Logic Gates

- Vacuum Tubes — ENIAC
- Transistor — Invented in 1947 at Bell Labs
  — switch — 2 states — ON / OFF
- Integrated Circuits IC's

Gordon Moore — co founder of Intel made an observation known as Moores law:

The no. of transistors you can fit on a given area of integrated circuit / chip will tend to double every 18–24 months approximately.

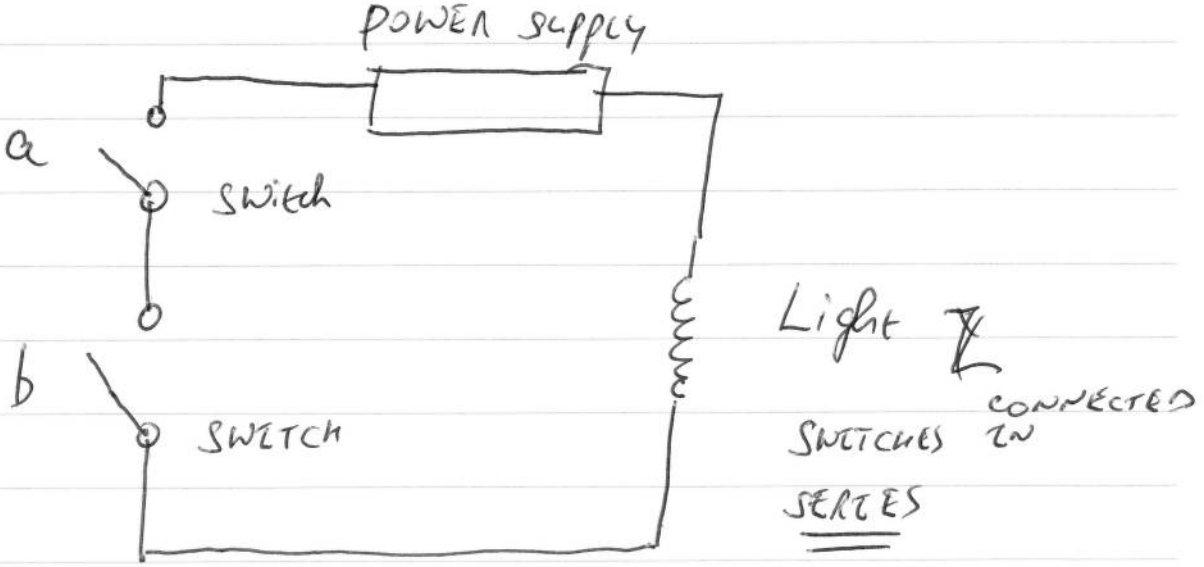
TRANSISTORS → GATES → CIRCUITS → CPU

GATES

AND	NOT (INVERTER)	XOR
OR	NAND	NOR

CIRCUITS

- HALF-ADDER
- FLIP FLOP
- DECODER

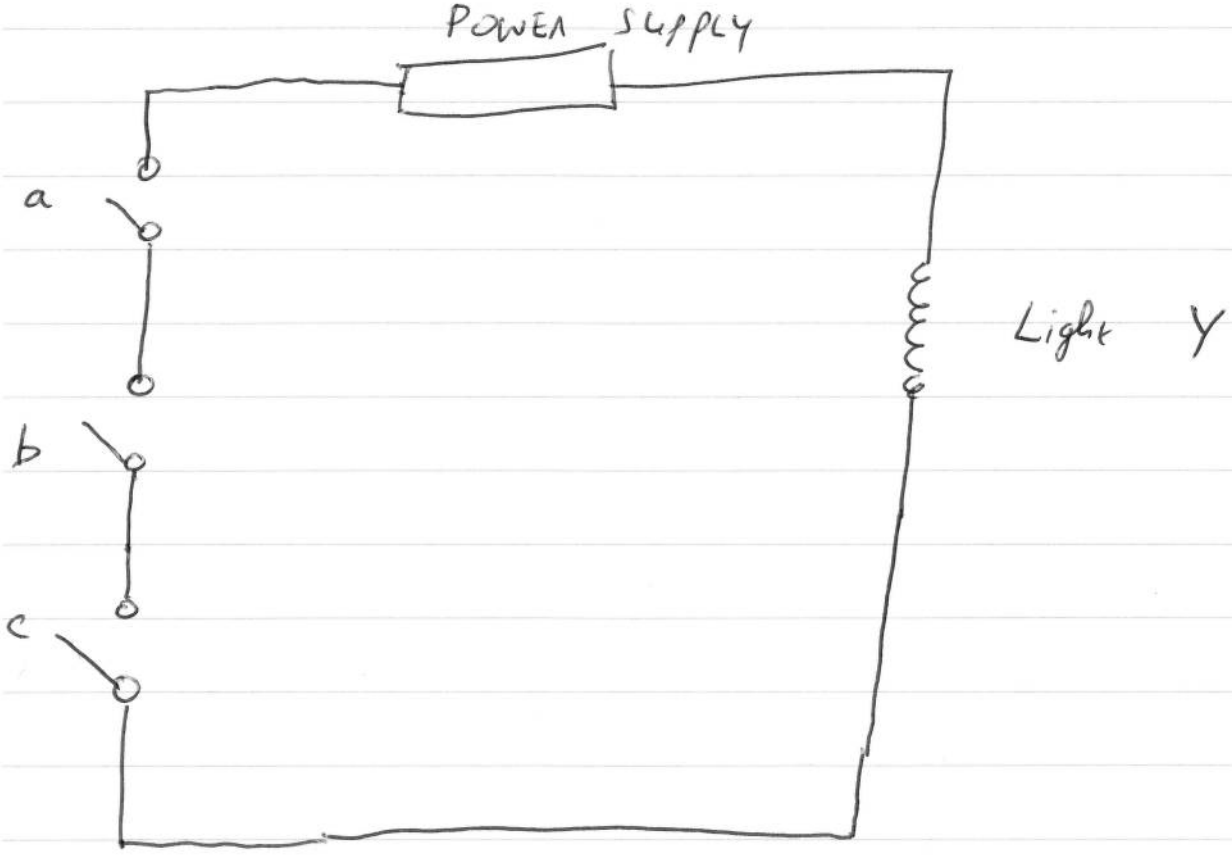


A	B	Y
OPEN	OPEN	OFF
OPEN	CLOSED	OFF
CLOSED	OPEN	OFF
CLOSED	CLOSED	ON

(3)

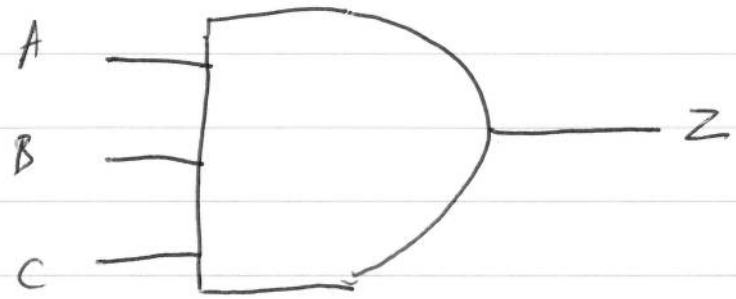
THE CIRCUIT PERFORMS A TWO INPUT AND FUNCTION

A THREE INPUT VERSION COULD BE CONSTRUCTED BY ADDING A 3RD SWITCH IN SERIES WITH THE OTHER TWO



④

A	B	C	Z
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

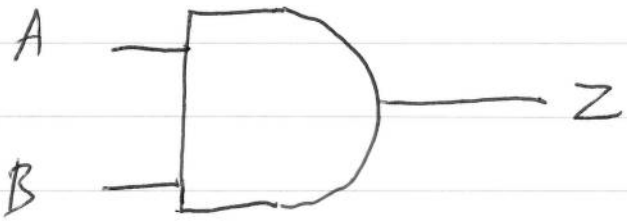


AND GATE (TRUTH TABLE)

A	B	Z
0	0	0
0	1	0
1	0	0
1	1	1

0 = OFF
1 = ON

WHEN BOTH A AND B ARE 1 THE OUTPUT Z IS A 1.



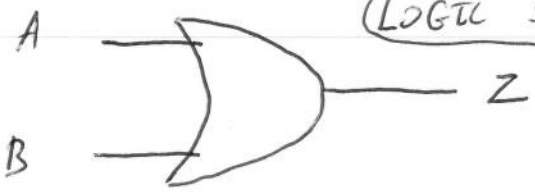
LOGIC SYMBOL

OR GATE

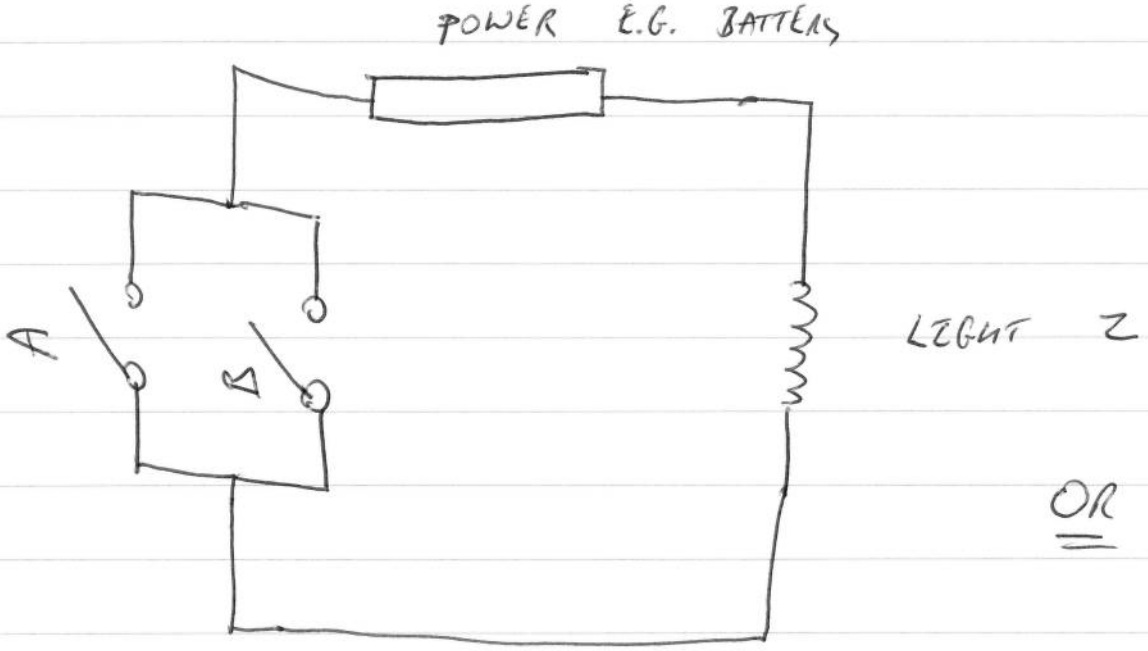
A	B	Z
0	0	0
0	1	1
1	0	1
1	1	1

IF EITHER INPUT IS 1 (HIGH), THE OUTPUT IS 1.

LOGIC SYMBOL



(6)

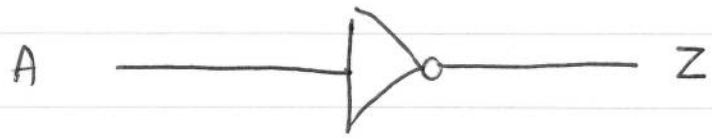


OR

SWITCHES CONNECTED IN PARALLEL

(7)

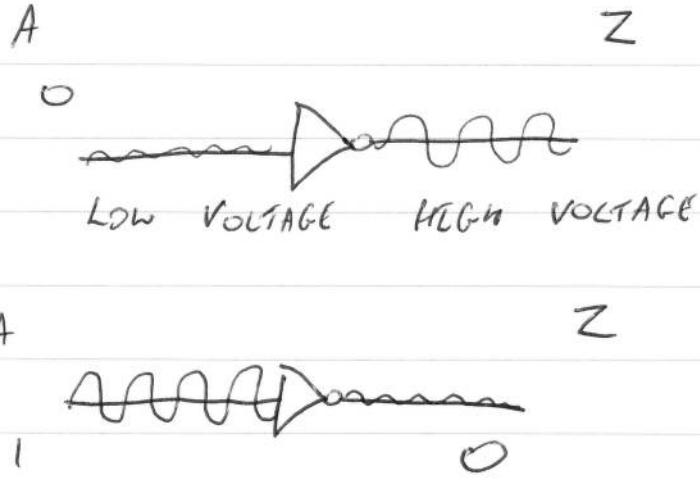
NOT (INVERTER)



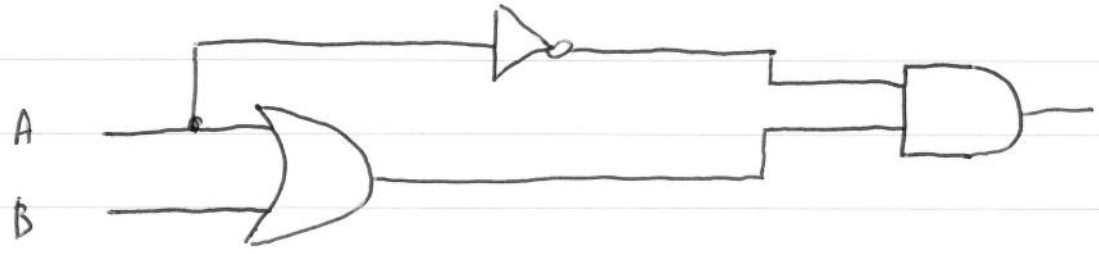
Logic Symbol

TRUTH TABLE

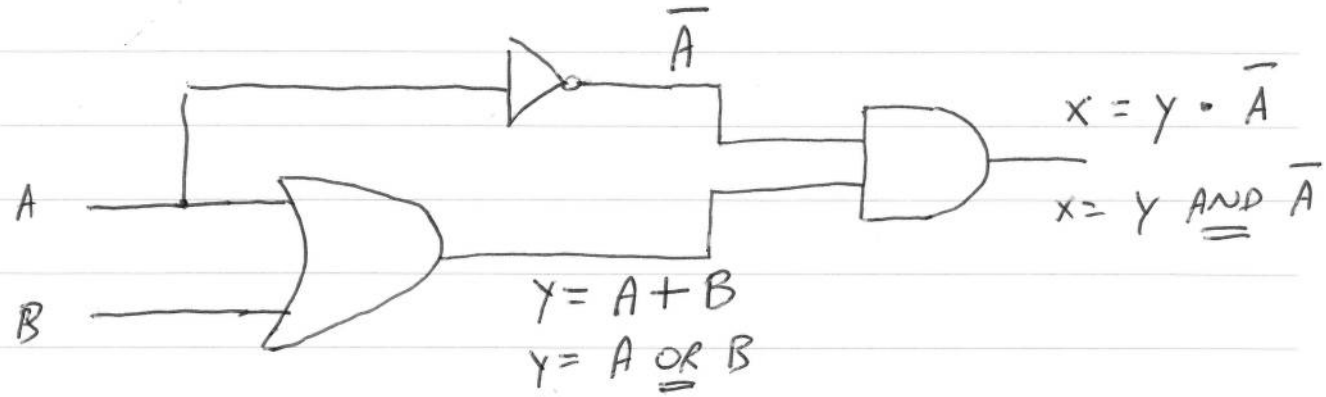
A	Z
0	1
1	0



(DL3) - EXAMPLE COMBINING GATES

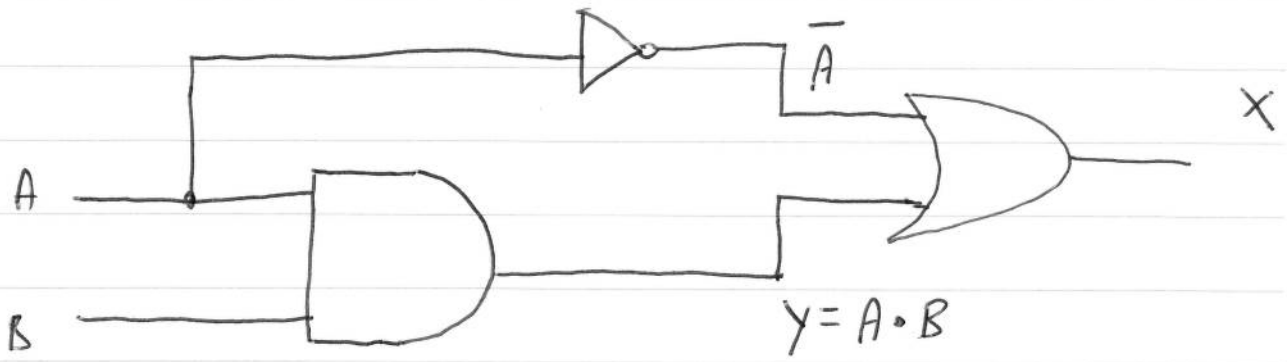


(8)



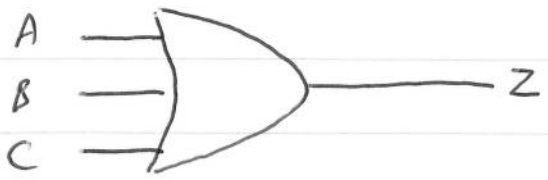
A	B	Y	$\overline{A}$	X
0	0	0	1	0
0	1	1	1	1
1	0	1	0	0
1	1	1	0	0

(DL. 4)



A	B	Y	$\bar{A}$	X
0	0	0	1	1
0	1	0	1	1
1	0	0	0	0
1	1	1	0	1

THREE INPUT OR GATE



$z = A + B + C$

3 INPUTS : A, B, C

$2^3 = 8 \Rightarrow$ 8 LINES

(10)

A	B	C	Z
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

3 INPUT OR TRUTH TABLE