

Base Two addition

There are few basic base two addition facts you need to know.

The familiar:

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

Zero + Zero = Zero

$$\begin{array}{r} 0 \\ +1 \\ \hline 1 \end{array}$$

Zero + one = one.

The strange and unfamiliar:

$$\begin{array}{r} 1 \\ +1 \\ \hline 10 \end{array}$$

One + One = Ten?

Think, One + One

=Zero carry one.

$$\begin{array}{r} 1 \\ 1 \\ +1 \\ \hline 11 \end{array}$$

Think,

One + One + One

= One, carry One.

$$\begin{array}{r} 1 \\ 1 \\ 1 \\ +1 \\ \hline 100 \end{array}$$

Think,

One + One + One +
One = Zero, carry
Zero, carry One.

It is weird but it will work.

Let's add 101101 and 110111.

- Beginning in the "ones" column
One plus one is zero, carry one.
- Continuing in the "twos" column
One plus one is zero, carry one.
- Continuing in the "fours" column
One plus one plus one is one, carry one.
- Continuing in the "eights" column
One plus one is zero, carry one.
- Continuing in the "sixteens" column
One plus one is zero, carry one.
- Continuing in the "thirty twos" column
One plus one plus one is one carry, one.
- Finally ending in the "sixty fours" column
Bring down the one we carried.

$$\begin{array}{r} 111111 \\ 101101 \\ +110111 \\ \hline 1100100 \end{array}$$

Practice Problems

$$\begin{array}{r} \text{a) } 111111 \\ +101111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b) } 111110 \\ +110111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c) } 111101 \\ +111011 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d) } 111011 \\ +111101 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e) } 110111 \\ +110111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f) } 101010 \\ +110111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g) } 100101 \\ +110111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h) } 111101 \\ +110101 \\ \hline \end{array}$$

$$\begin{array}{r} \text{i) } 110011 \\ +110011 \\ \hline \end{array}$$

$$\begin{array}{r} \text{j) } 111111 \\ +111111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k) } 100101 \\ +100111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{l) } 101101 \\ +100111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{m) } 101101 \\ +110101 \\ \hline \end{array}$$

$$\begin{array}{r} \text{n) } 101111 \\ +110111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{o) } 101101 \\ +110011 \\ \hline \end{array}$$

$$\begin{array}{r} \text{p) } 110011 \\ 101101 \\ +110111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{q) } 101111 \\ 111101 \\ +110111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{r) } 110110 \\ 111101 \\ +110111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{s) } 111101 \\ 101110 \\ +110111 \\ \hline \end{array}$$

$$\begin{array}{r} \text{bonus) } 111111 \\ 111111 \\ +111111 \\ \hline \end{array}$$

Answers

a) 1101110

b) 1110101

c) 1111000

d) 1111000

e) 1101110

f) 1100001

g) 1011100

h) 1110010

i) 1100110

j) 1111110

k) 1001100

l) 1010100

m) 1100010

n) 1100110

o) 1100000

p) 10010100

q) 10100011

r) 10101010

s) 10100010

bonus) 10111101