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**+\*-/++-+-\*+-Resources:**

*subnettingquestions.com*

*subnetting.org*

*Subnettingpractice.com*

[***https://www.packettracerlab.com/subnetting-examples/***](https://www.packettracerlab.com/subnetting-examples/)

[***https://www.packettracerlab.com/subnetting-practice/***](https://www.packettracerlab.com/subnetting-practice/)

[***Microsoft Word - CCNA (200-301) Subnetting Practice Excercises.docx (pearsoncmg.com)***](https://ptgmedia.pearsoncmg.com/images/9780136582755/errata/SubnettingPracticeExercises_revised.pdf)

*EXTENDED QUESTIONS*

**Question #1**

**What is the range of assignable IP addresses for a subnet containing an IP address of 172.16.1.10 /19?**

**a. 172.16.0.1 – 172.16.31.254**

**b. 172.16.0.1 – 172.16.63.254**

**c. 172.16.0.0 – 172.16.31.255**

**d. 172.16.0.1 – 172.16.31.255**

**e. 172.16.0.0 – 172.16.63.254**

Subnet mask: /19

11111111.11111111.11100000.00000000

Third octet is our focus as it has the first 0 in the mask

Mask decimal: 255.255.224.0

Block size = 256 - 224 = 32

172.16.0.0

172.16.32.0

172.16.64.0

Note the above ranges include network and broadcast addresses

Ip address 192.16.1.10 resides in the 172.16.0.1

**Question #2**

**You are assigning IP addresses to hosts in the 192.168.4.0 /26 subnet. Which two of the following IP addresses are assignable IP addresses that reside in that subnet?**

**a. 192.168.4.0**

**b. 192.168.4.63**

**c. 192.168.4.62**

**d. 192.168.4.32**

**e. 192.168.4.64**

Clas C 192

11111111.11111111.111111111.11000000

Last octect - 192

256 - 192 = 64 block size

192.168.4.0

192.168.4.64

Answer: C, D

Class c /26 subnet mask:

11111111.11111111.11111111.11000000

255.255.255.192

Fourth octet is where we focus as it receives the first 0

Block size = 256 - 192 = 64

Subnet ranges:

192.168.4.0

192.168.4.64

192.168.4.128

192.168.4.192

The answer will be C and D

**Question #3**

**A host in your network has been assigned an IP address of 192.168.181.182 /25. What is the subnet to which the host belongs?**

**a. 192.168.181.128 /25**

**b. 192.168.181.0 /25**

**c. 192.168.181.176 /25**

**d. 192.168.181.192 /25**

**e. 192.168.181.160 /25**

Class C /25 address

11111111.111111111.11111111.10000000

The last octet will be our focus

255.255.255.128

256 - 128 = 128 block size

Subnet ranges:

192.168.181.0

192.168.181.128

192.168.181.254

Answer = A

**Question #4**

**You are working with a Class B network with the private IP address of 172.16.0.0 /16. You need to maximise the number of broadcast domains, where each broadcast domain can accommodate 1000 hosts.**

**What subnet mask should you use?**

**a. /22**

**b. /23**

**c. /24**

**d. /25**

**e. /26**

Class B /16

11111111.11111111.00000000.00000000

Hosts = 2^h - 2

1000 hosts = 2^10 - 2 = 1022 hosts = 10 host bits needed

/32 is max - 10 = /22

Therefore, subnet mask 11111111.11111111.11111100.00000000 /22

Hosts = 2^h - 2

10 host bits = 2^10 = 1024 - 2 = 1022 hosts. We will use a subnet mask of 32 - 10 = /22

**Question #5**

**What is the directed broadcast address of a subnet containing an IP address of 172.16.1.10 /19?**

**a. 172.16.15.255**

**b. 172.16.31.255**

**c. 172.16.255.255**

**d. 172.16.95.255**

**e. 172.16.0.255**

/19 = 11111111.11111111.11100000.00000000

Interesting octet is 3rd

Subnet mask for /19 is 255.255.224.0

Block size = 256 - 224 = 32

Subnets:

172.16.0.0

172.16.32.0

172.16.64.0

The IP in question lies within first range (32) so broadcast is final address - 1

32 - 1 = 172.16.31.0 is answer

**Question #6**

**A customer is using a Class C network of 192.168.10.0 subnetted with a 28-bit subnet mask. How many subnets can be created by using this subnet mask?**

**a. 32**

**b. 16**

**c. 30**

**d. 8**

**e. 14**

Subnets = 2^n where n is borrowed bits

Class c = /24 and using /28 so 4 borrowed bits

2^4 = 16

**Question #7**

**Given a subnet of 172.16.56.0 /21, identify which of the following IP addresses belong to this subnet. (Select 2.)**

**a. 172.16.54.129**

**b. 172.16.62.255**

**c. 172.16.61.0**

**d. 172.16.65.255**

**e. 172.16.64.1**

/21 = 11111111.11111111.11111000.00000000

Interesting octet = 3rd

255.255.248.0

Block size = 256 - 248 = 8

172.16.0.0

172.16.8.0

172.16.16.0

172.16.24.0

172.16.32.0

172.16.40.8

172.48.0

172.16.56.0

172.16.64.0

B and c is answer

**Question #8**

**What is the subnet address of the IP address 192.168.5.55 with a subnet mask of 255.255.255.224?**

**a. 192.168.5.0 /27**

**b. 192.168.5.16 /27**

**c. 192.168.5.32 /27**

**d. 192.168.5.48 /27**

**e. 192.168.5.64 /27**

11111111.11111111.11111111.11100000 255.255.255.224

/27

Block size = 256 - 224 = 32

Answer is c

**Question #9**

**You are working for a company that will be using the 192.168.1.0 /24 private IP address space for IP addressing inside their organization. They have multiple geographical locations and want to carve up the 192.168.1.0 /24 address space into subnets. Their largest subnet will need 13 hosts. What subnet mask should you use to accommodate at least 13 hosts per subnet, while maximizing the number of subnets that can be created?**

**a. 255.255.255.248**

**b. 255.255.255.224**

**c. 255.255.255.252**

**d. 255.255.255.192**

**e. 255.255.255.240**

Hosts max = 2^h - 2

2^4 = 14 hosts

4 host bits + /24 = /28

Therefore, subnet mask =

11111111.11111111.11111111.11110000

255.255.255.240

E is anwer

**Question #10**

**A customer is using a Class C network of 192.168.10.0 subnetted with a 28-bit**

**subnet mask. How many assignable addresses are available in each of the subnets?**

**a. 32**

**b. 16**

**c. 30**

**d. 8**

**e. 14**

/28

11111111.11111111.11111111.111110000

255.255.255.240

256 - 240 = 16 - 2 = 14 assignable

Answer: e

**An IP address of 192.168.0.100 /27 belongs to which of the following subnets?**

**a. 192.168.0.92**

**b. 192.168.0.128**

**c. 192.168.0.64**

**d. 192.168.0.96**

**e. 192.168.0.32**

/27 = 11111111.11111111.11111111.11100000 = 255.255.255.224

256 - 224 = 32

192.168.0.0

192.168.0.32

192.168.0.64

192.168.0.96

Answer = d

**Question #12**

**What subnet mask should be used to subnet the 192.168.10.0 network to support the number of subnets and IP addresses per subnet shown in the following topology?**

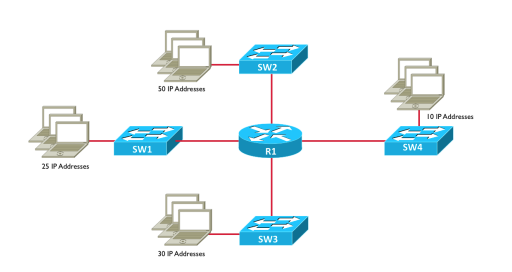
**a. 255.255.255.0**

**b. 255.255.255.128**

**c. 255.255.255.192**

**d. 255.255.255.224**

**e. 255.255.255.240**



Subnets in topology = 4

# subnets = 2^n = 2^2 = 4 subnets

2 bits accommodate subnets needed

/24 becomes /26

To make sure subnets cover 50 hosts:

2^h - 2

2^6 - 2 = 62 hosts

6 bits needed for hosts

Do we have 6 host bits available from /26? Yes 32-26 = 6

Therefore, /26 works.

11111111.11111111.11111111.11000000

255.255.255.192 is subnet mask

*free-practice:*

**Question #1**

**What is the range of assignable IP addresses for a subnet containing an IP address of 172.16.1.10 /19?**

**a. 172.16.0.1 – 172.16.31.254**

**b. 172.16.0.1 – 172.16.63.254**

**c. 172.16.0.0 – 172.16.31.255**

**d. 172.16.0.1 – 172.16.31.255**

**e. 172.16.0.0 – 172.16.63.254**

Subnet mask: /19

11111111.11111111.11100000.00000000

Third octet is our focus as it has the first 0 in the mask

Mask decimal: 255.255.224.0

Block size = 256 - 224 = 32

172.16.0.0

172.16.32.0

172.16.64.0

Note the above ranges include network and broadcast addresses

Ip address 192.16.1.10 resides in the 172.16.0.1

**Question #2**

**You are assigning IP addresses to hosts in the 192.168.4.0 /26 subnet. Which two of the following IP addresses are assignable IP addresses that reside in that subnet?**

**a. 192.168.4.0**

**b. 192.168.4.63**

**c. 192.168.4.62**

**d. 192.168.4.32**

**e. 192.168.4.64**

Class c /26 subnet mask:

11111111.11111111.11111111.11000000

255.255.255.192

Fourth octet is where we focus as it receives the first 0

Block size = 256 - 192 = 64

Subnet ranges:

192.168.4.0

192.168.4.64

192.168.4.128

192.168.4.192

The answer will be C and D

**Question #3**

**A host in your network has been assigned an IP address of 192.168.181.182 /25. What is the subnet to which the host belongs?**

**a. 192.168.181.128 /25**

**b. 192.168.181.0 /25**

**c. 192.168.181.176 /25**

**d. 192.168.181.192 /25**

**e. 192.168.181.160 /25**

Class C /25 address

11111111.111111111.11111111.10000000

The last octet will be our focus

255.255.255.128

256 - 128 = 128 block size

Subnet ranges:

192.168.181.0

192.168.181.128

192.168.181.254

Answer = A

**Question #4**

**You are working with a Class B network with the private IP address of 172.16.0.0 /16. You need to maximise the number of broadcast domains, where each broadcast domain can accommodate 1000 hosts.**

**What subnet mask should you use?**

**a. /22**

**b. /23**

**c. /24**

**d. /25**

**e. /26**

Hosts = 2^h - 2

10 host bits = 2^10 = 1024 - 2 = 1022 hosts. We will use a subnet mask of 32 - 10 = /22

**Question #5**

**What is the directed broadcast address of a subnet containing an IP address of 172.16.1.10 /19?**

**a. 172.16.15.255**

**b. 172.16.31.255**

**c. 172.16.255.255**

**d. 172.16.95.255**

**e. 172.16.0.255**

/19 = 11111111.11111111.11100000.00000000

Interesting octet is 3rd

Subnet mask for /19 is 255.255.224.0

Block size = 256 - 224 = 32

Subnets:

172.16.0.0

172.16.32.0

172.16.64.0

The IP in question lies within first range (32) so broadcast is final address - 1

32 - 1 = 172.16.31.0 is answer

**Question #6**

**A customer is using a Class C network of 192.168.10.0 subnetted with a 28-bit subnet mask. How many subnets can be created by using this subnet mask?**

**a. 32**

**b. 16**

**c. 30**

**d. 8**

**e. 14**

Subnets = 2^n where n is borrowed bits

Class c = /24 and using /28 so 4 borrowed bits

2^4 = 16

**Question #7**

**Given a subnet of 172.16.56.0 /21, identify which of the following IP addresses belong to this subnet. (Select 2.)**

**a. 172.16.54.129**

**b. 172.16.62.255**

**c. 172.16.61.0**

**d. 172.16.65.255**

**e. 172.16.64.1**

/21 = 11111111.11111111.11111000.00000000

Interesting octet = 3rd

255.255.248.0

Block size = 256 - 248 = 8

172.16.0.0

172.16.8.0

172.16.16.0

172.16.24.0

172.16.32.0

172.16.40.8

172.48.0

172.16.56.0

172.16.64.0

B and c is answer

**Question #8**

**What is the subnet address of the IP address 192.168.5.55 with a subnet mask of 255.255.255.224?**

**a. 192.168.5.0 /27**

**b. 192.168.5.16 /27**

**c. 192.168.5.32 /27**

**d. 192.168.5.48 /27**

**e. 192.168.5.64 /27**

11111111.11111111.11111111.11100000 255.255.255.224

/27

Block size = 256 - 224 = 32

Answer is c

**Question #9**

**You are working for a company that will be using the 192.168.1.0 /24 private IP address space for IP addressing inside their organization. They have multiple geographical locations and want to carve up the 192.168.1.0 /24 address space into subnets. Their largest subnet will need 13 hosts. What subnet mask should you use to accommodate at least 13 hosts per subnet, while maximizing the number of subnets that can be created?**

**a. 255.255.255.248**

**b. 255.255.255.224**

**c. 255.255.255.252**

**d. 255.255.255.192**

**e. 255.255.255.240**

Hosts max = 2^h - 2

2^4 = 14 hosts

4 host bits + /24 = /28

Therefore, subnet mask =

11111111.11111111.11111111.11110000

255.255.255.240

E is anwer

**Question #10**

**A customer is using a Class C network of 192.168.10.0 subnetted with a 28-bit**

**subnet mask. How many assignable addresses are available in each of the subnets?**

**a. 32**

**b. 16**

**c. 30**

**d. 8**

**e. 14**

/28

11111111.11111111.11111111.111110000

255.255.255.240

256 - 240 = 16 - 2 = 14 assignable

Answer: e

**An IP address of 192.168.0.100 /27 belongs to which of the following subnets?**

**a. 192.168.0.92**

**b. 192.168.0.128**

**c. 192.168.0.64**

**d. 192.168.0.96**

**e. 192.168.0.32**

/27 = 11111111.11111111.11111111.11100000 = 255.255.255.224

256 - 224 = 32

192.168.0.0

192.168.0.32

192.168.0.64

192.168.0.96

Answer = d

**Question #12**

**What subnet mask should be used to subnet the 192.168.10.0 network to support the number of subnets and IP addresses per subnet shown in the following topology?**

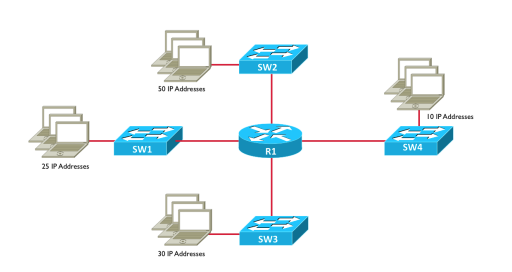
**a. 255.255.255.0**

**b. 255.255.255.128**

**c. 255.255.255.192**

**d. 255.255.255.224**

**e. 255.255.255.240**



Subnets in topology = 4

# subnets = 2^n = 2^2 = 4 subnets

2 bits accommodate subnets needed

/24 becomes /26

To make sure subnets cover 50 hosts:

2^h - 2

2^6 - 2 = 62 hosts

6 bits needed for hosts

Do we have 6 host bits available from /26? Yes 32-26 = 6

Therefore, /26 works.

11111111.11111111.11111111.11000000

255.255.255.192 is subnet mask

**Practice test:**

**Question #1 What is the range of assignable IP addresses for a subnet containing an IP address of 172.16.1.10 /19?**

**a. 172.16.0.1 – 172.16.31.254**

**b. 172.16.0.1 – 172.16.63.254**

**c. 172.16.0.0 – 172.16.31.255**

**d. 172.16.0.1 – 172.16.31.255**

**e. 172.16.0.0 – 172.16.63.254**

/19

11111111.11111111.11100000.00000

Third octet important

255.255.224.0

256-2224 = 32

Block size = 32

172.16.0.1

172.16.32.1

Answer A

**Question #2**

**You are assigning IP addresses to hosts in the 192.168.4.0 /26 subnet. Which two of the following IP addresses are assignable IP addresses that reside in that subnet?**

**a. 192.168.4.0**

**b. 192.168.4.63**

**c. 192.168.4.62**

**d. 192.168.4.32**

**e. 192.168.4.64**

/26  
11111111.11111111.11111111.11000000

255.255.255.192

256-192 = 64

Block size = 64

192.168.4.0

192.168.4.64

Answer C, D

**Question #3**

**A host in your network has been assigned an IP address of 192.168.181.182 /25. What is the subnet to which the host belongs?**

**a. 192.168.181.128 /25**

**b. 192.168.181.0 /25**

**c. 192.168.181.176 /25**

**d. 192.168.181.192 /25**

**e. 192.168.181.160 /25**

/25

11111111.11111111.1111111.10000000

255.255.255.128

256 - 128 = 128

Block size = 128

Answer A

**Question #4**

**You are working with a Class B network with the private IP address of 172.16.0.0 /16. You need to maximize the number of broadcast domains, where each broadcast domain can accommodate 1000 hosts. What subnet mask should you use?**

**a. /22**

**b. /23**

**c. /24**

**d. /25**

**e. /26**

11111111.11111111.0000000.0000000

255.255.0.0

/16

Hosts = 2^h - 2

2^10 = 1024 - 2 = 1022 hosts

We need 10 host bits

16 + 10 bits = /26

`

Answer E WRONG, a

Solution:

When dealing with host numbers…

2^n - 2

/32 is total bits… to get 1024 host need 10 host bits

32 - 10 = 22

So subnet mask must be /22 to allow 10 bits for hosts

**Question #5**

**What is the directed broadcast address of a subnet containing an IP address of 172.16.1.10 /19?**

**a. 172.16.15.255**

**b. 172.16.31.255**

**c. 172.16.255.255**

**d. 172.16.95.255**

**e. 172.16.0.255**

/19

11111111.11111111.11100000.00000000

255.255.224.0

256 - 224 = 32

172.16.0.255

172.16.32.255

Answer B

**Question #6**

**A customer is using a Class C network of 192.168.10.0 subnetted with a 28-bit subnet mask. How many subnets can be created by using this subnet mask?**

**a. 32**

**b. 16**

**c. 30**

**d. 8**

**e. 14**

/24 - /28 is 4 borrowed bits

11111111.11111111.11111111.11110000

255.255.255.240

Subnets = 2^n

2^4 = 16 subnets

Answer B

**Question #7**

**Given a subnet of 172.16.56.0 /21, identify which of the following IP addresses belong to this subnet. (Select 2.)**

**a. 172.16.54.129**

**b. 172.16.62.255**

**c. 172.16.61.0**

**d. 172.16.65.255**

**e. 172.16.64.1**

/21

11111111.11111111.11111000.00000000

255.255.248.0

256 - 248 = 8

172.16.0.0

172.16.8.0

172.16.16.0

172.16.24.0

172.16.32.0

172.16.40.0

172.16.48.0

172.16.56.0

172.16.64.0

Answer B or C

**Question #8**

**What is the subnet address of the IP address 192.168.5.55 with a subnet mask of 255.255.255.224?**

**a. 192.168.5.0 /27**

**b. 192.168.5.16 /27**

**c. 192.168.5.32 /27**

**d. 192.168.5.48 /27**

**e. 192.168.5.64 /27**

255.255.255.224

11111111.11111111.11111111.11100000

/27

265 - 224 = 32

1922.168.5.0

192.168.5.32

192.168.5.64

Answer C

**Question #9**

**You are working for a company that will be using the 192.168.1.0 /24 private IP address space for IP addressing inside their organization. They have multiple geographical locations and want to carve up the 192.168.1.0 /24 address space into subnets. Their largest subnet will need 13 hosts. What subnet mask should you use to accommodate at least 13 hosts per subnet, while maximizing the number of subnets that can be created?**

**a. 255.255.255.248**

**b. 255.255.255.224**

**c. 255.255.255.252**

**d. 255.255.255.192**

**e. 255.255.255.240**

2^h - 2 = hosts

/24 need 4 host bits for 16(-2) hosts per subnet 14

/24 + 4 = /28

11111111.11111111.11111111.11110000

255.255.255.240

Answer E

**Question #10**

**A customer is using a Class C network of 192.168.10.0 subnetted with a 28-bit subnet mask. How many assignable addresses are available in each of the subnets?**

**a. 32**

**b. 16**

**c. 30**

**d. 8**

**e. 14**

/28

11111111.11111111.11111111.11110000

255.255.255.240

256 - 240 = 16 assignable addresses

16 - 2 as 2 addresses pre-configured for network and broadcast

Answer E

**Question #11**

**An IP address of 192.168.0.100 /27 belongs to which of the following subnets?**

**a. 192.168.0.92**

**b. 192.168.0.128**

**c. 192.168.0.64**

**d. 192.168.0.96**

**e. 192.168.0.32**

/27

11111111.11111111.11111111.11100000

255.255.255.224

256 - 224 = 32

Block size = 32

192.168.0.0

192.168.0.32

192.168.0.64

192.168.0.96

192.168.0.128

Answer D

**Question #12**

**What subnet mask should be used to subnet the 192.168.10.0 network to support the number of subnets and IP addresses per subnet shown in the following topology?**

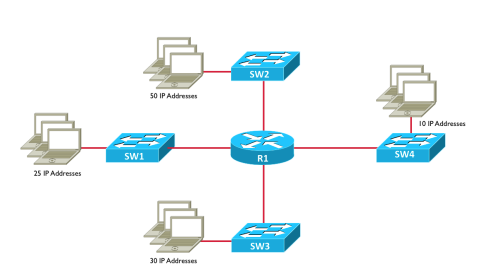
**a. 255.255.255.0**

**b. 255.255.255.128**

**c. 255.255.255.192**

**d. 255.255.255.224**

**e. 255.255.255.240**



Subnets = 2^n

4 subnets = 2^2

/24 as class C

Add 2 bits for 4 subnets

Becomes /26

255.255.255.192

/26 leaves 6 bits for hosts

Topology requires 50 hosts max

Hosts = 2^h - 2

2^6 - 2 = 62 hosts per subnet possible

CAN DO

/26 works = 255.255.255.192

Answer C

/29 class c

11111111.11111111.11111111.11111000

255.255.255.248

256 - 248 = 8 block size

**What is the last valid host address on the subnet 192.168.4.32/29?**

class C address

/29 = 5 borrowed bits

11000000.10110010.00000100.00100000

network borrowed hosts

11000000.10110010.00000100. 00100 000

to find broadcast address change all hostbits to 1

11000000.10110010.00000100.00100111

192.168.4.39

last usable address = broadcast address - 1

192.168.4.38

**What is the valid host range for subnet 192.168.15.48/28?**

11000000.10110010.00001111.00110000

network borrowed host

11000000.10110010.00001111. 0011 0000

network address: set all host bits to 0

= 192.168.15.48

first usable address = network address + 1

= 192.168.15.49

broadcast address: srt host bits to 1

11000000.10110010.00001111.00111111

= 192.168.15.63

last usable address = broadcast address - 1

= 192.168.15.62

valid host range = 192.168.15.49 - 192.168.15.62

**What is the broadcast address of the network 192.168.40.48/29?**

11000000.10110010.00101000.00110000

broadcast address: change host bits to 1

11000000.10110010.00101000.00110111

= 192.168.40.55/29

**What is the broadcast address of the subnet that host 172.18.182.245/23 is a part of?**

class B, 172, 16 bits, 7 borrowed for ,23

10110110.00010010.10110110.11110101

network borrowed host

10110110.00010010. 1011111 0.11110101

to find broadcast change all host bits to 1

10110110.00010010.10111111.11111111

= 172.18.183.255

**What is the last valid host on the subnet that host 192.168.62.26/28 belongs to?**

11000000.10101000.00111110.00011010

class c, /24, borrowed /4

broadcast address = all host bits to 1

= 11000000.10101000.00111110.00011111

= 192.168.62.31

last valid host = broadcast address - 1

= 192.168.62.30 /28

**What is the host range for 10.230.85.229 255.254.0.0?**

class A network, first octet is 10

subnet mask = 15

10.230.85.229/15, class 8 is 8 bits, borrowing 6

00001010.111000111.01010101.11100101

network bits borrowed bits host bits

00001010. 1110001 11.01010101.11100101

to find network address: set all host bits to 0

00001010.111000100.00000000.00000000

10.228.0.0 /15

first usable address = network address - 1

= 10.227.0.0 /15

broadcast address: all host bits to 1

= 00001010.111000111.11111111.11111111

= 10.231.255.255

last usable address = broadcast address - 1

= 10.231.255.254

host range = 10.227.0.0 - 10.231.255.254

**You have been asked to create a subnet that supports 16 hosts. What subnet mask should you use?**

2^5 = 32

11111111.11111111.11111111.111000000

we used 5 bits for host

subnet mask = 255.255.255.224

**What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.255.224 subnet mask?**

11111111.11111111.11111111.11100000

# host bits = 5

2^5 = 32 - 2 = 30

**Subnet the class C IP address 205.11.2.0 so that you have 30 subnets. What is the subnet mask for the max number of hosts? How many hosts can each subnet have?**

30 subnets = 2^5 = 32-2 = 30

Subnetmask: We know class C is /24 and the 5 bits from 2^5 (subnets, so working with network bits)

=11111111.11111111.11111111.11111000

=255.255.255.248

HOST BITS = 3

2^3 = 8 - 2 = 6 hosts

**What valid host range is the IP address 192.168.28.209 255.255.255.192 a part of?**

class c, 192, /24

255.255.255.192

11111111.11111111.11111111.11000000

/26

11000000.10110010.00011100.11010001

network bits borrowed bits host bits

11000000.10110010.00011100. 11 010001

find network address: covnert all host bits to 0

11000000.10110010.00011100.11000000

192.168.28.192/26

first usable IP = network address +1

= 192.168.28.193/26

broadcast address: all host bits to 1

= 192.168.28.255

last usable IP = broadcast address -1

= 192.168.28.254

host range = 192.168.28.193 - 192.168.28.254

**What is the first valid host address on the subnet that host 172.17.45.126 255.255.252.0 is a part of?**

class b, 172, /16

` 255.255.252.0

11111111.11111111.11111100.00000000

/22, 6 borrowed bits

10110110.00010001.00101101.01111110

network bits borrowed bits host bits

10110110.00010001. 001011 01.01111110

network address: all host bits to 0

10110110.00010001.00101100.00000000

172.17.44.0 + 1 will give first usable host ip

= 172.17.44.1

**What is the maximum number of valid hosts one will have from the network 192.168.131.0 255.255.255.192**

192, class c, /24

11111111.11111111.11111111.11000000

/26, 2 borrowed bits

11000000.10110010.100000011.00000000

network bits borrowed bits host bits

11000000.10110010.100000011. 00 000000

network address: all hostbits to 0

= 192.168.131.0

first usable IP = +1

= 192.168.131.1

broadcast address: all hostbits to 1

11000000.10110010.100000011.00111111

= 192.168.131.63

last usable address = -1

= 192.168.131.63

valid number of hosts from netweork:

192.168.131.1 - 192.168.131.63

= 62 hosts

**You need to divide the network 172.18.0.0 into 50 subnets. Each subnet will need to have room for up to 900 hosts. What subnet mask should you use?**

bit needed for 50 subnets:

2^6, we borrow 6 bits

172.18.0.0

10110110.00010010.00000000.00000000 = /16,172, class b

16 + 6 = /22

/22 = 11111111.111111111.11111100.00000000

= 255.255.252.0

host bits = 10

number of hosts = 2^10 = 1024 - 2 = 1022 hosts so this is okay!

subnet mask = 255.255.252.0

**Which subnet does host 192.168.111.51 255.255.255.192 belong to?**

255.255.255.192

11111111.11111111.11111111.11000000 = /26

192 + /26 = class c address (/24) so 2 borrowed bits

192.168.111.51

11000000.10110010.01101111.00110011

network bits borrowed bits host bits

11000000.10110010.01101111. 00 110011

find network address: turn all host bits to 0

11000000.10110010.01101111.00000000

192.168.111.0

first usable address = network address +1

= 192.168.111.1

broadcast address" all host bits to 1

11000000.10110010.01101111.00111111

192.168.111.128

last usable address = broadcast address - 1

= 192.168.111.127

therefore, subnet = 192.168.111.1 - 192.168.111.127

**What is the first valid host on the subnetwork that the node 192.168.20.79 255.255.255.192 belongs to?**

255.255.255.192

11111111.11111111.11111111.11000000

/26

192 = class c = /24

so /2 borrowed

11000000.10110010.00010100.01001110

network borrowed host

11000000.10110010.00010100. 01 001110

to find network address change all host bits to 0

11000000.10110010.00010100.01000000

= 192.168.20.64

**You need to subnet the 192.168.4.0 network into 7 different subnets. What subnet mask would you use?**

2^3 = 8

= 3 borrowed bits

192 = class c network = /24 + 3 borrowed bits = /27

/28 = 11111111.111111111.111111111.11110000

= 255.255.255.224

NO NEED TO FIND HOST BITS for number of hosts

But if did, find number of host bits from binary from subnet mask

Then 2^ x - 2 = number of hosts

**How many subnets and hosts per subnet can you get from the network 172.30.0.0/24?**

172.30.0.0 /24

1722 = class b, /16, 8 borrowed bits

2^8 = 256

256 subnets

256 - 2 (network and broadcast addresses = 254 usable host addresses per subnet

Which subnet does the ip address 192.168.4.32 /27 belong to?

nw b h

11000000.10101000.00000100. 001 00110

Change all host bits to 1

11000000.10101000.00000100.00111111

192.168.4.63

Therefore, it is part of the 192.168.4.64 network