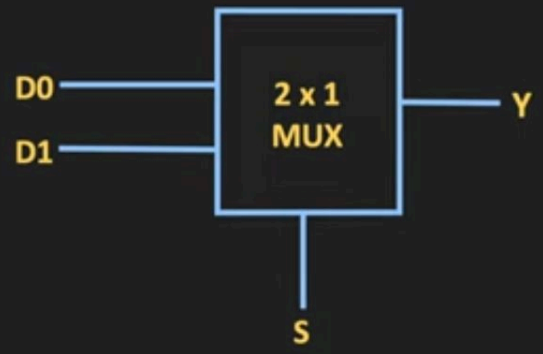
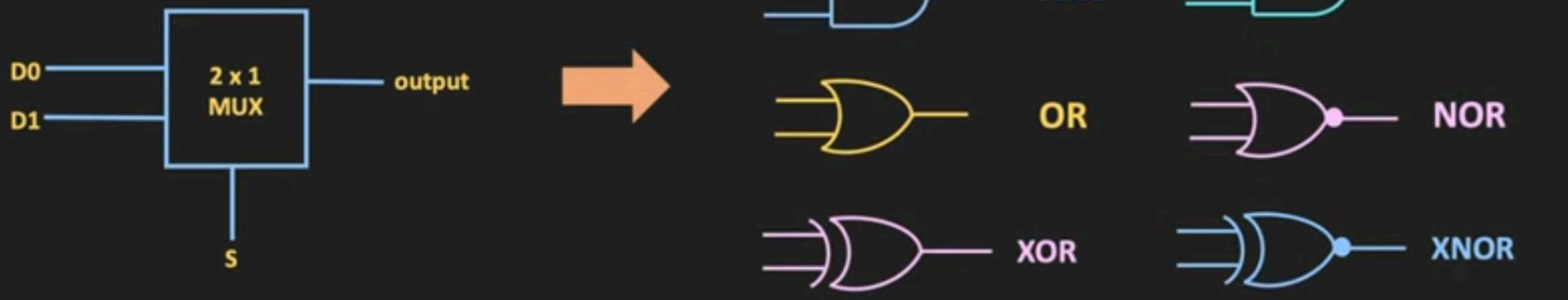
# 2 x 1 Multiplexer




$$Y = \overline{S}\ D0 + S\ D1$$

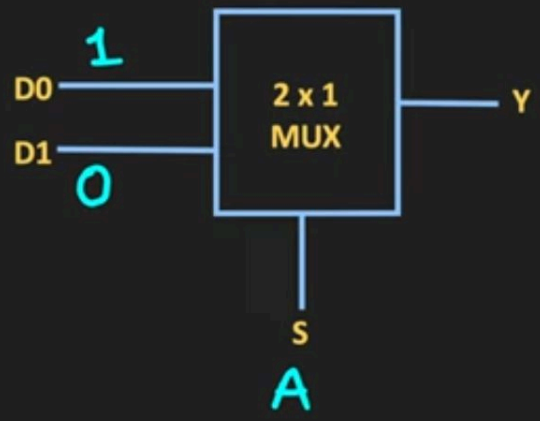

ALL ABOUT ELECTRONICS

# Logic Gates using Multiplexer



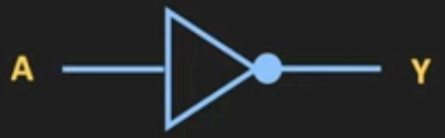

ALL ABOUT ELECTRONICS

# NOT gate using 2 x 1 MUX




$Y = \overline{S}\, D0 + S\, D1$

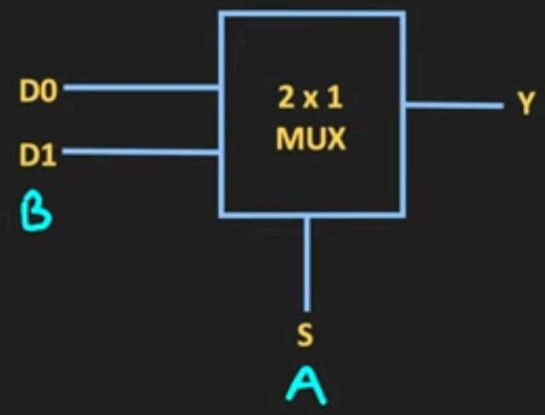
$Y = \bar{A} \cdot 1 + A \cdot 0 = \bar{A}$




$Y = \overline{A}$

ALL ABOUT ELECTRONICS

# AND gate using 2 x 1 MUX



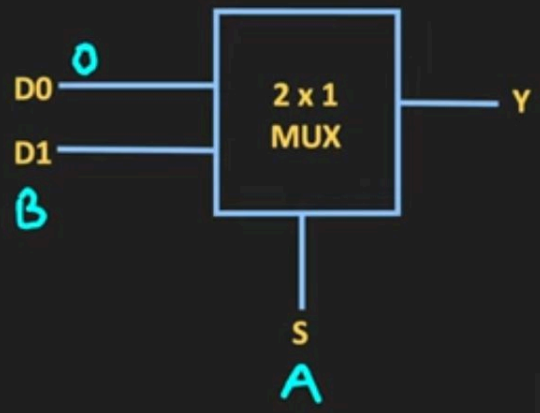

$$Y = \overline{S}\, D0 + S\, D1$$

$$A \cdot B$$


$$Y = A\,B$$

ALL ABOUT ELECTRONICS

# AND gate using 2 x 1 MUX




$$Y = \overline{S}\, D0 + S\, D1$$

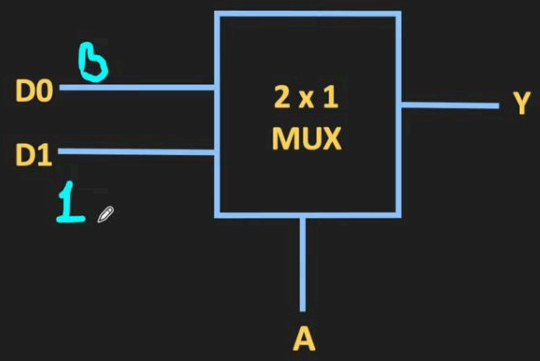
$$\overline{A} \cdot 0 \qquad A \cdot B$$

$$0$$


$$Y = A\,B$$

ALL ABOUT ELECTRONICS

# OR gate using 2 x 1 MUX




$$Y = \overline{S}\, D0 + S\, D1$$

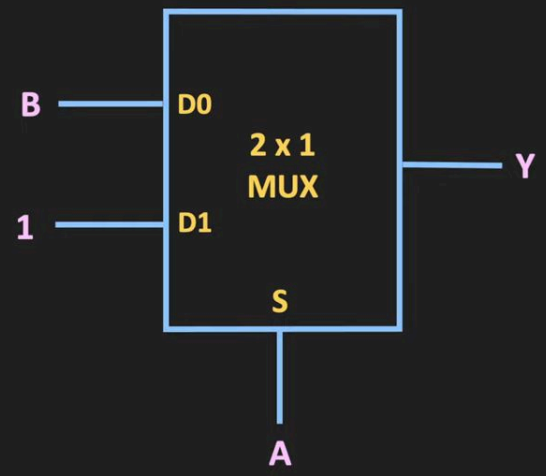

$$Y = A + B$$

## Truth Table

| A | B | Y | |
|---|---|---|---|
| 0 | 0 | 0 | Y = B |
| 0 | 1 | 1 | |
| 1 | 0 | 1 | Y = 1 |
| 1 | 1 | 1 | |

ALL ABOUT ELECTRONICS

# OR gate using 2 x 1 MUX





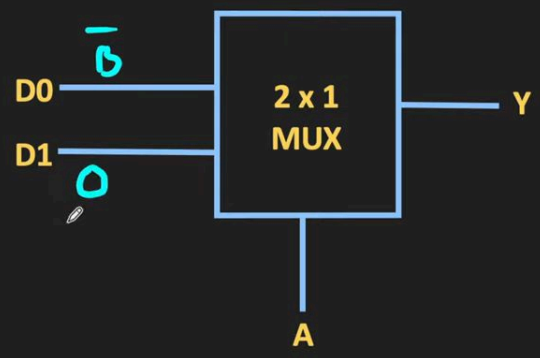
$Y = A + B$

$Y = \overline{S}\, D0 + S\, D1 = \bar{A} \cdot B + A \cdot 1 = A + \bar{A} B$

$= (A + \bar{A}) \cdot (A + B)$

ALL ABOUT ELECTRONICS

# NOR gate using 2 x 1 MUX




$$Y = \overline{S}\ D0 + S\ D1$$

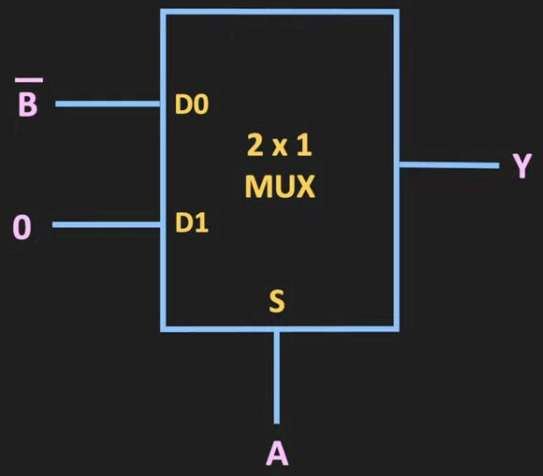

$$Y = \overline{(A + B)}$$

## Truth Table

| A | B | Y | |
|---|---|---|---|
| 0 | 0 | 1 | $Y = \overline{B}$ |
| 0 | 1 | 0 | |
| 1 | 0 | 0 | Y = 0 |
| 1 | 1 | 0 | |

ALL ABOUT ELECTRONICS

# NOR gate using 2 x 1 MUX





$$Y = \overline{(A + B)}$$

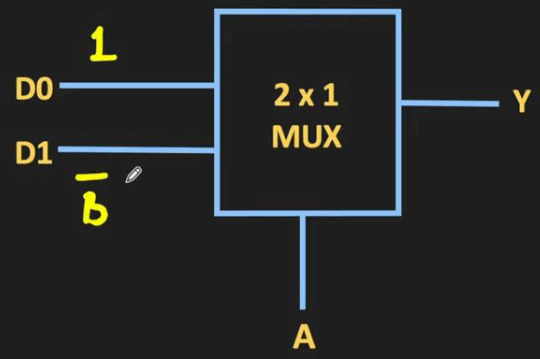
$$\overline{A} \cdot \overline{B} = \overline{A + B}$$

$$Y = \overline{S}\, D0 + S\, D1 = \overline{A} \cdot \overline{B} + A \cdot 0 = \overline{A} \cdot \overline{B}$$

$$= \overline{A + B}$$

ALL ABOUT ELECTRONICS

# NAND gate using 2 x 1 MUX




$Y = \overline{S}\ D0 + S\ D1$

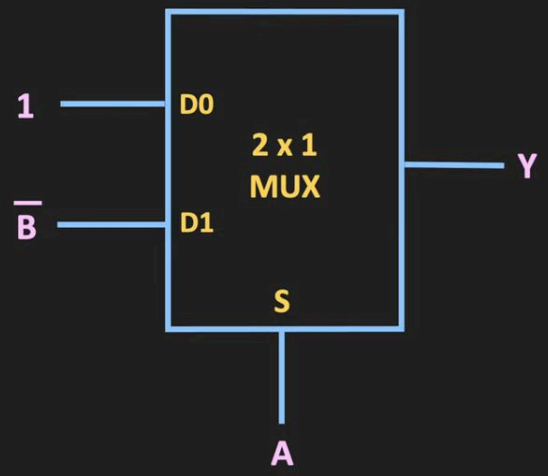

$Y = \overline{A\ B}$

## Truth Table

| A | B | Y | |
|---|---|---|---|
| 0 | 0 | 1 | Y = 1 |
| 0 | 1 | 1 | |
| 1 | 0 | 1 | $Y = \overline{B}$ |
| 1 | 1 | 0 | |

ALL ABOUT ELECTRONICS

# NAND gate using 2 x 1 MUX





$Y = \overline{A\,B}$

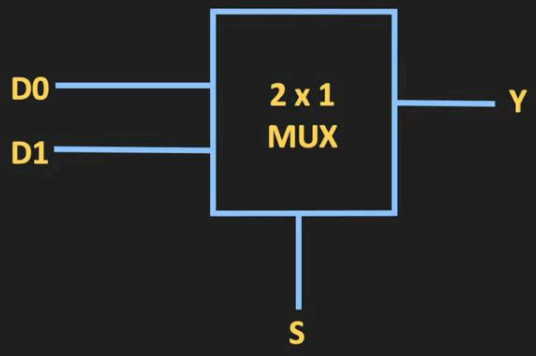
*Correction
It should be (AB)'

$Y = \overline{S}\,D0 + S\,D1 = \overline{A}\cdot 1 + A\cdot\overline{B} = (\overline{A}+A)\cdot(\overline{A}+\overline{B})$

$= \overline{A}+\overline{B} = \overline{A}\cdot\overline{B}$

ALL ABOUT ELECTRONICS

# XOR gate using 2 x 1 MUX



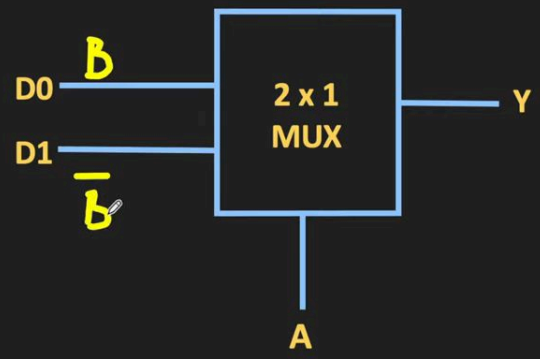

$Y = \overline{S}\ D0 + S\ D1$


$Y = A\overline{B} + \overline{A}B$

$Y = A \oplus B$

ALL ABOUT ELECTRONICS

# XOR gate using 2 x 1 MUX





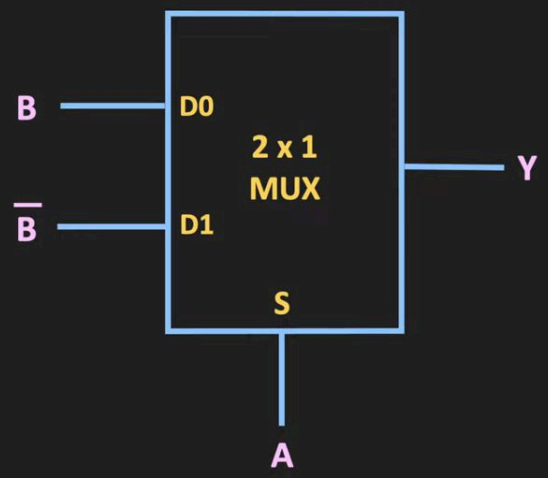
$Y = \overline{S}\ D0 + S\ D1$

## Truth Table

| A | B | Y | |
|---|---|---|---|
| 0 | 0 | 0 | Y = B |
| 0 | 1 | 1 | |
| 1 | 0 | 1 | $Y = \overline{B}$ |
| 1 | 1 | 0 | |

ALL ABOUT ELECTRONICS

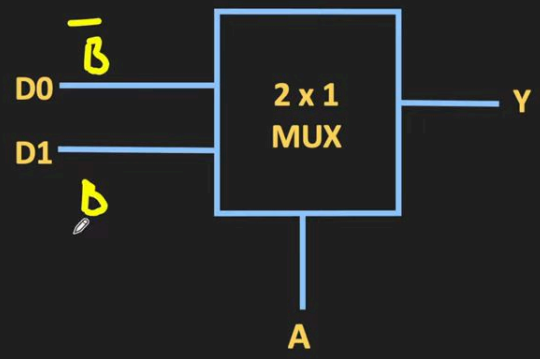
# XOR gate using 2 x 1 MUX





$Y = \overline{S}\, D0 + S\, D1 = \overline{A} \cdot B + A \cdot \overline{B} = A \oplus B$

# XNOR gate using 2 x 1 MUX




$Y = \overline{S}\ D0 + S\ D1$

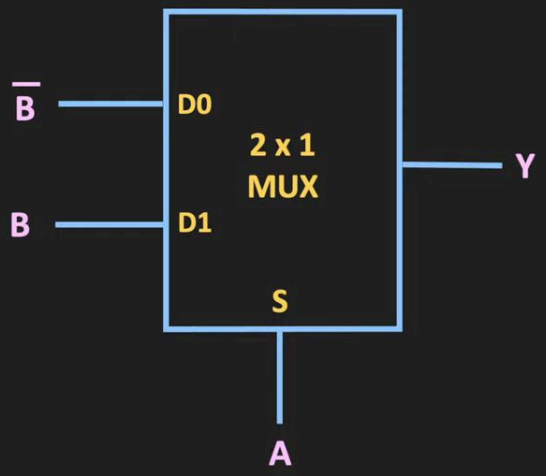

$Y = A\ B + \overline{A}\ \overline{B}$

## Truth Table

| A | B | Y | |
|---|---|---|---|
| 0 | 0 | 1 | $Y = \overline{B}$ |
| 0 | 1 | 0 | |
| 1 | 0 | 0 | $Y = B$ |
| 1 | 1 | 1 | |

ALL ABOUT ELECTRONICS

# XNOR gate using 2 x 1 MUX





$Y = A\,B + \overline{A}\,\overline{B}$

$Y = \overline{S}\,D0 + S\,D1 = \overline{A} \cdot \overline{B} + A\,B$

ALL ABOUT ELECTRONICS