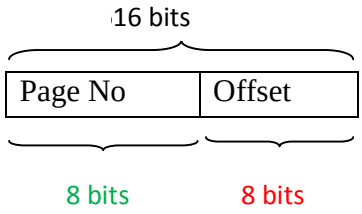
Solution to Problem 2 in Memory Management Tutorial

Virtual Address	**Memory Page**	**Page table entry (bits)**	**Virtual Page No # (bits)**	**Page Offset (bits)**	**Addressable Physical memory**
16	256 B	2	8	8	1 KB
32	1 MB	4	12	20	2^{24} Bytes (16 MB)
32	1 KB	8	22	10	2^{18} Bytes (256 KB)
64	16 KB	20	50	14	2^{34} Bytes (4 GB)
64	8 MB	16	41	23	2^{39} Bytes (512 GB)

(1)

To Find Page number bits and Offset:

Logical Address = 16 bits
Page Size = 256 Bytes = 2^8 (So, 8 bits are needed to represent the offset)
Remaining represents the bits needed to represent the page number = 16 – 8 = 8 bits



Addressable Memory:

Physical Address = Frame Number + Offset
Page table entry (Frame Number) = 2 bits
Offset = 8 bits (Same as the logical address as the page size and frame size are the same)

So the addressable memory is $2^{(8+2)} = 2^{10} = 1$KB

Basics:

1 KB = 1024 Bytes = 2^{10} Bytes
1MB = 1024 KB = $2^{10} * 2^{10} = 2^{(10+10)} = 2^{20}$ Bytes
1 GB = 1024 MB = $2^{10}*2^{10}*2^{10} = 2^{(10+10+10)} = 2^{30}$ Bytes

Note: 2^{24} Bytes can be written as $2^{20} * 2^4 = 1$ MB * 16 = 16 MB