnetting scheme and completed the table by filling in the missing host and interface IP addresses, you will configure the host PCs, switches and router interfaces.

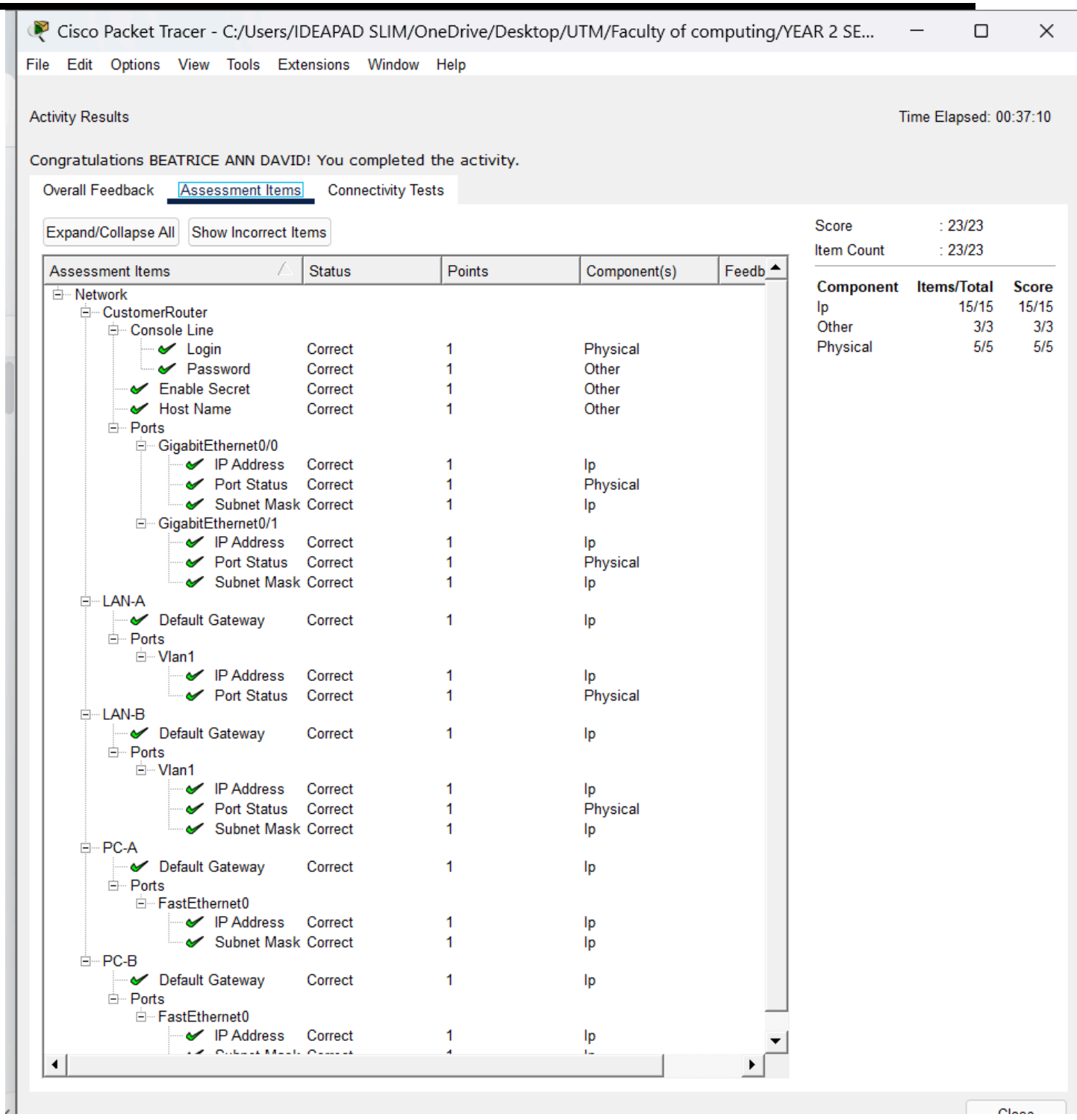
After the network devices and host PCs have been configured, you will use the **ping** command to test for network connectivity.

Screenshot:

A. Results



Packet Tracer – Subnet an IPv4 Network



B. Working

Part 1: Subnet the Assigned Network

Step 1: Create a subnetting scheme that meets the required number of subnets and required number of host addresses.

In this scenario, you are a network technician assigned to install a new network for a customer. You must create multiple subnets out of the 192.168.0.0/24 network address space to meet the following requirements:

a. The first subnet is the LAN-A network. You need a minimum of 50 host IP addresses.

b. The second subnet is the LAN-B network. You need a minimum of 40 host IP addresses.

c. You also need at least two additional unused subnets for future network expansion.

Note: Variable length subnet masks will not be used. All of the device subnet masks should be the same length.

d. Answer the following questions to help create a subnetting scheme that meets the stated network requirements:

How many host addresses are needed in the largest required subnet?

50 hosts

What is the minimum number of subnets required?

4

The network that you are tasked to subnet is 192.168.0.0/24. What is the /24 subnet mask in binary?

11111111.11111111.11111111.00000000

e. The subnet mask is made up of two portions, the network portion, and the host portion. This is represented in the binary by the ones and the zeros in the subnet mask.

In the network mask, what do the ones represent?

Network portion

In the network mask, what do the zeros represent?

Host portion

f. To subnet a network, bits from the host portion of the original network mask are changed into subnet bits. The number of subnet bits defines the number of subnets.

Given each of the possible subnet masks depicted in the following binary format, how many subnets and how many hosts are created in each example?

Hint: Remember that the number of host bits (to the power of 2) defines the number of hosts per subnet (minus 2), and the number of subnet bits (to the power of two) defines the number of subnets. The subnet bits (shown in bold) are the bits that have been borrowed beyond the original network mask of /24. The /24 is the prefix notation and corresponds to a dotted decimal mask of 255.255.255.0.

1) (/25) 11111111.11111111.11111111.**1**0000000

Dotted decimal subnet mask equivalent:

255.255.255.128

Number of subnets? Number of hosts?

Subnets: 2
Hosts: 126

2) (/26) 11111111.11111111.11111111.**11**000000

Dotted decimal subnet mask equivalent:

255.255.255.192

Number of subnets? Number of hosts?
Subnets: 4
Hosts: 62

3) (/27) 11111111.11111111.11111111.**111**00000

Dotted decimal subnet mask equivalent:

255.255.255.224

Number of subnets? Number of hosts?

Subnets: 8
Hosts: 30

4) (/28) 11111111.11111111.11111111.**1111**0000

Dotted decimal subnet mask equivalent:

255.255.255.240

Number of subnets? Number of hosts?
Subnets: 16
Hosts: 14

5) (/29) 11111111.11111111.11111111.**11111**000

Dotted decimal subnet mask equivalent:

255.255.255.248

Number of subnets? Number of hosts?

Subnets: 32
Hosts: 6

6) (/30) 11111111.11111111.11111111.**111111**00

Dotted decimal subnet mask equivalent:

255.255.255.252

Number of subnets? Number of hosts?

Subnets: 64
Hosts: 2

Considering your answers above, which subnet masks meet the required number of minimum host addresses?

255.255.255.128 and 255.255.255.192

Considering your answers above, which subnet masks meets the minimum number of subnets required?

255.255.255.192, 255.255.255.224, 255.255.255.240, 255.255.255.248, 255.255.255.252

Considering your answers above, which subnet mask meets both the required minimum number of hosts and the minimum number of subnets required?

255.255.255.192,

When you have determined which subnet mask meets all of the stated network requirements, derive each of the subnets. List the subnets from first to last in the table. Remember that the first subnet is 192.168.0.0 with the chosen subnet mask.

Subnet Address	Prefix	Subnet Mask
192.168.0.0	/26	255.255.255.192
192.168.0.64	/26	255.255.255.192
192.168.0.128	/26	255.255.255.192
192.168.0.192	/26	255.255.255.192

NETWORK ADDRESS	FIRST USABLE IP ADDRESS	LAST USABLE IP ADDRESS	BROADCAST ADDRESS	NO. OF HOST PER SUBNET	Prefix	Subnet Mask
192.168.0.0	192.168.0.1	192.168.0.62	192.168.0.63	64	/26	255.255.255.192
192.168.0.64	192.168.0.65	192.168.0.126	192.168.0.127	64	/26	255.255.255.192
192.168.0.128	192.168.0.129	192.168.0.190	192.168.0.191	64	/26	255.255.255.192
192.168.0.192	192.168.0.193	192.168.0.254	192.168.0.255	64	/26	255.255.255.192

Step 2: Fill in the missing IP addresses in the Addressing Table

Assign IP addresses based on the following criteria: Use the ISP Network settings as an example.

a. Assign the first subnet to LAN-A.

1) Use the first host address for the CustomerRouter interface connected to LAN-A switch.
2) Use the second host address for the LAN-A switch. Make sure to assign a default gateway address for the switch.
3) Use the last host address for PC-A. Make sure to assign a default gateway address for the PC.

b. Assign the second subnet to LAN-B.

1) Use the first host address for the CustomerRouter interface connected to LAN-B switch.
2) Use the second host address for the LAN-B switch. Make sure to assign a default gateway address for the switch.
3) Use the last host address for PC-B. Make sure to assign a default gateway address for the PC.

UPDATED ADDRESSING TABLE:

Device	Interface	IP Address	Subnet Mask	Default Gateway
CustomerRouter	G0/0	*192.168.0.1*	*255.255.255.192*	N/A
	G0/1	*192.168.0.65*	*255.255.255.192*	
	S0/1/0	209.165.201.2	255.255.255.252	
LAN-A Switch	VLAN1	*192.168.0.2*	*255.255.255.192*	*192.168.0.1*
LAN-B Switch	VLAN1	*192.168.0.66*	*255.255.255.192*	*192.168.0.65*
PC-A	NIC	*192.168.0.62*	*255.255.255.192*	*192.168.0.1*
PC-B	NIC	*192.168.0.126*	*255.255.255.192*	*192.168.0.65*
ISPRouter	G0/0	209.165.200.225	255.255.255.224	N/A
	S0/1/0	209.165.201.1	255.255.255.252	
ISPSwitch	VLAN1	209.165.200.226	255.255.255.224	209.165.200.225
ISP Workstation	NIC	209.165.200.235	255.255.255.224	209.165.200.225
ISP Server	NIC	209.165.200.240	255.255.255.224	209.165.200.225

Part 2: Configure the Devices

Configure basic settings on the PCs, switches, and router. Refer to the Addressing Table for device names and address information.

Step 1: Configure CustomerRouter.

a. Set the enable secret password on CustomerRouter to **Class123**

b. Set the console login password to **Cisco123**.

c. Configure **CustomerRouter** as the hostname for the router.

d. Configure the G0/0 and G0/1 interfaces with IP addresses and subnet masks, and then enable them.

e. Save the running configuration to the startup configuration file.

```
Router>enable
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#enable secret Class123
Router(config)#line console 0
Router(config-line)#password Class123
Router(config-line)#login
Router(config-line)#exit
Router(config)#hostname CustomerRouter
CustomerRouter(config)#interface gigabitEthernet0/0
CustomerRouter(config-if)#ip address 192.168.0.1 255.255.255.192
CustomerRouter(config-if)#no shutdown

CustomerRouter(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

CustomerRouter(config-if)#interface gigabitEthernet0/1
CustomerRouter(config-if)#ip address 192.168.0.65 255.255.255.192
CustomerRouter(config-if)#no shutdown

CustomerRouter(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

CustomerRouter(config-if)#^Z
CustomerRouter#
%SYS-5-CONFIG_I: Configured from console by console

CustomerRouter#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
CustomerRouter#
```

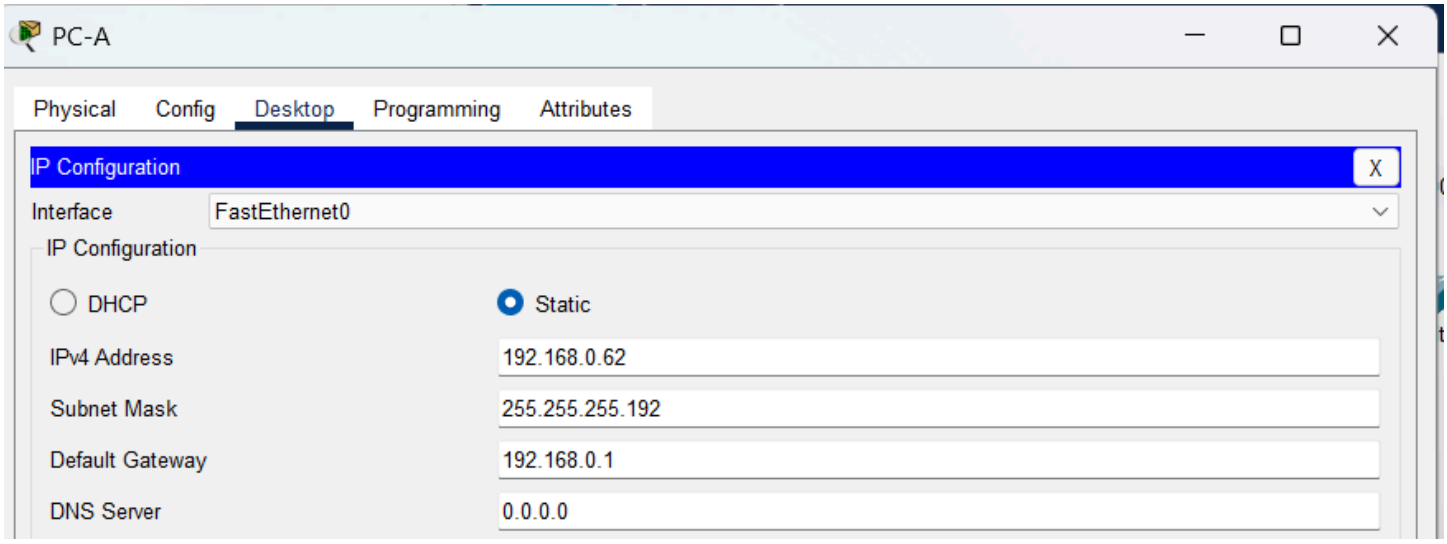
Step 2: Configure the two customer LAN switches.

Configure the IP addresses on interface VLAN 1 on the two customer LAN switches. Make sure to configure the correct default gateway on each switch.

```
Switch>enable
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#ip address interface vlan 1
                    ^
% Invalid input detected at '^' marker.

Switch(config)#interface vlan 1
Switch(config-if)#ip address 192.168.0.66 255.255.255.192
Switch(config-if)#no shutdown

Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Switch(config-if)#exit
Switch(config)#ip default-gateway 192.168.0.65
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Switch#
```

Step 3: Configure the PC interfaces.

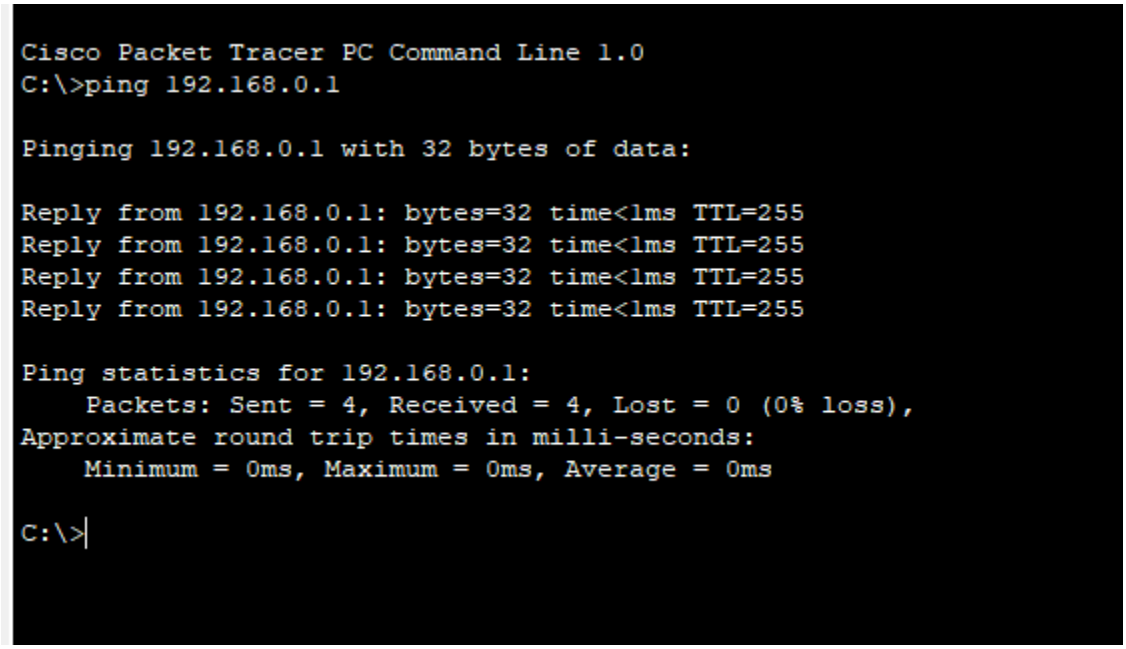
Configure the IP address, subnet mask, and default gateway settings on **PC-A** and **PC-B**.



Part 3: Test and Troubleshoot the Network

In Part 3, you will use the **ping** command to test network connectivity.

a. Determine if PC-A can communicate with its default gateway. Do you get a reply?



Yes

b. Determine if PC-B can communicate with its default gateway. Do you get a reply?

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.65

Pinging 192.168.0.65 with 32 bytes of data:

Reply from 192.168.0.65: bytes=32 time<1ms TTL=255
Reply from 192.168.0.65: bytes=32 time<1ms TTL=255
Reply from 192.168.0.65: bytes=32 time<1ms TTL=255
Reply from 192.168.0.65: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.0.65:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Yes

c. Determine if PC-A can communicate with PC-B. Do you get a reply?

```
C:\>ping 192.168.0.126

Pinging 192.168.0.126 with 32 bytes of data:

Reply from 192.168.0.126: bytes=32 time<1ms TTL=127
Reply from 192.168.0.126: bytes=32 time<1ms TTL=127
Reply from 192.168.0.126: bytes=32 time<1ms TTL=127
Reply from 192.168.0.126: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.0.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Yes

If you answered “no” to any of the preceding questions, then you should go back and check your IP address and subnet mask configurations, and ensure that the default gateways have been correctly configured on PC- A and PC-B.