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Coco Studio #7

Convert the number to the base indicated.

1. $123_{10} = \underline{\quad}_2$

$$123_{10} / 2 = 61 \quad r=1$$

$$61 / 2 = 30 \quad r=1$$

$$30 / 2 = 15 \quad r=0$$

$$15 / 2 = 7 \quad r=1$$

$$7 / 2 = 3 \quad r=1$$

$$3 / 2 = 1 \quad r=1$$

$$1 / 2 = 0 \quad r=1$$

$$123_{10} = 1111011_2$$

2. $9876_{10} = \underline{\quad}_{16}$

Convert to base 2

$$9876 / 2 = 4938 \quad r=0$$

$$14 / 2 = 9 \quad r=1$$

$$\begin{array}{r} 10011010010100 \\ \hline 2 \quad 6 \quad 9 \quad 4 \end{array}$$

$$4938 / 2 = 2469 \quad r=0$$

$$9 / 2 = 4 \quad r=1$$

$$2469 / 2 = 1234 \quad r=1$$

$$4 / 2 = 2 \quad r=0$$

$$1234 / 2 = 617 \quad r=0$$

$$2 / 2 = 1 \quad r=0$$

$$9876_{10} = 2694_{16}$$

$$617 / 2 = 308 \quad r=1$$

$$1 / 2 = 0 \quad r=1$$

$$308 / 2 = 154 \quad r=0$$

$$1 / 2 = 0 \quad r=1$$

$$154 / 2 = 77 \quad r=0$$

$$1 / 2 = 0 \quad r=1$$

$$77 / 2 = 38 \quad r=1$$

$$1 / 2 = 0 \quad r=0$$

$$38 / 2 = 19 \quad r=0$$

$$2694_{16}$$

$$3. 1011110_2 = \underline{\quad} _{10}$$

$$2^7 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1$$

$$128 + 32 + 16 + 8 + 4 + 2$$

$$128 + 32 + 30$$

$$128 + 62$$

$$190 \rightarrow 1011110_2 = 190_{10}$$

$$4. EF_{16} = \underline{\quad} _{10}$$

$$(14 \times 16^1) + (15 \times 16^0)$$

$$140 + 84$$

$$224 + 15$$

$$239 \rightarrow EF_{16} = 239_{10}$$

$$5. \begin{array}{r} \downarrow \downarrow \downarrow \downarrow \downarrow \downarrow \\ 1111111_2 \end{array} = \underline{\quad} _8$$

~~1111111~~

$$377_8 = 1111111_2$$

$$6. 7654_8 = \underline{\quad} _{10}$$

$$(7 \times 8^3) + (6 \times 8^2) + (5 \times 8^1) + (4 \times 8^0)$$

$$3584 + 384 + 40 + 4$$

$$3584 + 428$$

$$4012 \rightarrow 7654_8 = 4012_{10}$$

$$\begin{array}{r} 2 \\ 64 \quad \quad \quad 3 \\ \times 6 \quad \quad \quad \times 8 \\ \hline 384 \quad \quad \quad 512 \end{array}$$

$$384 \quad 512 \quad 3584$$

$$7. \quad 7654_9 = \underline{\quad}_{10}$$

$$(9^3 \times 7) + (9^2 \times 6) + (9^1 \times 5) + (9^0 \times 4)$$

$$5083 + 486 + 45 + 4$$

$$5083 + 535$$

$$5618 \rightarrow$$

$$7654_9 = \boxed{5618_{10}}$$

$$8. \quad 7654_9 = \underline{\quad}_3$$

$$\cancel{2} \cancel{2} \cancel{2} \cancel{1} \cancel{2} \cancel{0} \cancel{1}$$

$$\begin{array}{r} 011101110 \\ \hline 3 \quad 5 \quad 6 \quad 8 \end{array}$$

$$011101110$$

$$00-0$$

$$01-1$$

$$02-2$$

$$10-3$$

$$11-4$$

$$12-5$$

$$20-6$$

$$21-7$$

$$7654_9 = \boxed{21201211}_3$$

$$2126_{10} \rightarrow \underline{\quad}_3$$

$$2126/3 = 708 \ r=2$$

$$708/3 = 236 \ r=0$$

$$236/3 = 78 \ r=2$$

$$78/3 = 26 \ r=0$$

$$26/3 = 8 \ r=2$$

$$8/3 = 2 \ r=2$$

$$2/3 \neq 0 \ r=2$$

$$\boxed{2220202}_3$$

$$9. \quad 6125_7 = \underline{\quad}_3$$

$$(6 \cdot 7^3) + (1 \cdot 7^2) + (2 \cdot 7^1) + (5 \cdot 7^0) \times \underline{\quad}_{42}$$

$$= 2058 + 68$$

$$2058$$

$$\begin{array}{r} 2126 \\ + 68 \\ \hline 2126 \end{array}_{10}$$

$$\begin{array}{r} 49 \\ \times 42 \\ \hline 196 \\ 196 \\ \hline 2058 \end{array}$$

$$\boxed{2220202}_3$$

$$10. \frac{6+25}{(8 \times 1^3) + (4 \times 1^2) + (2 \times 1^1)} = 5$$

$$\begin{array}{r} 121 \\ \times 56 \\ \hline 726 \\ + 725 \\ \hline 7286 \end{array}$$

$$\begin{array}{r} 7986 \\ - 7986 \\ \hline 0 \\ + 137 \\ \hline 8123_{10} \end{array}$$

Please ignore
this. It will be
further in the file
and clearly labeled.

$$8123_{10} = \underline{\quad}_9$$

$$8123 \div 9 = 902 \quad r=5$$

$$902 \div 9 = 100 \quad r=2$$

$$100 \div 9 = \cancel{11} \quad \cancel{r=1}$$

$$11 \div 9 = \cancel{1} \quad r=2$$

$$1 \div 9 = 0 \quad r=8$$

$$11. 10110110110_2 = \underline{\quad}_{16}$$

$$\begin{array}{r} 5 B 6 \\ \hline 10110110110_2 \end{array} = \boxed{5B6_{16} = 10110110110_2}$$

$$12. 10110110110_4 = \underline{\quad}_{16} \rightarrow \boxed{114615_{16} = 10110110110_8}$$

$$\begin{array}{r} 114615 \\ \hline 10110110110_4 \end{array} = \boxed{\cancel{10110110110_4}}$$

$$13. 10110110110_8 = \underline{\quad}_{16}$$

$$\begin{array}{r} 00100000100000100010000010001000 \\ \hline 41209048_{16} = 10110110110_8 \end{array}$$

$$14. 10110110110_3 = \underline{\quad}_{16}$$

$$\begin{array}{r} 00001000000010000000000000000000 \\ \hline 4010802100420_{16} = 10110110110_8 \end{array}$$

Useful numbers

$$128_{10} = 10000000_2$$

$$256_{10} = 10000000_2$$

$$1024_{10} = 1000000000_2$$

~~$$1000000000000000 = 1048576$$~~

$$2^{11} = 2048$$

$$2^{12} = 4096$$

$$2^{13} = 5192$$

$$2^{14} = 10384$$

$$2^{15} = 20768$$

$$2^{16} = 40536$$

$$2^{17} = 81072$$

$$2^{18} = 162144$$

$$2^{19} = 324288$$

$$2^{20} = 648$$

$$512$$

$$\times 2$$

$$10384$$

$$20768$$

$$\times 2$$

$$40536$$

$$324288$$

$$\times 2$$

$$648576$$

$$1024$$

$$\times 1024$$

$$4096$$

$$2048$$

$$0000$$

$$\begin{array}{r} 0 \\ + 024 \\ \hline 1048576 \end{array}$$

Convert 16 bit sign magnitude

~~(at)~~
$$89_{10} =$$

$$89/2 = 44 \quad r=1$$

$$44/2 = 22 \quad r=0$$

$$22/2 = 11 \quad r=0$$

$$11/2 = 5 \quad r=1$$

$$5/2 = 2 \quad r=1$$

$$2/2 = 1 \quad r=0$$

$$1/2 = 0 \quad r=1$$

$$1011001$$

$$0000000001011001 = 89_{10}$$

(d) $A_1 \oplus B_1$

(B) $-89_{10} =$

$$89/2 = 44 \quad r=1$$

1011001

$$44/2 = 22 \quad r=0$$

$$22/2 = 11 \quad r=0$$

$$11/2 = 5 \quad r=1$$

$$5/2 = 2 \quad r=1$$

$$2/2 = 1 \quad r=0$$

$$1/2 = 0 \quad r=1$$

$$1000000001011001 = -89_{10}$$

(C) $32_{10} =$

0011 0010

$$10000000000110010_2 = 32_{10}$$

(D) $-32_{10} =$

0011 0010

$$1000000000110010_2 = -32_{10}$$

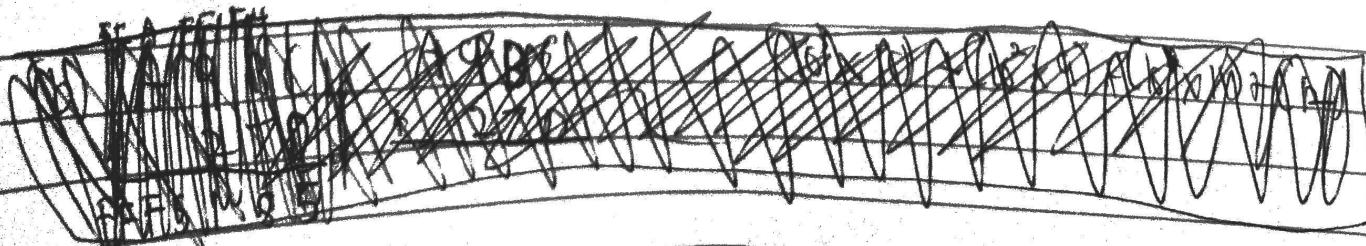
Add and check by converting to decimal

(a) $\begin{array}{r} 0010 0111 \\ + 0011 0101 \\ \hline 0101 1100 \end{array}$ Answer: 0101100

$$2^5 + 2^2 + 2^1 + 1 = 39$$

$$2^5 + 2^4 + 2^2 + 2^0 = +53$$

$$2^5 + 2^4 + 2^3 + 2^2 = 92$$



$$\begin{array}{r}
 (b) A \overset{1}{9} B C_{16} \\
 + 27 D_{16} \\
 \hline
 AC39
 \end{array}$$

$$\begin{array}{r}
 (10 \times 16^3) + (9 \times 16^2) + (11 \times 16) + 12 \\
 40960 + 2304 + 176 + 12 \\
 \hline
 43452
 \end{array}$$

$$\begin{array}{r}
 2304 \\
 + 176 \\
 \hline
 637
 \end{array}$$

$$\begin{array}{r}
 (2 \times 16^2) + (7 \times 16) + 13 \\
 512 + 112 + 13 \\
 \hline
 637
 \end{array}$$

Answer : AC39

$$\begin{array}{r}
 (c) \cancel{\begin{array}{r}
 \overset{P}{\cancel{1}} \overset{P}{\cancel{0}} \overset{P}{\cancel{1}} \overset{P}{\cancel{2}} \\
 \cancel{1} \cancel{0} \cancel{3} \cancel{8} \\
 - \cancel{F} \cancel{C} \cancel{E} \\
 \hline
 \overset{P}{\cancel{0}} \overset{P}{\cancel{4}} \overset{P}{\cancel{1}}
 \end{array}} \quad \cancel{\begin{array}{r}
 \overset{P}{\cancel{1}} \overset{P}{\cancel{0}} \overset{P}{\cancel{1}} \overset{P}{\cancel{2}} \\
 \cancel{1} \cancel{0} \cancel{3} \cancel{8} \\
 - \cancel{F} \cancel{C} \cancel{E} \\
 \hline
 \overset{P}{\cancel{0}} \overset{P}{\cancel{6}} \overset{P}{\cancel{A}}
 \end{array}} \\
 - FCE \\
 \hline
 006A
 \end{array}$$

$$\begin{array}{r}
 16^3 + (3 \times 16^2) + 8 = 4152 \\
 - 4046 \\
 \hline
 0106
 \end{array}$$

Answer: 6A

RE-DONE #10 PLEASE USE THIS ONE

$$\begin{array}{r}
 625_{11} = \underline{q} \\
 (6 \times 11^3) + (1 \times 11^2) + (2 \times 11) + (5) \quad |21 \\
 7986 + 148 \\
 \hline
 8134_{10}
 \end{array}$$

$$\begin{array}{r}
 8134_{10} = \underline{q} \\
 8134_{10} / q = 903 \quad r=7 \\
 903 / q = 100 \quad r=3
 \end{array}$$

$$\begin{array}{r}
 100 / q = 11 \quad r=1 \\
 11 / q = 1 \quad r=2 \\
 1 / q = 0 \quad r=1
 \end{array}$$

$$625_{11} = 12137_9$$