Number System Conversions

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a) $(1001101010)_2$ to Decimal

Solution:
Converting from Binary to Decimal involves multiplying each binary digit with it's place value. Place values in binary are in powers of 2, so

$$D = 1 \times 2^9 + 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^3 + 1 \times 2^1$$
$$\boxed{D = 618}$$

b) $(490)_{10}$ to Octal

Solution:
Dividing by 8 and reading the remainders upwards gives us the Octal number

8	490	2
8	61	5
8	7	7
	0	

Hence, $\boxed{(490)_{10} = (752)_8}$

c) $(576)_8$ to Hexadecimal

Solution:
An easy way to convert between two number systems where the place values are powers of 2 is to first convert to binary, then group the numbers together. This works, because the place values being powers of 2, play along nicely.

$$(576)_8 = (\underline{101}\,\underline{111}\,\underline{110})_2$$
$$(\underline{1}\,\underline{0111}\,\underline{1110})_2 = (17\text{E})_{16}$$

Hence, $\boxed{(576)_8 = (17\text{E})_{16}}$

d) $(\text{B9C0})_{16}$ to Binary

Solution:
simple in-place conversion of individual hex digits to binary works, since the base (16) is a power of 2.

$$\boxed{(\text{B9C0})_{16} = (\underline{1011}\,\underline{1001}\,\underline{1100}\,\underline{0000})_2}$$

e) $(6537)_8$ to Binary

Solution:
proceed similar to the above:

$$\boxed{(6537)_8 = (\underline{110}\,\underline{101}\,\underline{011}\,\underline{111})_2}$$

f) $(445)_{10}$ to Octal

Solution:
proceed similar to problem **b**

8	445	5
8	55	7
8	6	6
	0	

Hence, $\boxed{(445)_{10} = (675)_8}$

g) $(11001)_2$ to Decimal

Solution:
proceed similar to problem **a**

$$D = 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^0$$
$$\boxed{D = 25}$$

h) $(4AD)_{16}$ to Decimal

Solution:
This is similar to converting from Binary to Decimal: take the face value of each digit (in base 10) and multiply that with the place value of that digit

$$D = 4 \times 16^2 + 10 \times 16^1 + 13 \times 16^0$$
$$\boxed{D = 1197}$$