"SAY NETWHAT?"codam

All important formulas!

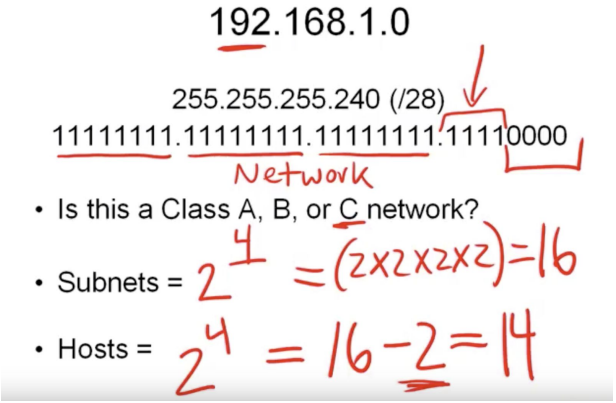
Helpful Example: N1LB table

IP Address	181.	185.	12.	216	/25 (CIDR)
Netmask	11111111	11111111	11111111	1|0000000	-
Binary	11111111	11111111	11111111	1|1011000	216
Network ID	11111111	11111111	11111111	1|0000000	-
1st host address	11111111	11111111	11111111	1|0000001	129
Last host address	11111111	11111111	11111111	1|1111110	254
Broadcast ID	11111111	11111111	11111111	1|1111111	-

To know how many subnets or valid hosts:
(https://www.youtube.com/watch?v=uyRtYUg6bnw)

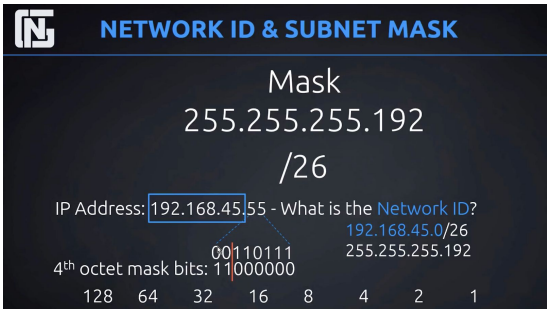
FIRST: is there a (/0) **CIDR** notation behind the address, no? convert into host part into binary! https://www.youtube.com/watch?v=XQ3T14SIlV4

1. Check which class the IP address belongs to so you know how many network bits and host bits there are.
2. Count the amount of ones which are your subnet bits.
3. Count the amount of 0's which are your host bits.
4. Number of subnets = 2^(number of subnet bits)
5. number of valid hosts = 2^(number of host bits) - 2(because of network and broadcast address that we don't count as valid hosts)



Find Network ID:

- Check class and see which octets are definitely in network ID.
- Make binary.
- Lay 4th octet of Ip address above 4th octet of mask. Look at the ones that are in the same place. If there are none it is 0.



Find amount of available addresses:

- Place border on the place between network and host bits, for example:
  128 64 | 32 16 8 4 2 1
  If you add up all numbers right of the border it is always 1 less than the number left of the border. If you add up all numbers it is the last octet of the broadcast address (192.168.45.63), if something is sent to this address it will go to everyone on the network.
- The amount of usable hosts/IP addresses is the numbers right of the border subtracted by 1, so 62 in this case.

Mandatory part:

What is a IP address?

An IP address (Internet Protocol address) is a numeric label assigned to a device that is connected to a computer network that uses Internet. It has two main functions:

- *host/network identification*
- *location addressing*

IPV4 = 32 bits
IPV6 = 128 bits

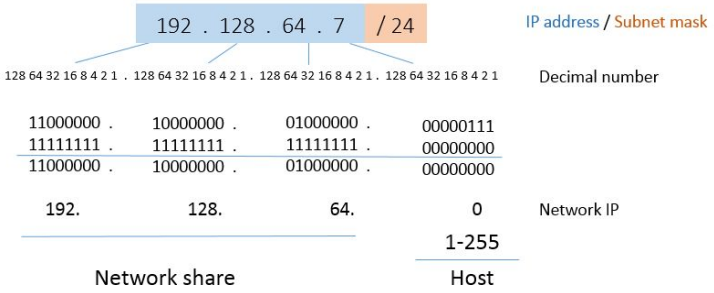
What is a Netmask? (IP: 192.168.40.55 Netmask: 255.255.248.0)

A netmask is a 32-bit number/mask that divides an IP address into subnets and specifies the network's hosts. With a netmask two bites are automatically assigned and can not be custom changed. The netmask together with the IP address defines the network that the computer belongs to.

What is the subnet of an IP with Netmask? watch

A subnetwork is a part of a network. The subnet mask is used by the network owner to decide which part of the IP address is the network-ID and the host-ID. Subnetting an IP network is to separate a big network into smaller multiple networks for reorganization and security purposes. The networks bits are then represented by 1's and the host bits by 0's.

The broadcast address has all the host bits set to the binary value of 1 so if all the host bits are set to the value 0, this is the subnet address.



This can be read from this chart:

192.128.64.1 = first host address

192.128.64.254 = last host address

192.128.64.255 = broadcast address

What is the broadcast address of a subnet?
https://www.youtube.com/watch?v=abtwx5E5Wb0
Every network has a dedicated broadcast address through which all users can broadcast. (-> above)

What are the different ways to represent an IP address with the Netmask?
An IP address consists of 4 decimals, called octets (can represent a number between 0 and 255), which are separated by points. (-> Classes of IP addresses)

What are the differences between public and private IPs?
*A **Public** IP address is an address that can be accessed over the internet, it can be used to deliver a postal mail to your home. It is a globally unique address assigned to a device. A **Private** IP address is used to assign devices in your private space without connecting it to the internet. Within your household your phones, laptops and tablets can have private addresses and the router than has one public address.*
*Any IP address that falls into this range is private IP and others are **public**.*

- *192.168.0.0 - 192.168.255.255 (65,536 IP addresses)*
- *172.16.0.0 - 172.31.255.255 (1,048,576 IP addresses)*
- *10.0.0.0 - 10.255.255.255 (16,777,216 IP addresses)*

What is a class of IP addresses?
Classed networks have commonly used netmasks which produce a new network address when applied.

Class	First octet value	Subnet mask	Netmask (Binary)
A	0-127	8	11111111 00000000 00000000 00000000
B	128-191	16	11111111 11111111 00000000 00000000
C (default IP address class)	192-223	24	11111111 11111111 11111111 00000000
D	224-239	-	-
E	240-255	-	-

Class A: first 8 bits represent the network part, remaining 24 bits represent the host part.
Class B: first 16 bits represent the network part, remaining 16 bits represent the host part.
Class C: first 24 bits represent the network part, remaining 8 bits represent the host part.
First = most host addresses available by default.

What is TCP?

*The **Transmission Control Protocol** (TCP) is one of the main protocols on the internet. TCP provides reliable, ordered, and error checked delivery of a stream of octets between applications running on hosts. Big internet applications such as World Wide Web rely on this protocol as it provides a communication service at an intermediate level between an application program and the Internet Protocol.*
Delivery of data to destination CAN be guaranteed in TCP.
TCP is also NOT a datagram oriented protocol.

ICMP is used as protocol by Ping.

What is UDP?

*The **User Datagram Protocol** is also an important member of the Internet Protocol suite. It allows computer applications to send messages, referred to as datagrams, to other hosts on an IP network. Prior communications is not required. **It DOES support broadcasting!***

What are network layers?

Network layers is a framework that help to understand the complex network interactions. A layer serves the layer above it and is served by the layer below.

1) *Physical (e.g. cable, RJ45) **media layer** -> responsible for transmission and reception of unstructured raw data between a device and a physical transmission medium, convert bits into electrical, radio, or optical signals.*
2) *Data Link (e.g. MAC, switches) **media layer** -> provides node-to-node data transfer. It detects and sometimes corrects errors in the physical layer.*

3) *Network (e.g. IP, routers)* ***media layer*** *-> provides functional and procedural means of transferring variable length data structures (packets) from one node to another while connected in different networks.*
4) *Transport (e.g. TCP,* ***UDP****, port numbers)* ***host layer*** *-> provides the functional and procedural means of transferring variable-length data structures from source to destination host, while maintaining the quality of service functions.*
5) *Session (e.g. Syn/Ack)* ***host layer*** *-> controls the dialogues between computers. Establishes, manages and terminates the connections between the local and remote application.*
6) *Presentation (e.g. encryption, ASCII, PNG, MIDI)* ***host layer*** *-> establishes context between application-layer entities. It provides independence from data representation by translating between application and network formats.*
7) *Application (e.g. SNMP, HTTP, FTP)* ***host layer*** *-> the layer closest to the end user, the user and the layer interact directly with the software application.*

ezelsbruggetje: Piet Doet Nogal Tering Stom oP APP

What is the OSI model?

The ***Open System Interconnection model (OSI model)*** *is a model that characterizes and standardizes the communication functions of a telecommunication or computing system. It partitions the communication into abstract layers (check previous question).*

What is a DHCP server and the DHCP protocol?

The ***Dynamic Host Configuration Protocol (DHCP)*** *is a network management protocol used on UDP/IP networks. It dynamically assigns an IP address and other network configuration parameters to each device on a network so they are able to communicate with other networks. If the DHCP server is not present, a device needs to be manually assigned an IP address, which makes communication a lot harder. For example, the router in your household has a DHCP server which automatically assigns an IP address to the device that is connected. These addresses are connected which makes it easier to contact each other.* ***Both IPv4 and IPv6 are supported!***

What is a DNS server and the DNS protocol?

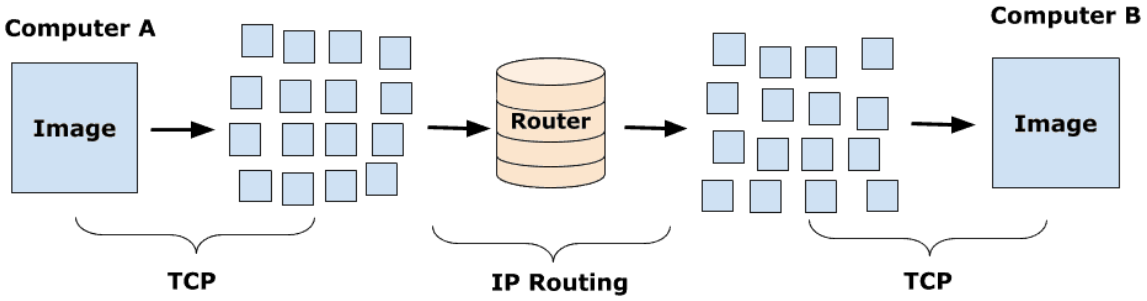
The ***Domain Name System (DNS)*** *is a hierarchical system that names computers, services or other resources connected to the internet. The system associates various information with the domain names which helps with locating and identifying computer services. It also specifies the technical functions of the database service.*

What are the rules to make 2 devices communicate using IP addresses?

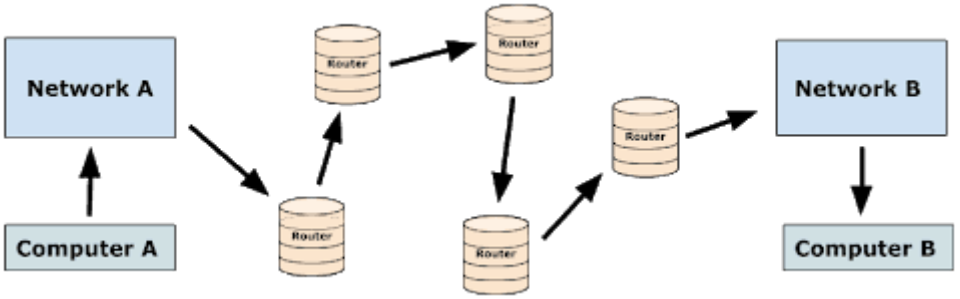
- *They have to have the same network ID.*
- *They have to be the same type of address.*

How routing is working with IP?

IP sends and delivers packets from one computer or server using a web of routers, this process is called IP routing. Once they arrive at the destination it is the job of TCP to reform them into their original state.



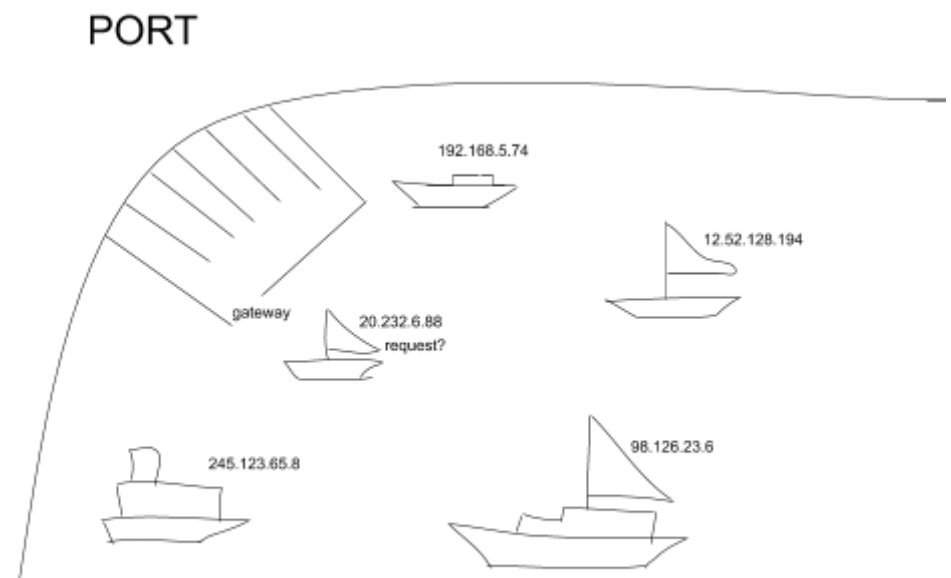
In order for a packet to be sent to the right location, the router needs to know the location of both destination and source through their IP address. IP routing determines the path for the packet to follow in order to navigate from one computer/server to another. The packet travels through a web of router using a routing algorithm. This algorithm looks at the packet's size and header to determine the best route and once it has arrived at the next router it uses both IP addresses and a routing table (list with all possible routes to a certain network) to determine the next hop address. This process is repeated until the destination is reached. Data if often divided into different packets which travel independently and can have different routes.



What is a default gateway for routing?

*A gateway is the entrance port to another network. A **Default** gateway is the address to which packets are sent if there is no specific gateway for a certain destination in the routing table. It is important because it is generally not achievable for all hosts to maintain knowledge of the routes to all networks. Hosts can set a particular route as their default gateway and only that one router must maintain the routes to remote networks. However, if a network is heavily used, you can manually add routes to the routing table which will optimize the process.*

What is a port from an IP point of view and what is it used for when connecting to another device?



A port is like a bay with various private boats docked. These boats want to dock there and request landing services but they all have to use the same port/gateway. Real (sea)ports work with berth numbers and port names which are used for identification of boats. So, berth numbers on the internet are Internet Protocol or IP addresses, a user's identification on the Internet, and the seaport names are used the same as Internet port names. A computer port is an electronic, software- or programming- related docking point through which information flows from a program on your computer or to your computer from the Internet. Computers or programs connect to somewhere on the Internet via a port. Port numbers and the IP address combine into information kept by every Internet Service Provider.

Questions: (answers at the end)

1. If an Ethernet port on a router were assigned an IP address of 243.6.0.69/27, which host address would be able to communicate with it?

   224.166.122.163

   243.6.0.91

   198.6.31.56

   105.198.58.92

   108.96.135.58

   243.210.218.20

   68.226.144.92

   34.210.68.246

2. Which of the following is private IP address?

   42.121.149.104
   126.220.244.113
   172.17.40.212
   188.105.118.120
   195.27.107.154

3. What is the Network address of a host with an IP address of 76.19.100.71/12?

   64.0.0.0
   76.0.0.0
   0.0.0.0
   76.16.0.0
   76.19.96.0
   76.19.100.64
   76.18.0.0

4. The _____ translates internet domain and host names to IP address

   routing information protocol

   domain name system

   network time protocol

   internet relay chat

5. What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.255.240 subnet mask?

   6

   34

   26

   14

   8

   16

   4

   10

6. You have an interface on a router with the IP address of 189.141.172.47/13. Including the router interface, how many hosts can have IP addresses on the LAN attached to the router interface?

   1048578

   262140

   524286

   524284

   524282

   1048576

   1048574

   262146

7. Which of the following is the valid host range for the subnet on which the IP address 181.185.12.216/25 resides?

   181.185.12.129-181.185.12.254

   181.185.12.133-181.185.13.2

   181.185.12.129-181.185.12.250

   181.185.12.129-181.185.13.2

   181.185.12.130-181.185.12.254

   181.185.12.126-181.185.12.252

8. How long is an IPv4 address?

   64 bits

   32 bits

   128 bits

   128 bytes

9. Which of this is not true?

   UDP is a connection-oriented protocol

   UDP has only the basic error checking mechanism using checksums

   The delivery of data to the destination cannot be guaranteed in UDP

   There is no sequencing of data in UDP. If ordering is required, it has to be managed by the application layer

   UDP is faster, simpler and more efficient than TCP

   UDP supports Broadcasting

10. You want to implement a mechanism that automates the IP configuration, including IP address, subnet mask, default gateway, and DNS information. Which protocol will you use to accomplish this?

ARP

SNMP

SMTP

DHCP

11. What is the Network address of a host with an IP address of 114.170.221.39/25?

114.170.221.0

0.0.0.0

114.170.192.0

114.170.128.0

114.168.0.0

114.0.0.0

114.170.216.0

112.0.0.0

12. You have an interface on a router with the IP address of 150.121.214.2/24. Including the router interface, how many hosts can have IP addresses on the LAN attached to the router interface?

510

128

254

508

256

514

122

13. If an Ethernet port on a router were assigned an IP address of 151.67.115.157/27, which host address would be able to communicate with it?

    81.108.98.50

    25.242.238.133

    151.67.115.129

    246.50.193.85

    148.132.106.14

    58.51.185.16

    73.227.136.210

    169.61.171.182

14. Which of the following is the valid host range for the subnet on which the IP address 29.141.28.30/15 resides?

    29.140.0.3-29.141.255.255

    29.139.255.254-29.141.255.249

    29.140.0.1-29.141.255.254

    29.139.255.254-29.141.255.251

    29.139.255.254-29.141.255.254

    29.140.0.4-29.142.0.0

15. What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.192.0 subnet mask?

    8194

    8190

8188

16382

16386

32770

8192

32766

16. Which protocol does DHCP use at the Transport layer?

ARP

IP

TCP

UDP

17. Which of this is not true?

TCP doesn't supports Broadcasting

TCP is faster, simpler and more efficient than UDP

TCP is a connection-oriented protocol

Sequencing of data is a feature of TCP (this means that packets arrive in-order at the receiver)

TCP is reliable as it guarantees delivery of data to the destination router

TCP provides extensive error checking mechanisms. It is because it provides flow control and acknowledgment of data

18. If an Ethernet port on a router were assigned an IP address of 192.24.25.205/23, which host address would be able to communicate with it?

81.108.98.50

192.24.24.11

201.21.54.10

148.132.106.14

170.49.146.186

73.227.136.210

189.222.155.108

174.66.204.163

19. Which of the following is the valid host range for the subnet on which the IP address 163.162.176.191/21 resides?

163.162.176.3-163.162.183.254

163.162.176.0-163.162.183.254

163.162.176.1-163.162.183.249

163.162.176.1-163.162.183.254

Answers:

1. 243.6.0.91
2. 172.17.40.212
3. 76.16.0.0
4. domain name system
5. 14
6. 524286
7. 181.185.12.129-181.185.12.254
8. 32 bits
9. UDP is a connection-oriented protocol
10. DHCP
11. 114.170.221.0
12. 254
13. 151.67.115.129
14. 29.140.0.1-29.141.255.254
15. 16382
16. UDP
17. TCP is faster, simpler and more efficient than UDP.
18. 192.24.24.11
19. 163.162.176.1-163.162.183.254

Question 1

You have an interface on a router with the IP address of 240.19.3.205/12. Including the router interface, how many hosts can have IP addresses on the local network connected to the router interface?er of IP addresses that can be assigned to hosts on a local subnet using the 255.224.0.0 subnet mask?

1048576
2097154
1048574
524284
1048578
2097148
1048572
2097150

Question 3

Which of the following IP addresses is a private address?

222.9.230.144
135.167.134.35
172.32.0.5
27.157.141.96
172.16.0.2
129.244.78.149
137.223.167.235

Question 4

Which of the following proposals is a private IP address?

57.195.242.245
172.27.217.52
249.204.256.26
249.204.156.26
4.137.228.63
176.37.230.43
218.106.207.158

Question 5

What is the size of an IPV4 address?

128 bits
32 bits
64 miles
16 bits
8 bits

64 bytes
128 bytes

Question 6
What is the network address of a host with an IP address of 116.45.224.50/8?

116.0.1.0
116.0.0.0
116.255.255.0
116.255.255.255

Question 7
What is the size of an IPV6 address?
128 bits
32 bits
64 miles
16 bits
8 bits
64 bytes
128 bytes

Question 8
Which of the following proposals is the valid host range for the subnet on which the IP address 233.249.146.36/21 resides?

233.249.143.255-233.249.151.250
233.249.144.4-233.249.152.0
233.249.144.1-233.249.151.254
233.249.144.6-233.249.152.1
233.249.144.0-233.249.151.249

Question 9
What type of address is supported by DHCP?
IPV4
IPV6
IPV4 and IPV6
None of them

Question 10
What is the maximum number of IP addresses that can be assigned to hosts on a local subnet using the 255.255.255.255.128 subnet mask?

128
60
126
62
252
258
124
58
64

Question 11
Which of the following IP addresses is a private address?

169.153.119.123
24.23.102.151
255.62.136.173
10.166.25.20
46.244.138.171
27.147.158.251

Question 12
What are the different layers of the OSI model?

Application - Presentation - Session - Transport - Network - Data Link - Physical
Application - Mediation - Session - Transport - Network - Data Link - Physical
Presentation - Session - Transport - Network - Data Link - Application - Real
Relation - Transport - Session - Data Link - Mediation - Presentation - Application

Question 13
Which of the following propositions is not true?

UDP is faster, simpler and more efficient than TCP
UDP provides extended error checking mechanisms. This is because it provides flow control and data acknowledgement
UDP is a datagram oriented protocol
UDP supports broadcasting

Question 14
What is the network address of a host with an IP address of 182.161.121.118/24?

180.0.0.0
182.161.121.64
182.161.120.0
182.161.121.116
0.0.0.0
182.161.96.0
182.160.0.0
182.161.121.0

Question 15
What is the CIDR notation of the 255.255.192.0 subnet mask?

/5
/31
/18
/14

Question 16
_____ translates Internet domain names and host names into IP addresses

Network time protocol
Default routing protocol
Domain name system
OSI model system

Question 17
If the IP address 123.48.189.194/21 is assigned to an Ethernet port of a router, what host address could communicate with it?

101.219.223.235
75.153.38.143
5.200.165.154
13.28.168.153
172.1.223.196
43.241.96.42
123.48.189.109
253.99.227.186

Question 18
Which IP address class has more host addresses available by default?

C
D
E
F
FIRST

Question 19
Which of the following propositions is not true?

TCP is a datagram oriented protocol
TCP does not support broadcasting
TCP provides extended error checking mechanisms. This is because it provides flow control and data acknowledgement
Data sequencing is a TCP feature (this means that packets arrive in order in the recipient)
TCP is reliable because it guarantees the delivery of data to the router of the destination
TCP is comparatively slower than UDP

Question 20
What is the CIDR notation of the 255.255.128.0 subnet mask?

/8
/16
/9
/17

Question 21
Which of the following propositions is not true?

UDP is faster, simpler and more efficient than TCP
UDP only has the basic error control mechanism
UDP is a datagram oriented protocol
UDP does not support broadcasting

Question 22
Which of the following IP addresses is a private address?

108.246.233.231
146.227.105.173
59.155.254.18
253.29.133.220
192.168.20.253
94.152.104.99

Question 23
Which of the following proposals is the valid host range for the subnet on which the IP address 1.93.149.6/17 resides?

1.93.127.255- 1.93.255.250
1.93.128.1- 1.94.0.1
1.93.128.1- 1.93.255.251
1.93.128.1- 1.93.255.254
1.93.128.1- 1.94.0.3

Question 24
Which of the following propositions is not true?

TCP is a connection-oriented protocol
TCP does not support broadcasting
TCP provides extended error checking mechanisms. This is because it provides flow control and data acknowledgement
Data sequencing is a TCP feature (this means that packets arrive in order in the recipient)
The delivery of data to the destination cannot be guaranteed in TCP
TCP is reliable because it guarantees the delivery of data to the router of the destination

Question 25
Which of the following proposals is a private IP address?

10.182.204.132
116.124.85.24
52.178.248.246
186.183.40.79

Question 26
What is the default IP address class available?

A AND B
FIRST
C
B

Question 27
What is the network address of a host with an IP address of 166.175.144.121/23?

166.128.0.0
166.175.144.0
166.175.144.96
128.0.0.0
166.174.0.0
166.0.0.0
166.0.0.0
166.175.144.120

Question 28
What is the network address of a host with an IP address of 45.195.37.187/16?

45.194.37.187
45.0.0.0
45.194.0.0
45.195.0.0

Question 29
You have an interface on a router with the IP address of 124.144.156.248/21. Including the router interface, how many hosts can have IP addresses on the local network connected to the router interface?

1020
2050
2044
4090
2046
2048
4092
2042
4094

Question 30
What is the broadcast address of a host with an IP address of 51,254,122,100/24?

51.254.122.0
51.254.122.1
51.254.122.254
51.254.122.255

Question 31
Which of the following proposals is the valid host range for the subnet on which the IP address 158.167.18.156/15 resides?

158.166.0.1- 158.167.255.253
158.165.255.253- 158.167.255.254
158.166.0.1- 158.167.255.254
158.166.0.2- 158.168.0.2

Question 32
Which protocol does Ping use?

ARP
BootP
TCP
ICMP

Question 33
What is the maximum number of IP addresses that can be assigned to hosts on a local subnet using the 255.255.128.0 subnet mask?

65536
65532
16380
32768
32770
65530
32766
16382
32764

Question 34
You want to implement a mechanism that automates IP configuration, including IP address, subnet mask, default gateway and DNS information. What protocol will you use to achieve this?

SNMP
DHCP
SMTP
ARP

Question 35
What DHCP protocol does it use at the transport layer level?

ICMP
TCP
FTP
UDP

Question 36†
What is the network address of a host with an IP address of 107.212.146.212.212/25?

107.212.146.208
107.128.0.0
0.0.0.0
64.0.0.0
107.212.128.0
107.212.146.128
107.212.0.0
107.208.0.0
107.212.146.192

Question 37
What is the subnet mask of /24?

255.255.255.255
255.255.255.0
255.0.0.0
255.255.128.0
255.192.0.0
255.224.0.0

Which class of IP address has the most host addresses available by default?

B

A and B

A

C

Answer : A