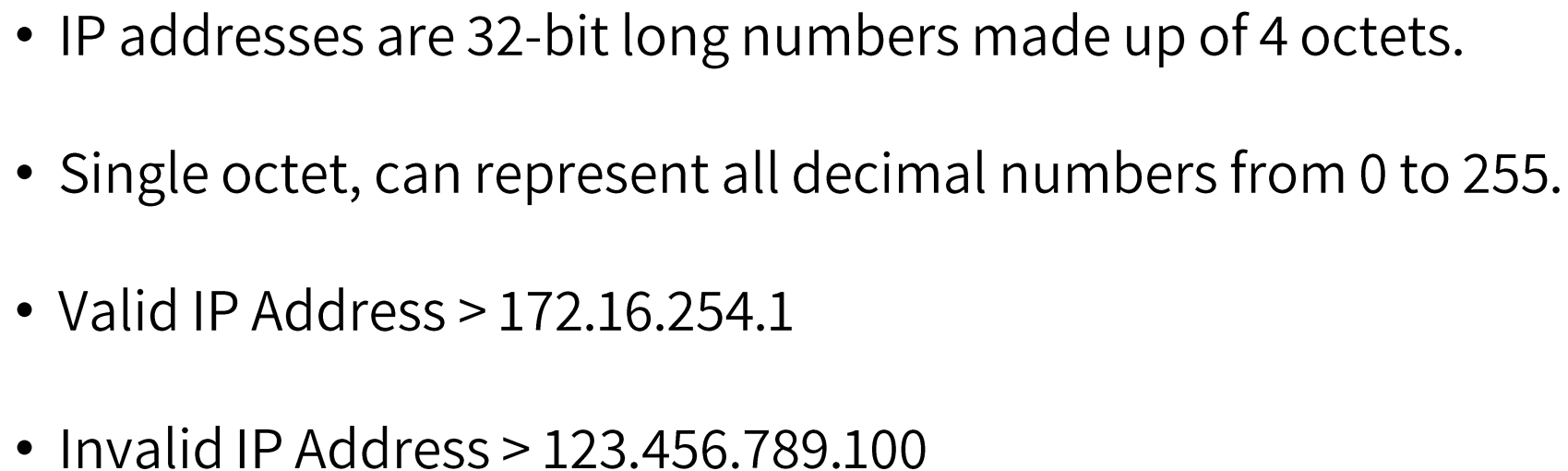**Outcome:**

1. You'll be able to describe the IP addressing scheme and how sub-netting works.

2. You'll also be able to demonstrate how encapsulation works, and how protocols such as ARP allow different layers of the network to communicate.

3. You'll gain an understanding of the basics behind routing, routing protocols and how the internet works.

- MAC Addresses is not ideal across multiple networks across long distances.

- IP addresses come into play.

#	Layer Name	Protocol	Protocol Data Unit	Addressing
5	Application	HTTP, SMTP, etc..	Messages	n/a
4	Transport	TCP/UDP	Segment	Port #'s
3	Network	IP	Datagram	IP address
2	Data Link	Ethernet, Wi-Fi	Frames	MAC Address
1	Physical	10 Base T, 802.11	Bits	n/a

- IP addresses are 32-bit long numbers made up of 4 octets.

- Single octet, can represent all decimal numbers from 0 to 255.

- Valid IP Address > 172.16.254.1

- Invalid IP Address > 123.456.789.100

An IPv4 address (dotted-decimal notation)

172 . 16 . 254 . 1

10101100 · 00010000 · 11111110 · 00000001

One byte = Eight bits

Thirty-two bits (4 x 8) , or 4 bytes

Quiz Time

You need to subnet a 192.168.1.0 network. You decide to use the 255.255.255.240 subnet mask. What is 240 equal to in binary?
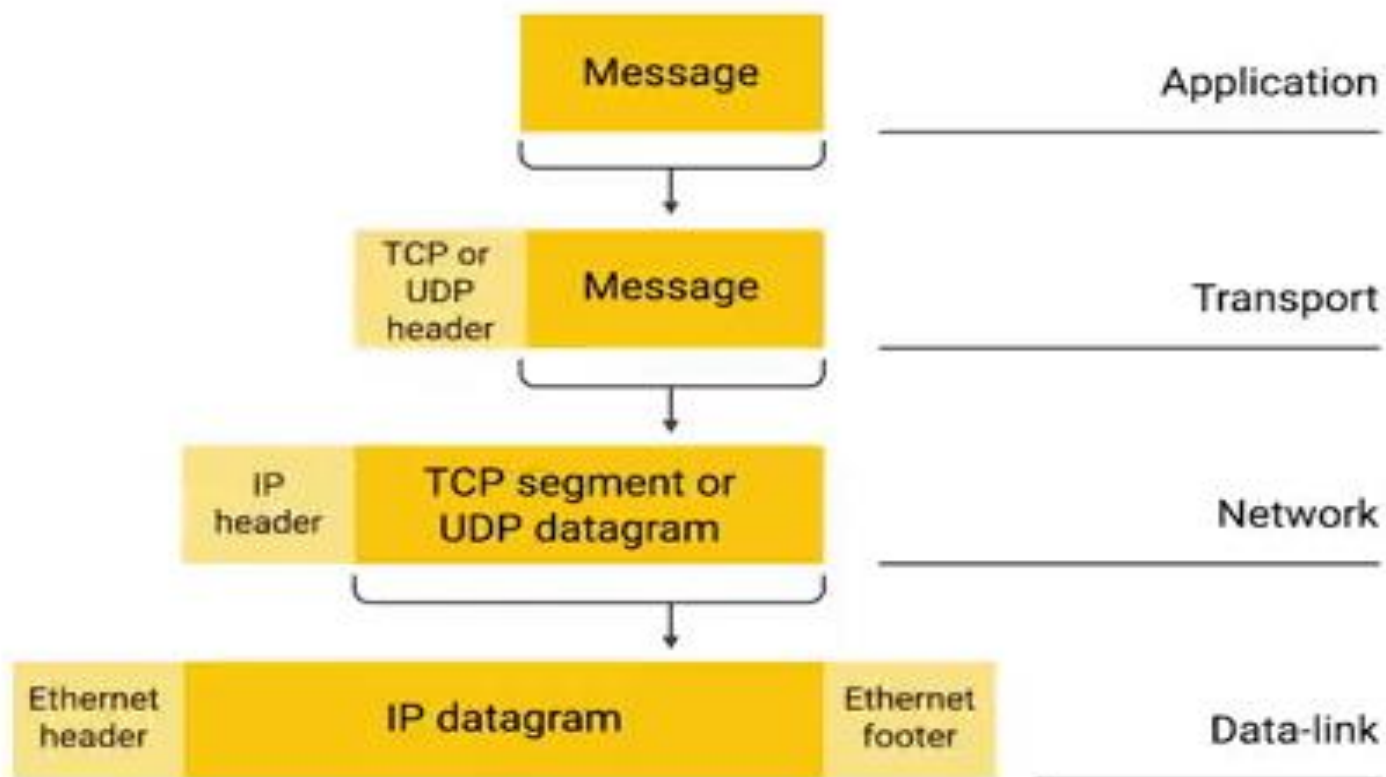
A. 11100000

B. 11000000

C. 10000000

D. 11110000

Correct Answer: D

- Class A addresses are those where the first octet is used for the network ID, and the last three are used for the host ID.
- Class B addresses are where the first two octets are used for the network ID, and the second two, are used for the host ID.
- Class C addresses, are those where the first three octets are used for the network ID, and only the final octet is used for the host ID.

IP address classes

Class	Range	Max Hosts
A	0-126	16 Million
B	128-191	64,000
C	192-224	254
D	224-239	N/A
E	240-255	N/A

- Sub-netting is the process of taking a large network and splitting it up into many individual smaller subnetworks or subnets.

- Subnet Mask - Just like an IP address, they are 32-bit numbers that are normally written as four octets in decimal.

- Subnet IDs are calculated via what's known as a subnet mask.

Questions ???