* From Digital Design 5th edition (textbook)

A magnitude comparator is a digital combinational circuit that determines weather one number is greater than, less than or equal to another number. The outcome of the operation is specified by three binary variables that indicate weather or not the first number say "A” is greater than , less than or equal to another quantity “B”. The circuit for comparing two n-bit numbers has 2^(2n) entries in a truth table . Because at a value as low as n=3 the truth table representing all possible comparator outcomes becomes cumbersome to compute an algorythem is implemented in it’s place. If the number of bits of both inputs is the same, and the value of each bit is the same the two quantities A and B are equal. To determine weather A is greater than or less than B ,we inspect the relative magnitudes of pairs of significant digits , starting from the most significant digit.. As long as corresponding significant digits are equal, we examine the next less significant digit until either A or B posses a greater value at a respective digit. The gate implementation of the three output variables is simpler than it seams because it involves a certain amount of repetition. The unequal outputs can use the same gate that are needed to generate the equal output.

From class notes/lecture:

The specific comparator we were tasked with building in class was a 2 bit comparator constructed on a bread bord using “And” “Or” and “Not” gates in the configuration shown in the data section of this report. The 4 inputs (A0,A1,B0,B1) represent 2 quantites (the first two number places of the binary number system) . Because A1 and B1 represent the more significant bit their comparison takes priority and further comparison depends on the result. The binary numbers that we are representing with this circuit are physically 2 different voltage values that denote either a high or low state for each digit. The 3 possible outcomes are self explanatory but it is important to keep in mind that what is actually being compared is the magnitude of each 2 digit number, not the individual bits.