* Other number systems :-

Convert into Decimal.

{Decimal, Binary, octal, Hex}

$(135.42)_6 = (\quad)_{10}$ $(59.722222..)_{10}$

$r = 6$

$4 \times 6^{-1} + 2 \times 6^{-2} = \frac{4}{6} + \frac{2}{36} = \_\_\_\_$

(1) $(539.6A)_{12} = (\quad)_{10}$

(2) $(3425.61)_7 = (1244.66666\ldots)_{10}$ $\because 3\times7^3 + 4\times7^2 + 2\times7^1 + 5\times7^0 + 6\times7^{-1} + 1\times7^{-2} = (1244.87755102)_{10}$

(3) $(232.313)_4 = (46.859375)_{10}$

$(5\times12^2) + 3\times12^1 + 9\times12^0 + 6\times12^{-1} + A\times12^{-2}$

$= 720 + 36 + 9 + 0.5 + \frac{10}{144} = 0.0694444$

$= (765.5694444)_{10}$

Any number system $\rightleftarrows$ Decimal

* Convert a decimal number into any other number system :-

$(abc.def)_{10} \Rightarrow (\quad)_r$

- abc: Division process by r → Note remainders
- def: Multiplication process by r → Note integer part as answer

(1) $(48)_{10} = (\quad)_2$ (2)

2	48	
2	24	0
2	12	0
2	6	0
2	3	0
2	1	1
	0	1

$(110000)_2 = (48)$ ($2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$)

$1\times2^5 + 1\times2^4 =$

$32 + 16 = (48)_{10}$

2	1	1
	0	1

(2)

2	129	
2	64	1
2	32	0
2	16	0
2	8	0
2	4	0
2	2	0
2	1	0
		1

$(129.35)_{10} \Rightarrow ($ ②

division Multiplication

$2^7\ 2^6\ 2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$

$(1\ 0\ 0\ 0\ 0\ 0\ 0\ 1)_2$

$1 \times 2^7 + 1 \times 2^0 =$

$128 + 1 = (129)_{10}$

$0.35 \times 2 = 0.70$ → 0

$0.70 \times 2 = 1.40$ → 1

$0.40 \times 2 = 0.80$ → 0

$0.80 \times 2 = 1.60$ → 1

$0.60 \times 2 = 1.20$ → 1

$= 0.40$ → 0

0 2 0 2 2

$(0.35)_{10} = (0.010110)_2$

$(48.35)_{10} \downarrow$

$(110000.010110)_2$

(1) $(135.67)_{10} = (10000111.101010)_2$

(2) $(251.15)_{10} = (11111011.001001\ldots)_2$

(3) $(256.99)_{10} = (100000000.111111\ldots)_3$

$256. \quad 1\times2^{-1} + 1\times2^{-2} + 1\times2^{-3} + 1\times2^{-4} + 1\times2^{-5} + 1\times2^{-6}$

$= \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64}$

$= 0.5 + 0.25 + 0.125 + 0.0625 + 0.03125 + 0.015625$

$= (0.984375)_{10} \neq (0.99)_{10}$

(111111) ↑ Compromised the accuracy.

⇒ Decimal to octal & Hexadecimal Number system :-

(1) $(257.99)_{10} = (400.772702)_8 = (100.FD70A3)_{16}$

(2) $(1035.250)_{10} = (2013.2000)_8 = (408.4)_{16}$

(3) $(3092.8125)_{10} = (6024.6400)_8 = (C14.D)_{16}$

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(4) $(257.99)_{10} = (213.A98765)_{11} = (514.663366)_7$

(5) $(1035.258)_{10} = (1370.226554)_9 = (1102100.020220)_3$

$0.256 \times 3 = 0.768 \quad 0$

$0.768 \times 3 = 2.304 \quad 2$

$0.304 \times 3 = 0.912 \quad 0$

$0.912 \times 3 = 2.736 \quad 2$

$0.736 \times 3 = 2.208 \quad 2$

$0.208 \times 3 = 0.624 \quad 0$