Subnetting Cheat Sheet/ Reference Card

CIDR is the number of network bits turned on in mask. So 255.255.255.192 = 11111111.11111111.11111111.11000000 = /26 network bits, and 32-26 = 6 host bits
Usable subnets=2^N - In this equation, N for "subnet bits" means CIDR minus the bits reserved for address Class (A=8, B=16, C=24) Usable hosts per subnet= 2^H-2.
Block Sizes: Subtract subnet mask from 256 to get the bit position or "magic number." A mask of 192 (256-192=64) gives the network numbers of 0, 64, 128, and 192.
So 255.255.255.192 has a /26 CIDR. Since 32-26= 6 host bits, we get 2^6-2=62 usable hosts per subnet. Class C has 24 net bits, so 26-24=2 subnet bits, and 2^2= 4 subnets.

The chart below displays total hosts per subnet, so you need to subtract 2 to get the number of "usable hosts" per subnet.

Trick for remembering mask numbers: Add current bit value to it's bigger neighbor's mask like this: 128+64=192, 192+32=224, 224+16=240, etc.

Normal Bit Value/ Position	**128**	**64**	**32**	**16**	**8**	**4**	**2**	**1**	
2-exponent representation	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
Subnet Mask for Bit Position	128	192	224	240	248	252	254	255	
Class C CIDR	/25	/26	/27	/28	/29	/30	/31	/32	
Subnets	2	4	8	16	32	64	128	n/a	**Gets Bigger this way--->**
Hosts per Subnet (subtract 2)	128	64	32	16	8	4	2*	n/a	**<--- Gets bigger this way**
Class B CIDR (3rd Octet)	/17	/18	/19	/20	/21	/22	/23	/24	
Subnets	2	4	8	16	32	64	128	256	
Hosts per Subnet (subtract 2)	32768	16384	8192	4096	2048	1024	512	256	
Class B CIDR (4th Octet)	/25	/26	/27	/28	/29	/30			
Subnets	512	1024	2048	4096	8192	16384			
Hosts per Subnet (subtract 2)	128	64	32	16	8	4			
Class A CIDR (2nd Octet)	/9	/10	/11	/12	/13	/14	/15	/16	
Subnets	2	4	8	16	32	64	128	256	
Hosts per Subnet (subtract 2)	8,388,608	4,194,304	2,097,152	1,048,576	524,288	262,144	131,072	65,536	
Class A CIDR (3rd Octet)	/17	/18	/19	/20	/21	/22	/23	/24	
Subnets	512	1024	2048	4096	8192	16,384	32,768	65,536	
Hosts per Subnet (subtract 2)	32,768	16,384	8192	4096	2048	1024	512	256	
Class A CIDR (4th Octet)	/25	/26	/27	/28	/29	/30			
Subnets	131,072	262,144	524,288	1,048,576	2,097,152	4,194,304			
Hosts per Subnet (subtract 2)	128	64	32	16	8	4			

When subnetting, the first question is how many subnets and how many hosts. This number line assists in seeing how many bits accommodate hosts.

For this many hosts:	**32,766**	**16,382**	**8,190**	**4,094**	**2,046**	**1,022**	**510**	**254**
You need this many bits:	16	15	14	13	12	11	10	9

For this many hosts:	**8,388,606**	**4,194,302**	**2,097,150**	**1,048,574**	**524,286**	**262,142**	**131,070**	**65,534**
You need this many bits:	24	23	22	21	20	19	18	17

Bits 1-8 are omitted since those are pretty obvious. The number of hosts in these two little charts have been adjusted with the -2 already (for netID and BC numbers)
This is designed to make it easier when you count bits from the right and need more than 8 bits.

Default Classful System

	Leading Bits		**Starts At**	**Net Bits**	**Bits Left**	**# of Nets**	**Hosts per Net**	**Default Mask**	**"Native" CIDRs**
Class A	0xxx, 1-126	-	0.0.0.1	8	24	128	16,777,216	255.0.0.0	/9 to /16
Class B	10xx, 128-191	-	128.0.0.0	16	16	16,384	65,534	255.255.0.0	/17 to /24
Class C	110x, 192-223	-	192.0.0.0	24	8	2,097,152	254	255.255.255.0	/25 to /32
Class D	1110, 224-239	Multicast	224.0.0.0	-	-	-	-	-	
Class E	1111, 240-254	Reserved	240.0.0.0	-	-	-	-	-	

Reserved and Private Addresses

Class A	10.0.0.0 - 10.255.255.255	10.0.0.0/8 (255.0.0.0)
Class B	172.16.0.0 - 172.31.255.255	172.16.0.0/12 (255.240.0.0)
Class C	192.168.0.0 - 255.255	192.168.0.0/16 (255.255.0.0)
Loopback	*127.x.x.x*	*127.0.0.0/8*
APIPA	*169.254.x.x*	*169.254.0.0/16*

A few notes:
The CIDRs /28, /20, and /12 are all in the 240 subnet, 16 block-size. Notice patterns pop up in the 240 subnet's numbers.
This is a useful subnet to know, since it's in the middle of the octet, it makes things easier to remember. Make it as familiar as the octet-boundary subnets
In each class there is a "sweet spot" where the number of subnets and number of hosts-per-subnet are (about) the same: Class C /28=16, Class B /24=256, Class A /20=4096
With familiarity and practice, all the numbers fall into place
Note on CIDR /31: Some claim using a /31 for two isolated ports without incident. A /30 is considered the lowest usable CIDR, accomdating reserved BC and NetID

Observations to edit:
CIDR is always matched with the same bit place (1-8) and number of hosts per subnet
A CIDR thats higher than "native" for an IP's classful placement has most to do with increasing the number of subnets each with a certain number of hosts.

Clearing up a binary misunderstanding:
The "8th" bit position /25 uses 32-25=7 host bits - it has a hosts-per-subnet value of 2^7-2 because the 1st bit position is 2^0
The best way to get around this when you are counting hosts on the number line is to count up from 0 (0, 1, 2, 3…)
This is because the network Identified at the 8th counted bit CONTAINS the 7 hosts bits behind it (thus it is 2^7)

Remember that when dissecting a network IP (separating network, subnet bits, host bits) that when you are asked about broadcasts they do go from 0-255 in all octets involved
Example - 10.0.0.0 /18 a 255.255.192.0 is 64 block - Class A= 8bits, 10 bits subnet, 14 host bits. Networks: 10.0.0.0, 10.0.64.0, etc up to last network [10.0.192.0-10.0.255.255]

Example: quick-deconstruct of 10.0.0.0 /19
CIDR of 19 - 8 (for Class A) = 11 subnet bits and 2^11 subnets.
For hosts, 32 - 19 CIDR = 13 host bits which means [(2^13)-2] hosts