Converting decimal numbers to signed binary

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Converting from a signed decimal number to a signed binary number

Remember the recipe for doing this conversion. It is:

1. Convert the absolute value of the number to binary.
2. If the original number was negative, then flip (invert) all the bits.
3. Add one to the binary number.
   That's it!

Examples:

- Convert -57 decimal to a signed binary number.
  1. Convert the decimal number to a 7 bit binary number.
     But first you have to check to see if 57 will fit in 7 bits. Will it? What is the largest number you can represent in 7 bits? It is $2^7 - 1$ which is 127.
     Now do the conversion to *7 bit* binary number, but add a zero to the *8th bit* for the sign bit. 57 decimal = 00111001
  2. Flip (invert) all the bits: 11000110
  3. Add one: $\underline{\qquad\quad +1}$
     11000111
     Notice that the sign bit is a one, which shows that the number is negative.

- Convert -126 decimal to a signed binary number
  1. Convert the decimal number 126 to a 7 bit binary number. It does fit in 7 bits and with a 0 in the 8th bit it is: 01111110
  2. Flip the bits: 10000001
  3. Add one: 10000010 that's it!

- Convert -33 decimal to signed binary.
  1. Convert the absolute value to a binary number: 00100001
  2. Flip the bits: 11011110
  3. Add one: 11011111 that's it.

- Convert -32 decimal to signed binary.
  1. Convert the abs value to binary: 00100000
  2. Flip the bits: 11011111
  3. Add one: 11100000 that's it.

- Convert 10 decimal to a signed binary.
  1. Convert the abs value to binary: 00001010 that's it!
     This is a positive number so we don't flip the bits or add one.