**Exercises : conversion the numbers to another base.**

Dear Students,

Your Quiz 1 should have 3 or 4 questions required several conversions of different numbers to another base, including to base 10, binary, octal, hexadecimal, etc.

**Please review the entire Chapter 3 and the textbook examples (5 th edition textbook) on page# 77, 83, 85 and 92.**

You need also practice the End of Ch 3 Exercises. I enclosed the correct answers to selected exercises.

Please make sure the End of Chapter Exercises are not the same as Reading Review Questions.

Ex. 3.1 on page 96

Ex3.3 on page 96

Ex. 3.8 on page 97

Ex.3.10 on page 97

Ex. 3.11 on page 98

Ex. 3.15 on page 98

Ex. 3.20 on page 98

Ex. 3.22 on page 98

Ex. 3.24 on page 99

Ex. 3.27 on page 99

Ex. 3.28 on page 99

Answers:

**3.1 a.** Each digit is one power of 6 increased from the previous digit. Therefore, starting from the right, the digits represent 1, 6, 36, 216, and 1296.

**b.** The decimal equivalent for 245316 is 2  1296 + 4  216 + 5  36 + 3  6 + 1 = 3655.

**3.3** a. 4E16 = 4  16 + 14 = 78

b. 3D716 = 3  256 + 13  16 + 7 = 983

c. 3D7016 = 16  983 = 15728. The same result will, of course, be obtained from taking 3  4096 + 13  256 + 7  16.

**3.8 a & e.**

101101101 = 16D16

+10011011 = 9B16

1000001000 = 20816

**b & e.**

110111111 = 1BF16

+110111111 = 1BF16

1101111110 = 37E16

**c & e.**

11010011= D316

+10001010 = 8A16

101011101 = 15D16

**d & e**

1101 = D16

1010 = A16

111 = 716

+101 = 516

100011 = 2316

**3.10 a.**

1101100

110 )1010001001

110

1000

110

1001

110

110

110

01

**B.**

10001011

1011 )11000000000

1011

10000

1011

10100

1011

10010

1011

111

**3.11** The powers of digits in 8 are 1, 8, 64, 512, 4096. Therefore,

6026 - ***1*** 4096 = 1930 - ***3***  512 = 394 - ***6***  64 = 10 - ***1***  8 = ***2***.

**3.12**

The powers of digits in hexadecimal are 1, 16, 256, 4096. Therefore,

6026 - ***1***  4096 = 1930 - ***7***  256 = 138 - ***8***  16 = ***10***.

The solution is 178A16

**3.15 a.** Converting 1100010100100001 to decimal. Working from left to right:

****

**b.** (BL2) Converting C52116 to decimal

1216=192+5=19716=3152+2=315416=50464+1= **5**0**465**

Of course, the student should notice that the result is the same, and that C521 converts to the binary value in part a.

**c.**  Converting 3ADF16 to decimal,

316=48+10=5816=928+13=94116=15056+15= **15**0**71**

**d.** Converting 245567 to decimal,

27=14+4=187=126+5=1317=917+5=9227=6454+6= **646**0

**3.20** This conversion is performed using decimal as an intermediary number base. Using the power method for both conversions,

2101023 = 2 + 9 + 81 + 2  243 = 57810.

57810 = 512 + 64 + 2  1 = 11028.

**3.22** This is a programming problem, with a number of different solutions. The easiest approach is to accept digits from the keyboard as characters, one at a time. The result is initialized to zero. As characters are entered, each character is checked for validity and converted to an integer. Using the multiplier method, the previous result is multiplied by 8, and the new digit added to the result to form the new result. The process stops when the input character is a space or carriage return.

**3.24** This is a programming problem, with a number of different solutions. Arguably, the easiest solution is to perform both conversions with base 10 as an intermediary. One approach to direct conversion is to build a pair of tables that match integer values from 0 to 15 with their corresponding hexadecimal and binary text strings. Then, to convert from binary to hexadecimal, the program takes the binary input as characters, collects the characters into groups of four, calculates the value for each group, looks up the hexadecimal equivalent and prints it. A crucial point is that the binary digits must be grouped from least significant bit to most significant, which requires that all of the data must be entered before grouping can take place. Conversion in the other direction is easier, since each hexadecimal digit can be converted to its binary equivalent directly from the tables.

**3.27**

**a.** 27.625 = (16 + 8 + 2 + 1) . 625. Either recognize that .625 = 5/8 or multiply:

.625

X2

1.250

X2 The result is 11011.10102 = 1B.A16

0 .50

X2

1 .00

**b.** 4192.37761 = (4096 + 64 + 32).37761

.37761

X2

0 .75522

X2

1 .51044

X2

1 .02088 The solution is 1000001100000.011000002 = 1060.6016

X2

0 .04176

X2

0 .08352

X2

0 .16704

X2

0 .33408

X2

0 .66816

**3.28 a.** 1100101.1 = (64 + 32 +4 + 1). (1/2) = 101.5

**b.** 1110010.11 = (64 + 32 + 16 + 2). (1/2 + 3/4) = 114.75

**c.** 11100101.1 = (128 + 64 + 32 + 4 + 1). (1/2) = 229.5.

Since this number is the same as the one in part b with the binary point shifted one to the right, you would expect the value to be exactly twice that of the value in b, which it is.