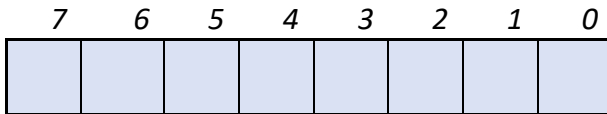
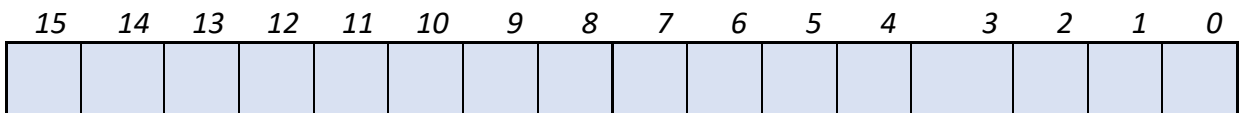


Memory/Storage Units

Byte = 8 bits (universal)

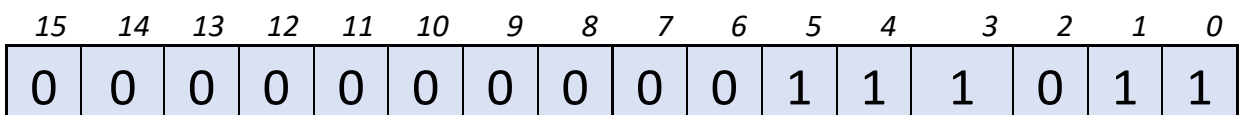
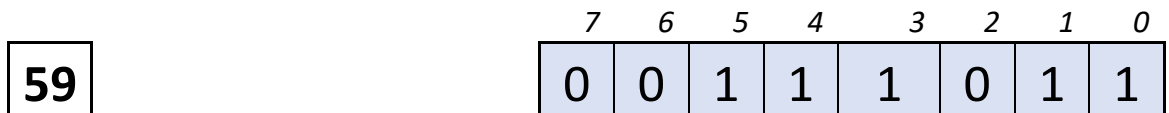


Word = 16 bits in the LC-3 (machine dependent)



Doubleword, Quadword, Octaword

Unsigned Integer Representation



Unsigned Byte: **x3B**

Unsigned Word: **x003B**

Signed Integer Representations

- a: Sign-Magnitude *Not Used*
- b: One's-Complement *Seldom Used*
- c: Two's Complement *Most Used (default)*

High bit always the **sign-bit** **0**: positive, **1**: negative

Viability

Test 1: $-(-x) = x$ Test 2: $x + (-x) = 0$

Sign-Magnitude Representation

Storage Unit of **n** bits: **1 sign bit, n-1 magnitude bits**

	7	6	5	4	3	2	1	0	
+59	0	0	1	1	1	0	1	1	x3B
-59	1	0	1	1	1	0	1	1	xBB

Viability? Test 1: \checkmark Test 2: \times

One's Complement Representation

Positive integers: "pure" binary

Negative integers: all bits complemented

	7	6	5	4	3	2	1	0	
+59	0	0	1	1	1	0	1	1	x3B
-59	1	1	0	0	0	1	0	0	xC4

Interpreting a 1's complement integer

1: Interpret the sign-bit, + or -

2: If -, complement all bits

3: Interpret the bits to get the magnitude

	Test	Test
<u>Viability?</u>	1: ✓	2: ✓
<u>Drawback:</u>	Two representations of 0	

Two's Complement Representation

Positive integers: "pure" binary

Negative integers: all bits complemented, then add 1

	7	6	5	4	3	2	1	0	
+59	0	0	1	1	1	0	1	1	x3B
-59	1	1	0	0	0	1	0	1	xC5

Interpreting a 2's complement integer

1: Interpret the sign-bit, + or -

2: If -, complement all bits then add 1

3: Interpret the bits to get the magnitude

<u>Viability?</u>	Test		Test
	1:	√	2: √