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LOGIC GATES - WHAT ARE THEY MADE OF?



OVERVIEW & INTRODUCTION

• This Lesson is an introduction to Logic Gate and how they are built on the Silicon. It is a quick review of what a Transistor is and how they are connected in some Silicon examples to create a Digital Logic Gate





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RESOURCES & MATERIALS NEEDED

- These Lecture Slides
- Interactive Lab books to take notes



POSSIBLE NEW WORDS...

- Integrated
- Silicon
- Semiconductor



LOGIC GATE REVIEW



2-Input AND			
A	В	F=A•B	
0	0	0	
0	1	0	
1	0	0	
1	1	1	

2-Input OR		
A	В	F=A+B
0	0	0
0	1	1
1	0	1
1	1	1

NOT		
A	F=A'	
0	1	
1	0	



LOGIC GATE REVIEW







2-Input NAND				
Α	В	F=A●B		
0	0	1		
0	1	1		
1	0	1		
1	1	0		

2-Input NOR		
A	В	F=A+B
0	0	1
0	1	0
1	0	0
1	1	0

2-Input XOR

Α	В	F=A⊕B
0	0	0
0	1	1
1	0	1
1	1	0



LOGIC GATES ARE BUILT FROM TRANSISTORS

- Digital logic gate are manufactured as integrated circuits
- All the transistors and resistors are built on a single piece of semiconductor material.





REMEMBER HOW A TRANSISTOR WORKS?

- Transistors are Semiconductors
- A current on the Base causes a larger current to flow from the Collector to the Emitter





REMEMBER HOW A TRANSISTOR WORKS?

• Can act as a Switch









AND GATES - TRANSISTORS

- If A AND B are HIGH they
 - Create a path from VCC to the Output
 - Block the path from the Output to Ground
- If A or B are LOW they
 - Block the path from VCC to the Output
 - Create a path from the Output to Ground





OR GATES - TRANSISTORS

- If A OR B are HIGH they
 - Create a path from VCC to the Output
 - Block the path from the Output to Ground
- If A and B are LOW they
 - Create a path from the Output to Ground
 - Block the path from VCC to the Output





MORE GATE...



Power(5V)

BC547

BC557

. Gnd

output C

Squeaky Hinge

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 Σ

DUAL IN-LINE PACKAGE (DIP)

- DIP-enclosed integrated circuits are available with
 - Even numbers of pins, located at 0.100 inch intervals
 - Allows for standard circuit board layout compatibility.
 - DIP "chips" pin counts are 8, 14, 16, 18, and 24





DUAL IN-LINE PACKAGE (DIP)

- Part numbers on the DIP packages specify what type and number of gates are enclosed
- Industry standards part numbers
 - A "74LS02" manufactured by Motorola will be identical in function to a "74LS02" manufactured by Fairchild
 - Or any other manufacturer
- First letter codes prepended to the part number are unique to the manufacturer
 - SN74LS02 is a quad 2-input TTL NOR gate manufactured by Motorola
 - DM74LS02 is the exact same circuit manufactured by Fairchild.





7408 QUAD AND GATE 14 PIN DIP







OR/AND







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NAND/NOR







INV / XOR







LOGIC ON BREADBOARDS





ASSESSMENT

Assessment Type(s): ✓ Demonstrations ✓ Interviews ✓ Journals ✓ Observations ✓ Labs ✓ Projects ✓ Portfolios ✓ Rubrics ✓ Surveys ✓ Teacher-Made Test ✓ Writing Samples





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REERENCESLDES



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LEARNING DOMAIN, CTE STANDARDS AND STUFF LIKE THAT...

• Learning Domain

[] cognitive [] affective[] psychomotor

- What are some cognitive skills required for success in your pathway?
- What are some affective skills required for success in your pathway?
- What are some psychomotor skills required for success in your pathway?
- Time:
 - Lecture
 - Lab

- Standards
 - CTE
 - CCSS
 - NCSS







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APPENDIX



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