Bin $\rightarrow$ Dec

Sum of Weights

$\boxed{7}$ (g) $1011010.1010_2 \longrightarrow ?_{10}$

$= 2^6 + 2^4 + 2^3 + 2^1 + 2^{-1} + 2^{-3}$

$= 64 + 16 + 8 + 2 + 0.5 + 0.125 = 90.625_{10}$

$\boxed{8}$ (h) Highest possible decimal number that can be represented by n bits $\longrightarrow 2^n - 1$

$n = 9 \longrightarrow$ highest possible decimal number $= 2^9 - 1 = 511$

$\boxed{9}$ (g) # of bits needed to represent $132_{10} = ?$

With n-bits, we can represent decimal numbers in the range $0 : 2^n - 1$

So the question becomes: What is the value of n that guarantees that 132_{10} belongs to the range $0 : 2^n - 1$

$\Rightarrow 132_{10} \leq 2^n - 1$

$\Rightarrow 133 \leq 2^n$

$\Rightarrow \log_2 133 \leq n$

minimum value

$\Rightarrow \dfrac{\log 133}{\log 2} \leq n \Rightarrow n \geq 7.055 \Rightarrow n = 8$

$\boxed{10}$ (e) Generate the binary sequence for $64_{10} \rightarrow 75_{10}$

$$64_{10} = 1000\,000_2$$
$$65_{10} = 1000\,001$$
$$= 1000\,010$$
$$= 1000\,011$$
$$= 1000\,100$$
$$= 1000\,101$$
$$= 1000\,110$$
$$= 1000\,111$$
$$= 1001\,000$$
$$= 1001\,001$$
$$= 1001\,010$$
$$75_{10} = 1001\,011_2$$

$\boxed{11}$ (g) $125_{10} = ?_2$ using sum-of-weights

$$= 64 + 32 + 16 + 8 + 4 + 1$$
$$= 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 0 + 2^0$$
$$= 1\;1\;1\;1\;1\;0\;1_2$$

$\boxed{12}$ (b) $0.246_{10} = ?_2$ using sum-of-weights

$$= 0 + 0 + 0.125 + 0.0625 + 0.03125 + 0.015625 + \ldots$$
$$2^{-3} \quad 2^{-4} \quad 2^{-5} \quad 2^{-6}$$
$$= 0.\,0\;0\;1\;1\;1\;1\;\ldots$$

$\boxed{13}$ (f) $59_{10} = ?_2$ using repeated division by 2

$59 \div 2 = 29 \quad 1$

$29 \div 2 = 14 \quad 1$

$14 \div 2 = 7 \quad 0$

$7 \div 2 = 3 \quad 1$

$3 \div 2 = 1 \quad 1$

$1 \div 2 = 0 \quad 1$

111011_2

$\boxed{14}$ (b) $0.347 = ?_2$ using repeated multip. by 2

$0.347 * 2 = \underline{0}.694$

$0.694 * 2 = \underline{1}.388$

$0.388 * 2 = \underline{0}.776$

$0.776 * 2 = \underline{1}.552$

$0.552 * 2 = \underline{1}.104$

$0.104 * 2 = \underline{0}.208$

$0.208 * 2 = \underline{0}.416$

$0.416 * 2 = \underline{0}.832$

$0.832 * 2 = \underline{1}.664$

$\vdots$

$0.010110001\ldots_2$

$\boxed{15}$ (e)

$$
\begin{array}{r}
\scriptstyle 1 \\
1001 \\
+\,0101 \\
\hline
1110
\end{array}
$$

$\boxed{16}$ (f)

$$
\begin{array}{r}
\scriptstyle 1\,1\,1 \\
11010 \\
-\,10111 \\
\hline
00011
\end{array}
$$

$\boxed{17}$ (d)

$$
\begin{array}{r}
1001 \\
\times\ \ 110 \\
\hline
0000 \\
1001 \\
1001 \\
\hline
110110
\end{array}
$$

$\boxed{18}$ (b)

$$
\begin{array}{r|l}
 & 0011 \\
\hline
11 & 1001 \\
 & 11 \\
\cline{2-2}
 & 11 \\
 & 11 \\
\cline{2-2}
 & 00
\end{array}
$$

$\boxed{37}$ (d) $5C8_{16} = 0101\ 1100\ 1000_2$

$\boxed{40}$ (f) $2890_{10} = ?_{16}$

Repeated Division by 16

$2890 \div 16 = 180$ $\boxed{10}$

$180 \div 16 = 11$ $\boxed{4}$

$11 \div 16 = 0$ $\boxed{11}$

$B\ 4\ A_{16}$

$\boxed{42}$ (b)

$$\begin{array}{r} \overset{1}{C}\ 8 \quad {}^{18_{16} = 24_{10}} \\ -\ 3\ A \quad {}^{= 10_{10}} \\ \hline 8\ E \quad {}^{14_{10}} \end{array}$$

$\boxed{43}$ (g) $163_8 = ?_{10}$

$= 1 * 8^2 + 6 * 8^1 + 3 * 8^0 = 115_{10}$

$\boxed{46}$ (h) $\underbrace{010}\underbrace{110}\underbrace{000}\underbrace{011}_2 = ?_8$

$2\ \ 6\ \ 0\ \ 3_8$