

FIND THE SUBNET. KEEP THE USABLE RANGE.

Given an IPv4 address and prefix, identify the network, broadcast and usable host range.

THE DECISION PATH

1 Count the host bits

IPv4 has 32 bits. Subtract the prefix length to find the host-bit count h .

$$h = 32 - \text{prefix}; \text{addresses} = 2^h$$

[C1, C2]

2 Find the enclosing block

For /24 through /30, use blocks in the last octet. Round that octet down to a multiple of the block size.

$$\text{network octet} = \text{floor}(\text{octet} / \text{block}) \times \text{block}$$

[C1]

3 Reserve both endpoints

The first address identifies the network; the last is the broadcast. Hosts lie strictly between them.

$$\text{broadcast} = \text{network} + \text{block} - 1$$

[C1, C2]

WORKED EXAMPLE / ORIGINAL STUDYMAPS SCENARIO

A host is configured as 192.168.8.77/27

Find its subnet and the address range available for ordinary LAN hosts.

.64 Network	.65 to .94 Usable hosts	.95 Broadcast
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1. $32 - 27 = 5$ host bits; $2^5 = 32$ addresses.
2. Last-octet blocks begin at 0, 32, 64, 96... The value 77 falls in the 64-95 block.
3. Network: 192.168.8.64/27. Broadcast: 192.168.8.95.
4. Exclude .64 and .95: usable hosts are .65 through .94, a total of 30.

RESULT

192.168.8.65 to 192.168.8.94 are usable.

Principles: [C1, C2]. Original example: StudyMaps.

Catch this mistake

A /27 contains 32 addresses, not 32 ordinary host addresses. Also, a block boundary is a network address even when its last octet is not zero.

CLOSE THE BOARD. SHOW YOUR WORKING.

Original practice problems. Answer key on page 3.

PRACTICE 1

What is the broadcast address for 10.4.2.142/28?

- A. 10.4.2.128
- B. 10.4.2.143
- C. 10.4.2.144
- D. 10.4.2.158

PRACTICE 2

How many ordinary LAN hosts fit in a /29?

- A. 4
- B. 6
- C. 8
- D. 14

PRACTICE 3

Are 172.16.5.62/26 and 172.16.5.65/26 in the same subnet?

- A. Yes, because the first three octets match
- B. Yes, because the prefixes match
- C. No: the blocks are 0-63 and 64-127
- D. No: /26 permits only one host

Return later

Without the board: what is the usable host range for 192.168.12.203/28?

- | | |
|-----------------------|-----------------------|
| A. 192.168.12.192-207 | B. 192.168.12.193-206 |
| C. 192.168.12.201-214 | D. 192.168.12.204-219 |

Write your reasoning before checking page 3.

CHECK THE REASONING, TOO.

PRACTICE 1

10.4.2.143

A /28 has 16 addresses. 142 falls in 128-143; 143 is the last address and therefore the broadcast.

Use step 3: the next block begins at 144, so this block ends one address earlier.

PRACTICE 3

No: the blocks are 0-63 and 64-127

A /26 has blocks of 64. The first host belongs to .0/26; the second belongs to .64/26.

Find the enclosing block for each address before comparing network IDs.

PRACTICE 2

6

$32 - 29 = 3$ host bits. Eight total addresses minus network and broadcast leaves six usable hosts.

Use steps 1 and 3 together. Total addresses and usable hosts are different counts.

RETURN LATER

192.168.12.193-206

The block size is 16; 203 lies in 192-207. Removing the network and broadcast leaves 193-206.

Write host bits, block boundaries and reserved endpoints as three separate lines.

Sources and scope

Conventional IPv4 LAN subnets, /24 through /30. /31 point-to-point and /32 host routes use different rules. Focused CCNA practice supplement; it does not cover the full exam blueprint.

[C1] Cisco: Configure IP Addresses and Unique Subnets · <https://www.cisco.com/c/en/us/support/docs/ip/routing-information-protocol-rip/13788-3.html> · Checked 2026-09-09

[C2] Cisco: Understand Host and Subnet Quantities · <https://www.cisco.com/c/en/us/support/docs/ip/routing-information-protocol-rip/13790-8.html> · Checked 2026-09-09

[C3] Cisco CCNA v1.1 exam topics · <https://learningcontent.cisco.com/documents/marketing/exam-topics/200-301-CCNA-v1.1.pdf> · Checked 2026-09-09