
EXERCISE 1.4

1. Convert the following decimal numbers to binary numbers:

(i) 25

(ii) 53

(iii) 108

(iv) 129

(v) 75.125

(vi) 213.75

(vii) 39.625

(viii) 217.8125

2. Perform the following binary additions:

$$\begin{array}{r} \text{(i)} \quad 10001 \\ + 11101 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(ii)} \quad 101101 \\ + 11001 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(iii)} \quad 1110 \\ + 1111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(iv)} \quad 11011 \\ + 1001010 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(v)} \quad 10111 \\ + 110101 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(vi)} \quad 1111101 \\ + 10101010 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(vii)} \quad 011 \\ 111 \\ + 1011 \\ \hline \end{array}$$

$$\begin{array}{r} \text{(viii)} \quad 11111111 \\ + 11111111 \\ \hline \end{array}$$

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3. Perform the following binary subtractions.

$$(i) \begin{array}{r} 1011011 \\ - 10010 \\ \hline \end{array}$$

$$(ii) \begin{array}{r} 1010110 \\ - 101010 \\ \hline \end{array}$$

$$(iii) \begin{array}{r} 1000101 \\ - 101100 \\ \hline \end{array}$$

$$(iv) \begin{array}{r} 101101 \\ - 100111 \\ \hline \end{array}$$

$$(v) \begin{array}{r} 1110110 \\ - 1010111 \\ \hline \end{array}$$

$$(vi) \begin{array}{r} 100010110 \\ - 1111010 \\ \hline \end{array}$$

$$(vii) \begin{array}{r} 10100111001 \\ - 11101011 \\ \hline \end{array}$$

4. Perform the following binary multiplications.

$$(i) \begin{array}{r} 1010 \\ \times 101 \\ \hline \end{array}$$

$$(ii) \begin{array}{r} 1011 \\ \times 11 \\ \hline \end{array}$$

$$(iii) \begin{array}{r} 1110 \\ \times 101 \\ \hline \end{array}$$

$$(iv) \begin{array}{r} 11011 \\ \times 111 \\ \hline \end{array}$$

$$(v) \begin{array}{r} 11011 \\ \times 1001 \\ \hline \end{array}$$

$$(vi) \begin{array}{r} 1101011 \\ \times 101101 \\ \hline \end{array}$$

5. Perform the following binary divisions.

$$(i) 1111100 \div 10 \quad (ii) 101101 \div 101 \quad (iii) 11011 \div 101 \quad (iv) 101100 \div 1011$$

$$(v) 1000110 \div 101$$

6. Solve the following equations, where all numbers, including x , are binary numbers:

$$(i) \frac{x}{11} = 110$$

$$(ii) \frac{x}{101} = 101$$

$$(iii) \frac{x}{111} = 1011$$

7. Find the value of $(1101)^2 - (101)^2$.

8. Multiply the following binary numbers and verify the product by converting the two sides to decimal system:

$$(i) 1001 \text{ and } 101 \quad (ii) 11010 \text{ and } 111 \quad (iii) 101011 \text{ and } 1101$$

9. Divide the following binary numbers and verify the result by converting the two sides to decimal system :

$$(i) 101111 \text{ by } 111 \quad (ii) 1110101 \text{ by } 1001 \quad (iii) 10000001 \text{ by } 1111$$

Also, find the quotient and remainder in each case.