1 a) **5.75 = 0101.11**

+, S = 0101

	0.75	0.11
×2 →	1.5	1
×2 decimal portion →	1	1

convert whole # to binary → S = 101

convert decimal to binary → 0.75 = 0.11

combine both parts → 5.75 = 101.11

b) $\frac{63}{64}$ = 100 0000.1111 11

$2^6 = 64 = 0100\ 0000$

63 = 0011 1111

combine both parts with

64 = whole #, 63 = fraction

→ 100 0000.1111 11

	0.984375	0.111111
×2 →	1.96875	1
×2 decimal portion →	1.9375	1
	1.875	1
	1.75	1
	1.5	1
	1	1

c) **9.8125 = 1001.1101**

9 = 1001

0.8125	0.1101
1.625	1
1.25	1
0.5	0
1	1

same steps as 1a)

9 = 1001

0.8125 = 0.1101

2 34.890625

sign = positive = 0

34 = 1000 10

0.890625 = 0.1111 001

combine whole # and fraction

→ 1000 10.1111 001

0.890625	0.111001
1.78125	1
1.5625	1
1.125	1
0.25	0
0.5	0
1	1

move decimal point till only single leading 1

→ 1.0001 0111 1001 × 2^5

get exponent by adding 127 to the exponent of 2

converting to binary → 5 + 127 = 132

132 = 1000 0100

mantissa = binary fraction portion

combine all parts

→ 0 1000 0100 0001 0111 1001 0-0

↑ rest all zero's

3 sign = 0 = positive

convert exponent to decimal, then subtract 127

→ 0111 1011 = 123, 123 - 127 = -4

convert mantissa to decimal → 0...0 = 0.0

add leading 1 to mantissa → 1.0

multiply mantisa by $2^{exponent}$

→ $1 \times 2^{-4} = \boxed{0.0625}$

4 denormalized # is when the exponent is all 0's but the mantissa isn't. You assume the smallest exponent but without the leading 1.

15 - 0 = -15 but assume exponent = -14

smallest normalized #:

* 00000 0000 0000 01 = 2^{-14}

= 0.00006103515

largest denormalized #:

* 00000 1111 1111 11 = $(1-2^{-10}) \times 2^{-14}$

= 0.0000604755 5

$2^{-14} - (1-2^{-10}) \times 2^{-14}$

= 0.000000005 96