

Half Adder and Full Adder: Truth Table to Breadboard

Mokxi · one-page lesson plan

OBJECTIVE

Build a half adder from a 74HC86 and a 74HC08, then a full adder and a 2-bit ripple adder. Flip the switches and read the sum and carry off the LEDs.

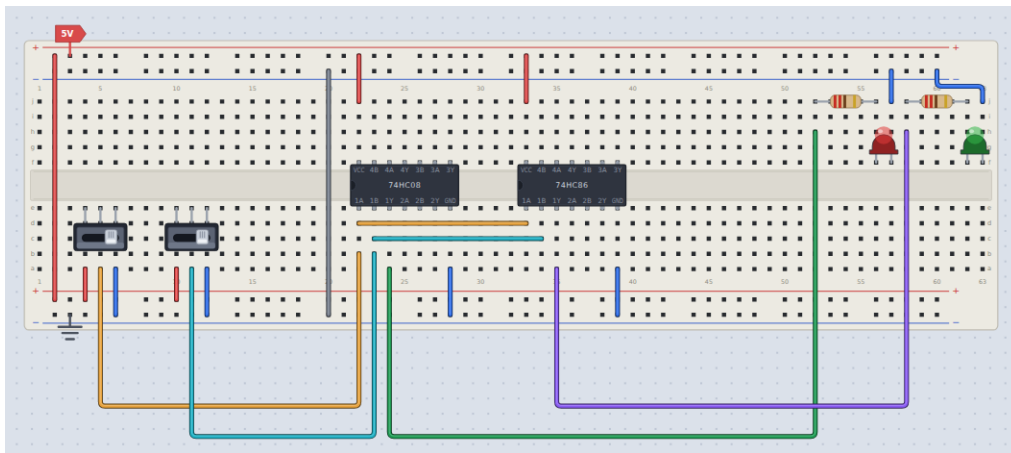
WHAT YOU NEED

Full-size breadboard, Power supply, Ground, Slide switch (2), 74HC08 quad AND, 74HC86 quad XOR, Resistor (2), LED (2)

STEPS

- The half adder — A B, carry sum: 0 0 gives 0 0.
- The full adder — A full adder takes three inputs, A, B and a carry-in, and produces a sum and a carry-out.
- Chaining them: a 2-bit ripple-carry adder — To add two-bit numbers, use a half adder for bit 0 and a full adder for bit 1, and wire bit 0's carry-out int...
- Why the carry is the slow part — Each gate takes a few nanoseconds to respond.

THE CIRCUIT



ASSESSMENT IDEA

Have the student complete the full adder truth table, predict the LEDs for 10 + 11 on the 2-bit ripple adder, then set the switches and check the prediction.

<https://mokxi.com/learn/half-adder-full-adder>