- CIDR always corresponds to a specific number of hosts per subnet.
- CIDR also always falls at the same block size and subnet mask
Don't forget to subtract 2 hosts for broadcast and network number!!

Bit	Block	Subnets	Mask	CIDR - Hosts		CIDR - Hosts		CIDR - Hosts	
1	(1)	(256)	255	/32	1	/24	256	/16	65,536
2	2	128	254	/31	(2)*	/23	512	/15	131,072
3	4	64	252	/30	4	/22	1,024	/14	262,144
4	8	32	248	/29	8	/21	2,048	/13	524,188
5	16	16	240	/28	16	/20	4,096	/12	1,048,576
6	32	8	224	/27	32	/19	8,192	/11	2,097,152
7	64	4	192	/26	64	/18	16,384	/10	4,194,304
8	128	2	128	/25	128	/17	32,768	/9	8,388,608

While 32-CIDR=N, 2^N - 2 = Valid hosts per subnet
** Despite what Cisco says, /31 debatedly works in special cases of non-broadcast, 2 endpoints with one using network number*

CIDRs in the chart are arranged by their "native" Class. CIDR is classless!! Your IP might have a CIDR not in it's classful range! A CIDR used outside of "class ranges" demands a closer look! Here's an example:

How many subnets and hosts per subnet can you get from the network 10.0.0.0/20?
Well, since the CIDR always tells us the hosts per subnet, we know we have 4094 hosts.
A /20 is always blocks of 16, but that doesn't tell us anything! Subnets?

It's a Class A address- the first thing we should notice is that first octet.
The CIDR tells us how many network bits are used, and Class A is using 8 of those.
Cisco calls the 12 bits left over the "subnet bits", and its what we use in our equation:

CIDR - classful_bits = subnet_bits, and while N= subnet_bits, 2^N = number of subnets.
So for us this looks like this: N = (20-8) = 12 and 2^{12} is 4096
Answer: 4096 subnets and 4094 hosts

How many subnets and hosts per subnet can you get from the network 172.25.0.0/28?
172 is Class B; CIDR 28- 16 bits for a B is 12; 2^{12} is 4096 subnets. For hosts, 32-CIDR of 28 is 4; 2^4 is 16-2 means 14 hosts, just like the chart shows us.
Answer: 4096 subnets and 14 hosts
(/28 is "Class C-native," but that CIDR is always going to give us 14 hosts, plus a network and a broadcast address)

Usable host IPs per subnet? 32-CIDR = host_bits; while N= host_bits, (2^H - 2)= hosts
Number of subnets? CIDR - class_bits = subnet_bits; while N= subnet_bits, 2^N = subnets

Who does powers of 2 in their head? Easy reference point: 2^{10} = 1024
If you have to figure out on the fly what 2^{15} is, this gives you a jump-point, take 1024 and double from there 5 times counting from 11 to 15 to get 32,768.

How many subnets and hosts per subnet can you get from the network 172.29.0.0 255.255.255.192?
172 is Class B; 255.255.255.192 = (8+8+8+2) CIDR bits.
26 - 16 bits for a B is 10; 2^{10} is 1024 subnets.
For hosts, 32 - CIDR of 26 is 6; 2^6 is 64-2 means 62 hosts
Answer: 1024 subnets and 62 hosts

<u>Provisioning: a different kind of problem</u>
You need a subnet mask for the 172.16.0.0 network with 100 subnets with up to 300 hosts on each subnet.
What subnet mask should you use? Answer: 255.255.254.0

The two ways to tackle this are to first figure out how many bits you need for your networks and how many for your hosts. You need to think in binary to do this and here is how to do it:

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8		2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
32768	16384	8192	4096	2048	1024	512	256		128	64	32	16	8	4	2	1