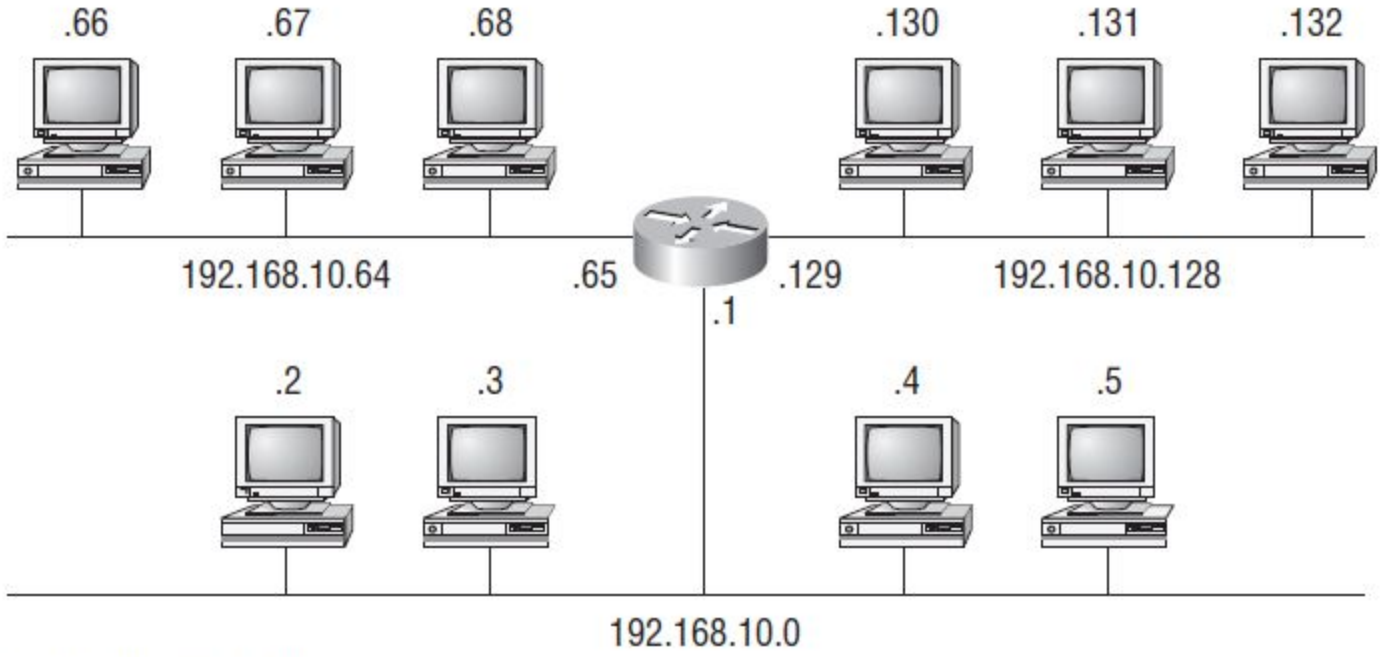
VLSM

Variable Length Subnet Mask




```
Router#show ip route
[output cut]
C 192.168.10.0 is directly connected to Ethernet 0
C 192.168.10.64 is directly connected to Ethernet 1
C 192.168.10.128 is directly connected to Ethernet 2
```

To answer the last two questions, first just write out the subnets, then write out the broadcast addresses—the number right before the next subnet. Last, fill in the host addresses. The following table gives you all the subnets for the 255.255.255.224 Class C subnet mask:

The subnet address	0	32	64	96	128	160	192	224
The first valid host	1	33	65	97	129	161	193	225
The last valid host	30	62	94	126	158	190	222	254
The broadcast address	31	63	95	127	159	191	223	255

Practice Example #2C: 255.255.255.192 (/26)

In this second example, we're going to subnet the network address 192.168.10.0 using the subnet mask 255.255.255.192.

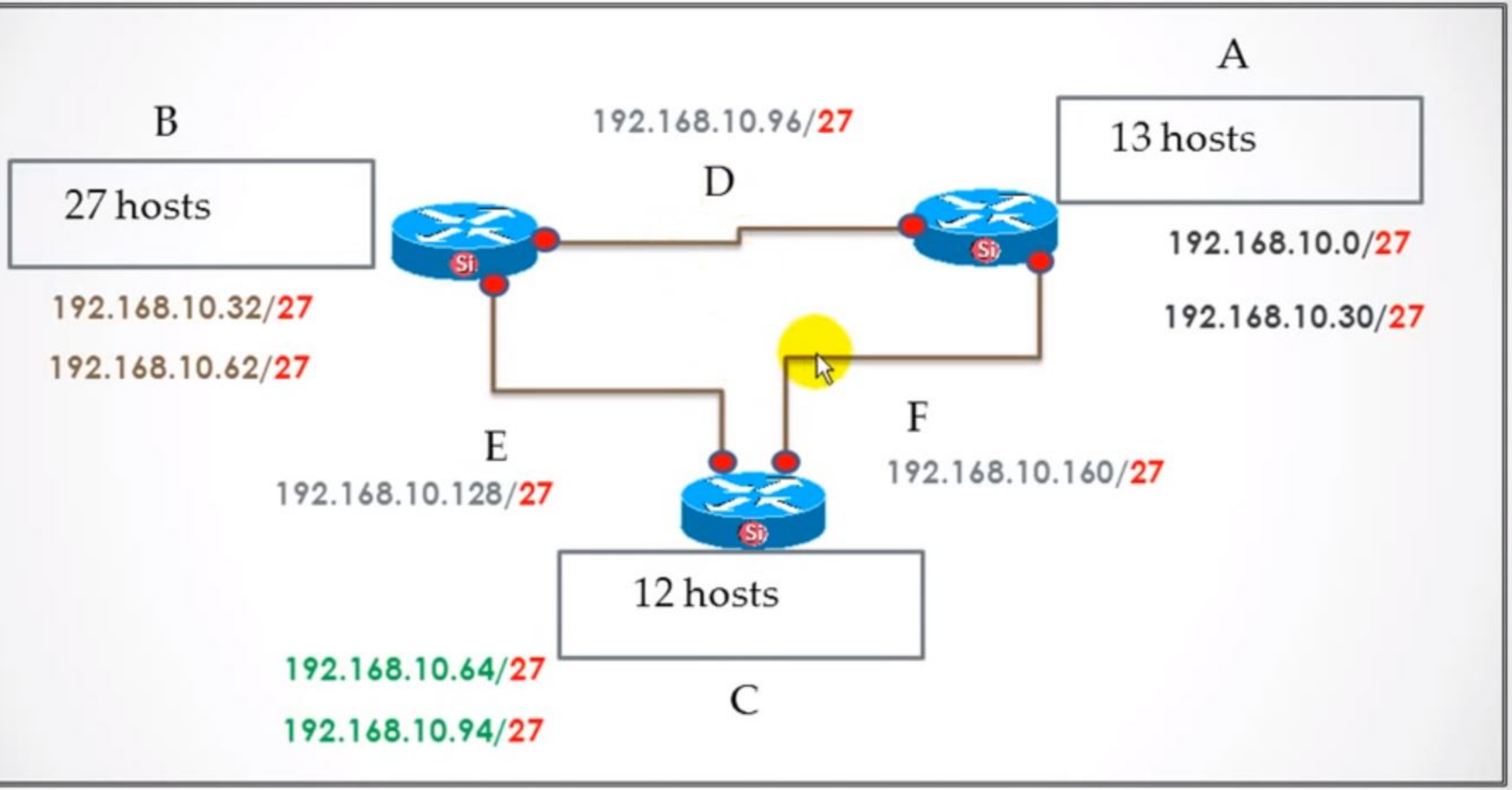
192.168.10.0 = Network address

255.255.255.192 = Subnet mask

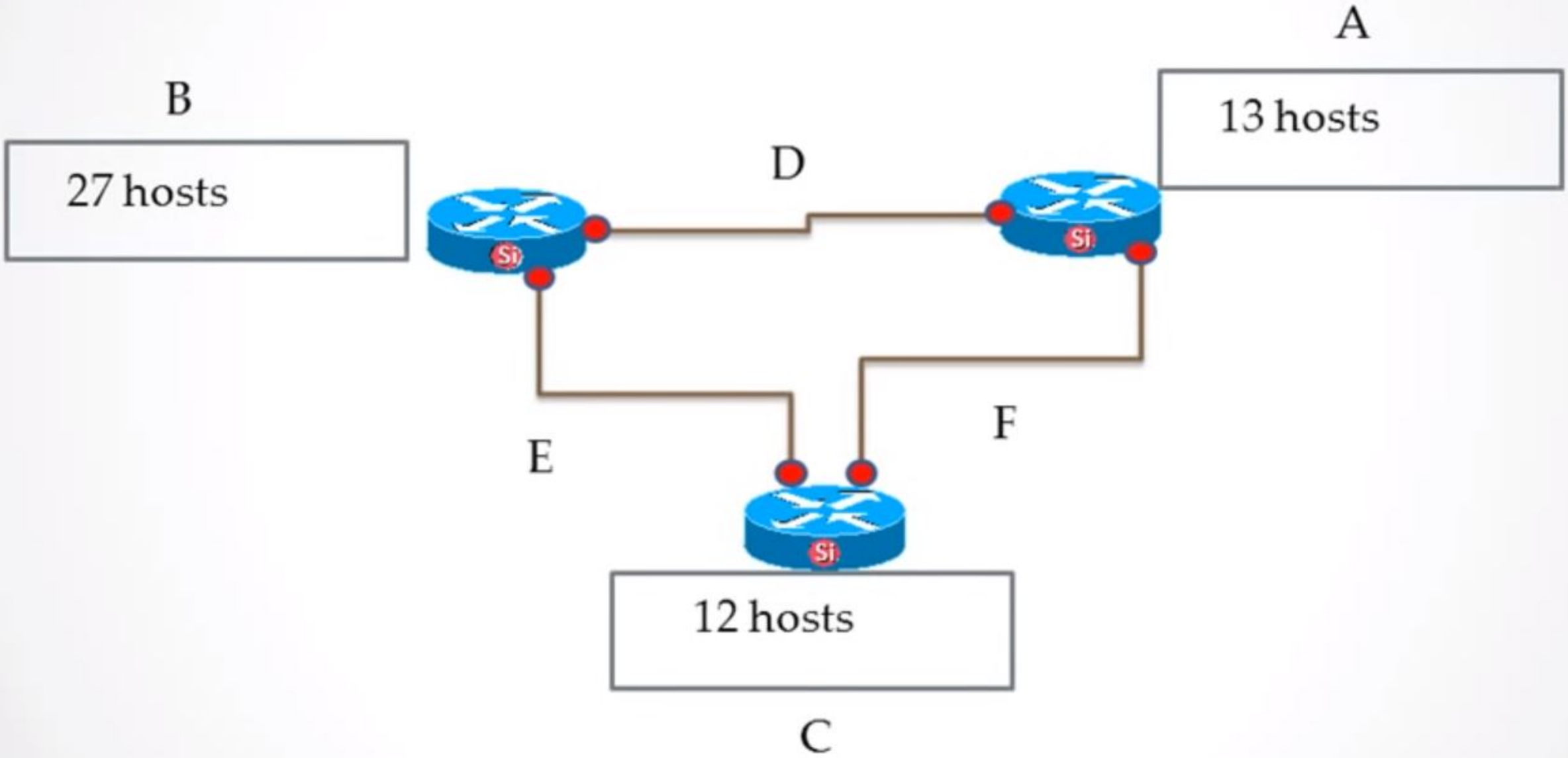
Now, let's answer the big five:

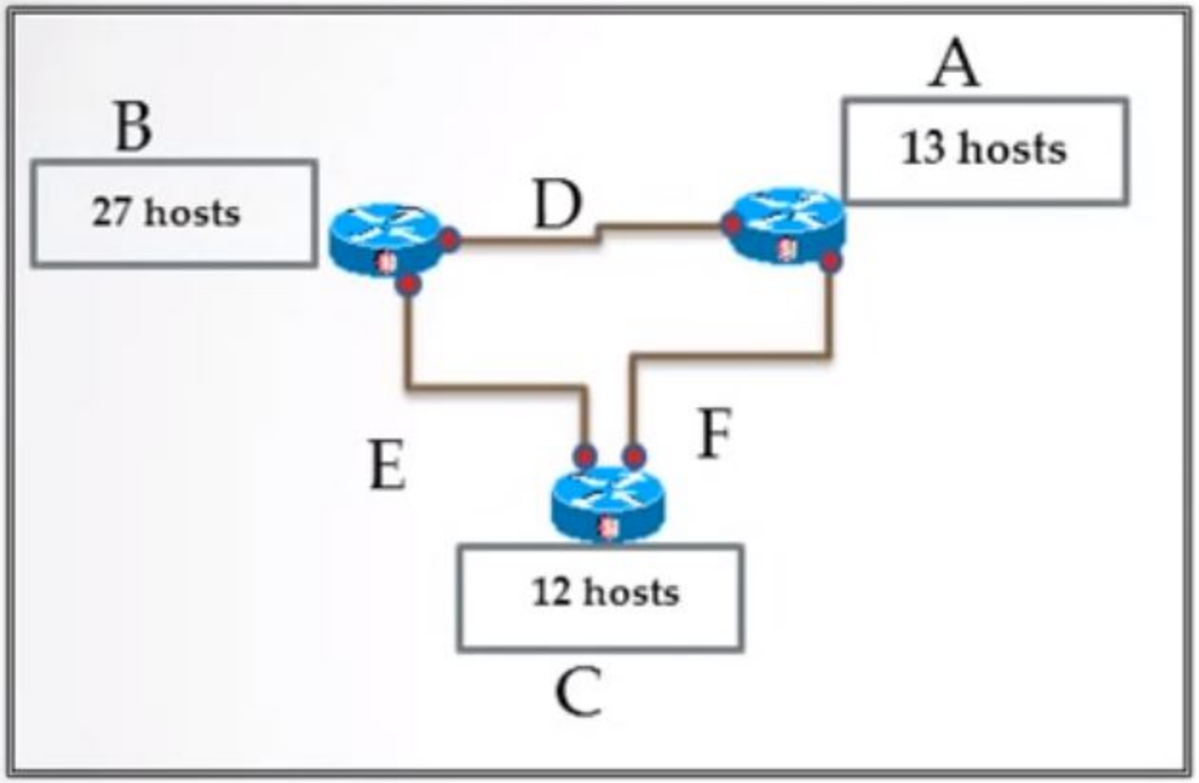
- *How many subnets?* Since 192 is 2 bits on (11000000), the answer would be $2^2 = 4$ subnets.
- *How many hosts per subnet?* We have 6 host bits off (11000000), so the equation would be $2^6 - 2 = 62$ hosts.
- *What are the valid subnets?* 256 – 192 = 64. Remember, we start at zero and count in our block size, so our subnets are 0, 64, 128, and 192.
- *What's the broadcast address for each subnet?* The number right before the value of the next subnet is all host bits turned on and equals the broadcast address. For the zero subnet, the next subnet is 64, so the broadcast address for the zero subnet is 63.
- *What are the valid hosts?* These are the numbers between the subnet and broadcast address. The easiest way to find the hosts is to write out the subnet address and the broadcast address. This way, the valid hosts are obvious. The following table shows the 0, 64, 128, and 192 subnets, the valid host ranges of each, and the broadcast address of each subnet:

The subnets (do this first)	0	64	128	192
Our first host (perform host addressing last)	1	65	129	193
Our last host	62	126	190	254
The broadcast address (do this second)	63	127	191	255



Classless Inter-Domain Routing (CIDR)


A
13 hosts
B
27 hosts
D
F
E
12 hosts
C



192.168.10.0/27

192.168.10.1/27

192.168.10.30/27

192.168.10.31/27

192.168.10.0

255.255.255.0

Net => B (27 Hosts)

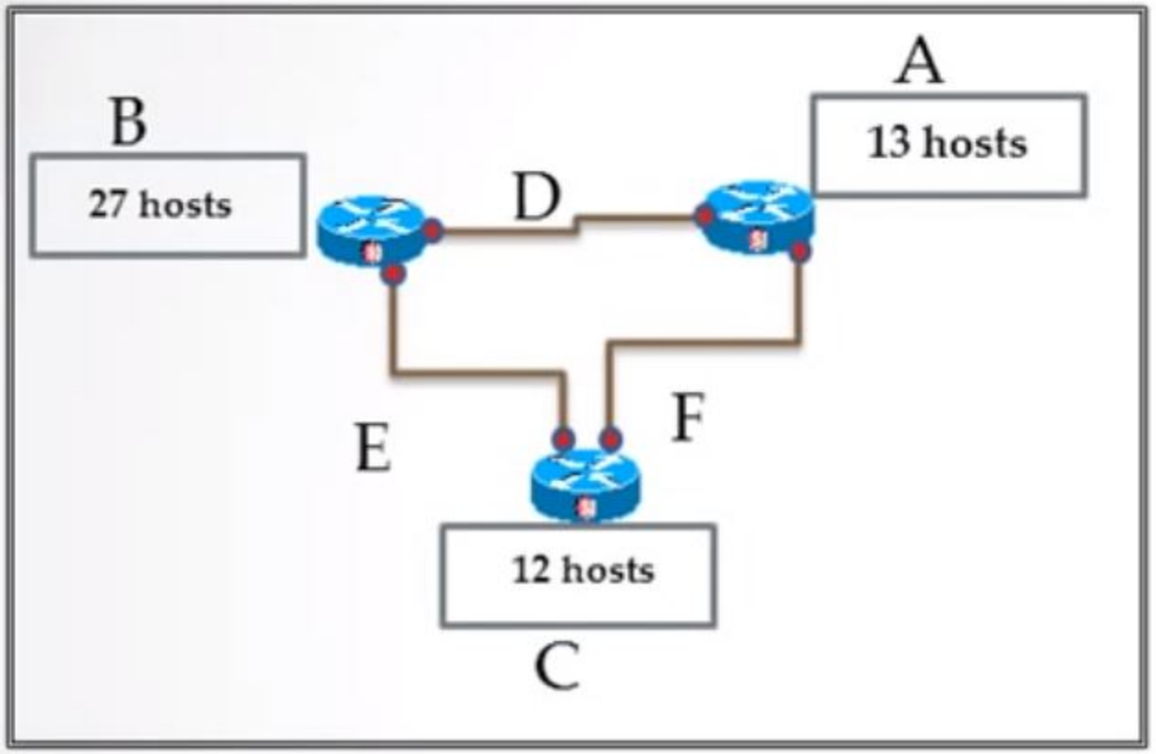
11111111.11111111.11111111.00000000

11111111.11111111.11111111.11100000

$2^5 - 2 = 32 - 2 = 30$ $2^N - 2 = X$

11100000 => 224 = 27

256 – 224 =32



192.168.10.0
255.255.255.0

Net => A (13 Hosts)

11111111.11111111.11111111.00000000

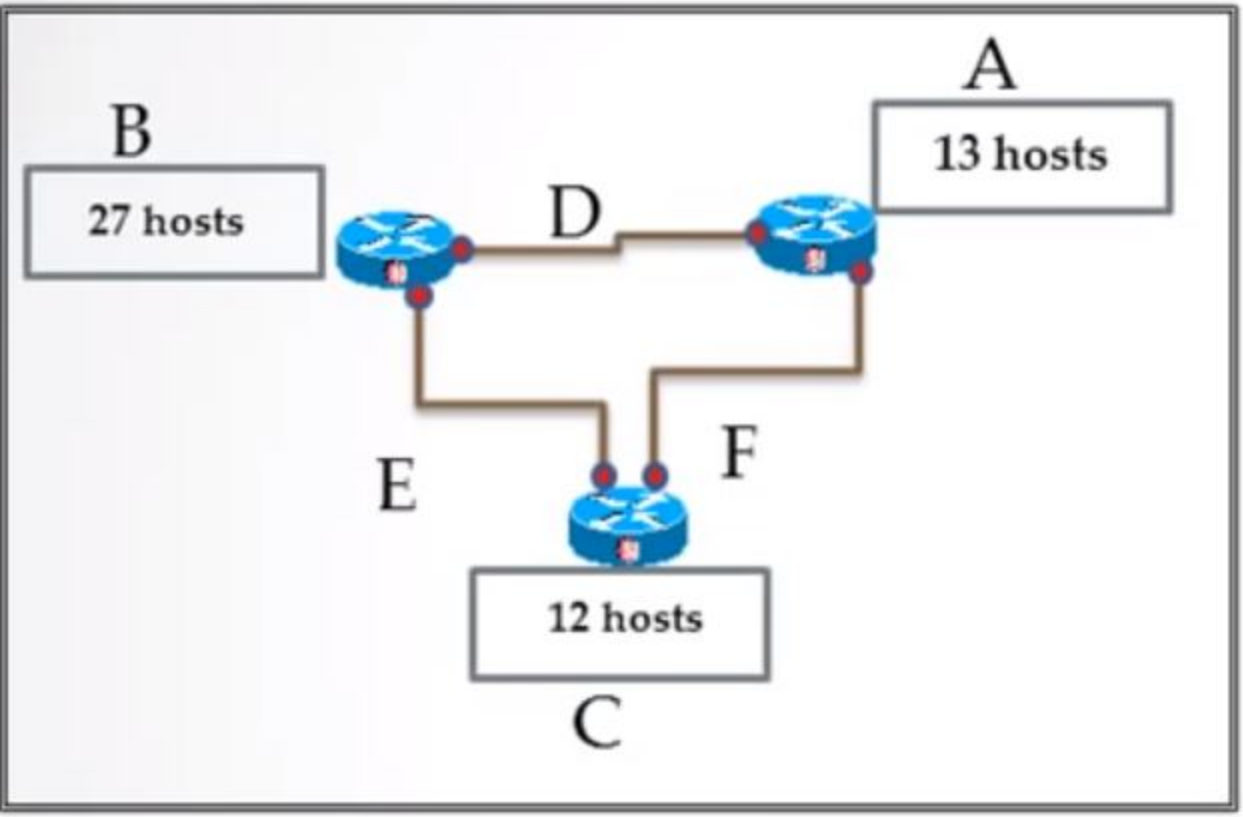
11111111.11111111.11111111.11110000

$2^4 - 2 = 16 - 2 = 14$ $2^N - 2 = X$

11110000 => 240 = 28

256 – 240 =16

192.168.10.32/28
192.168.10.33/28
192.168.10.46/28
192.168.10.47/28

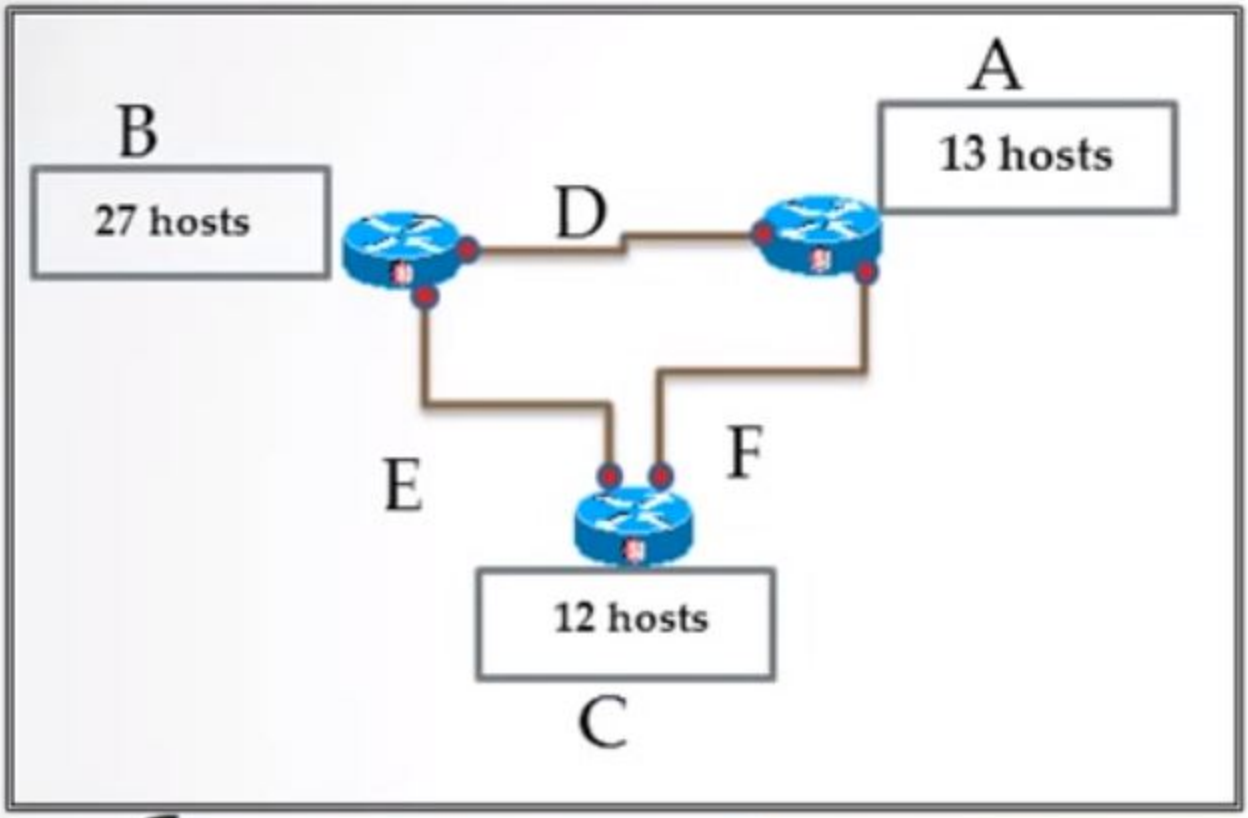


192.168.10.48/28

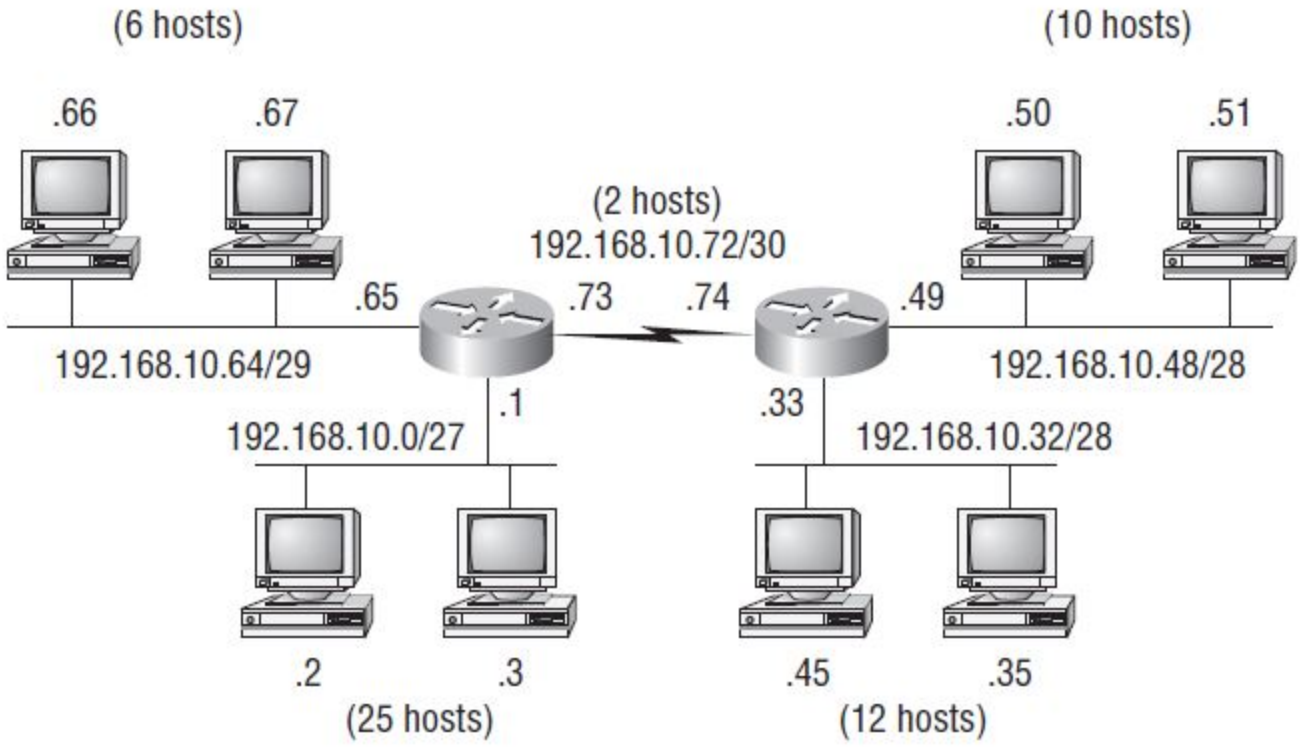
192.168.10.49/28

192.168.10.62/28

192.168.10.63/28



D	192.168.10.64/30	192.168.10.65/30
	192.168.10.67/30	192.168.10.66/30
E	192.168.10.68/30	192.168.10.69/30
	192.168.10.71/30	192.168.10.70/30
F	192.168.10.72/30	192.168.10.73/30
	192.168.10.75/30	192.168.10.74/30


(6 hosts)
(10 hosts)
.66
.67
.50
.51
(2 hosts)
192.168.10.72/30
.65
.73
.74
.49
192.168.10.64/29
192.168.10.48/28
.1
.33
192.168.10.0/27
192.168.10.32/28
.2
.3
.45
.35
(25 hosts)
(12 hosts)