Example 3A – Class A on 3rd Octet
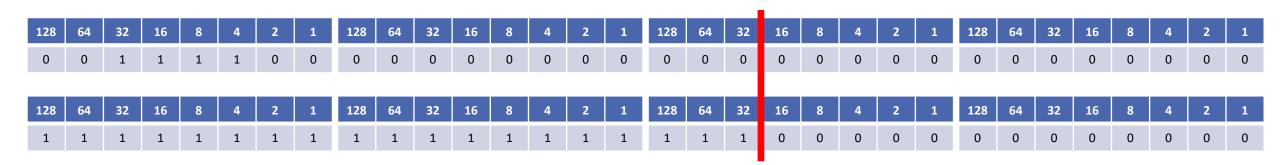
- For this example we're allocated Class A 60.0.0.0/8

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

- If we subnet this into /19 networks, how many subnets do we have and how many hosts per subnet?
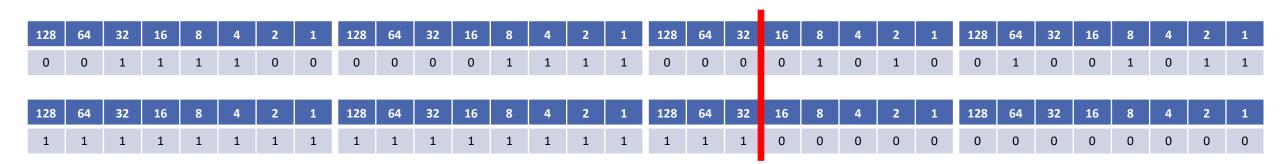
- Pause the video and calculate the answer

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128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

- 8190 hosts per network (2^{13} - 2)
- Because we were allocated a Class A /8 address range, we have 11 bits for network addresses
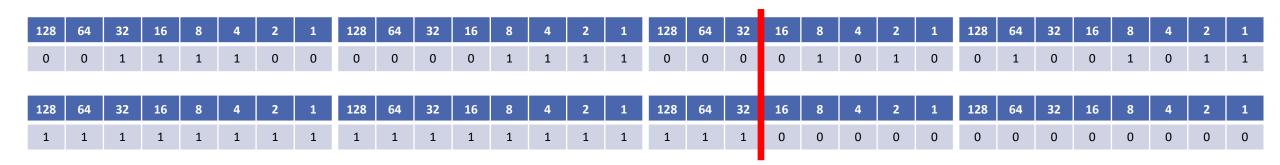- This allows 2048 subnets (2^{11})

Example 3B – Class A on 3rd Octet

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
0	0	1	1	1	1	0	0	0	0	0	0	1	1	1	1	0	0	0	0	1	0	1	0	0	1	0	0	1	0	1	1

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

- For the IP address 60.15.10.75/19, what is the network address, broadcast address, and range of valid IP addresses?
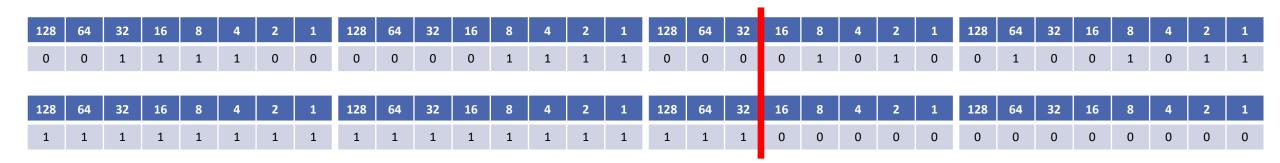- Pause the video and provide the answer

Example 3B – Class A on 3rd Octet

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
0	0	1	1	1	1	0	0	0	0	0	0	1	1	1	1	0	0	0	0	1	0	1	0	0	1	0	0	1	0	1	1

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

- For the IP address 60.15.10.75/19, what is the network address, broadcast address, and range of valid IP addresses?
- We're subnetting on the third octet
- The line is after the 32, so the network address goes up in multiples of 32
- Network address = 60.15.0.0
- Next network address = 60.15.32.0
- Broadcast address = 60.15.31.255
- Valid host addresses = 60.15.0.1 to 60.15.31.254

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The Magic Number Method – Example 3B

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
0	0	1	1	1	1	0	0	0	0	0	0	1	1	1	1	0	0	0	0	1	0	1	0	0	1	0	0	1	0	1	1

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

- For the IP address 60.15.10.75/19, what is the network address, broadcast address, and range of valid IP addresses?
- The subnet mask is 255.255.224.0
- Subtract the value in the subnetted octect from 256: 256 – 224 = 32
- The network address goes up in multiples of 32
- Network address = 60.15.0.0
- Next network address = 60.15.32.0
- Broadcast address = 60.15.31.255
- Valid host addresses = 60.15.0.1 to 60.15.31.254
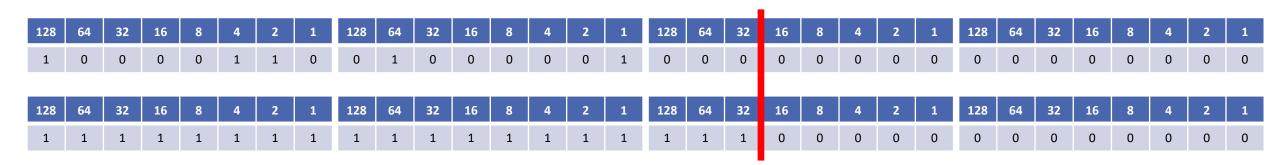
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Subnetting Large Networks – Example 4

- You have been asked to subnet the 134.65.0.0 network into at least six different networks.
- What subnet mask do you use?
- Pause the video and provide the answer

Example 4 – Class B on 3ʳᵈ Octet

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
1	0	0	0	0	1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

- 134.65.0.0 is a Class B network so we'll be subnetting on the third octet to get 6 subnets
- 3 bits would provide 8 subnets (2^3)
- So the answer is /19 or 255.255.224.0
- Network addresses would be 134.65.0.0, 134.65.32.0, 134.65.64.0 etc.
- 8190 hosts in each subnet (2^{13} - 2)

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Subnetting Question Categories

- Given a network requirement of 'x' amount of subnets and 'y' amount of hosts per subnet, what network address and subnet mask should be used for each subnet?

- Given a particular IP address and subnet mask, calculate:
  - The subnet's network address
  - The broadcast address
  - The range of valid host IP addresses