Set 4 — Answer key

Mark your paper first, then read the working for anything you missed. Every answer was generated from subnet maths and checked independently.

1. Last usable host in the subnet of 10.184.33.196/23?

   Answer: 10.184.33.254

   - /23 = 255.255.254.0: interesting octet is the 3rd (254). Block = 256 − 254 = 2.
   - 33 ÷ 2 = 16 r1 → block starts at 32, next block at 34.
   - Network 10.184.32.0, broadcast 10.184.33.255 (octets to the right: 0 on the network, 255 on the broadcast).
   - Last usable = broadcast − 1 = 10.184.33.254 (not 10.184.33.255).

   `Check it: https://subnetcalculator.dev/?ip=10.184.33.196&cidr=23`

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2. Smallest prefix that fits 63 hosts?

   Answer: /25 (255.255.255.128, 126 usable)

   - 63 hosts + 2 (network and broadcast) = 65 addresses.
   - Next power of two: 128 = 7 host bits → /25 (126 usable).

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3. Prefix length for mask 255.255.224.0?

   Answer: /19

   - 255.255.224.0: 2 × 255 = 16 bits, plus 224 = 3 bit(s) → /19.

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4. Broadcast address for 10.120.28.117/21?

   Answer: 10.120.31.255

   - /21 = 255.255.248.0: interesting octet is the 3rd (248). Block = 256 − 248 = 8.
   - 28 ÷ 8 = 3 r4 → block starts at 24, next block at 32.
   - Network 10.120.24.0, broadcast 10.120.31.255 (octets to the right: 0 on the network, 255 on the broadcast).
   - Trap: the 4th octet of the broadcast is 255, not the block edge.

   `Check it: https://subnetcalculator.dev/?ip=10.120.28.117&cidr=21`

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5. 172.17.171.183/22: find the network, broadcast and usable range.

   Answer: Network 172.17.168.0 · broadcast 172.17.171.255 · usable 172.17.168.1–172.17.171.254

   - /22 = 255.255.252.0: interesting octet is the 3rd (252). Block = 256 − 252 = 4.
   - 171 ÷ 4 = 42 r3 → block starts at 168, next block at 172.
   - Network 172.17.168.0, broadcast 172.17.171.255 (octets to the right: 0 on the network, 255 on the broadcast).
   - Usable 172.17.168.1–172.17.171.254 (1,022 hosts).

   `Check it: https://subnetcalculator.dev/?ip=172.17.171.183&cidr=22`

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6. Last usable host in the subnet of 10.126.244.21/25?

   Answer: 10.126.244.126

   - /25 = 255.255.255.128: interesting octet is the 4th (128). Block = 256 − 128 = 128.
   - 21 ÷ 128 = 0 r21 → block starts at 0, next block at 128.
   - Network 10.126.244.0, broadcast 10.126.244.127.
   - Last usable = broadcast − 1 = 10.126.244.126 (not 10.126.244.127).

   `Check it: https://subnetcalculator.dev/?ip=10.126.244.21&cidr=25`

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7. Broadcast address for 10.11.89.89/21?

   Answer: 10.11.95.255

   - /21 = 255.255.248.0: interesting octet is the 3rd (248). Block = 256 − 248 = 8.
   - 89 ÷ 8 = 11 r1 → block starts at 88, next block at 96.
   - Network 10.11.88.0, broadcast 10.11.95.255 (octets to the right: 0 on the network, 255 on the broadcast).
   - Trap: the 4th octet of the broadcast is 255, not the block edge.

   `Check it: https://subnetcalculator.dev/?ip=10.11.89.89&cidr=21`

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8. Mask 255.255.240.0: which octet does the block size count in?

   Answer: 3rd octet (block 16)

   - The first octet that isn't 255 is the 3rd (240): block 256 − 240 = 16.

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9. Which network is 192.168.32.0/19 in?

   Answer: 192.168.32.0/19

   - /19 = 255.255.224.0: interesting octet is the 3rd (224). Block = 256 − 224 = 32.
   - 32 ÷ 32 = 1 r0 → block starts at 32, next block at 64.
   - Network 192.168.32.0, broadcast 192.168.63.255 (octets to the right: 0 on the network, 255 on the broadcast).
   - Trap: the address is itself the network address of its block.

   `Check it: https://subnetcalculator.dev/?ip=192.168.32.0&cidr=19`

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10. On a /20, what is 192.168.143.255?

    Answer: The broadcast address

    - /20 = 255.255.240.0: interesting octet is the 3rd (240). Block = 256 − 240 = 16.
    - 143 ÷ 16 = 8 r15 → block starts at 128, next block at 144.
    - Network 192.168.128.0, broadcast 192.168.143.255 (octets to the right: 0 on the network, 255 on the broadcast).
    - 192.168.143.255 is the broadcast address.

    `Check it: https://subnetcalculator.dev/?ip=192.168.143.255&cidr=20`

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11. Which network is 192.0.2.0/26 in?

    Answer: 192.0.2.0/26

    - /26 = 255.255.255.192: interesting octet is the 4th (192). Block = 256 − 192 = 64.
    - 0 ÷ 64 = 0 r0 → block starts at 0, next block at 64.
    - Network 192.0.2.0, broadcast 192.0.2.63.
    - Trap: the address is itself the network address of its block.

    `Check it: https://subnetcalculator.dev/?ip=192.0.2.0&cidr=26`

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12. On a /23, what is 10.142.124.255?

    Answer: A usable host address

    - /23 = 255.255.254.0: interesting octet is the 3rd (254). Block = 256 − 254 = 2.
    - 124 ÷ 2 = 62 r0 → block starts at 124, next block at 126.
    - Network 10.142.124.0, broadcast 10.142.125.255 (octets to the right: 0 on the network, 255 on the broadcast).
    - 10.142.124.255 is a usable host address.

    `Check it: https://subnetcalculator.dev/?ip=10.142.124.255&cidr=23`

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13. 10.133.223.59/27: find the network, broadcast and usable range.

    Answer: Network 10.133.223.32 · broadcast 10.133.223.63 · usable 10.133.223.33–10.133.223.62

    - /27 = 255.255.255.224: interesting octet is the 4th (224). Block = 256 − 224 = 32.
    - 59 ÷ 32 = 1 r27 → block starts at 32, next block at 64.
    - Network 10.133.223.32, broadcast 10.133.223.63.
    - Usable 10.133.223.33–10.133.223.62 (30 hosts).

    `Check it: https://subnetcalculator.dev/?ip=10.133.223.59&cidr=27`

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14. 192.168.232.173/28: find the network, broadcast and usable range.

    Answer: Network 192.168.232.160 · broadcast 192.168.232.175 · usable 192.168.232.161–192.168.232.174

    - /28 = 255.255.255.240: interesting octet is the 4th (240). Block = 256 − 240 = 16.
    - 173 ÷ 16 = 10 r13 → block starts at 160, next block at 176.
    - Network 192.168.232.160, broadcast 192.168.232.175.
    - Usable 192.168.232.161–192.168.232.174 (14 hosts).

    `Check it: https://subnetcalculator.dev/?ip=192.168.232.173&cidr=28`

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15. 172.21.125.94/21: find the network, broadcast and usable range.

    Answer: Network 172.21.120.0 · broadcast 172.21.127.255 · usable 172.21.120.1–172.21.127.254

    - /21 = 255.255.248.0: interesting octet is the 3rd (248). Block = 256 − 248 = 8.
    - 125 ÷ 8 = 15 r5 → block starts at 120, next block at 128.
    - Network 172.21.120.0, broadcast 172.21.127.255 (octets to the right: 0 on the network, 255 on the broadcast).
    - Usable 172.21.120.1–172.21.127.254 (2,046 hosts).

    `Check it: https://subnetcalculator.dev/?ip=172.21.125.94&cidr=21`

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16. Smallest prefix that fits 31 hosts?

    Answer: /26 (255.255.255.192, 62 usable)

    - 31 hosts + 2 (network and broadcast) = 33 addresses.
    - Next power of two: 64 = 6 host bits → /26 (62 usable).

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17. Which network is 10.83.168.159/27 in?

    Answer: 10.83.168.128/27

    - /27 = 255.255.255.224: interesting octet is the 4th (224). Block = 256 − 224 = 32.
    - 159 ÷ 32 = 4 r31 → block starts at 128, next block at 160.
    - Network 10.83.168.128, broadcast 10.83.168.159.
    - Trap: this host address is the broadcast of its block, so it still belongs to that block.

    `Check it: https://subnetcalculator.dev/?ip=10.83.168.159&cidr=27`

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18. Which network is 192.168.63.255/19 in?

    Answer: 192.168.32.0/19

    - /19 = 255.255.224.0: interesting octet is the 3rd (224). Block = 256 − 224 = 32.
    - 63 ÷ 32 = 1 r31 → block starts at 32, next block at 64.
    - Network 192.168.32.0, broadcast 192.168.63.255 (octets to the right: 0 on the network, 255 on the broadcast).
    - Trap: this host address is the broadcast of its block, so it still belongs to that block.

    `Check it: https://subnetcalculator.dev/?ip=192.168.63.255&cidr=19`

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19. VLSM: 192.168.224.0/23 already has 192.168.224.0/24, 192.168.225.0/25. Next subnet for 30 hosts?

    Answer: 192.168.225.128/27

    - 30 hosts + 2 → /27 (block 32).
    - The used blocks end at 192.168.225.127, so the next free address is 192.168.225.128.
    - 192.168.225.128 is a multiple of 32 in its octet, so it is aligned: 192.168.225.128/27.

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20. VLSM: 10.134.183.0/24 already has 10.134.183.0/25, 10.134.183.128/29. Does a subnet for 100 hosts still fit?

    Answer: No

    - 100 hosts + 2 → /25 (block 128).
    - Free space: 10.134.183.136–10.134.183.255 (120 addresses).
    - No: there is no free, aligned block of 128 left.

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