### Subnet Mask Calculation:

1. A default Class B address has a subnet mask of 255.255.0.0 (/16). Adding 5 subnet bits means we extend the network part of the address by 5 bits:

- Original subnet mask (Class B): 255.255.0.0 (/16)

- New subnet mask: 255.255.248.0 (/21)

- Calculation: 16 bits (original) + 5 bits (added) = 21 bits → 255.255.248.0 (/21)

2. A default Class A address has a subnet mask of 255.0.0.0 (/8). Adding 15 bits means we extend the network part of the address by 15 bits:

- Original subnet mask (Class A): 255.0.0.0 (/8)

- New subnet mask: 255.255.240.0 (/23)

- Calculation: 8 bits (original) + 15 bits (added) = 23 bits → 255.255.240.0 (/23)

### Subnets and Hosts Calculation:

3. The number of hosts per subnet decreases by half each time an additional subnet bit is added. This is because each subnet bit reduces the number of host bits, and the number of hosts is calculated as (2^{number of host bits} - 2).

4. To construct five subnets, we need to find the smallest power of 2 that is greater than or equal to 5. (2^3 = 8) (since (2^2 = 4) is less than 5):

- 3 subnet bits are required.

5. To construct eleven subnets, we need to find the smallest power of 2 that is greater than or equal to 11. (2^4 = 16) (since (2^3 = 8) is less than 11):

- 4 subnet bits are required.

### Subnets and Hosts Available:

6. In network 155.16.0.0 with the subnet mask 255.255.240.0, we have:

- Subnets: ((2^4 = 16))

- Hosts per subnet: (2^{12} - 2 = 4094) hosts (because there are 12 host bits, and we subtract 2 for the network and broadcast addresses).

### Class Address and Subnet Requirements:

7. For the network ID 192.117.10.0 and dividing it into nine subnets, we need:

- (2^4 = 16) subnets (next power of 2 greater than 9)

- Subnet mask: 255.255.255.240 (/28) (4 bits for subnets)

8. To provide 2,000 subnets, each with 5,000 users, we need:

- Total host bits required for 5,000 users: (2^{13} - 2 = 8190)

- Remaining bits for subnets: 32 - 13 = 19 bits

- Class A address: 255.255.240.0

### Next Higher Subnet Calculation:

9. For the subnet address of 135.100.7.0 with a subnet mask of 255.255.252.0 (/22):

- Next higher subnet address: 135.100.12.0

### Subnet Mask Identification:

10. Given the subnet addresses 153.93.4.0, 153.93.8.0, 153.93.12.0, 153.93.16.0, the correct subnet mask is:

- Subnet mask: 255.255.252.0 (/22)

### Practical Subnetting Exercise:

11. For a network with IP=192.168.15.0 divided into 6 subnets:

- Subnet mask: 255.255.224.0 (/27)

- Hosts per subnet: (2^5 - 2 = 30) hosts

- Network IDs: 192.168.15.0, 192.168.15.32, 192.168.15.64, 192.168.15.96, 192.168.15.128, 192.168.15.160, 192.168.15.192

- Broadcast address of subnet number 4: 192.168.15.127

- Subnet containing IP=192.168.15.77: 192.168.15.64/27