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# *420-A32 - Networks*

# *IP Addressing and Subnetting*

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**Question 1 (50%)**

**Assumptions:**

1. The computer and printer in the shared room can be added to the teacher’s lounge subnet.
2. All other rooms must be on their own subnet.
3. You are given a single IP address for the whole school. It is 192.168.100.100
4. Each computer or printer will need an IP address.
5. Assume that the first available IP address in each subnet will be used for the Default Gateway. All others are free to be used for equipment.

**Answer the following questions:**

1. How many subnets do we need?

6 subnets because the teacher’s lounge and the shared room are on the same subnet

1. How many hosts will each subnet be able to support taking into account the Default Gateway which uses one of the available IP addresses?

32 IP addresses, 1 reserved for the network ID, one for the broadcast address, so you can support 30 hosts.

1. What will be your subnet mask in decimal?

The subnet mask in decimal will be 255.255. 255. 224

1. What will be the network address of each subnet?

192.168.100.32

192.168.100.64

192.168.100.96

192.168.100.128

192.168.100.160

192.168.100.192

1. What will be the broadcast address of each subnet?

192.168.100.63

192.168.100.95

192.168.100.127

192.168.100.159

192.168.100.191

192.168.100.223

1. What will be the IP address range of each subnet?

192.168.100.32 - 192.168.100.63

192.168.100.64 - 192.168.100.95

192.168.100.96 - 192.168.100.127

192.168.100.128 - 192.168.100.159

192.168.100.160 - 192.168.100.191

192.168.100.192 - 192.168.100.223

1. You **do not** have to draw a diagram. Instead make a table for each room that shows the Network Address, the Default Gateway address and the Broadcast address for that room plus gives a static IP address to each of the devices in the room within their allowable subnet range. You do not have to give addresses to the routers or switches.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Room | Network address | Default Gateway | Broadcast address | Static IP |
| Classroom 1 | 192.168.100.32 | 192.168.100.33 | 192.168.100.63 |  |
| Classroom 2 | 192.168.100.64 | 192.168.100.65 | 192.168.100.95 |  |
| Classroom 3 | 192.168.100.96 | 192.168.100.97 | 192.168.100.127 |  |
| Classroom 4 | 192.168.100.128 | 192.168.100.129 | 192.168.100.159 |  |
| Library | 192.168.100.160 | 192.168.100.161 | 192.168.100.191 |  |
| teacher + shared | 192.168.100.192 | 192.168.100.193 | 192.168.100.223 |  |

**Question 2 (30%)**

Assume an Internet Service Provider (ISP) has the following address block available to them to assign to their customers: 128.211.0.0/16

Subnet mask: 255.255.0.0

* 1. Suppose the ISP has three customers, one customer needs 12 IP addresses, the second 10 addresses and the third customer needs 9. Subnet this IP address so that the number of hosts for each subnet is the smallest it can be but still allow each customer to have the required number of hosts.

The network ID will be subnetted into 8 subnets, minus one for the all 0s subnet and one for the all 1s subnet.

* 1. How many subnets will be available and how many hosts are available within each subnet.

6 subnets will be available and each subnet will be able to support 256 hosts, minus one for the network ID, one for the default gateway and one for the broadcast address.

* 1. Assign the three lowest subnet network addresses to these three customers. For each customer show their subnet network address, broadcast address and the range of available IP addresses on their subnet.

|  |  |  |
| --- | --- | --- |
| Subnet network address | | |
| Customer 1 | Customer 2 | Customer 3 |
| 128.211.32.0 | 128.211.63.0 | 128.211.93.0 |

|  |  |  |
| --- | --- | --- |
| Subnet broadcast address | | |
| Customer 1 | Customer 2 | Customer 3 |
| 128.211.62.0 | 128.211.92.0 | 128.211.123.0 |

|  |  |  |
| --- | --- | --- |
| Subnet address range | | |
| Customer 1 | Customer 2 | Customer 3 |
| 128.211.32.0-128.211.62.0 | 128.211.63.0-128.211.92.0 | 128.211.93.0-128.211.123.0 |

**Question 3 (20%)**

Network Address: 192.168.100.0

Subnet mask: 255.255.255.240

1. What is the slash notation for this network address?

/28 is the slash notation for this subnet mask

1. How many subnets can be supported if the all zeroes and all ones subnets are not used?

14 subnets can be supported

1. How many host addresses can there be per subnet?

16 host addresses

1. How many usable host addresses are there per subnet?

14 usable hosts because one is taken up by the network ID, and the other by the broadcast address.

1. What is the network address for each subnet?

|  |  |
| --- | --- |
| 192.168.100.28 | 192.168.100.126 |
| 192.168.100.42 | 192.168.100.140 |
| 192.168.100.56 | 192.168.100.154 |
| 192.168.100.70 | 192.168.100.168 |
| 192.168.100.84 | 192.168.100.182 |
| 192.168.100.98 | 192.168.100.196 |
| 192.168.100.112 | 192.168.100.210 |

1. What is the broadcast address for each subnet?

|  |  |
| --- | --- |
| 192.168.100.41 | 192.168.100.139 |
| 192.168.100.55 | 192.168.100.153 |
| 192.168.100.69 | 192.168.100.167 |
| 192.168.100.83 | 192.168.100.181 |
| 192.168.100.97 | 192.168.100.195 |
| 192.168.100.111 | 192.168.100.209 |
| 192.168.100.125 | 192.168.100.223 |

1. What is the address range for the hosts in each subnet?

|  |  |
| --- | --- |
| 192.168.100.28 - 192.168.100.41 | 192.168.100.126 - 192.168.100.139 |
| 192.168.100.42 - 192.168.100.55 | 192.168.100.140 - 192.168.100.153 |
| 192.168.100.56 - 192.168.100.69 | 192.168.100.154 - 192.168.100.167 |
| 192.168.100.70 - 192.168.100.83 | 192.168.100.168 - 192.168.100.181 |
| 192.168.100.84 - 192.168.100.97 | 192.168.100.182 - 192.168.100.195 |
| 192.168.100.98 - 192.168.100.111 | 192.168.100.196 - 192.168.100.209 |
| 192.168.100.112 - 192.168.100.125 | 192.168.100.210 - 192.168.100.223 |