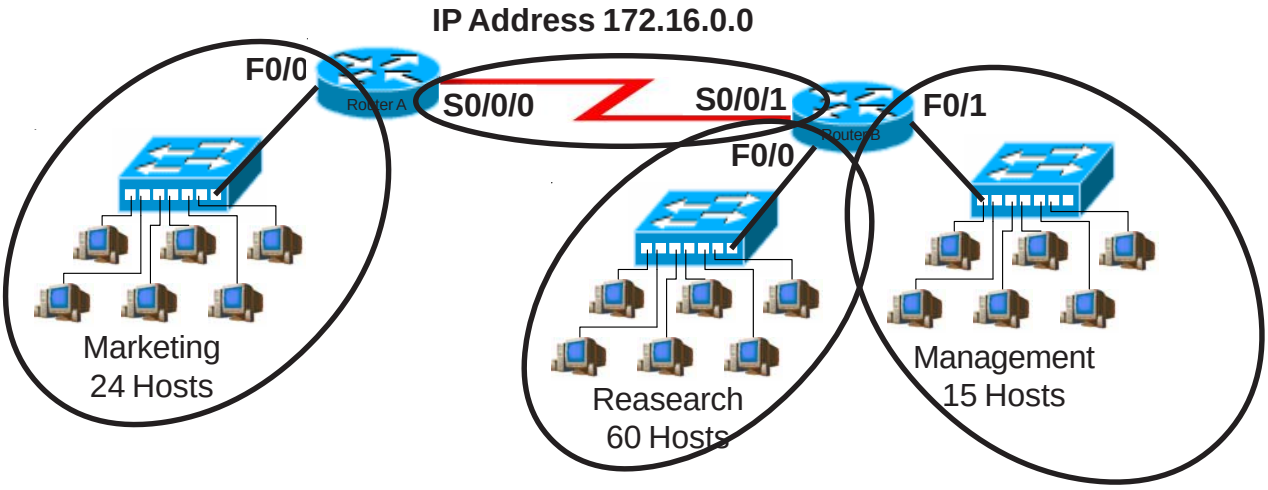
Practical Subnetting 1

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of subnets**, and allow enough extra subnets and hosts for 100% growth in both areas. Circle each subnet on the graphic and answer the questions below.



Address class	B
Custom subnet mask	255.255.224.0
Minimum number of subnets needed	4
Extra subnets required for 100% growth (Round up to the next whole number)	+ 4
Total number of subnets needed	= 8
Number of host addresses in the largest subnet group	60
Number of addresses needed for 100% growth in the largest subnet (Round up to the next whole number)	+ 60
Total number of address needed for the largest subnet	= 120

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Research	172.16.0.0 to 172.31.255
IP address range for Marketing	172.16.32.0 to 172.63.255
IP address range for Management	172.16.64.0 to 172.95.255
IP address range for Router A to Router B serial connection	172.16.96.0 to 172.127.255

Show your work for Practical Subnetting 1 in the space below.

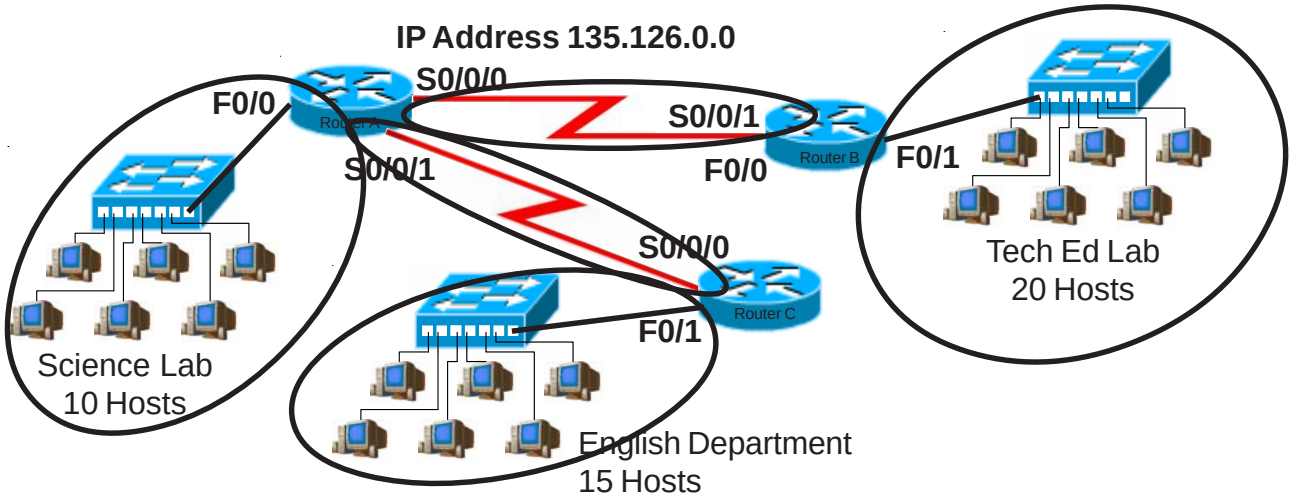
Number of Hosts –	65,536	32,768	16,384	8,192	4,096	2,048	1,024	512	.256	128	64	32	16	8	4	2
Number of Subnets –	2	4	8	16	32	64	128	256.	512	1024	2048	4,096	8,192	16,384	32,768	65,536
Binary values –	128	64	32	16	8	4	2	1 .	128	64	32	16	8	4	2	1
172 . 16 .	0	0	0	0	0	0	0	0 .	0	0	0	0	0	0	0	0

(0)			0	172.16.0.0	to	172.16.31.255
(1)			1	172.16.32.0	to	172.16.63.255
(2)		1	0	172.16.64.0	to	172.16.95.255
(3)		1	1	172.16.96.0	to	172.16.127.255
(4)	1	0	0	172.16.128.0	to	172.16.159.255
(5)	1	0	1	172.16.160.0	to	172.16.191.255
(6)	1	1	0	172.16.192.0	to	172.16.223.255
(7)	1	1	1	172.16.224.0	to	172.16.255.255

$$\begin{array}{r} 4 \\ \times 1.0 \\ \hline 4 \end{array} \qquad \begin{array}{r} 60 \\ \times 1.0 \\ \hline 60 \end{array}$$

Practical Subnetting 2

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of hosts per subnet**, and allow enough extra subnets and hosts for 30% growth in all areas. Circle each subnet on the graphic and answer the questions below.



Address class	B
Custom subnet mask	255.255.255.224
Minimum number of subnets needed	5
Extra subnets required for 30% growth (Round up to the next whole number)	+ 2
Total number of subnets needed	= 7
Number of host addresses in the largest subnet group	20
Number of addresses needed for 30% growth in the largest subnet (Round up to the next whole number)	+ 6
Total number of address needed for the largest subnet	= 26

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Tech Ed	135.126.0.0 to 135.126.0.31
IP address range for English	135.126.0.32 to 135.126.0.63
IP address range for Science	135.126.0.64 to 135.126.0.95
IP address range for Router A to Router B serial connection	135.126.0.96 to 135.126.0.127
IP address range for Router A to Router B serial connection	135.126.0.128 to 135.126.0.159

Show your work for Problem 2 in the space below.

Number of Hosts –	65,536	32,768	16,384	8,192	4,096	2,048	1,024	512	.256	128	64	32	16	8	4	2
Number of Subnets –	2	4	8	16	32	64	128	256.	512	1024	2048	4,096	8,192	16,384	32,768	65,536
Binary values –	128	64	32	16	8	4	2	1 .	128	64	32	16	8	4	2	1
135. 126 .	0	0	0	0	0	0	0	0 .	0	0	0	0	0	0	0	0

(0)	.			0	135.126.0.0	to	135.126.0.31
(1)				1	135.126.0.32	to	135.126.0.63
(2)			1	0	135.126.0.64	to	135.126.0.95
(3)			1	1	135.126.0.96	to	135.126.0.127
(4)		1	0	0	135.126.0.128	to	135.126.0.159
(5)		1	0	1	135.126.0.160	to	135.126.0.191
(6)		1	1	0	135.126.0.192	to	135.126.0.223
(7)		1	1	1	135.126.0.224	to	135.126.0.255
(8)	1	0	0	0	135.126.1.0	to	135.126.1.31
(9)	1 .	0	0	1	135.126.1.32	to	135.126.1.63
(10)	1 .	0	1	0	135.126.1.64	to	135.126.1.95
(11)	1 .	0	1	1	135.126.1.96	to	135.126.1.127
(12)	1	1	0	0	135.126.1.128	to	135.126.1.159
(13)	1 .	1	0	1	135.126.1.160	to	135.126.1.191
(14)	1 .	1	1	0	135.126.1.192	to	135.126.1.223
(15)	1 .	1	1	1	135.1261.224	to	135.126.1.255

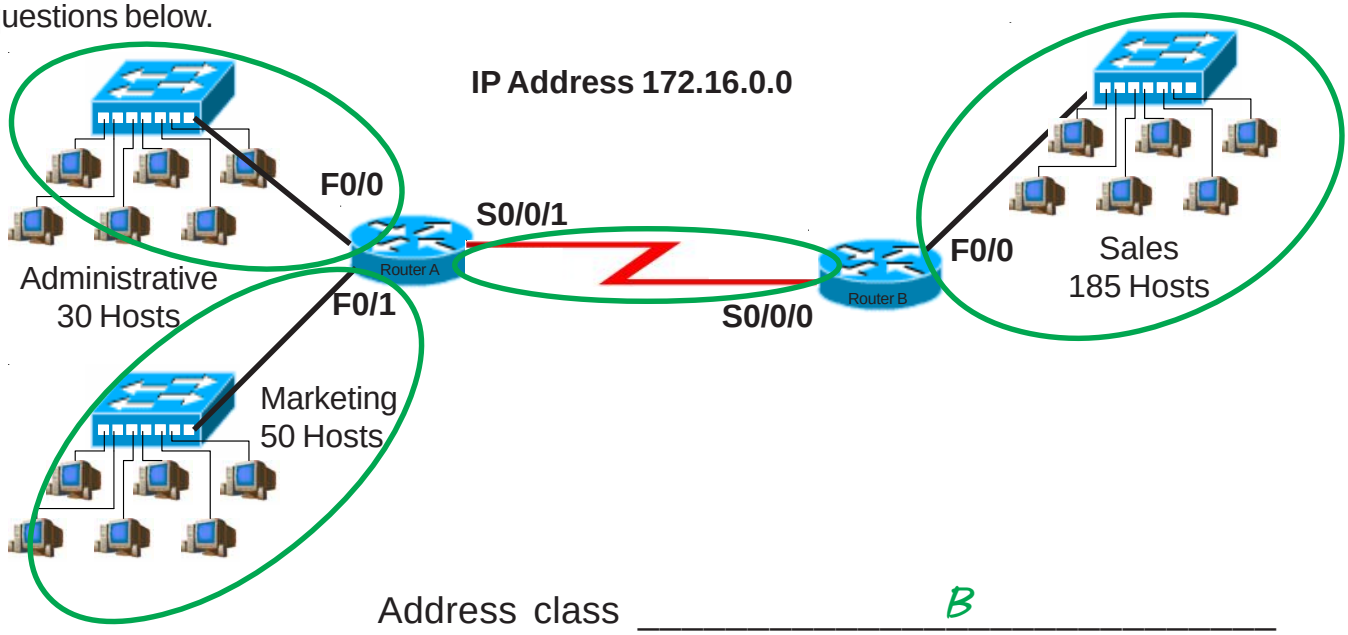
$$\begin{array}{r} 5 \\ \underline{x.3} \\ 1.5 \end{array}$$

(Round up to 2)

$$\begin{array}{r} 20 \\ \underline{x.3} \\ 6 \end{array}$$

Practical Subnetting 3

Based on the information in the graphic shown, design a classfull network addressing scheme that will supply the **minimum number of hosts per subnet**, and allow enough extra subnets and hosts for 25% growth in all areas. Circle each subnet on the graphic and answer the questions below.



Address class	B
Custom subnet mask	255.255.255.0
Minimum number of subnets needed	4
Extra subnets required for 25% growth (Round up to the next whole number)	+ 1
Total number of subnets needed	= 5
Number of host addresses in the largest subnet group	185
Number of addresses needed for 25% growth in the largest subnet (Round up to the next whole number)	+ 47
Total number of address needed for the largest subnet	= 232

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Sales	172.16.0.0 to 172.16.0.255
IP address range for Marketing	172.16.1.0 to 172.16.1.255
IP address range for Administrative	172.16.2.0 to 172.16.2.255
IP address range for Router A to Router B serial connection	172.16.3.0 to 172.16.3.255

Show your work for <u>Problem 3</u> in the space below.

Number of Hosts –	65,536	32,768	16,384	8,192	4,096	2,048	1,024	512	.256	128	64	32	16	8	4	2
Number of Subnets –	2	4	8	16	32	64	128	256.	512	1024	2048	4,096	8,192	16,384	32,768	65,536
Binary values –	128	64	32	16	8	4	2	1 .	128	64	32	16	8	4	2	1
172. 16 .	0	0	0	0	0	0	0	0 .	0	0	0	0	0	0	0	0

(0)	. 0	172.16.0.0	to	1172.16.0.255
(1)	1	172.16.1.0	to	1172.16.1.255
(2)	1 0	172.16.2.0	to	1172.16.2.255
(3)	1 1	172.16.3.0	to	1172.16.3.255
(4)	1 0 0	172.16.4.0	to	1172.16.4.255
(5)	1 0 1	172.16.5.0	to	1172.16.5.255
(6)	1 1 0	172.16.6.0	to	1172.16.6.255
(7)	1 1 1	172.16.7.0	to	1172.16.7.255
(8)	1 . 0 0 0	172.16.8.0	to	1172.16.8.255
(9)	1 . 0 0 1	172.16.9.0	to	1172.16.9.255
(10)	1 . 0 1 0	172.16.10.0	to	1172.16.10.255
(11)	1 . 0 1 1	172.16.11.0	to	1172.16.11.255
(12)	1 . 1 0 0	172.16.12.0	to	1172.16.12.255
(13)	1 . 1 0 1	172.16.13.0	to	1172.16.13.255
(14)	1 . 1 1 0	172.16.14.0	to	1172.16.14.255
(15)	1 . 1 1 1	172.16.15.0	to	1172.16.15.255

$$\begin{array}{r} 4 \\ \times .25 \\ \hline 1 \end{array}$$

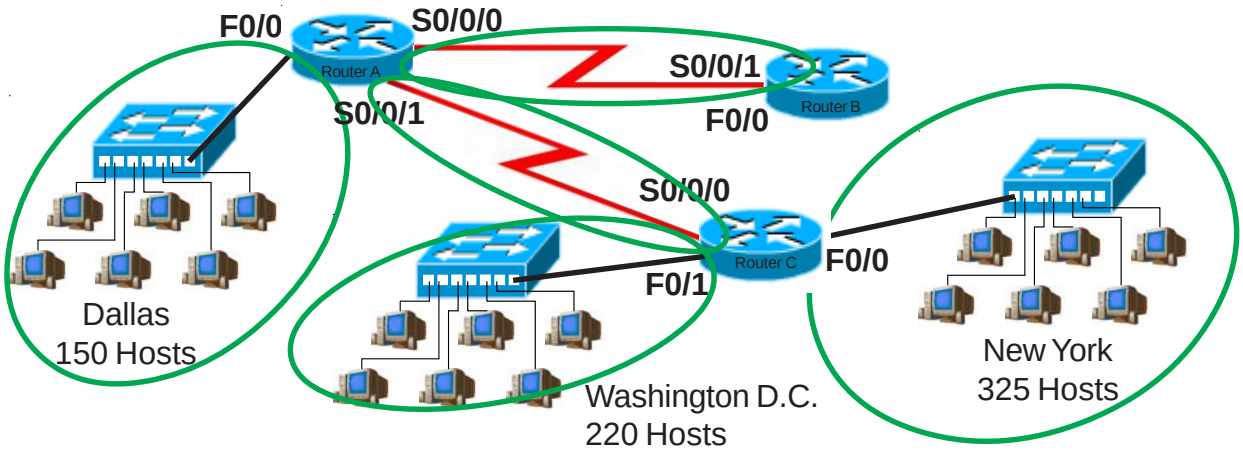
$$\begin{array}{r} 225 \\ \times .25 \\ \hline 56.25 \end{array}$$

(Round up to 57)

Practical Subnetting 4

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of subnets**, and allow enough extra subnets and hosts for 70% growth in all areas. Circle each subnet on the graphic and answer the questions below.

IP Address 135.126.0.0



Address class ___B___

Custom subnet mask ___255.255.240.0___

Minimum number of subnets needed ___5___

Extra subnets required for 70% growth + ___4___
(Round up to the next whole number)

Total number of subnets needed = ___9___

Number of host addresses in the largest subnet group ___325___

Number of addresses needed for 70% growth in the largest subnet + ___228___
(Round up to the next whole number)

Total number of address needed for the largest subnet = ___553___

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for New York ___135.126.0.0 to 135.126.15.255___

IP address range for Washington D. C. ___135.126.16.0 to 135.126.31.255___

IP address range for Dallas ___135.126.32.0 to 135.126.47.255___

IP address range for Router A to Router B serial connection ___135.126.48.0 to 135.126.63.255___

IP address range for Router A to Router C serial connection ___135.126.64.0 to 135.126.79.255___

Show your work for <u>Problem 4</u> in the space below.

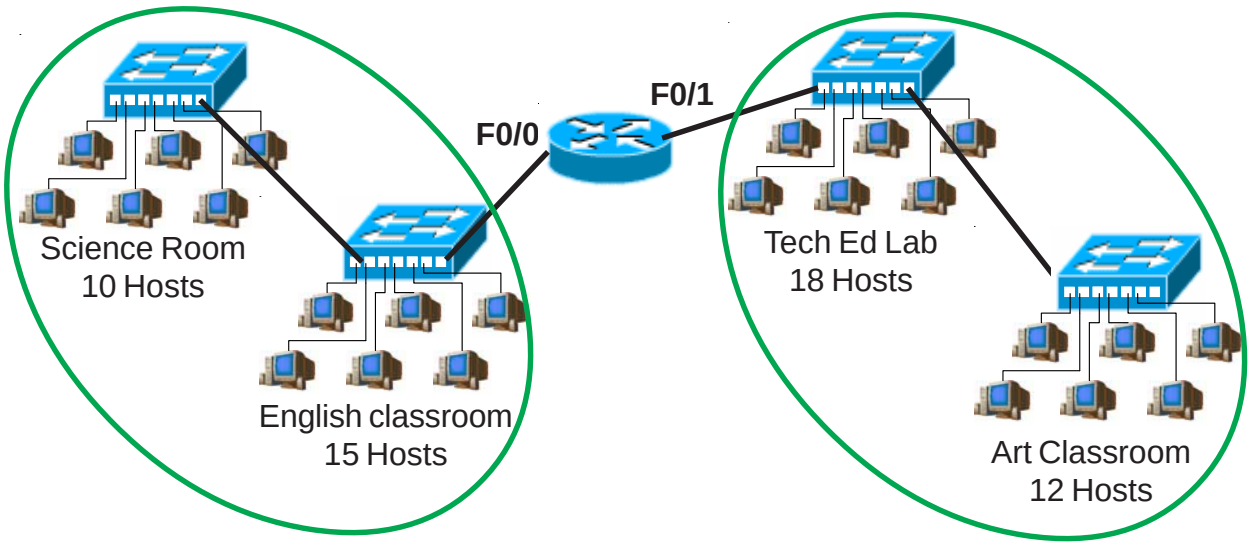
Number of Hosts –	65,536	32,768	16,384	8,192	4,096	2,048	1,024	512	.256	128	64	32	16	8	4	2
Number of Subnets –	2	4	8	16	32	64	128	256.	512	1024	2048	4,096	8,192	16,384	32,768	65,536
Binary values –	128	64	32	16	8	4	2	1 .	128	64	32	16	8	4	2	1
135. 126 .	0	0	0	0	0	0	0	0 .	0	0	0	0	0	0	0	0

(0)	.			0	135.126.0.0	to	135.126.15.255
(1)				1	135.126.16.0	to	135.126.31.255
(2)			1	0	135.126.32.0	to	135.126.47.255
(3)			1	1	135.126.48.0	to	135.126.63.255
(4)		1	0	0	135.126.64.0	to	135.126.79.255
(5)		1	0	1	135.126.80.0	to	135.126.95.255
(6)		1	1	0	135.126.96.0	to	135.126.111.255
(7)		1	1	1	135.126.112.0	to	135.126.127.255
(8)	1	0	0	0	135.126.128.0	to	135.126.143.255
(9)	1	0	0	1	135.126.144.0	to	135.126.159.255
(10)	1	0	1	0	135.126.160.0	to	135.126.175.255
(11)	1	0	1	1	135.126.176.0	to	135.126.191.255
(12)	1	1	0	0	135.126.192.0	to	135.126.207.255
(13)	1	1	0	1	135.126.208.0	to	135.126.223.255
(14)	1	1	1	0	135.126.224.0	to	135.126.239.255
(15)	1	1	1	1	135.126.240.0	to	135.126.1255.255

Practical Subnetting 5

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of hosts per subnet**, and allow enough extra subnets and hosts for 100% growth in all areas. Circle each subnet on the graphic and answer the questions below.

IP Address 210.15.10.0



Address class C

Custom subnet mask 255.255.255.192

Minimum number of subnets needed 2

Extra subnets required for 100% growth + 2
(Round up to the next whole number)

Total number of subnets needed = 4

Number of host addresses in the largest subnet group 30

Number of addresses needed for 100% growth in the largest subnet + 30
(Round up to the next whole number)

Total number of address needed for the largest subnet = 60

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Router F0/0 Port 210.15.10.0 to 210.15.10.63

IP address range for Router F0/1 Port 210.15.10.64 to 210.15.10.127

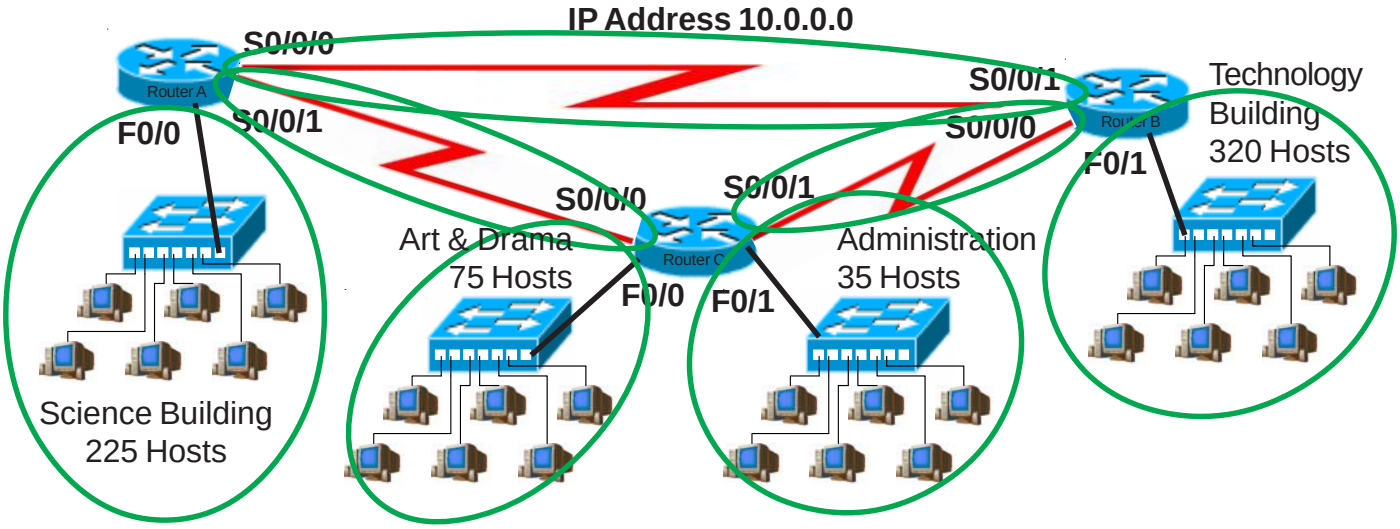
Show your work for <u>Problem 5</u> in the space below.

Number of Subnets	256	128	64	32	16	8	4	2	Number of Hosts
	2	4	8	16	32	64	128	256	
	128	64	32	16	8	4	2	1	Binary values
210.15.10.0	0	0	0	0	0	0	0	0	

(0)	0		210.15.10.0	to	210.15.10.63
(1)	1		210.15.10.64	to	210.15.10.127
(2)	1	0	210.15.10.128	to	210.15.10.191
(3)	1	1	210.15.10.192	to	210.15.10.255

Practical Subnetting 6

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of subnets**, and allow enough extra subnets and hosts for 20% growth in all areas. Circle each subnet on the graphic and answer the questions below.



Address class	A
Custom subnet mask	255.240.0.0
Minimum number of subnets needed	7
Extra subnets required for 20% growth (Round up to the next whole number)	+ 2
Total number of subnets needed	= 9

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Technology	10.0.0.0 to 10.15.255.255
IP address range for Science	10.16.0.0 to 10.31.255.255
IP address range for Arts & Drama	10.32.0.0 to 10.47.255.255
IP Address range Administration	10.48.0.0 to 10.63.255.255
IP address range for Router A to Router B serial connection	10.64.0.0 to 10.79.255.255
IP address range for Router A to Router C serial connection	10.80.0.0 to 10.95.255.255
IP address range for Router B to Router C serial connection	10.96.0.0 to 10.111.255.255

Show your work for <u>Problem 6</u> in the space below.

Number of Hosts – 4,194,304 2,097,152 1,048,576 524,288 262,144 131,072 65,536 32,768 16,384 8,192 4,096 2,048 1,024 512 . 256 128 64 32 16 8 4 2

Number of Subnets – 2 4 8 16 32 64 128 256 . 512 1,024 2,048 4,096 8,192 16,384 32,768 65,536 . 131,072 262,144 524,288 1,048,576 2,097,152 4,194,304

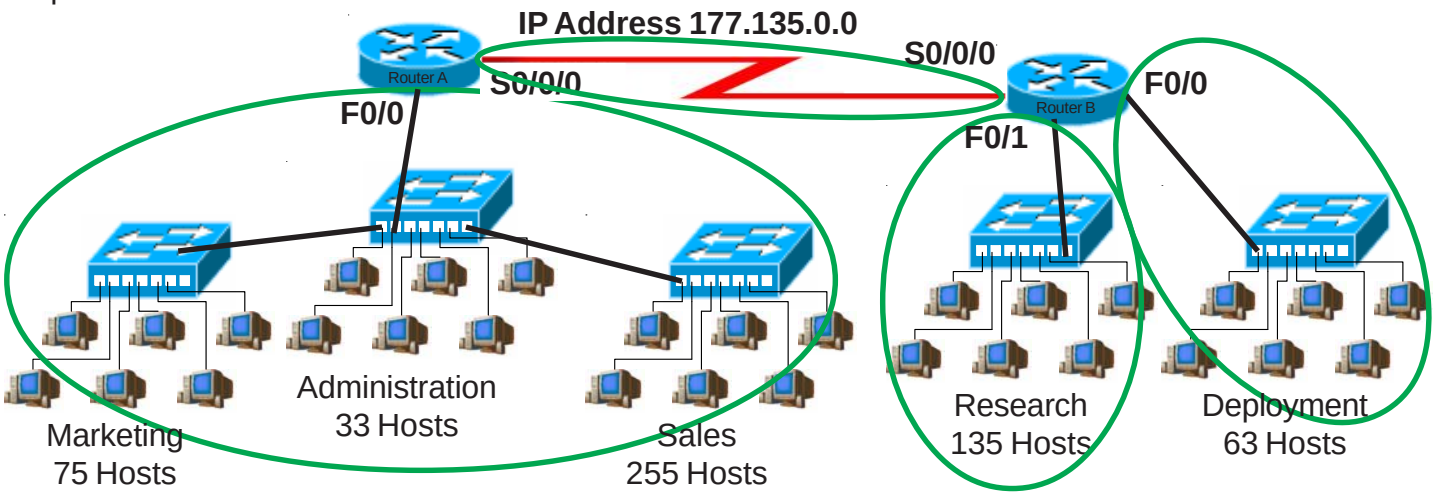
Binary values – 128 64 32 16 8 4 2 1 . 128 64 32 16 8 4 2 1 . 128 64 32 16 8 4 2 1

10. 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	10.0.0.0	to	10.15.255.255
(1)	1	10.16.0.0	to	10.32.255.255
(2)	1 0	10.32.0.0	to	10.47.255.255
(3)	1 1	10.48.0.0	to	10.63.255.255
(4)	1 0 0	10.64.0.0	to	10.79.255.255
(5)	1 0 1	10.80.0.0	to	10.95.255.255
(6)	1 1 0	10.96.0.0	to	10.111.255.255
(7)	1 1 1	10.112.0.0	to	10.127.255.255
(8)	1 0 0 0	10.128.0.0	to	10.143.255.255
(9)	1 0 0 1	10.144.0.0	to	10.159.255.255
(10)	1 0 1 0	10.160.0.0	to	10.175.255.255
(11)	1 0 1 1	10.176.0.0	to	10.191.255.255
(12)	1 1 0 0	10.192.0.0	to	10.207.255.255
(13)	1 1 0 1	10.208.0.0	to	10.223.255.255
(14)	1 1 1 0	10.224.0.0	to	10.239.255.255
(15)	1 1 1 1	10.240.0.0	to	10.255.255.255

Practical Subnetting 7

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of hosts per subnet**, and allow enough extra subnets and hosts for 125% growth in all areas. Circle each subnet on the graphic and answer the questions below.



Address class _____ B

Custom subnet mask _____ 255.255.252.0

Minimum number of subnets needed _____ 4

Extra subnets required for 125% growth + _____ 5
(Round up to the next whole number)

Total number of subnets needed = _____ 9

Number of host addresses in the largest subnet group _____ 363

Number of addresses needed for 125% growth in the largest subnet + _____ 454
(Round up to the next whole number)

Total number of address needed for the largest subnet = _____ 817

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Router A Port F0/0 _____ 177.135.0.0 to 177.135.3.255

IP address range for Research _____ 177.135.4.0 to 177.135.7.255

IP address range for Deployment _____ 177.135.8.0 to 177.135.11.255

IP address range for Router A to Router B serial connection _____ 177.135.12.0 to 177.135.15.255

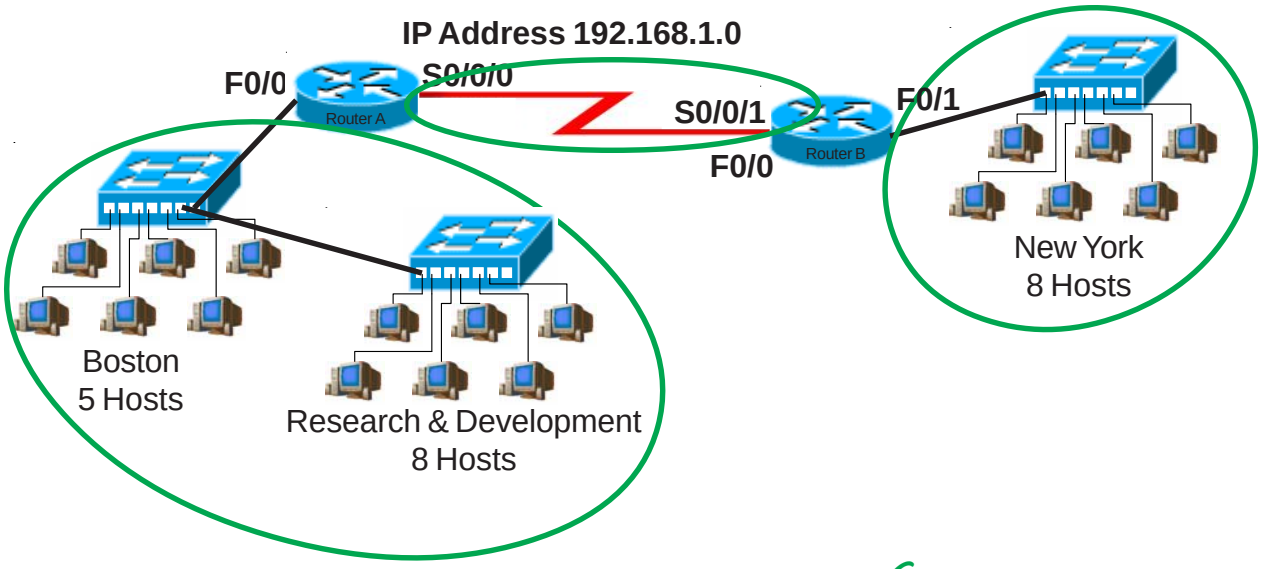
Show your work for <u>Problem 7</u> in the space below.

Number of Hosts –	65,536	32,768	16,384	8,192	4,096	2,048	1,024	512		.256	128	64	32	16	8	4	2
Number of Subnets –	2	4	8	16	32	64	128	256.		512	1024	2048	4,096	8,192	16,384	32,768	65,536
Binary values –	128	64	32	16	8	4	2	1	.	128	64	32	16	8	4	2	1
177.135 .	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0

(0)				0	177.135.0.0	to	177.135.3.255
(1)				1	177.135.4.0	to	177.135.7.255
(2)			1	0	177.135.8.0	to	177.135.11.255
(3)			1	1	177.135.12.0	to	177.135.15.255
(4)		1	0	0	177.135.16.0	to	177.135.19.255
(5)		1	0	1	177.135.20.0	to	177.135.23.255
(6)		1	1	0	177.135.24.0	to	177.135.27.255
(7)		1	1	1	177.135.28.0	to	177.135.31.255
(8)	1	0	0	0	177.135.32.0	to	177.135.35.255
(9)	1	0	0	1	177.135.36.0	to	177.135.39.255
(10)	1	0	1	0	177.135.40.0	to	177.135.43.255
(11)	1	0	1	1	177.135.44.0	to	177.135.47.255
(12)	1	1	0	0	177.135.48.0	to	177.135.51.255
(13)	1	1	0	1	177.135.52.0	to	177.135.55.255
(14)	1	1	1	0	177.135.56.0	to	177.135.59.255
(15)	1	1	1	1	177.135.60.0	to	177.135.63.255

Practical Subnetting 8

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number subnets**, and allow enough extra subnets and hosts for 85% growth in all areas. Circle each subnet on the graphic and answer the questions below.



Address class _____ C

Custom subnet mask _____ 255.255.255.224

Minimum number of subnets needed _____ 3

Extra subnets required for 85% growth + 3
(Round up to the next whole number)

Total number of subnets needed = 6

Number of host addresses in the largest subnet group _____ 13

Number of addresses needed for 85% growth in the largest subnet + 12
(Round up to the next whole number)

Total number of address needed for the largest subnet = 25

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Router A F0/0 _____ 192.168.1.0 to 192.168.1.31

IP address range for New York _____ 192.168.1.32 to 192.168.1.63

IP address range for Router A to Router B serial connection _____ 192.168.1.64 to 192.168.1.95

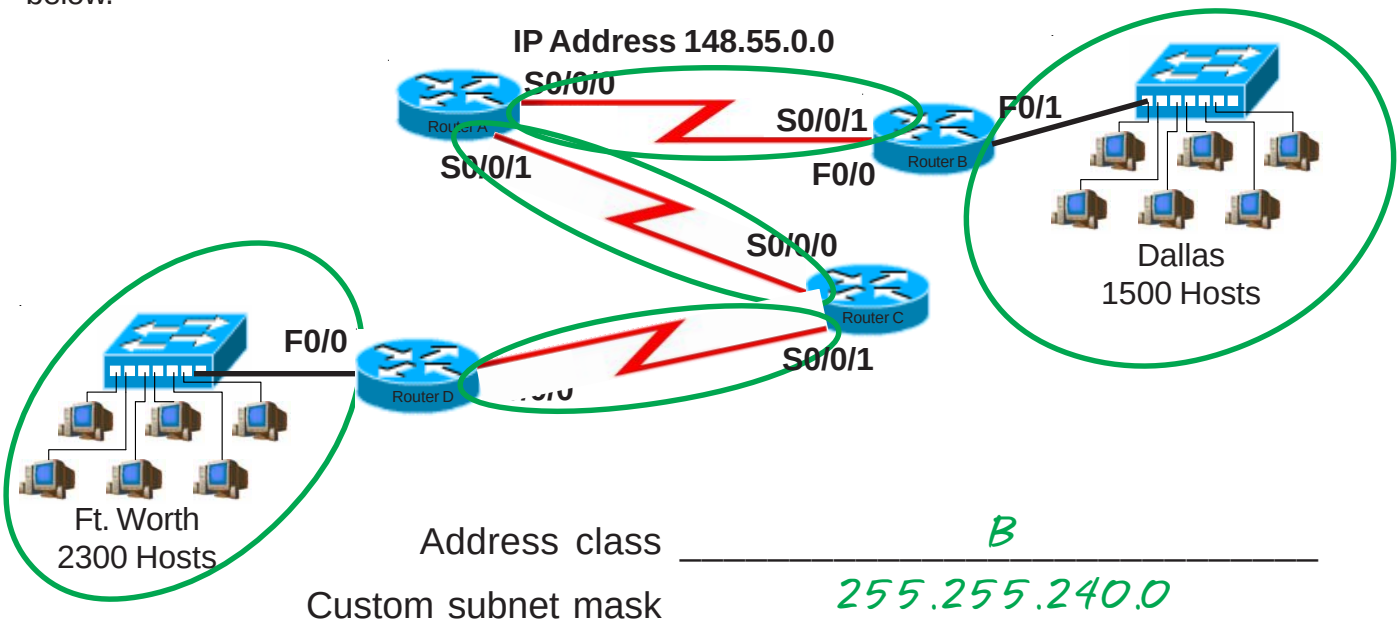
Show your work for <u>Problem 8</u> in the space below.

Number of Subnets	256	128	64	32	16	8	4	2	- Number of Hosts
	- 2	4	8	16	32	64	128	256	
	128	64	32	16	8	4	2	1	- Binary values
192.168.1.0	0	0	0	0	0	0	0	0	

(0)	0	192.168.1.0	to 192.168.1.31
(1)	1	192.168.1.32	to 192.168.1.63
(2)	1 0	192.168.1.64	to 192.168.1.95
(3)	1 1	192.168.1.96	to 192.168.1.127
(4)	1 0 0	192.168.1.128	to 192.168.1.159
(5)	1 0 1	192.168.1.160	to 192.168.1.1191
(6)	1 1 0	192.168.1.192	to 192.168.1.223
(7)	1 1 1	192.168.1.224	to 192.168.1.255

Practical Subnetting 9

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of hosts per subnet**, and allow enough extra subnets and hosts for 15% growth in all areas. Circle each subnet on the graphic and answer the questions below.



Address class ___B___

Custom subnet mask ___255.255.240.0___

Minimum number of subnets needed ___5___

Extra subnets required for 15% growth + ___1___
(Round up to the next whole number)

Total number of subnets needed = ___6___

Number of host addresses in the largest subnet group ___2300___

Number of addresses needed for 15% growth in the largest subnet + ___345___
(Round up to the next whole number)

Total number of address needed for the largest subnet = ___2645___

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Ft. Worth ___148.55.0.0. to 148.55.15.255___

IP address range for Dallas ___148.55.16.0. to 148.55.31.255___

IP address range for Router A to Router B serial connection ___148.55.32.0. to 148.55.47.255___

IP address range for Router A to Router C serial connection ___148.55.48.0. to 148.55.63.255___

IP address range for Router C to Router D serial connection ___148.55.64.0. to 148.55.79.255___

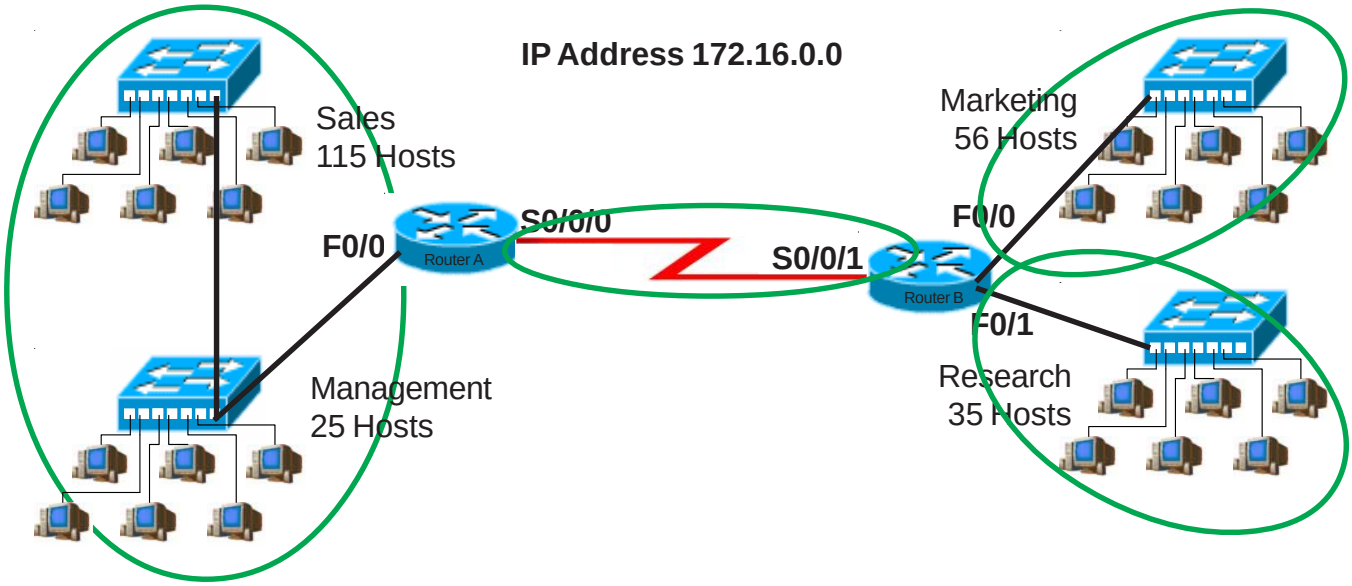
Show your work for Problem 9 in the space below.

Number of Hosts –	65,536	32,768	16,384	8,192	4,096	2,048	1,024	512	.256	128	64	32	16	8	4	2
Number of Subnets –	2	4	8	16	32	64	128	256.	512	1024	2048	4,096	8,192	16,384	32,768	65,536
Binary values –	128	64	32	16	8	4	2	1.	128	64	32	16	8	4	2	1
148.55.	0	0	0	0	0	0	0	0.	0	0	0	0	0	0	0	0

	128	64	32	16	From		To
(0)				0	148.55.0.0	to	148.55.15.255
(1)				1	148.55.16.0	to	148.55.31.255
(2)			1	0	148.55.32.0	to	148.55.47.255
(3)			1	1	148.55.48.0	to	148.55.63.255
(4)		1	0	0	148.55.64.0	to	148.55.79.255
(5)		1	0	1	148.55.80.0	to	148.55.95.255
(6)		1	1	0	148.55.96.0	to	148.55.111.255
(7)		1	1	1	148.55.112.0	to	148.55.127.255
(8)	1	0	0	0	148.55.128.0	to	148.55.143.255
(9)	1	0	0	1	148.55.144.0	to	148.55.159.255
(10)	1	0	1	0	148.55.160.0	to	148.55.175.255
(11)	1	0	1	1	148.55.176.0	to	148.55.191.255
(12)	1	1	0	0	148.55.192.0	to	148.55.207.255
(13)	1	1	0	1	148.55.208.0	to	148.55.223.255
(14)	1	1	1	0	148.55.224.0	to	148.55.239.255
(15)	1	1	1	1	148.55.240.0	to	148.55.255.255

Practical Subnetting 10

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of subnets**, and allow enough extra subnets and hosts for 110% growth in all areas. Circle each subnet on the graphic and answer the questions below.



Address class	B
Custom subnet mask	255.255.255.240
Minimum number of subnets needed	4
Extra subnets required for 110% growth (Round up to the next whole number)	+ 5
Total number of subnets needed	= 9
Number of host addresses in the largest subnet group	140
Number of addresses needed for 110% growth in the largest subnet (Round up to the next whole number)	+ 154
Total number of address needed for the largest subnet	= 294

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Sales/Managemnt	172.16.0.0 to 172.16.15.255
IP address range for Marketing	172.16.16.0 to 172.16.31.255
IP address range for Research	172.16.32.0 to 172.16.47.255
IP address range for Router A to Router B serial connection	172.16.48.0 to 172.16.63.255

Show your work for <u>Problem 10</u> in the space below.

Number of Hosts –	65,536	32,768	16,384	8,192	4,096	2,048	1,024	512	. 256	128	64	32	16	8	4	2
Number of Subnets –	2	4	8	16	32	64	128	256.	512	1024	2048	4,096	8,192	16,384	32,768	65,536
Binary values –	128	64	32	16	8	4	2	1 .	128	64	32	16	8	4	2	1
172.16 .	0	0	0	0	0	0	0	0 .	0	0	0	0	0	0	0	0

	128	64	32	16			
(0)				0	172.16.0.0	to	172.16.15.255
(1)				1	172.16.16.0	to	172.16.31.255
(2)			1	0	172.16.32.0	to	172.16.47.255
(3)			1	1	172.16.48.0	to	172.16.63.255
(4)		1	0	0	172.16.64.0	to	172.16.79.255
(5)		1	0	1	172.16.80.0	to	172.16.95.255
(6)		1	1	0	172.16.96.0	to	172.16.111.255
(7)		1	1	1	172.16.112.0	to	172.16.127.255
(8)	1	0	0	0	172.16.128.0	to	172.16.143.255
(9)	1	0	0	1	172.16.144.0	to	172.16.159.255
(10)	1	0	1	0	172.16.160.0	to	172.16.175.255
(11)	1	0	1	1	172.16.176.0	to	172.16.191.255
(12)	1	1	0	0	172.16.192.0	to	172.16.207.255
(13)	1	1	0	1	172.16.208.0	to	172.16.223.255
(14)	1	1	1	0	172.16.224.0	to	172.16.239.255
(15)	1	1	1	1	172.16.240.0	to	172.16.255.255

Valid and Non-Valid IP Addresses

Using the material in this workbook identify which of the addresses below are correct and usable. If they are not usable addresses explain why.

IP Address: 0.230.190.192
Subnet Mask: 255.0.0.0
Reference Page Inside Front Cover

The network ID cannot be 0.

IP Address: 192.10.10.1
Subnet Mask: 255.255.255.0
Reference Pages 28-29

OK

IP Address: 245.150.190.10
Subnet Mask: 255.255.255.0
Reference Page Inside Front Cover

245 is reserved for experimental use.

IP Address: 135.70.191.255
Subnet Mask: 255.255.254.0
Reference Pages 48-49

This is the broadcast address for this range.

IP Address: 127.100.100.10
Subnet Mask: 255.0.0.0
Reference Pages Inside Front Cover

127 is reserved for loopback testing.

IP Address: 93.0.128.1
Subnet Mask: 255.255.224.0
Reference Pages 56-57

OK

IP Address: 200.10.10.128
Subnet Mask: 255.255.255.224
Reference Pages 54-55

This is the subnet address for the 3rd usable range of 200.10.10.0

IP Address: 165.100.255.189
Subnet Mask: 255.255.255.192
Reference Pages 30-31

OK

IP Address: 190.35.0.10
Subnet Mask: 255.255.255.192
Reference Pages 34-35

This address is taken from the first range for this subnet which is invalid.

IP Address: 218.35.50.195
Subnet Mask: 255.255.0.0
Reference Page Inside Front Cover

This has a class B subnet mask.

IP Address: 200.10.10.175 /22
Reference Pages 54-55 and/or Inside Front Cover

A class C address must use a minimum of 24 bits.

IP Address: 135.70.255.255
Subnet Mask: 255.255.224.0
Reference Pages 48-49

This is a broadcast address.

IP Address Breakdown

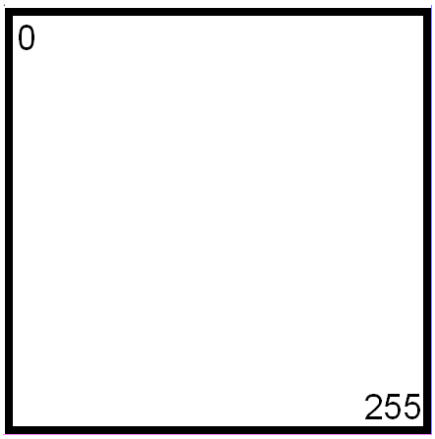
/24 8+8+8 255.255.255.0 256 Hosts	/25 8+8+8+1 255.255.255.128 128 Hosts	/26 8+8+8+2 255.255.255.192 64 Hosts	/27 8+8+8+3 255.255.255.224 32 Hosts	/28 8+8+8+4 255.255.255.240 16 Hosts	/29 8+8+8+5 255.255.255.248 8 Hosts	/30 8+8+8+6 255.255.255.252 4 Hosts
0-255	0-127	0-63		0-15	0-7	0-3
						4-7
					8-15	8-11
						12-15
				16-31	16-23	16-19
						20-23
					24-31	24-27
						28-31
				32-47	32-39	32-35
						36-39
					40-47	40-43
						44-47
				48-63	48-55	48-51
						52-55
					56-63	56-59
						60-63
		64-127		64-79	64-71	64-67
						68-71
					72-79	72-75
						76-79
				80-95	80-87	80-83
						84-87
					88-95	88-91
						92-95
				96-111	96-103	96-99
						100-103
					104-111	104-107
						108-111
				112-127	112-119	112-115
						116-119
					120-127	120-123
						124-127
	128-255	128-191		128-143	128-135	128-131
						132-135
					136-143	136-139
						140-143
				144-159	144-151	144-147
						148-151
					152-159	152-155
						156-159
				160-175	16-167	160-163
						164-167
					168-175	168-171
						172-175
				176-191	176-183	176-179
						180-183
					184-191	184-187
						188-191
		192-255		192-207	192-199	192-195
						196-199
					200-207	200-203
						204-207
				208-223	208-215	208-211
						212-215
					216-223	216-219
						220-223
				224-239	224-231	224-227
						228-231
					232-239	232-235
						236-239
				240-255	240-247	240-243
						244-247
					248-255	248-251
						252-255

Visualizing Subnets Using The Box Method

The box method is the simplest way to visualize the breakdown of subnets and addresses into smaller sizes.

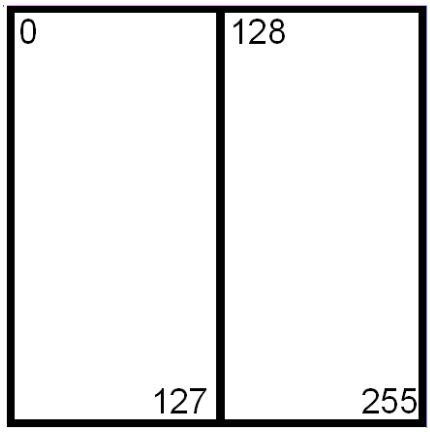
Start with a square. The whole square is a single subnet comprised of 256 addresses.

/24
255.255.255.0
256 Hosts
1 Subnet



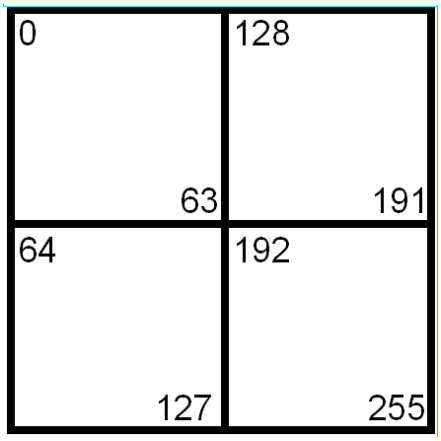
Split the box in half and you get two subnets with 128 addresses,

/25
255.255.255.128
128 Hosts
2 Subnets



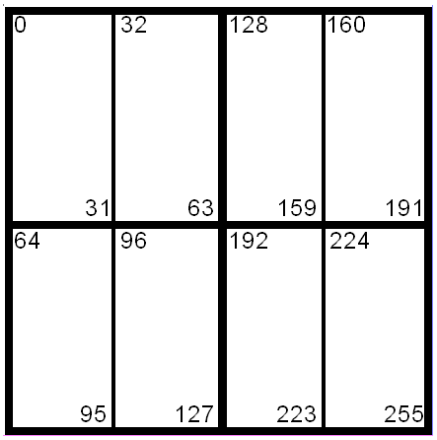
Divide the box into quarters and you get four subnets with 64 addresses,

/26
255.255.255.192
64 Hosts
4 Subnets



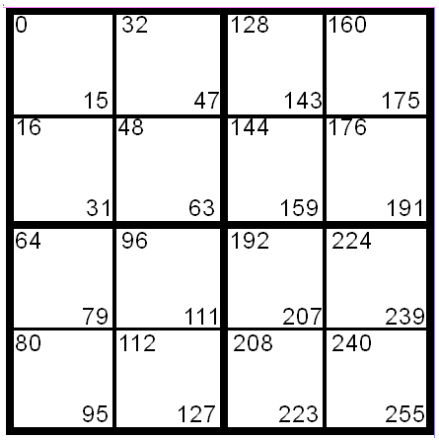
Split each individual square and you get eight subnets with 32 addresses,

/27
255.255.255.224
32 Hosts
8 Subnets



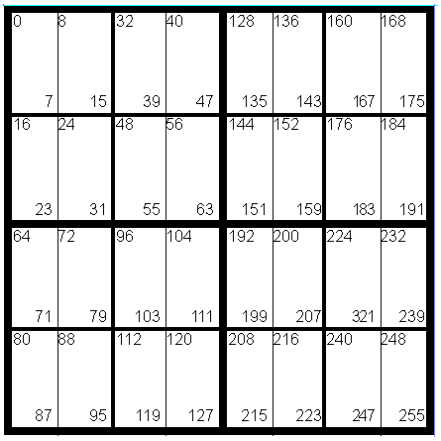
Split the boxes in half again and you get sixteen subnets with sixteen addresses,

/28
255.255.255.240
16 Hosts
16 Subnets



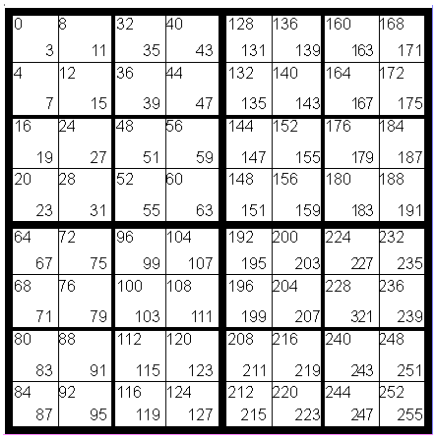
The next split gives you thirty two subnets with eight addresses,

/29
255.255.255.248
8 Hosts
32 Subnets



The last split gives sixty four subnets with four addresses each,

/30
255.255.255.252
4 Hosts
64 Subnets



Class A Addressing Guide					
CIDR	# of Bits Borrowed	Subnet Mask	Total # of Subnets	Total # of Hosts	Usable # of Hosts
/8	0	255.0.0.0	1	16,777,216	16,777,214
/9	1	255.128.0.0	2	8,388,608	8,388,606
/10	2	255.192.0.0	4	4,194,304	4,194,302
/11	3	255.224.0.0	8	2,097,152	2,097,150
/12	4	255.240.0.0	16	1,048,576	1,048,574
/13	5	255.248.0.0	32	524,288	524,286
/14	6	255.252.0.0	64	262,144	262,142
/15	7	255.254.0.0	128	131,072	131,070
/16	8	255.255.0.0	256	65,536	65,534
/17	9	255.255.128.0	512	32,768	32,766
/18	10	255.255.192.0	1,024	16,384	16,382
/19	11	255.255.224.0	2,048	8,192	8,190
/20	12	255.255.240.0	4,096	4,096	4,094
/21	13	255.255.248.0	8,192	2,048	2,046
/22	14	255.255.252.0	16,384	1,024	1,022
/23	15	255.255.254.0	32,768	512	510
/24	16	255.255.255.0	65,536	256	254
/25	17	255.255.255.128	131,072	128	126
/26	18	255.255.255.192	262,144	64	62
/27	19	255.255.255.224	524,288	32	30
/28	20	255.255.255.240	1,048,576	16	14
/29	21	255.255.255.248	2,097,152	8	6
/30	22	255.255.255.252	4,194,304	4	2

Class B Addressing Guide					
CIDR	# of Bits Borrowed	Subnet Mask	Total # of Subnets	Total # of Hosts	Usable # of Hosts
/16	0	255.255.0.0	1	65,536	65,534
/17	1	255.255.128.0	2	32,768	32,766
/18	2	255.255.192.0	4	16,384	16,382
/19	3	255.255.224.0	8	8,192	8,190
/20	4	255.255.240.0	16	4,096	4,094
/21	5	255.255.248.0	32	2,048	2,046
/22	6	255.255.252.0	64	1,024	1,022
/23	7	255.255.254.0	128	512	510
/24	8	255.255.255.0	256	256	254
/25	9	255.255.255.128	512	128	126
/26	10	255.255.255.192	1,024	64	62
/27	11	255.255.255.224	2,048	32	30
/28	12	255.255.255.240	4,096	16	14
/29	13	255.255.255.248	8,192	8	6
/30	14	255.255.255.252	16,384	4	2

Class C Addressing Guide					
CIDR	# of Bits Borrowed	Subnet Mask	Total # of Subnets	Total # of Hosts	Usable # of Hosts
/24	0	255.255.255.0	1	256	254
/25	1	255.255.255.128	2	128	126
/26	2	255.255.255.192	4	64	62
/27	3	255.255.255.224	8	32	30
/28	4	255.255.255.240	16	16	14
/29	5	255.255.255.248	32	8	6
/30	6	255.255.255.252	64	4	2