Binary Fractions

Example #1: Use binary expansion to convert binary fractions into decimals.

$\mathbf{101.1101_2} = (1x2^2) + (0x2^1) + (1x2^0) + (1x2^{-1}) + (1x2^{-2}) + (0x2^{-3}) + (1x2^{-4})$

$= 4 + 0 + 1 + 0.5 + 0.25 + 0 + 0.0625 = \mathbf{5.8125_{10}}$

In a binary fraction, the point here is referred to as a "binary point"

Now you try some:

Find the decimal equivalent for each binary fraction.

a. 1101.0111

b. 111.111

c. 101.01011

Example #2: Convert 13.6875_{10} to a binary fraction.

PART A:

Convert 13 to binary in the ordinary way.

2	13	R=1
2	6	R=0
2	3	R=1
2	1	R=1 ↑read↑
	0	

Therefore, $13_{10} = 1101_2$

PART B:

Convert the decimal part in the following manner:

Read Down **INTEGER PART**

.6875 x 2 = **1**.375	1
.375 x 2 = **0**.75	0
.75 x 2 = **1**.50	1
.5 x 2 = **1**.00	1

Therefore, $.6875_{10} = .1011_2$

Hence,
$13.6875_{10} = 1101.1011_2$

Now you try some:

Find the binary equivalent for each decimal fraction.

a. 32.45 b. 28.555 c. 7.0202