VLSM & IP ADDRESSING EXAMPLE QUESTIONS   with answers;

1   Given the network address of 112.44.0.0 and the network mask of 255.255.0.0
Would the two stations with addresses 112.44.22.19/16 and 112.44.23.2/16 be on the same network ?

> 112.44.0.0/16   i.e. 16 bits of network
> 112.44.0.0 through to 112.44.255.255
> 112.44.22.19/16 is on the same network as 112.44.23.2/16

2   Workstations with addresses   172.16.22.1/22 and 172.16.23.9/22 share what network and broadcast address ?

> 172.16.22.1/22   i.e. 22 bits of network = 10 bits host
> 172.16.20.0 through to 172.16.23.255
> 172.16.20.0/22 is the network
> 172.16.23.255   is the broadcast address

3   How many network devices can be supported on a single network using network mask of 255.255.240.0 ?

> 255.255.240.0 i.e.   20 bits of network = 12 bits host
> 12 bits will support up to   4094 devices

4   Which of the following devices share the same network;
> A   192.168.78.25/29
> B   192.168.78.23/29
> C   192.168.78.33/29
> D   192.168.78.38/29
> E   192.168.78.41/29

> 29 bits of network = 3bits of host
> 3 bits will support   6 hosts in each network
> Networks would be; 0   8   16   24   32   40   48 …. Etc.
> C and D are in the same network (192.168.78.32/29)

5   Which of the following would best support a point to point link
> A   255.255.255.253
> B   255.255.255.0
> C   255.255.255.128
> D   255.255.255.252
> E   255.255.252.0

> To support each end of a point to point connection, two addresses
> are required.   i.e. 2 hosts to be supported = 2 bits of host
> 2 bits of host = 30 bits of network = D (255.255.255.252)
> addresses would be   0 = network
>   1 = first connection
>   2 = second connection
>   3 = broadcast address

6   Which addresses should not be advertised to the Internet

        A 172.12.0.1
        B 192.168.0.23
        C 10.0.78.2
        D 127.0.0.1
        E 112.56.22.5

Any private addresses (and local addresses) should not be advertised
B   192.168.0.23   part of the 192.168.0.0/24
C   10.0.78.2   part of the 10.0.0.0/8
D   127.0.0.1   (loopback address)

7   Given a class B network of 155.44.200.0, what mask could be used to provide 15 networks each supporting 120 users

        A 255.255.252.0
        B 255.255.248.0
        C 255.255.240.0
        D 255.255.255.128
        E 255.255.255.240

120 users would require 7 bits of host address space
7 bits of host = 25 bits of network
So we need 15 x 25 bit networks out of the supplied class B
155.44.200.0   155.44.200.128   155.44.201.0   155.44.201.128
155.44.202.0 ….. etc.
with a network mask of 255.255.255.128
Subnet Number = 9 bit (difference between Classfull and host bits)

8   What would be used to share a single public address within a company

        A NAT
        B Private Addressing and NAT
        C Private Addressing and PAT
        D PAT
        E VLSM

D PAT (Port Address Translation)   would be correct
C Private Addressing and PAT   would be a better answer

9   How many hosts could be supported on a 22 bit network

        A 22
        B 1024
        C 4094
        D 512
        E 1022

E 1022   (22 bits = 1024 less network and broadcast)

10   What is the broadcast address and network for station 192.168.99.77/19

19 bits of network = 13 bits of host
network is 192.168.96.0   Broadcast is 192.168.127.255

11   The network 182.16.192.0 with a mask of   255.255.240.0 will support
           A 256 stations
           B 1024 stations
           C 4094 stations
           D 4096 stations
           E 1022 stations

           255.255.240.0 =   20 bits of network = 12 bits of host
           12 bits = 4094 stations (4096 less network and broadcast)

12   What is the broadcast and network address for host 112.48.160.183 255.255.255.192

           255.255.255.192 = 26 bits of network = 6 bits of host
           112.48.160.128 is the network
           112.48.160.191 is the broadcast

13   What is the broadcast and network address for host 222.129.199.222/21

           21 bits of network = 11 bits of host
           222.129.192.0 is the network
           222.129.199.255 is the broadcast

14   What is the zero subnet address where the station address is 164.20.227.6/19

           19 bits of network = 13 bits of host
           164.20.224.0 is the network
           164.20.255.255 is the broadcast
           the Subnet Number (classfull mask – host bits) = 3 bits
           if all 3 subnet number bits = zero   network = 163.20.0.0/19
             (called the Zero-Subnet) ** old format
           if all 3 subnet number bits = one   network = 163.20.224.0/19
             (called the broadcast subnet) ** old format

15   What will be the source mac address in a packet received from 192.168.0.1 by 192.168.0.244/25
           A mac address of 192.168.0.1
           B mac address of the 192.168.0.0/25 gateway
           C mac address of the 192.168.0.128/25 gateway
           D mac address of gateway for 192.168.0.244
           E mac address of gateway for 192.168.0.1

           25 bit network = 7 bit host
           192.168.0.1 is on different network to 192.168.0.244
           traffic between the networks would use the gateway
           Although several answers are correct C and maybe E,
           the best answer is D (192.168.0.244 would receive from it's gateway,
           as we are not sure if it is the same gateway for 192.168.0.1 and/or
           if there is only one gateway for 192.168.0.244)

16   What single summary address could be used for the following networks;
                192.168.32.0/19
                192.168.0.0 255.255.240.0
                192.168.64.0/18

19 bit network, 20 bit network and a 18 bit network
take the shortest network prefix (18 bits) and check that all networks
are within.   192.168.0.0/18 would only cover 192.168.0.0 through to
192.168.63.255   - so we need to expand to 17 bit to cover the .64/18
also -   Best answer is   192.168.0.0/17 (255.255.128.0)
this would cover networks required

192.168.32.0/19   is 192.168.32.0 up to 192.168.63.255
192.168.0.0/20   is 192.168.0.0 up to 192.168.15.255
192.168.64.0/18   is 192.168.64.0 up to 192.168.127.255

i.e. the question calls for cover for the networks
192.168.0.0 up to 192.168.15.255   then a gap
from 192.168.16.0 up to 192.168.31.255
and cover for 192.168.32.0 up to 192.168.127.255   -- this is not
possible with a single summary, so we have to provide the best fit

192.168.16.0 up to 192.168.31.255 is not required by the question
but has to be covered by the summary in order to cover the .64/18
network.   Not ideal, but the question ask for a SINGLE SUMMARY
therefore this is the best you can do.

17   An ISP supplies a class B network of 136.210.0.0 to an enterprise that requires ten networks each
        to support 110 users.   What is the network mask that would be configured in each workstation
        and what would be the NetID, Subnet Number   ?

110 users would need 7 bits of host = 25 bit networks
Subnet Number would be $16 - 7 = 9$ bits
the class B COULD be split into (9 bits worth) 512 networks
We could take the first ten networks to answer the question;
NetID = 136.210.0.0
Subnet Number = 9
Networks   = 136.210.0.0   136.210.0.128   136.210.1.0
                      136.210.1.128 136.210.2.0   136.210.2.128
                      136.210.3.0   136.210.3.128 136.210.4.0
                      136.210.4.128   each supporting 126 addresses
                      with a mask of 255.255.255.128
                      networks 136.210.5.0 through to 136.210.255.128
                      would be free and unused for future use

NOTE - the exam wants to see you are not wasting address space
and not allocating ALL the address space at this time….   Sometimes
the question will ask you to divide the given address space into WAN
links using /30 and LANs to support n hosts etc.. and will want to
see you are able to do so without waste and show that you have thought
ahead to allow your organization to expand into the address space.

Best practice also states – due to broadcast traffic, it is advisable to
limit the size of PC user LANs to 1000 - so do not make your LANs
too big

18   What destination network address would be seen in a packet leaving an Internet host that was destine for a work station of a company that makes use of NAT to reach the internal network 192.168.10.0/24 ;

   A   192.168.10.0
   B   the inside-local address
   C   the inside-global address
   D   the outside-local address
   E   the outside-global address

> Internal addresses seen inside the company are inside-local addresses and are not sent out to the Internet but are translated into inside-global addresses and sent to the Internet.
> Outside-global addresses are public and are sent through the Internet.
> Outside-local addresses are translations of public addresses into private or alternative addresses for use on a private network.
>
> Answer… an Internet host would be sending a packet to a public address on the Internet… i.e. the address seen by the public Internet to represent the private device…. the public address may then be translated when it reaches the private company to address the device on the private network. C inside-global address

19   What source network address would be seen in a packet leaving an Internet host that was destine for a work station of a company that makes use of NAT to reach the internal network 192.168.10.0/24 ;

   A   192.168.10.0/24
   B   the inside-local address
   C   the inside-global address
   D   the outside-local address
   E   the outside-global address

> E the outside-global address

20   An ISP supplies a class C network of 236.20.0.0 to an enterprise that requires three networks each to support 37 users.   What is the network mask and network address that would be configured in each workstation and what would be the NetID, Subnet Number and Host Numbers ?

> we need 6 bits of host to support the 37 users
> 6 bits of host = 26 bits of network (255.255.255.192)
> Subnet Number = 8 - 6 = 2 bits
> we can fit 2 bits worth of networks into the class C (4 networks)
> Network Mask = 255.255.255.192
> Network addresses would be 236.20.0.0/26 236.20.0.64/26
>   and 236.20.0.128/26   with 236.20.0.192/26 free
> NetID remains 236.20.0.0
> Subnet Number = 2

21   On network 10.210.44.0/22 with a gateway address of 10.210.46.1   What mac address would be seen in a packet leaving a workstation destine for 10.210.45.254   as the destination ?

> 10.210.45.254 is on the 10.210.44.0/22 network
> destination mac would be seen of 10.210.45.254

22   Station addressed 10.210.46.112/21 with a gateway address of 10.210.46.1   What would be the
destination mac address of a packet destine for 10.210.49.2 ;
      A   mac address of 10.210.49.2
      B   mac address of 10.210.46.1
      C   mac address of 10.210.46.0/21
      D   unable to determine

                   As the destination is not on the local 10.210.32.0/21 network,
                   The packet would be sent via the gateway. B

23   A station with address 10.210.46.33/21 and gateway address of 10.210.46.1   What would be
the destination mac address of a packet destine for 10.210.47.2 ;
      A   mac address of 10.210.47.2
      B   mac address of 10.210.46.1
      C   mac address of 10.210.44.0/21
      D   unable to determine

        A   as they are on the same local network

24   Given the network 244.10.10.0/25   Select an addressing scheme to support 20 loopback
addresses and addresses for 5 point to point links with room for expansion in either direction.

        Loopbacks need only one address (255.255.255.255 mask) = 1bit
        Point to point links need 2 addresses (255.255.255.252 masks) = 2 bits
        Loopback addresses   244.10.10.1/32   244.10.10.2/32   244.10.10.3 etc.
        Point to point addresses   244.10.10.236/30 244.10.10.240/30 244.10.10.244/30
                    244.10.10.248/30   244.10.10.252/30

25   On network 192.168.33.192/26 a station is configured with an address of 192.168.33.220/26 and
a gateway address of 192.168.33.180   What problems, if any, would be seen ?

        The gateway address is not on the local network. The station would not be able
        to send traffic beyond the local network.

26   On network 10.210.46.0/25 a station is configured with an address of 10.210.46.11, mask
of 255.255.255.0 and a gateway address of 10.210.46.37
What problems, if any, would be seen ?

        Network masks are not equal.   If it exists, the 10.210.46.128/25 network would
        not be reachable from the workstation as the gateway is only used for networks
        outside of the full 24 bit network (255.255.255.0).