**Custom Subnet Masks**

**Problem 1**

Number of needed subnets **14**

Number of needed usable hosts **14**

Network Address **192.10.10.0**

Address class *C*

Default subnet mask *255 . 255 . 255 . 0*

Custom subnet mask *255 . 255 . 255 . 240*

Total number of subnets *16* Total number of host addresses *16* Number of usable addresses *14* Number of bits borrowed *4*

# Show your work for Problem 1 in the space below.

*Number of Subnets -*

## 192 . 10 . 10 . 0 0 0 0

## 0 0 0 0

*Number of*

Add the binary value numbers to the left of the line to create the custom subnet mask.

*128*

*64*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *256 128 64* | *32* | *16* | *8* | *4* | *2* | *- Hosts* |
| *2 4 8* | *16* | *32* | *64 128 256* | | | |
| *128 64 32* | *16* | *8* | *4* | *2* | *1* | *- Binary values* |

*32*

*+16 240*

*16*

*-2 14*

Observe the total number of hosts.

Subtract 2 for the number of usable hosts.

**Custom Subnet Masks**

**Problem 2**

Number of needed subnets **1000**

Number of needed usable hosts **60**

Network Address **165.100.0.0**

Address class *B*

Default subnet mask *255 . 255 . 0 . 0*

Custom subnet mask *255 . 255 . 255 . 192*

Total number of subnets *1,024* Total number of host addresses *64* Number of usable addresses *62* Number of bits borrowed *10*

# Show your work for Problem 2 in the space below.

*512*

*1,024*

*2,048*

*4,096*

*8,192*

*16,384*

*32,768*

*Number of*

*65,536*

*Hosts -*

*1024*

*512*

*. 256 128*

*64 32 16 8 4 2*

*65,536*

*32,768*

*16,384*

*8,192*

*4,096*

*2048*

Add the binary value numbers to the left of the line to create the custom subnet mask.

*128*

*64*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Number of Subnets* | *-* | *2* | *4 8* | *16 32* | *64* | *128 256.* | | | | | | |
| *Binary values* | *-* | *128 64 32* | | *16 8* | *4* | *2 1* ***.*** *128* | *64* | *32 16* | *8* | *4* | *2* | *1* |
| ***165 . 100*** | ***.*** | ***0 0 0*** | | ***0 0*** | ***0*** | ***0 0 . 0*** | ***0*** | ***0 0*** | ***0*** | ***0*** | ***0*** | ***0*** |

*32*

*16*

*8*

*4*

*2*

*128*

*+64*

*192*

*64*

*-2 62*

Observe the total number of hosts.

Subtract 2 for the number of usable hosts.

*+1 255*

**Problem 3**

**Custom Subnet Masks**

Network Address **148.75.0.0 /26**

**/26** indicates the total number of bits used for the network and subnetwork portion of the address. All bits remaining belong to the host portion of the address.

Address class *B*

Default subnet mask *255 . 255 . 0 . 0*

Custom subnet mask *255 . 255 . 255 . 192*

Total number of subnets *1,024* Total number of host addresses *64 32 bits - /26 = 6 2^6 = 64*

Number of usable addresses *62* Number of bits borrowed *10 class = 16 /26 = 10 = borrowed bits*

# Show your work for Problem 3 in the space below.

*512*

*1,024*

*2,048*

*4,096*

*8,192*

*16,384*

*32,768*

*65,536*

*Number of*

*Hosts -*

*1024*

*512*

*. 256 128*

*64 32 16 8 4 2*

*65,536*

*32,768*

*16,384*

*8,192*

*4,096*

*2048*

Add the binary value numbers to the left of the line to create the custom subnet mask.

*128*

*64*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Number of Subnets* | *-* | *2* | *4 8* | *16 32* | *64* | *128 256.* | | | | | | |
| *Binary values* | *-* | *128 64 32* | | *16 8* | *4* | *2 1* ***.*** *128* | *64* | *32 16* | *8* | *4* | *2* | *1* |
| ***148 . 75*** | ***.*** | ***0 0 0*** | | ***0 0*** | ***0*** | ***0 0 . 0*** | ***0*** | ***0 0*** | ***0*** | ***0*** | ***0*** | ***0*** |

*32*

*16*

*8*

*4*

*128*

*+64*

*192*

*64*

*-2*

*62*

Observe the total number of hosts.

Subtract 2 for the number of usable hosts.

*2*

*+1 255*

*1024*

*-2 1,022*

Subtract 2 for the total number of subnets to get the usable number of subnets.

**Custom Subnet Masks**

**Problem 7**

Number of needed subnets **2000**

Number of needed usable hosts **15**

Network Address **178.100.0.0**

Address class Class B

Default subnet mask 255.255.0.0

Custom subnet mask 255.255.255.224

Total number of subnets 2048

Total number of host addresses 32

Number of usable addresses 30

Number of bits borrowed 11

# Show your work for Problem 7 in the space below.

*Number of*

*65,536*

*Hosts -*

*Number of*

*32,768*

*16,384*

*8,192*

*4,096*

*2048*

*1024*

*512*

*512*

*1,024*

*2,048*

*4,096*

*8,192*

*16,384*

*32,768*

*. 256 128 64| 32 16 8 4 2*

*Subnets - 2 4 8 16 32 64 128 256.*

*Binary values -*

*65,536*

*128 64 32 16 8 4 2 1* ***.***

*128 64 32 | 16 8 4 2 1*

## 178 . 100 . 0 0 0 0 0 0 0 0 . 0 0 0 | 0 0 0 0 0

***Address Class: 128 to 191 = Class B***

***Default Subnet Mask: Class B default is 255.255.0.0***

***Custom Subnet Mask: 2048 so the line cuts off at 32 binary so 128 + 64 + 32 = 224 = 255.255.255.224***

***Total Number of Subnets: 2^11 = 2048***

***Total Number of Host Addresses : Class B - 16 bits for hosts - 2 ^5 = 32***

***Number of Usable Addresses : 32 – 2 = 30***

***Number of Bits : 11 because we get it from 2^ 11 OR count number of 0s before the line***

**Custom Subnet Masks**

**Problem 15**

Number of needed usable hosts **50**

Network Address **172.59.0.0**

Address class: Class B

Default subnet mask 255.255.0.0

Custom subnet mask 255.255.255.192

Total number of subnets 1024

Total number of host addresses 64

Number of usable addresses 62

Number of bits borrowed 10

# Show your work for Problem 15 in the space below.

**Subnets - 2 4 8 16 32 64 | 128 256**

**------------------------------------------**

**Binary Values - 128 64 32 16 8 4 | 2 1**

**-----------------------------------------**

**175 . 59 . 0 0 0 0 0 0 | 0 0 . 0 0 0 0 0 0 0 0**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **H** | **65536** | **32768** | **16384** | **8192** | **4096** | **2014** | **1024** | **512** | **.256** | **128** | **|64** | **32** | **16** | **8** | **4** | **2** |
| **S** | **2** | **4** | **8** | **16** | **32** | **64** | **128** | **256** | **.512** | **1024** | **|2048** | **4096** | **8192** | **16384** | **32768** | **65356** |
| **B** | **128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** | **.128** | **64** | **|32** | **16** | **8** | **4** | **2** | **1** |
| **IP** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **. 0** | **0** | **|0** | **0** | **0** | **0** | **0** | **0** |

***Address Class: 128 to 191 = Class B***

***Default Subnet Mask: Class B default is 255.255.0.0***

**Custom subnet mask : 128 + 64 = 255.255.255.192**

**Total number of subnets: 1024, last subnet before the line**

**Total number of host addresses: 2 ^ 64**

**Number of usable addresses: 64 – 2 = 62**

**Number of bits: 10 because there’s 10 0s before the line**

**Subnetting**

**Problem 1**

Number of needed subnets **14**

Number of needed usable hosts **14**

Network Address **192.10.10.0**

Address class *C*

Default subnet mask *255 . 255 . 255 . 0*

Custom subnet mask *255 . 255 . 255 . 240*

Total number of subnets *16* Total number of host addresses *16* Number of usable addresses *14* Number of bits borrowed *4*

What is the 4th

subnet range? *192.10.10.48 to 192.10.10.63*

What is the subnet number

for the 8th subnet?

What is the subnet broadcast address for the 13th subnet?

What are the assignable addresses for the 9th

*192 . 10 . 10 . 112*

*192 . 10 . 10 . 207*

subnet? *192.10.10.129 to 192.10.10.142*

# Show your work for Problem 1 in the space below.

*Number of*

*Number of*

*256 128 64 32 16 8 4 2 - Hosts*

*Subnets -* ***2 4 8 16*** *32 64 128 256*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *128* | *64* | *32* | *16* | *8* | *4* | *2* | *1 -* | *Binary values* |
| ***192. 10 . 10 . 0*** | ***0*** | ***0*** | ***0*** | ***0*** | ***0*** | ***0*** | ***0*** |  |

*(0) 0*

*(1) 0*

*(2) 0*

*(3) 0*

*(4) 0*

*(5) 0*

*(6) 0*

*(7) 0*

*(8) 1*

*(9) 1*

*(10) 1*

*(11) 1*

*(12) 1*

*(13) 1*

*(14) 1*

*(15) 1*

*0 0 0*

*0 0 1*

*0 1 0*

*0 1 1*

*1 0 0*

*1 0 1*

*1 1 0*

*1 1 1*

*0 0 0*

*0 0 1*

*0 1 0*

*0 1 1*

*1 0 0*

*1 0 1*

*1 1 0*

*1 1 1*

*192.10.10.0 to 192.10.10.15*

*192.10.10.16 to 192.10.10.31*

*192.10.10.32 to 192.10.10.47*

*192.10.10.48 to 192.10.10.63*

*192.10.10.64 to 192.10.10.79*

*192.10.10.80 to 192.10.10.95*

*192.10.10.96 to 192.10.10.111*

*192.10.10.112 to 192.10.10.127*

*192.10.10.128 to 192.10.10.143*

*192.10.10.144 to 192.10.10.159*

*192.10.10.160 to 192.10.10.175*

*192.10.10.176 to 192.10.10.191*

*192.10.10.192 to 192.10.10.207*

*192.10.10.208 to 192.10.10.223*

*192.10.10.224 to 192.10.10.239*

*192.10.10.240 to 192.10.10.255*

Custom subnet

mask

*128*

*64*

*32*

*+16 240*

Usable subnets

*16*

*-2 14*

*16*

Usable hosts *-2*

*14*

The binary value of the last bit borrowed is the range. In this problem the range is 16.

The first address in each subnet range is the subnet number.

The last address in each subnet range is the subnet broadcast address.

**Subnetting**

**Problem 2**

Number of needed subnets **1000**

Number of needed usable hosts **60**

Network Address **165.100.0.0**

Address class *B*

Default subnet mask *255 . 255 . 0 . 0*

Custom subnet mask *255 . 255 . 255 . 192*

Total number of subnets *1,024* Total number of host addresses *64* Number of usable addresses *62* Number of bits borrowed *10*

What is the 15th

subnet range? *165.100.3.128 to 165.100.3.191*

What is the subnet number

for the 6th subnet?

What is the subnet broadcast address for

the 6th subnet?

What are the assignable addresses for the 9th

*165 . 100 . 1 . 64*

*165 . 100 . 1 . 127*

subnet? *165.100.2.1 to 165.100.0.62*

*Number of*

*65,536*

*Hosts -*

*Number of*

*32,768*

*16,384*

*8,192*

*4,096*

*2048*

*1024*

*512*

*512*

*1,024*

*2,048*

*4,096*

*8,192*

*16,384*

*32,768*

*. 256 128*

*64 32 16 8 4 2*

*65,536*

*Subnets - 2 4 8 16 32 64 128 256.*

*Binary values - 128 64 32 16 8 4 2 1* ***.*** *128 64 32 16 8 4 2 1*

## 165 . 100 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

*64*

Usable *-2*

hosts *62*

*128*

*64*

*32*

*16*

*(0)*

*(1)*

*(2)*

*(3)*

*(4)*

*(5)*

*. 0*

*1*

*1*

*0*

*1*

*1*

*1 . 0 0*

*1 . 0 1*

*165.100.0.0 to 165.100.0.63*

*165.100.0.64 to 165.100.0.127*

*165.100.0.128 to 165.100.0.191*

*165.100.0.192 to 165.100.0.255*

*165.100.1.0 to 165.100.1.63*

*165.100.1.64 to 165.100.1.127*

Custom

*128*

*8 (6)*

*1 . 1*

*0 165.100.1.128 to 165.100.1.191*

subnet mask *+64*

*192*

*4 (7)*

*2 (8)*

*1 . 1 1*

*1 0 . 0 0*

*165.100.1.192 to 165.100.1.255*

*165.100.2.0 to 165.100.0.63*

The binary value of the last bit borrowed is the range. In this problem the range is 64.

*+1*

*255*

*(9) 1 0 . 0 1*

*(10) 1 0 . 1 0*

*165.100.2.64 to 165.100.0.127*

*165.100.2.128 to 165.100.0.191*

The first address in each subnet range is the subnet number.

The last address in each subnet range is the subnet broadcast address.

*(11) 1 0 . 1 1*

*(12)*

*1*

*1 .*

*0*

*0*

*(13) 1 1 . 0 1*

*(14) 1 1 . 1 0*

*(15) 1 1 . 1 1*

*165.100.2.192 to 165.100.0.255*

*165.100.3.0 to 165.100.3.63*

*165.100.3.64 to 165.100.3.127*

*165.100.3.128 to 165.100.3.191*

*165.100.3.192 to 165.100.3.255*

*Down to*

**Subnetting**

**Problem 11**

Number of needed usable hosts **8,000**

Network Address **135.70.0.0**

Address class Class B

Default subnet mask 255.255.0.0

Custom subnet mask 255.255.255.224

Total number of subnets 8

Total number of host addresses 8192

Number of usable addresses 8190

Number of bits borrowed 3

What is the 6th subnet range? 135.70.0.160 to 135.70.0.191

What is the subnet number for the 7th subnet? 135.70.0.192

What is the subnet broadcast address for the 3rd subnet? 135.70.0.95

What are the assignable addresses for the 5th subnet? 135.70.0.129 to 135.70.0.158

# Show your work for Problem 11 in the space below.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **H** | **65536** | **32768** | **16384** | **|8192** | **4096** | **2014** | **1024** | **512** | **.256** | **128** | **64** | **32** | **16** | **8** | **4** | **2** |
| **S** | **2** | **4** | **8** | **|16** | **32** | **64** | **128** | **256** | **.512** | **1024** | **2048** | **4096** | **8192** | **16384** | **32768** | **65356** |
| **B** | **128** | **64** | **32** | **|16** | **8** | **4** | **2** | **1** | **.128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| **IP** | **0** | **0** | **0** | **|0** | **0** | **0** | **0** | **0** | **. 0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **(0)** | **0** | **0** | **0 |** | **135.70.0.0** | **To** | **135.70.0.31** |
| **(1)** | **0** | **0** | **1 |** | **135.70.0.32** | **To** | **135.70.0.63** |
| **(2)** | **0** | **1** | **0 |** | **135.70.0.64** | **To** | **135.70.0.95** |
| **(3)** | **0** | **1** | **1 |** | **135.70.0.96** | **To** | **135.70.0.127** |
| **(4)** | **1** | **0** | **0 |** | **135.70.0.128** | **To** | **135.70.0.159** |
| **(5)** | **1** | **0** | **1 |** | **135.70.0.160** | **To** | **135.70.0.191** |
| **(6)** | **1** | **1** | **0 |** | **135.70.0.192** | **To** | **135.70.0.223** |
| **(7)** | **1** | **1** | **1 |** | **135.70.0.224** | **To** | **135.70.0.255** |

***Address Class: 128 to 191 = Class B***

***Default Subnet Mask: Class B default is 255.255.0.0***

**Custom subnet mask : 128 + 64 + 32 = 224 = 255.255.255.224**

**Total number of subnets: 8 is left of line**

**Total number of host addresses: 2^13 = 8192**

**Number of usable addresses: 8192 – 2 = 8190**

**Number of bits: 3 0’s left of line**

**How to do it if its /26**

**/26**

**1111 1111 1111 1111 1111 1111 1100 0000**

**2^7 + 2^6 = 192**

**255.255.255.192**

**Subnetting**

**Problem 12**

Number of needed usable hosts **45**

Network Address **198.125.50.0**

Address class Class C

Default subnet mask 255.255.255.0

Custom subnet mask 255.255.255.192

Total number of subnets 4

Total number of host addresses 64

Number of usable addresses 62

Number of bits borrowed 2

What is the 2nd

subnet range? 198.125.50.6 to 198.125.50.11

What is the subnet number

for the 2nd subnet? 198.125.50.6

What is the subnet broadcast address for

the 4th subnet? 198.125.50.23

What are the assignable addresses for the 3rd

subnet? 198.125.50.13 to 198.125.50.16

# Show your work for Problem 12 in the space below.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **H** | **256** | **128** | **| 64** | **32** | **16** | **8** | **4** | **2** |
| **S** | **2** | **4** | **| 8** | **16** | **32** | **64** | **128** | **256** |
| **B** | **128** | **64** | **| 32** | **16** | **8** | **4** | **2** | **1** |
| **IP** | **0** | **0** | **| 0** | **0** | **0** | **0** | **0** | **0** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **(0)** | **0** | **0 |** | **198.125.50.0** | **To** | **198.125.50.5** |
| **(1)** | **0** | **1 |** | **198.125.50.6** | **To** | **198.125.50.11** |
| **(2)** | **1** | **0 |** | **198.125.50.12** | **To** | **198.125.50.17** |
| **(3)** | **1** | **1 |** | **198.125.50.18** | **To** | **198.125.50.23** |

***Address Class: 192 to 223 = Class C***

***Default Subnet Mask: Class C default is 255.255.0.0***

**Custom subnet mask : 128 + 64 = 192 = 255.255.255.192**

**Total number of subnets: 4 is left of line**

**Total number of host addresses: 2^6 = 64**

**Number of usable addresses: 64 – 2 = 62**

**Number of bits: 2 0’s left of line**

**Practical Subnetting 1**

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of subnets**, and allow enough extra subnets and hosts for 100% growth in both areas. Circle each subnet on the graphic and answer the questions below.

**IP Address 172.16.0.0**



**F0/0**

Router A

**S0/0/0**

**S0/0/1**

**F0/0**

**F0/1**

Router B

Marketing 24 Hosts

Reasearch 60 Hosts

Management 15 Hosts

Address class Custom subnet mask

Minimum number of subnets needed

*B*

*255.255.224.0*

*4*

Extra subnets required for 100% growth + *4*

(Round up to the next whole number)

Total number of subnets needed = *8*

Number of host addresses in the largest subnet group

Number of addresses needed for 100% growth in the largest subnet

(Round up to the next whole number)

Total number of address needed for the largest subnet

*60*

+ *60*

= *120*

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Research IP address range for Marketing

IP address range for Management

IP address range for Router A to Router B serial connection

58

*172.16.0.0 to 172.31.255*

*172.16.32.0 to 172.63.255*

*172.16.64.0 to 172.95.255*

*172.16.96.0 to 172.127.255*

*Number of*

*16,384*

*32,768*

*65,536*

*Hosts -*

*8,192*

*2048*

*1024*

*512*

*. 256 128 64 32 16 8 4 2*

*32,768*

*16,384*

*4,096*

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Number of Subnets* | *-* | | *2* | *4 8* | *16 32* | *64 128 256.* | | | | | |
| *Binary values* | *-* | *128 64 32* | | | *16 8* | *4 2* | *1* ***.*** *128 64 32 16* | *8* | *4* | *2* | *1* |
| ***172 . 16*** | ***.*** | ***0 0 0*** | | | ***0 0*** | ***0 0*** | ***0 . 0 0 0 0*** | ***0*** | ***0*** | ***0*** | ***0*** |

*4 x1.0*

*4*

*60 x1.0*

*60*

*(0) 0*

*(1) 1*

*(2) 1 0*

*(3) 1 1*

*(4) 1 0 0*

*(5) 1 0 1*

*(6) 1 1 0*

*(7) 1 1 1*

*172.16.0.0*

*172.16.32.0*

*172.16.64.0*

*172.16.96.0*

*172.16.128.0*

*172.16.160.0*

*172.16.192.0*

*172.16.224.0*

*to 172.16.31.255*

*to 172.16.63.255*

*65,536*

*to 172.16.95.255*

*to 172.16.127.255*

*to 172.16.159.255*

*to 172.16.191.255*

*to 172.16.223.255*

*to 172.16.255.255*

*512*

*1,024*

*2,048*

*4,096*

*8,192*

**Show**

**your**

**work**

**for**

**Practical**

**Subnetting**

**1**

**in**

**the**

**space**

**below.**

59

**Practical Subnetting 2**

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of hosts per subne**t, and allow enough extra subnets and hosts for 30% growth in all areas. Circle each subnet on the graphic and answer the questions below.

Address class Custom subnet mask

Minimum number of subnets needed

Extra subnets required for 30% growth

(Round up to the next whole number)

Total number of subnets needed

Number of host addresses in the largest subnet group

Number of addresses needed for 30% growth in the largest subnet

(Round up to the next whole number)

Total number of address needed for the largest subnet

*B*

*255.255.255.224*

*5*

+ *2*

= *7*

*20*

+ *6*

= *26*

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Tech Ed IP address range for English IP address range for Science

IP address range for Router A to Router B serial connection

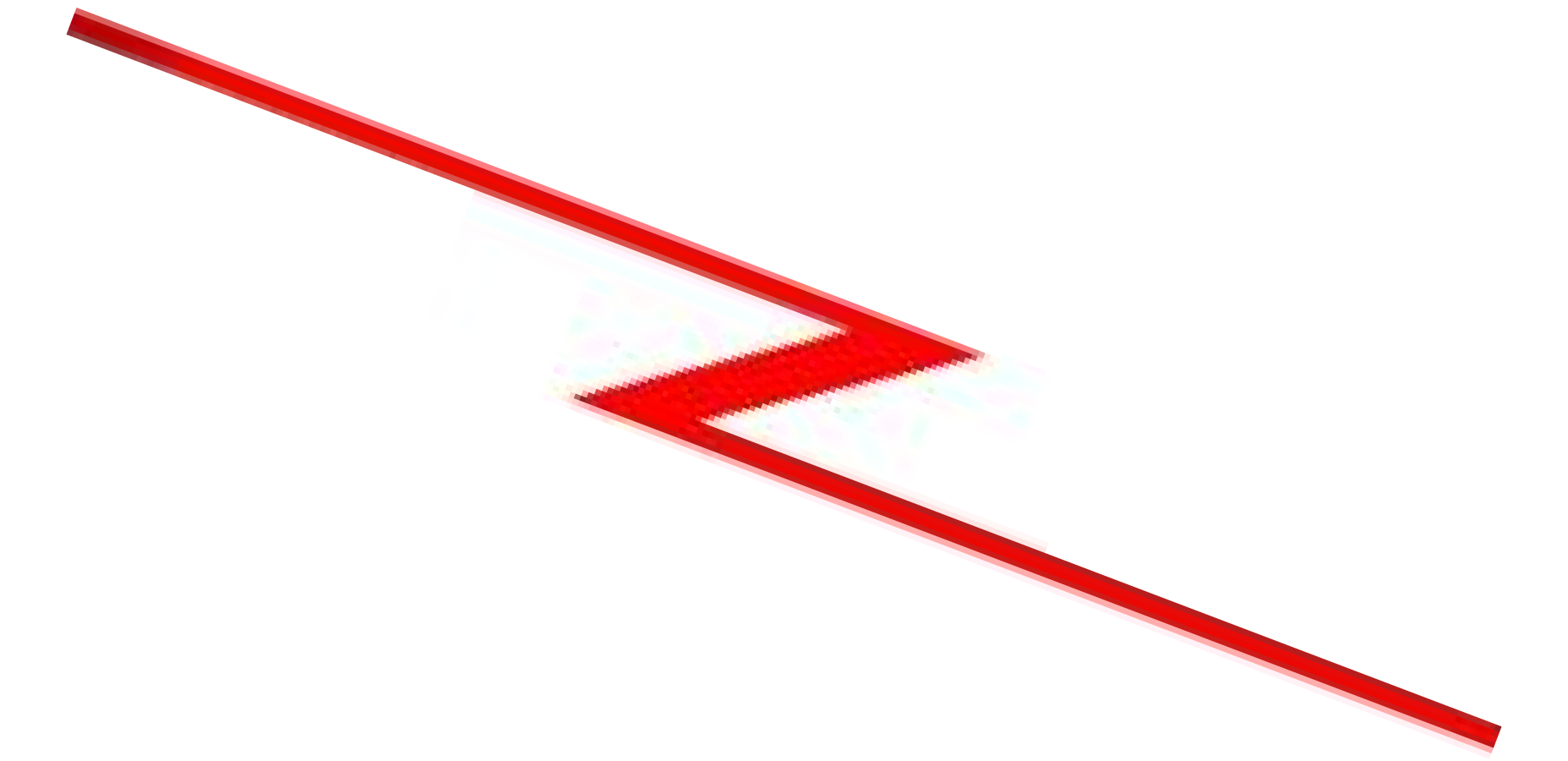
IP address range for Router A

*135.126.0.0 to 135.126.0.31 135.126.0.32 to 135.126.0.63*

*135.126.0.64 to 135.126.0.95*

*135.126.0.96 to 135.126.0.127*

to Router B serial connection*135.126.0.128 to 135.126.0.159*



**IP Address 135.126.0.0**

**S0/0/0**

**F0/0**

Router A **S0/0/1**

**S0/0/1**

**F0/0**

Router B

**F0/1**

**S0/0/0**

Tech Ed Lab 20 Hosts

**F0/1**

Router C

Science Lab 10 Hosts

English Department 15 Hosts

60

*Number of*

*65,536*

*Hosts -*

*Number of*

*32,768*

*16,384*

*8,192*

*4,096*

*2048*

*1024*

*512*

*512*

*1,024*

*2,048*

*4,096*

*8,192*

*16,384*

*32,768*

*. 256 128 64 32 16 8 4 2*

*Subnets - 2 4 8 16 32 64 128 256.*

*Binary values -*

*65,536*

*128 64 32 16 8 4 2 1* ***.***

*128 64 32*

*16 8 4 2 1*

## 135. 126 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

*5*

*x.3*

*1.5*

*(Round up to 2)*

*20*

*x.3*

*6*

*(0) . 0*

*(1) 1*

*(2) 1 0*

*(3) 1 1*

*(4) 1 0 0*

*(5) 1 0 1*

*(6) 1 1 0*

*(7) 1 1 1*

*(8) 1 . 0 0 0*

*(9) 1 . 0 0 1*

*(10) 1 . 0 1 0*

*(11) 1 . 0 1 1*

*(12) 1 1 0 0*

*.*

*(13) 1 . 1 0 1*

*(14) 1 . 1 1 0*

*(15) 1 . 1 1 1*

*135.126.0.0 to*

*135.126.0.32 to*

*135.126.0.64 to*

*135.126.0.96 to*

*135.126.0.128 to*

*135.126.0.160 to*

*135.126.0.192 to*

*135.126.0.224 to*

*135.126.1.0 to*

*135.126.1.32 to*

*135.126.1.64 to*

*135.126.1.96 to*

*135.126.1.128 to*

*135.126.1.160 to*

*135.126.1.192 to*

*135.1261.224 to*

*135.126.0.31*

*135.126.0.63*

*135.126.0.95*

*135.126.0.127*

*135.126.0.159*

*135.126.0.191*

*135.126.0.223*

*135.126.0.255*

*135.126.1.31*

*135.126.1.63*

*135.126.1.95*

*135.126.1.127*

*135.126.1.159*

*135.126.1.191*

*135.126.1.223*

*135.126.1.255*

**Show**

**your**

**work**

**for**

**Problem 2**

**in**

**the**

**space**

**below.**

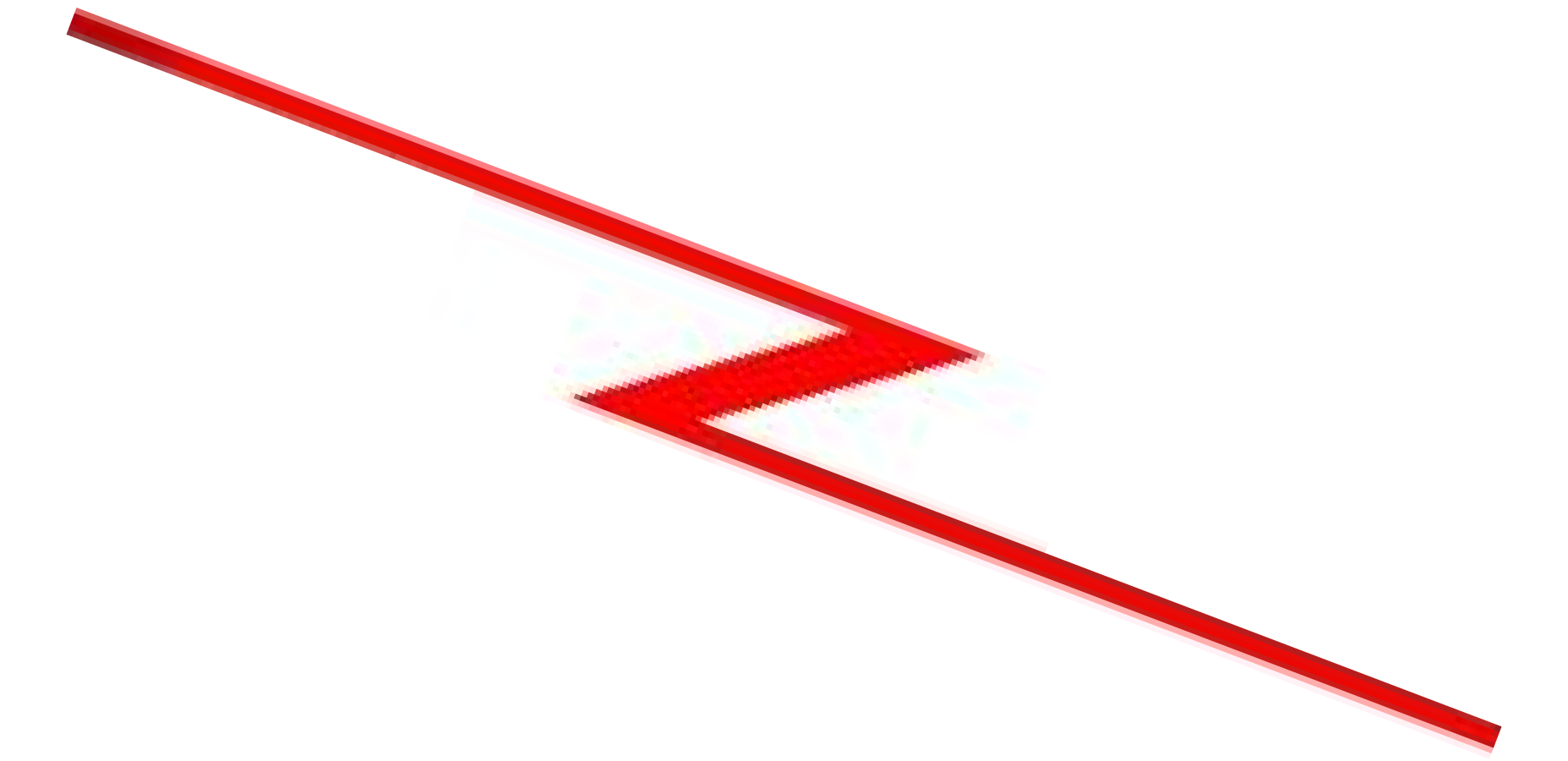
61

**Practical Subnetting 4**

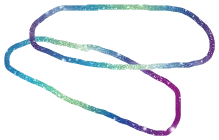
Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of subnets**, and allow enough extra subnets and hosts for 70% growth in all areas. Circle each subnet on the graphic and answer the questions below.

**IP Address 135.126.0.0**

**F0/0 S0/0/0**



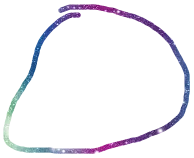
Router A

**S0/0/1**

**S0/0/1**

**F0/0**

**S0/0/0**

Router B



Dallas

**F0/1**

Router C **F0/0**

150 Hosts New York

Washington D.C. 220 Hosts

325 Hosts

Address class = **Class B**

Custom subnet mask = **255.255.240.0**

Minimum number of subnets needed = **5**

Extra subnets required for 70% growth = **+4**

Total number of subnets needed = **9**

Number of host addresses in the largest subnet group = **325**

Number of addresses needed for

70% growth in the largest subnet = **+228**

Total number of address

needed for the largest subnet = **553**

IP address range for New York = **135.126.0.0 to 135.126.15.255**

IP address range for Washington D. C. = **135.126.16.0 to 135.126.31.255**

IP address range for Dallas = **135.126.32.0 to 135.126.47.255**

IP address range for Router A

to Router B serial connection = **135.126.48.0 to 135.126.63.255**

IP address range for Router A

to Router C serial connection =**135.126.64.0 to 135.126.79.255**

# Show your work for Problem 4 in the space below.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **H** | **65536** | **32768** | **16384** | **8192** | **|4096** | **2014** | **1024** | **512** | **.256** | **128** | **64** | **32** | **16** | **8** | **4** | **2** |
| **S** | **2** | **4** | **8** | **16** | **| 32** | **64** | **128** | **256** | **.512** | **1024** | **2048** | **4096** | **8192** | **16384** | **32768** | **65356** |
| **B** | **128** | **64** | **32** | **16** | **| 8** | **4** | **2** | **1** | **.128** | **64** | **32** | **16** | **8** | **4** | **2** | **1** |
| **IP** | **0** | **0** | **0** | **0** | **| 0** | **0** | **0** | **0** | **. 0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

**0 0 0 | 135.126.0.0 to 135.126.15.255**

**0 0 1 | 135.126.16.0 to 135.126.31.255**

**0 1 0 | 135.126.32.0 to 135.126.47.255**

**0 1 1 | 135.126.48.0 to 135.126.63.255**

**1 0 0 | 135.126.64.0 to 135.126.79.255**

**1 0 1 | 135.126.80.0 to 135.126.95.255**

**1 0 1 | 135.126.96.0 to 135.126.111.255**

**1 1 1 | 135.126.112.0 to 135.126.127.255**

**1 0 0 0 | 135.126.128.0 to 135.126.143.255**

**1 0 0 1 | 135.126.144.0 to 135.126.159.255**

**1 0 1 0 | 135.126.160.0 to 135.126.175.255**

**1 0 1 1 | 135.126.176.0 to 135.126.191.255**

**1 1 0 0 | 135.126.192.0 to 135.126.207.255**

**1 1 0 1 | 135.126.208.0 to 135.126.223.255**

**1 1 1 0 | 135.126.224.0 to 135.126.239.255**

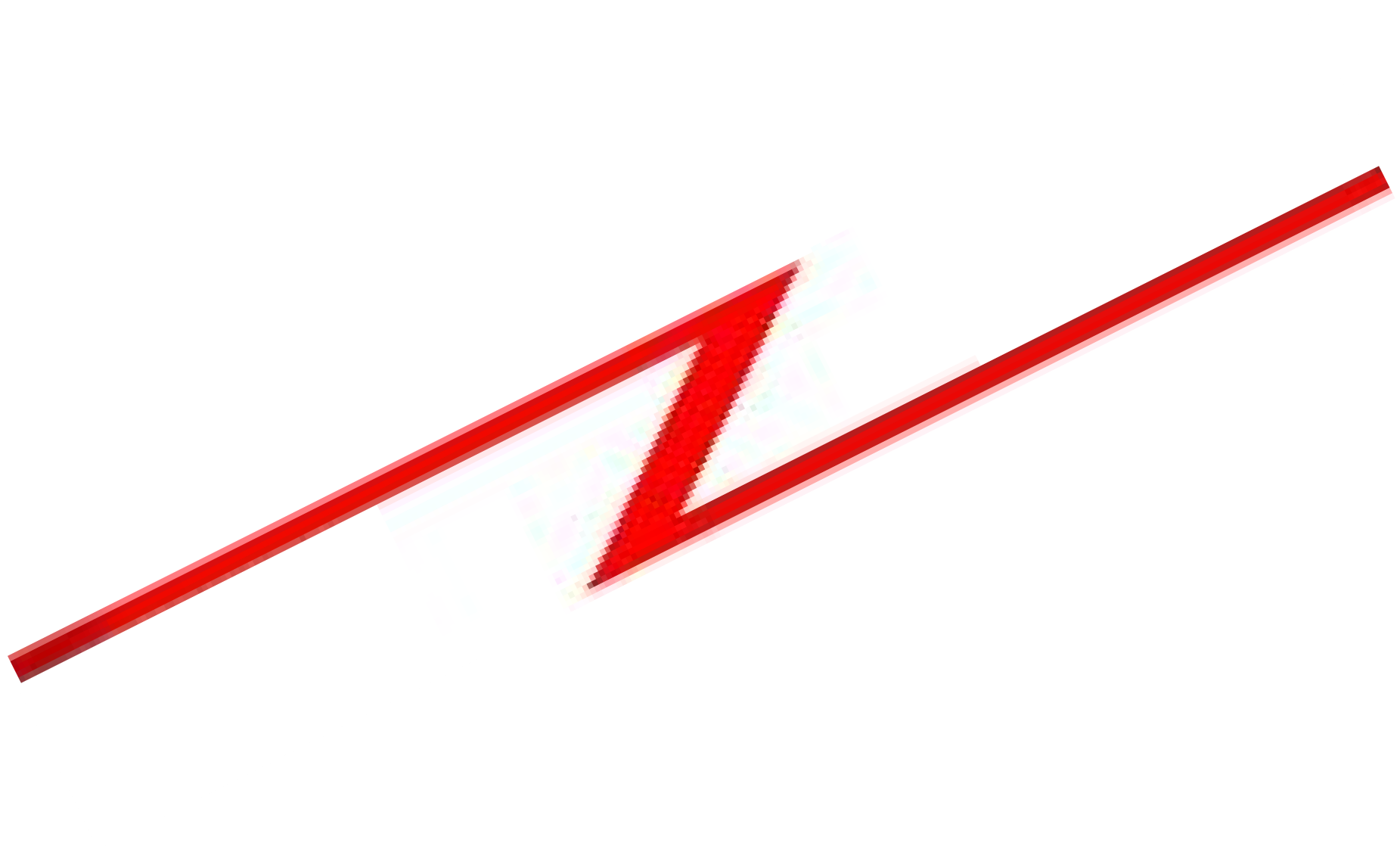
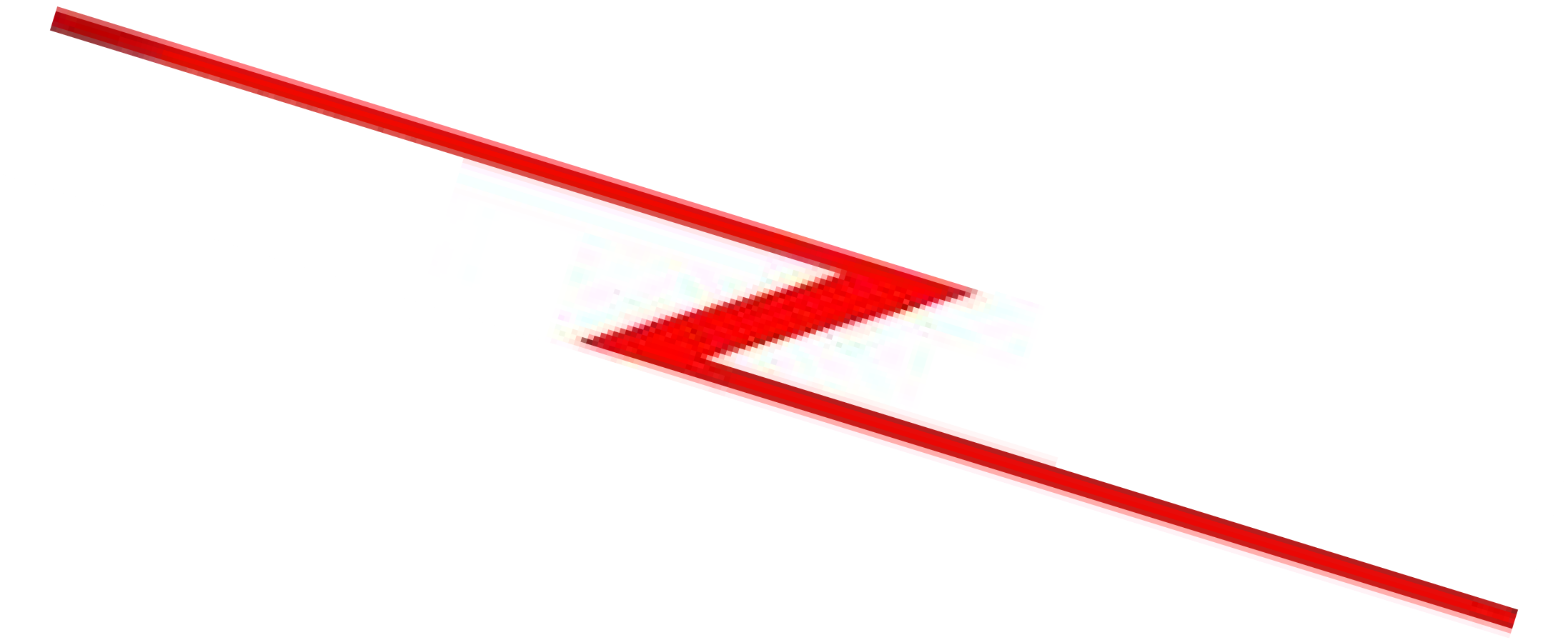
**1 1 1 1 | 135.126.240.0 to 135.126.1255.255**

**(I done the other workings on a sheet, I am very tired of typing so hopefully this is good enough)**

**Practical Subnetting 6**

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of subnets**, and allow enough extra subnets and hosts for 20% growth in all areas. Circle each subnet on the graphic and answer the questions below.

**IP Address 10.0.0.0**



**S0/0/0**

Router A

**F0/0**

**S0/0/1**

**S0/0/1**

**S0/0/0**

Technology Building 320 Hosts

**S0/0/0**

Art & Drama

**S0/0/1**

Router B

**F0/1**

75 Hosts

Router C

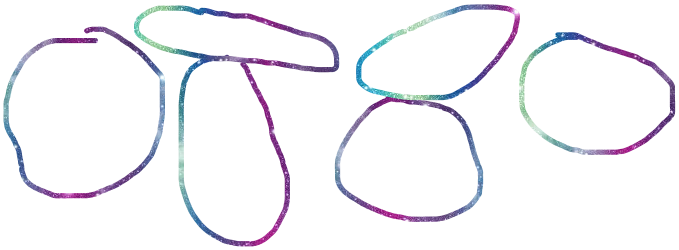
**F0/0**

**F0/1**

Administration 35 Hosts

Science Building 225 Hosts

****

****

Address class = Class A

Custom subnet mask = 255.240.0.0

Minimum number of subnets needed = 7

Extra subnets required for 20% growth = + 2

(Round up to the next whole number)

Total number of subnets needed = 9

IP address range for Technology = **10.0.0.0 to 10.15.255.255**

IP address range for Science = **10.16.0.0 to 10.31.255.255**

IP address range for Arts & Drama = **10.32.0.0 to 10.47.255.255**

IP Address range Administration =**10.48.0.0 to 10.63.255.255**

IP address range for Router A = **10.64.0.0 to 10.79.255.255**

IP address range for Router A to Router C serial connection = **10.80.0.0 to 10.95.255.255**

IP address range for Router B to Router C serial connection = **10.96.0.0 to 10.111.255.255**

# Show your work for Problem 6 in the space below.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **H** | **<<<<<** | **<<<<<** | **4,194,304** | **2,097.152** | **1,048,576** | **| 524,288** | **262,144** | **131,072** |
| **S** | **2** | **4** | **8** | **16** | **32** | **| 64** | **128** | **256** |
| **B** | **128** | **64** | **32** | **16** | **8** | **| 4** | **2** | **1** |
| **IP** | **0** | **0** | **0** | **0** | **0** | **| 0** | **0** | **0** |

**0000 | 10.0.0.0 to 10.15.255.255**

**0001 | 10.16.0.0 to 10.32.255.255**

**0010 | 10.32.0.0 to 10.47.255.255**

**0011 | 10.48.0.0 to 10.63.255.255**

**0100 | 10.64.0.0 to 10.79.255.255**

**0101 | 10.80.0.0 to 10.95.255.255**

**0110 | 10.96.0.0 to 10.111.255.255**

**0111 | 10.112.0.0 to 10.127.255.255**

**1000 | 10.128.0.0 to 10.143.255.255**

**1001 | 10.144.0.0 to 10.159.255.255**

**1010 | 10.160.0.0 to 10.175.255.255**

**1011 | 10.176.0.0 to 10.191.255.255**

**1100 | 10.192.0.0 to 10.207.255.255**

**1101 | 10.208.0.0 to 10.223.255.255**

**1110 | 10.224.0.0 to 10.239.255.255**

**1111 | 10.240.0.0 to 10.255.255.255**

**(I done the other workings on a sheet, I am very tired of typing so hopefully this is good enough)**

**(the same thing applies here, typing this stuff is very awkward so I only typed that out…too much workings out only for the first lab)**

69