**Number System Conversion And Arithmetic**

# Convert the following numbers in decimal to binary, octal, and hexadecimal: 156, 1024, 255.

## 156 :

Decimal To Binary :

|  |  |  |
| --- | --- | --- |
| 2 | 156 |  |
| 2 | 78 | **0** |
| 2 | 39 | **0** |
| 2 | 19 | **1** |
| 2 | 9 | **1** |
| 2 | 4 | **1** |
| 2 | 2 | **0** |
|  | **1** | **0** |

**(156)10 = (10011100)2**

Decimal To Octal

|  |  |  |
| --- | --- | --- |
| 8 | 156 |  |
| 8 | 19 | **4** |
|  | 2 | **3** |

**(156)10 = (234)8**

Decimal To Hexa Decimal

|  |  |  |
| --- | --- | --- |
| 16 | 156 |  |
|  | 8 | **12** |

=> 12 = C

**(156)10 = (8C)16**

## 1024

Decimal To Binary

|  |  |  |
| --- | --- | --- |
| 2 | 1024 |  |
| 2 | 512 | **0** |
| 2 | 256 | **0** |
| 2 | 128 | **0** |
| 2 | 64 | **0** |
| 2 | 32 | **0** |
| 2 | 16 | **0** |
| 2 | 8 | **0** |
| 2 | 4 | **0** |
| 2 | 2 | **0** |
|  | **1** | **0** |

**(1024)10 = (10000000000)2**

Decimal To Octal

|  |  |  |
| --- | --- | --- |
| 8 | 1024 |  |
| 8 | 128 | **0** |
| 8 | 16 | **0** |
|  | 2 | **0** |

**(1024)10 = (2000)8**

Decimal To Hexa Decimal

|  |  |  |
| --- | --- | --- |
| 16 | 1024 |  |
| 16 | 64 | **0** |
| 16 | 4 | **0** |

**(1024)10 = (400)16**

## 255

Decimal To Binary

|  |  |  |
| --- | --- | --- |
| 2 | 255 |  |
| 2 | 127 | **1** |
| 2 | 63 | **1** |
| 2 | 31 | **1** |
| 2 | 15 | **1** |
| 2 | 7 | **1** |
| 2 | 3 | **1** |
|  | **1** | **1** |

**(255)10 = (11111111)2**

Decimal To Octal

|  |  |  |
| --- | --- | --- |
| 8 | 255 |  |
| 8 | 31 | **7** |
| 8 | 3 | **7** |

**(255)10 = (377)8**

Decimal To Hexadecimal

|  |  |  |
| --- | --- | --- |
| 16 | 255 |  |
| 8 | 15 | **15** |

=> 15 = F

**(255)10 = (FF)16**

# Convert the following into Octal (124)10 , (A78E)16

## (124)10

|  |  |  |
| --- | --- | --- |
| 8 | 124 |  |
| 8 | 15 | **4** |
|  | 1 | **7** |

**(124)10 = (174)8**

## 2. (A78E)16

(A78E)16

= (A x 163) + (7 x 162) + (8 x 161) + ( E x 160)

We know that A = 10 And E = 14

= (10 x 163) + (7 x 162) + (8 x 161) + (14 x 160)

= 40960 + 1792 + 128 + 14

= (42894)10

|  |  |  |
| --- | --- | --- |
| 8 | 42894 |  |
| 8 | 5361 | **6** |
| 8 | 670 | **1** |
| 8 | 83 | **6** |
| 8 | 10 | **3** |
| 8 | 1 | **2** |

**(A78E)16 = (123616)8**

# Convert the following into Hexadecimal (784)10, (372)8 .

## (784)10

|  |  |  |
| --- | --- | --- |
| 16 | 784 |  |
| 16 | 49 | **0** |
|  | 3 | **1** |

**(784)10 = (310)16**

## 2. (372)8

= (3 x 82) + (7 x 81) + (2 x 80)

= 192 + 56 + 2

= (250)10

|  |  |  |
| --- | --- | --- |
| 16 | 250 |  |
| 16 | 15 | **10** |

We Know That 15 = F And 10 = A

**(372)8 = (FA)16**

# Convert the following into Binary (235)8, (276)10, (C13E)16

## 1. (235)8

= (2 x 82) + (3 x 81) + (5 x 80)  
= 128 + 24 + 5

= (157)10

|  |  |  |
| --- | --- | --- |
| 2 | 157 |  |
| 2 | 78 | **1** |
| 2 | 63 | **1** |
| 2 | 31 | **1** |
| 2 | 15 | **1** |
| 2 | 7 | **1** |
| 2 | 3 | **1** |
|  | **1** | **1** |

**(235)8 = (11111111)2**

## 2. (276)10

|  |  |  |
| --- | --- | --- |
| 2 | 276 |  |
| 2 | 138 | **0** |
| 2 | 69 | **0** |
| 2 | 34 | **1** |
| 2 | 17 | **0** |
| 2 | 8 | **1** |
| 2 | 4 | **0** |
| 2 | 2 | **0** |
|  | **1** | **0** |

**(276)10 = (100010100)2**

## 3. (C13E)16

= ( C x 163 ) + ( 1 x 162 ) + ( 3 x 161 ) + ( E x 160 )

We Know That C = 12 And E = 14

= ( 12 x 163 ) + ( 1 x 162 ) + ( 3 x 161 ) + ( 14 x 160 )

= 49152 + 256 + 48 + 14

= (49470)10

|  |  |  |
| --- | --- | --- |
| 2 | 49470 |  |
| 2 | 24735 | **0** |
| 2 | 12367 | **1** |
| 2 | 6183 | **1** |
| 2 | 3091 | **1** |
| 2 | 1545 | **1** |
| 2 | 772 | **1** |
| 2 | 386 | **0** |
| 2 | 193 | **0** |
| 2 | 96 | **1** |
| 2 | 48 | **0** |
| 2 | 24 | **0** |
| 2 | 12 | **0** |
| 2 | 6 | **0** |
| 2 | 3 | **0** |
| 2 | 1 | **1** |

**(C13E)16 = (110000100111110)2**