Subnetting cheat sheet

What subnetting is, explained simply, then everything in CompTIA Network+ N10-009 objective 1.7 (private ranges, APIPA, loopback, CIDR, VLSM and the address classes), a prefix chart from /8 to /30 with masks and host counts, and the four steps to find any subnet.

Core 13 is everything named in CompTIA Network+ N10-009 objective 1.7: public vs. private (APIPA, RFC1918, loopback), subnetting (VLSM, CIDR) and the address classes. Ext. 27 adds addresses to identify, the kind of scenario 1.7 asks for. Masks, Hosts and Find it drill the subnetting math. The prefix chart is our own.

ITEM	WHAT IT IS
WHAT SUBNETTING IS	
Subnetting	**Splitting one network into smaller networks** Each subnet gets its own range of addresses. That keeps traffic local, cuts down broadcasts and gives each team, floor or VLAN only the addresses it needs.
ELI5	**One big apartment building split into smaller ones** The network part of an address is the building's street number and the host part is the apartment number. Subnetting turns one huge building into several smaller ones, each with its own street number, so mail for one building never wanders through the others. The mask tells you where the street number ends and the apartment number starts.
/n (prefix)	**How many of the 32 bits name the network** /26 means the first 26 bits are the network and the last 6 count the hosts. 6 host bits give 64 addresses.
Network address	**The first address in a subnet** It names the subnet itself, so it isn't given to a host.
Broadcast	**The last address in a subnet** A message sent to it reaches every host in the subnet. It isn't given to a host either.
Usable hosts	**Addresses minus 2** The network and broadcast addresses are taken, so a /26 has 64 − 2 = 62 hosts.
CORE 13	
10.0.0.0/8	**RFC1918 private** Private range 10.0.0.0 to 10.255.255.255. Not routed on the internet
172.16.0.0/12	**RFC1918 private** Private range 172.16.0.0 to 172.31.255.255
192.168.0.0/16	**RFC1918 private** Private range 192.168.0.0 to 192.168.255.255, the one most home routers use
169.254.0.0/16	**APIPA** Self-assigned when a DHCP client gets no answer. Works on the local link only
127.0.0.0/8	**Loopback** The host talking to itself. 127.0.0.1 is localhost
First octet 1–126	**Class A** Default mask 255.0.0.0 (/8). 127 is set aside for loopback

ITEM	WHAT IT IS
First octet 128–191	**Class B** Default mask 255.255.0.0 (/16)
First octet 192–223	**Class C** Default mask 255.255.255.0 (/24)
First octet 224–239	**Class D · Multicast** Multicast, one sender to a group of listeners. No default mask
First octet 240–255	**Class E · Experimental** Reserved for experimental use. Not assigned to hosts
Public address	**Routable on the internet** Any address outside the private, APIPA, loopback, multicast and reserved ranges
CIDR	**Prefix written as /n, like /26** Classless Inter-Domain Routing. The /n counts the network bits, replacing classes
VLSM	**Different mask sizes in one network** Variable Length Subnet Mask. Size each subnet to fit, like a /30 for a link and a /24 for a LAN
ADDED IN EXT. 27	
10.200.4.17	**RFC1918 private** Inside 10.0.0.0/8
172.31.250.9	**RFC1918 private** Inside 172.16.0.0/12, which runs to 172.31.255.255
192.168.1.254	**RFC1918 private** Inside 192.168.0.0/16
169.254.10.3	**APIPA** A 169.254 address usually means DHCP failed
127.0.0.53	**Loopback** All of 127.0.0.0/8 is loopback, not just 127.0.0.1
224.0.0.5	**Class D · Multicast** Multicast (OSPF routers use it)
239.255.255.250	**Class D · Multicast** Multicast (SSDP device discovery uses it)
8.8.8.8	**Public** A public address (Google DNS)
172.32.0.5	**Public** Public. The private 172 range stops at 172.31
192.169.0.1	**Public** Public. Only 192.168 is private
255.0.0.0	**Class A · default mask** The Class A default mask, /8
255.255.0.0	**Class B · default mask** The Class B default mask, /16
255.255.255.0	**Class C · default mask** The Class C default mask, /24
240.1.2.3	**Class E · Experimental** Class E, reserved. You will not see it on a host
PREFIX CHART · /8 TO /30	
/8	**255.0.0.0** 16,777,216 addresses · 16,777,214 usable
/9	**255.128.0.0** 8,388,608 addresses · 8,388,606 usable
/10	**255.192.0.0** 4,194,304 addresses · 4,194,302 usable
/11	**255.224.0.0** 2,097,152 addresses · 2,097,150 usable
/12	**255.240.0.0** 1,048,576 addresses · 1,048,574 usable
/13	**255.248.0.0** 524,288 addresses · 524,286 usable
/14	**255.252.0.0** 262,144 addresses · 262,142 usable

ITEM	WHAT IT IS
/15	**255.254.0.0** 131,072 addresses · 131,070 usable
/16	**255.255.0.0** 65,536 addresses · 65,534 usable
/17	**255.255.128.0** 32,768 addresses · 32,766 usable
/18	**255.255.192.0** 16,384 addresses · 16,382 usable
/19	**255.255.224.0** 8,192 addresses · 8,190 usable
/20	**255.255.240.0** 4,096 addresses · 4,094 usable
/21	**255.255.248.0** 2,048 addresses · 2,046 usable
/22	**255.255.252.0** 1,024 addresses · 1,022 usable
/23	**255.255.254.0** 512 addresses · 510 usable
/24	**255.255.255.0** 256 addresses · 254 usable
/25	**255.255.255.128** 128 addresses · 126 usable
/26	**255.255.255.192** 64 addresses · 62 usable
/27	**255.255.255.224** 32 addresses · 30 usable
/28	**255.255.255.240** 16 addresses · 14 usable
/29	**255.255.255.248** 8 addresses · 6 usable
/30	**255.255.255.252** 4 addresses · 2 usable

FIND IT · THE METHOD	
1	**Find the octet the prefix ends in** /25 to /30 is the fourth octet, /17 to /24 the third
2	**Block size = 256 minus that mask octet** /26: mask .192, so 256 − 192 = 64
3	**Count up in blocks to find the IP's block** 0, 64, 128, 192. 200 falls in 192–255
4	**Network is the block's first address, broadcast its last** First usable host = network + 1, last = broadcast − 1