

IPv4 Subnetting – Sections

Section 1: Analyzing Individual Subnets

Section 2: Converting Subnet Masks

Section 3: Analyzing IP Networks

Section 4: Identifying the Subnets of a Network

Section 5: Analyzing Designs Using Masks

Section 6: Subnetting and the Exam

IPv4 Subnetting – Section 6

Subnetting on the Exams

In This Lesson...

Subnetting on the Exams

- **Exam Overview**
- Your Exam Day Plan for Subnetting
- Your Practice Options for Subnetting
- Your Learning Stages and Speed Goals

The CCNA 200-125 Exam

1. Exam Info: cisco.com/go/certifications
2. Registration: vue.com
3. Time and Number of Questions:
 - A. Range of Questions: **60-70** questions
 - B. Time: **90** minutes
 - C. Subject to Change!
4. Exam Environment
 - A. A Room w/ PCs
 - B. No Outside Notes, etc. Allowed
 - C. Testing Center Supplies: Laminated Sheets and Dry Erase Markers

Question Types

Multiple Choice

- Single Answer
- Multiple Answer

Special Types

- Simulator Questions (Sim)
- Simlet Questions (Simlet)
- Testlet Questions (Testlet)
- Drag and Drop Questions (DnD)

Example CCNA Exam Question Breakdown

60 Minutes for 60 MC

60 MC

40 MC MA

20 MC SA



30 Minutes For Four Specials

Sim



Sim



SimLet



TestLet



Question with Subnetting Math

A packet destined to 10.1.15.150 arrives at router R1. Out which interface does the router forward the packet?

- A. G0/1.1
 - B. G0/1.99
 - C. G0/1.100
 - D. None; Packet is Discarded
-

```
R1# show ip route
! Legend omitted for brevity

  10.0.0.0/8 is variably subnetted, 240 subnets, 8 masks
D      10.1.1.0/26 [90/2172416] via 10.2.1.1, 00:00:34, G0/1.1
D      10.1.1.128/28 [90/2172416] via 10.2.1.5, 00:00:34, G0/1.2
D      10.2.1.160/28 [90/2172416] via 10.2.1.9, 00:00:34, G0/1.3
D      10.1.14.0/23 [90/2172416] via 10.2.2.141, 00:00:34, G0/1.99
D      10.1.15.128/29 [90/2172416] via 10.2.2.145, 00:00:34, G0/1.100
! Lines omitted for brevity
```

Subnetting Math to Answer the Question

Output Interface	Destination Subnet	Time to Convert Mask	Time to Find Address Range	Totals Per Row
G0/1.1	10.1.1.0/26	10	30	40
G0/1.99	10.1.14.0/23	10	30	40
G0/1.100	10.1.15.128/29	10	30	40

How to Avoid Time Pressure

- Better Preparation!
- Three Primary Ways to Avoid Time Pressure
 1. Sim: Practice Top **Configuration** Topics
 2. Simlet: Practice Understanding **show Command** Output
 3. Math: Should be **Good and Fast**

In This Lesson...

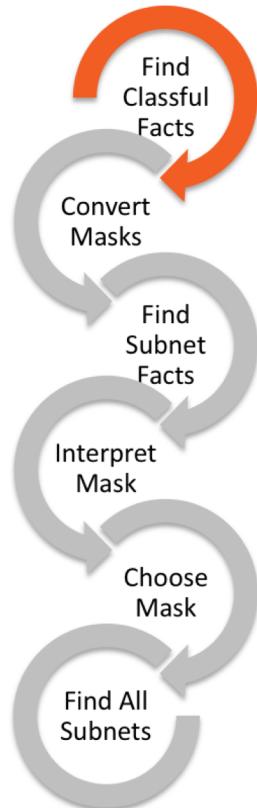
Subnetting on the Exams

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Exam Day Plan

- What will You Write before the Timer Starts?
 1. Powers of 2?
 2. Masks?
 3. Mask Octets?
 4. Multiples of 8, 16, 32?
 5. Charts that Make Sense to You?

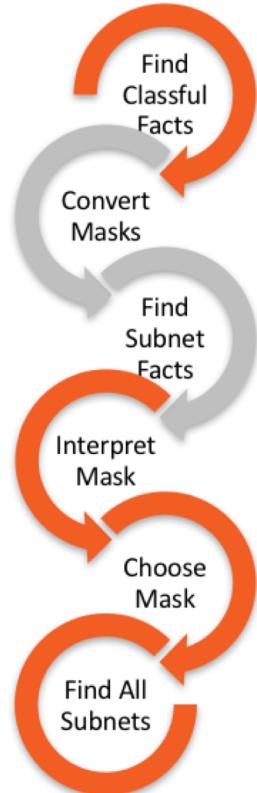
Address Class Key



Range of First Octet (Inclusive)	Class	# Network Octets	# Host Octets	Default Mask
1..126*	A	1	3	255.0.0.0
128..191	B	2	2	255.255.0.0
192..223	C	3	1	255.255.255.0
224..239	D	N/A	N/A	N/A
240..255	E	N/A	N/A	N/A

* First Octet of 0 or 127: Reserved for Special Uses

Powers of 2

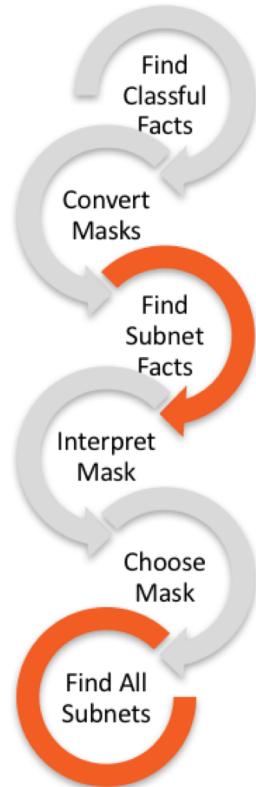


Power	Decimal
2^0	1
2^1	2
2^2	4
2^3	8
2^4	16
2^5	32
2^6	64
2^7	128

Power	Decimal
2^8	256
2^9	512
2^{10}	1024
2^{11}	2048
2^{12}	4096
2^{13}	8192
2^{14}	16,384
2^{15}	32,768

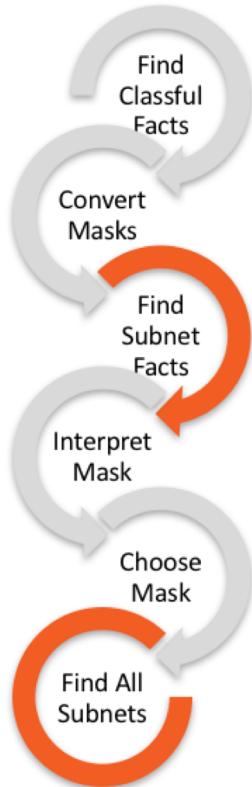
Power	Decimal
2^{16}	65,536
2^{17}	131,072
2^{18}	262,144
2^{19}	524,288
2^{20}	1,048,576
2^{21}	2,097,152
2^{22}	4,194,304
2^{23}	8,388,608

Multiples of 8



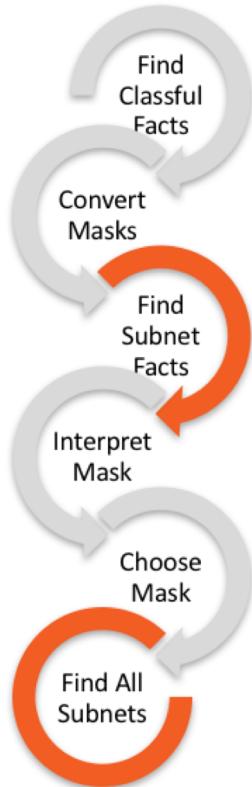
0	64	128	192
8	72	136	200
16	80	144	208
24	88	152	216
32	96	160	224
40	104	168	232
48	112	176	240
56	120	184	248

Multiples of 8, 16, and 32



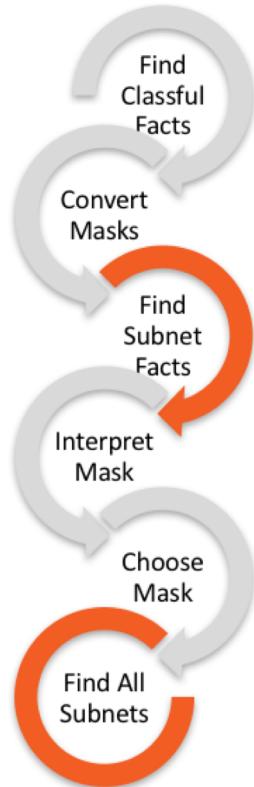
→ 0	→ 64	→ 128	→ 192
8	72	136	200
→ 16	→ 80	→ 144	→ 208
24	88	152	216
→ 32	→ 96	→ 160	→ 224
40	104	168	232
→ 48	→ 112	→ 176	→ 240
56	120	184	248

Multiples of 8, 16, and 32



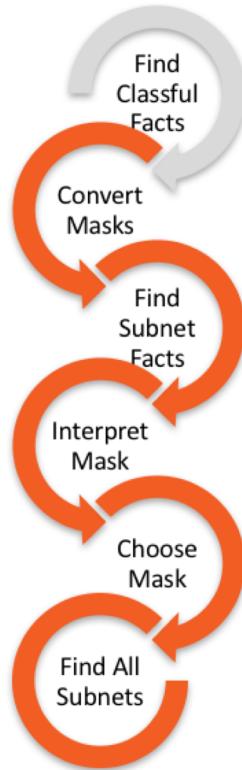
0	64	128	192
8	72	136	200
16	80	144	208
24	88	152	216
32	96	160	224
40	104	168	232
48	112	176	240
56	120	184	248

Multiples of 16 and 32



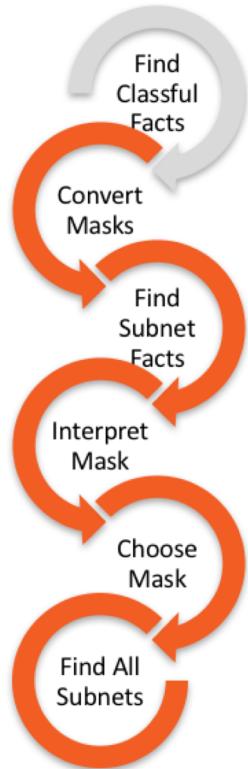
0	128
16	144
32	160
48	176
64	192
80	208
96	224
112	240

Nine DDN Mask Values and Magic Numbers



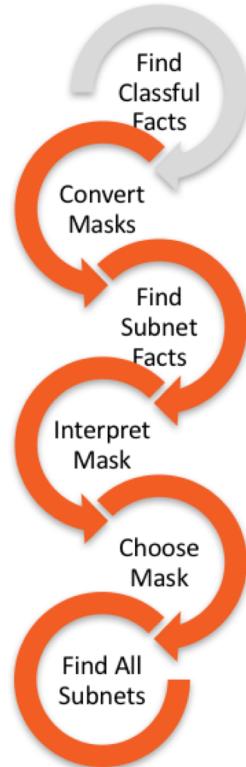
Decimal Octet Value	Binary	Number of Binary 1's
0	00000000	0
128	10000000	1
192	11000000	2
224	11100000	3
240	11110000	4
248	11111000	5
252	11111100	6
254	11111110	7
255	11111111	8

Nine DDN Mask Values and Magic Numbers



Decimal Octet Value	Magic Number	Binary	Number of Binary 1's
0	256	00000000	0
128	128	10000000	1
192	64	11000000	2
224	32	11100000	3
240	16	11110000	4
248	8	11111000	5
252	4	11111100	6
254	2	11111110	7
255	1	11111111	8

Mask Value Chart



255. __ .0.0	255.255. __ .0	255.255.255. __	Missing DDN Octet:	Magic Number
/9	/17	/25	128	128
/10	/18	/26	192	64
/11	/19	/27	224	32
/12	/20	/28	240	16
/13	/21	/29	248	8
/14	/22	/30	252	4
/15	/23	/31	254	2
/16	/24	/32	255	1

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Practice Problems from this Course

- Watch for Email about Recording
- **Bookmark the Link to the Recording!**
- Recording Site Includes the Chat Transcript
- I will Add the Links to the Course Practice Problems at the End of the Transcript

Practice Problems in ICND1 Book

- [ICND1 Official Cert Guide](#)

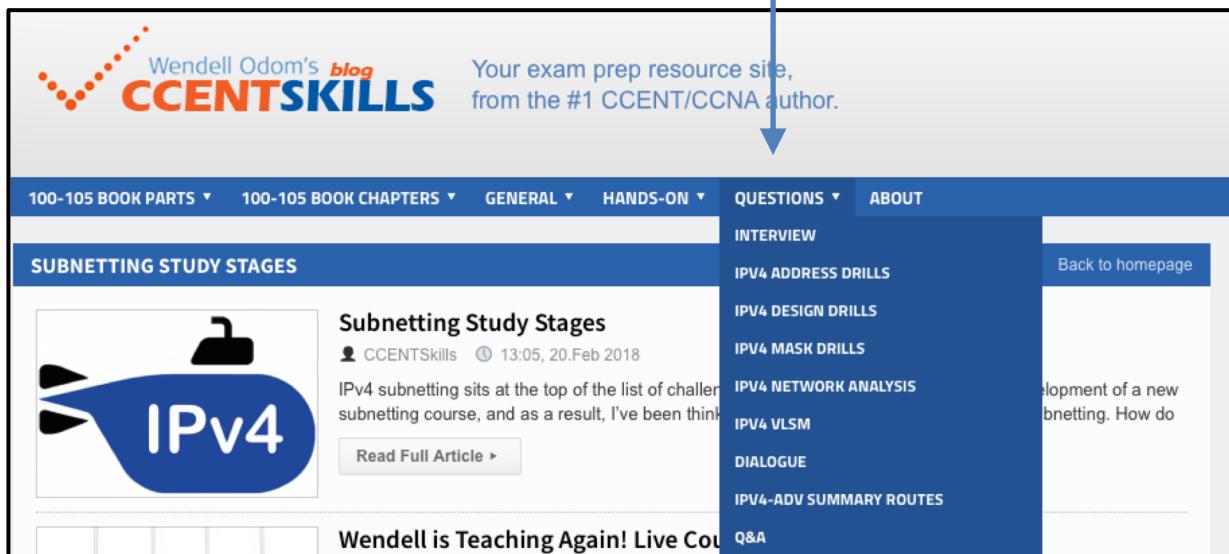
- Part of Safari
- Many Practice Questions

Book Element	Types of Problems
Appendix D	Find Classful Facts
Appendix E	Convert Masks
Appendix E	Interpret Masks
Appendix F	Find Subnet Facts
Appendix G	Choose Masks
Appendix G	Find All Subnets
Appendix H	VLSM

Practice Problems in Wendell's Blog

- Wendell's CCENT Skills Blog
 - blog.certskills.com/ccent
 - Look in “Questions” Tab

Click “Questions”



Build Your Own

- Use Any Subnetting Calculator
 - Windows: Solarwinds Subnetting Calculator
 - Linux/Mac: ipcalc command-line tool
 - Look in “Questions” Tab

```
Wendell-Odoms-iMac:~ wendellodom$ ipcalc -b 192.168.1.55/27
Address: 192.168.1.55
Netmask: 255.255.255.224 = 27
Wildcard: 0.0.0.31
=>
Network: 192.168.1.32/27
HostMin: 192.168.1.33
HostMax: 192.168.1.62
Broadcast: 192.168.1.63
Hosts/Net: 30                                Class C, Private Internet
```

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Speed Goals and Learning Stages

Subnetting Processes	Book Speed Goals	Your Speed Goal	Your Current Speed	Your Current Stage
Find Classful Network Facts *	10			
Convert Mask Formats *	10			
Find Subnet Facts	30			
Interpret Design w/ Mask	15			
Choose One Mask	15			
Find All Subnet IDs *	45			

* These Time Estimates Do Not Include the Time to Write/Type the Answers

Thank You!

1. Fill Out Your **Evals!**
2. Watch for upcoming **“Acing the CCNA Exam” Courses!**
3. Tweet **@WendellOdom** to Tell Me What Other Courses You Want!
4. Check out These (and Other) eProducts on Safari!

