

(6a)

$$\text{Base } 10 = 51.1875 \quad \text{Base } 2 = 110011.0011$$

$$\text{Base } 8 = 63.14 \quad \text{Base } 16 = 33.3$$

51.1875_{10}	$51/2$	$25 \text{ r } 1$
	$25/2$	$12 \text{ r } 1$
	$12/2$	$6 \text{ r } 0$
	$6/2$	$3 \text{ r } 0$
	$3/2$	$1 \text{ r } 1$
	$1/2$	$0 \text{ r } 1$

$$\begin{array}{r|l} 0.1875 \times 2 & 0.3750 \\ 0.3750 \times 2 & 0.750 \\ 0.750 \times 2 & 1.50 \\ 0.50 \times 2 & 1.0 \end{array} \quad \begin{array}{c} 0 \\ 0 \\ 1 \\ 1 \end{array}$$

$$51.1875_{10} = 110011.0011_2 = 0.1100110011 \times 2^6$$

$51/8$	$6 \text{ r } 3$
$6/8$	$0 \text{ r } 6$

$$\begin{array}{r|l} 0.1875 \times 8 & 1.5000 \\ 0.5 \times 8 & 4.0 \end{array} \quad \begin{array}{c} 1 \\ 4 \end{array}$$

$$51.1875_{10} = 63.14$$

$51/16$	$3 \text{ r } 3$
$3/16$	$0 \text{ r } 3$

$$0.1875 \times 16 \quad \begin{array}{c} 3.0 \\ | \\ 3 \end{array}$$

$$51.1875_{10} = 33.3_{16}$$

$$01100110 \quad | 01100000 \quad | 00000000 \quad | 00000100$$

6 6 6 0 0 0 0 6

(a)

$$\text{Base } 10 = 3.19921875 \quad \text{Base } 2 = 11.00110011$$
$$\text{Base } 8 = 3.146 \quad \text{Base } 16 = 3.33$$

$$3.19921875_{10}$$

$$\begin{array}{r} 3/2 \\ \hline 1 \end{array} \quad \begin{array}{r} 1 \end{array} \quad \begin{array}{r} 1 \\ 1 \end{array}$$

$$\begin{array}{r} 0.19921875 \times 2 \\ \hline 0.39843750 \end{array} \quad \begin{array}{r} 39843750 \\ 0.7968750 \end{array} \quad \begin{array}{r} 0 \\ 0 \end{array}$$
$$\begin{array}{r} 0.796875 \times 2 \\ \hline 1.59375 \end{array} \quad \begin{array}{r} 1.59375 \\ 1.1675 \end{array} \quad \begin{array}{r} 1 \\ 1 \end{array}$$
$$\begin{array}{r} 0.59375 \times 2 \\ \hline 0.1875 \end{array} \quad \begin{array}{r} 0.1875 \\ 0.375 \end{array} \quad \begin{array}{r} 0 \\ 0 \end{array}$$
$$\begin{array}{r} 0.375 \times 2 \\ \hline 0.75 \end{array} \quad \begin{array}{r} 0.75 \\ 0.75 \end{array} \quad \begin{array}{r} 0 \\ 0 \end{array}$$
$$\begin{array}{r} 0.75 \times 2 \\ \hline 0.5 \end{array} \quad \begin{array}{r} 0.5 \\ 1.5 \end{array} \quad \begin{array}{r} 1 \\ 1 \end{array}$$
$$\begin{array}{r} 0.5 \times 2 \\ \hline 1.0 \end{array} \quad \begin{array}{r} 1.0 \\ 1 \end{array} \quad \begin{array}{r} 1 \\ 1 \end{array}$$

$$3.19921875_{10} = 11.00110011_2 = 0.1100110011 \times 2^2$$

$$3/8 \quad 1 \quad 0 \quad r \quad 3$$

$$\begin{array}{r} 0.19921875 \times 8 \\ \hline 1.59375 \end{array} \quad \begin{array}{r} 1.59375 \\ 4 \end{array} \quad \begin{array}{r} 1 \\ 4 \end{array}$$
$$\begin{array}{r} 0.59375 \times 8 \\ \hline 4.75 \end{array} \quad \begin{array}{r} 4.75 \\ 6 \end{array} \quad \begin{array}{r} 4 \\ 6 \end{array}$$
$$\begin{array}{r} 0.75 \times 8 \\ \hline 6.0 \end{array} \quad \begin{array}{r} 6.0 \\ 6 \end{array} \quad \begin{array}{r} 6 \\ 6 \end{array}$$

$$3.19921875_{10} = 3.146_8$$

$$3/16 \quad 1 \quad 0 \quad r \quad 3$$

$$\begin{array}{r} 0.19921875 \times 16 \\ \hline 3.1875 \end{array} \quad \begin{array}{r} 3.1875 \\ 3 \end{array} \quad \begin{array}{r} 3 \\ 3 \end{array}$$
$$\begin{array}{r} 0.1875 \times 16 \\ \hline 3.0 \end{array} \quad \begin{array}{r} 3.0 \\ 3 \end{array} \quad \begin{array}{r} 3 \\ 3 \end{array}$$

$$3.19921875_{10} = 3.33_{16}$$

$$01100110 \quad 101100000 \quad 100000000 \quad 100000010$$

$$6 \quad 6 \quad 6 \quad 0 \quad 0 \quad 0 \quad 0 \quad \cancel{0} \quad 2$$

6a)

$$\text{Base } 10 = 0.2 \quad \text{Base } 2 = 0.00110011\dots$$
$$\text{Base } 8 = 0.1463\dots \quad \text{Base } 16 = 0.333\dots$$

0.2_{10}

0.2×2	0.4	0
0.4×2	0.8	0
0.8×2	1.6	1
0.6×2	1.2	1
0.2×2	0.4	0
0.4×2	0.8	0
0.8×2	1.6	1
0.6×2	1.2	1

$$0.2_{10} = 0.\underline{00110011}_2 = 0.\underline{110011} \times 2^{-2} = 00000010 \\ \underline{1111101+1}$$

0.2×8	1.6	1
0.6×8	4.8	4
0.8×8	6.4	6
0.4×8	3.2	3
0.2×8	1.6	1

$$0.2_{10} = 0.\underline{1463}_8$$

0.2×16	3.2	3
0.2×16	3.2	3

$$0.2_{10} = 0.\underline{333}_{16}$$

011001101011001101011001101111110

6 6 6 6 6 0 F E

6(b)

$$\begin{array}{ll} \text{Base 10} = -51.1875 & \text{Base 2} = -110011.0011 \\ \text{Base 8} = -63.14 & \text{Base 16} = -33.3 \end{array}$$

$$-1100110011 = -0.110010011 \times 2^6$$

11100110 | 0110 0000 | 0000 0000 | 000000110
E 6 6 0 0 0 0 \$0 6

$$\begin{array}{ll} \text{Base 10} = -3.19921875 & \text{Base 2} = -11.00110011 \\ \text{Base 8} = -3.146 & \text{Base 16} = -3.33 \end{array}$$

$$-11.00110011 = -0.1100110011 \times 2^2$$

11100110101100000100000000100000010
E 6 6 0 0 0 0 2

Base 10 = -0.2 Base 2 = -0.00110011...
Base 8 = ~~-0.1463~~... Base 16 = ~~-0.333~~...

$$-0.00110011 = 0.110011 \dots \times 2^{-2} = 00000010 \\ \text{11111101+}$$

11100110|01100110|01100110|11111110
E 6 6 6 6 6 F E

60

69999902
0110100110011001110011001100000010

$$0.\underline{1101001\ldots} \times 2^2 = 11.\underline{01001\ldots}$$

$$1 \times 2^1 + 1 \times 2^0 + 1 \times 2^{-2} + 1 \times 2^{-5} = \cancel{1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1} \\ = 3.78125$$

$$\text{Base 2} = 11.\underline{0001} \dots \quad \text{Base 10} = 3.28125$$

6 a a a a a a 63

6 a a a a a G3
0101001100110011001100000011

$$0.\underline{1101001} \times \vec{2} = 110.\underline{1001} \dots$$

$$1 \times 2^2 + 1 \times 2^1 + 1 \times 2^{-1} + 1 \times 2^{-4} = 6.59765625$$

Base 2 = 110.1001... Base 10 = 6.59765625

9 6 6 6 6 7 F F

$$0.0010110011001100110011 \times 2 = 0.0000011110 = 0.350001431474693$$

Base 2: 0.01011001100110011

Base 10 = 0.350000143114746694