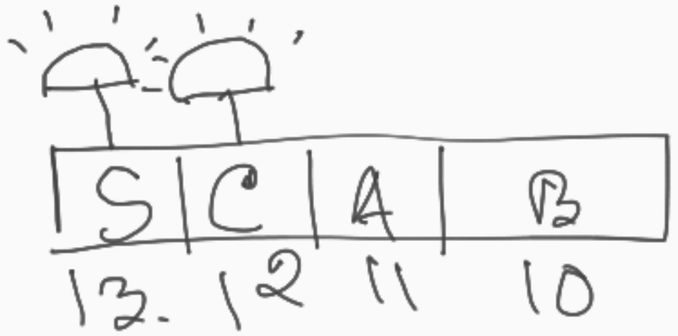
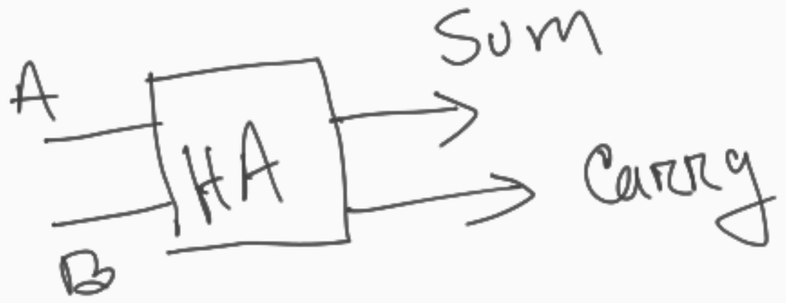
Half Adder

Pins →





Equation for Sum & Carry:

$S = \bar{A}B + A\bar{B} = A \oplus B$

$C = AB = A \& B$

Truth table:

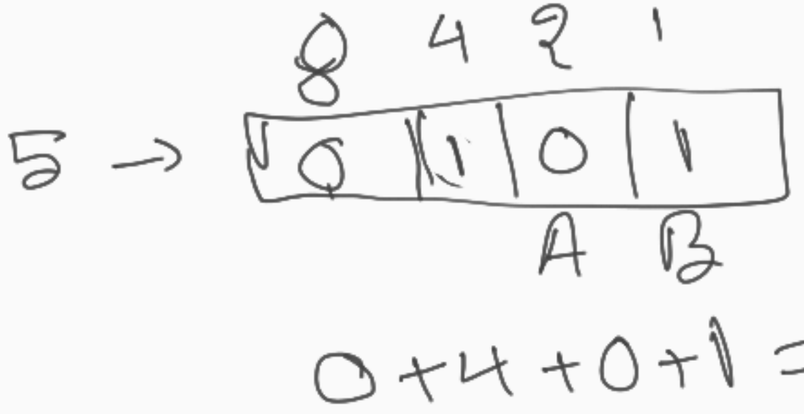
A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Sketch for HA:

```
byte A,B;
void setup() {
pinMode(13, OUTPUT);
pinMode(12, OUTPUT);
pinMode(11, INPUT);
pinMode(10, INPUT);
}
```

```
void loop()
{
  A= digitalRead(11);
  B= digitalRead(10);
digitalWrite(13, A^B);
digitalWrite(12, A&B);
}
```

Suppose, 5 is the input you have to take the last two bits of this Number and show the half adder operation.



Full Adder

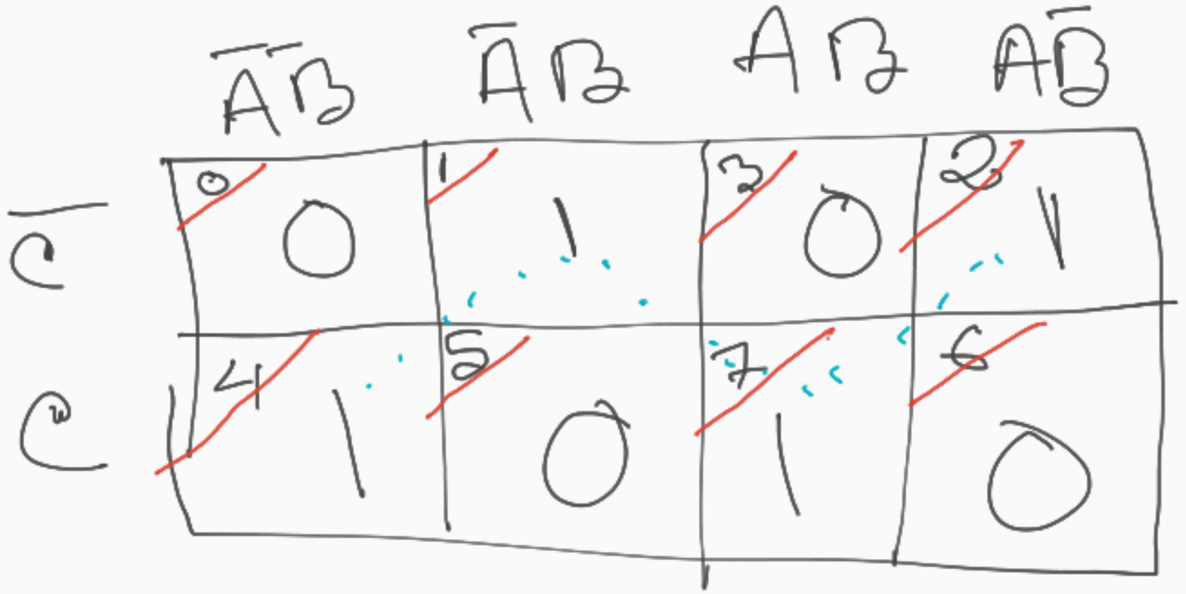
Truth table:

A	B	C	Sum	Carry (out)
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

Equation:

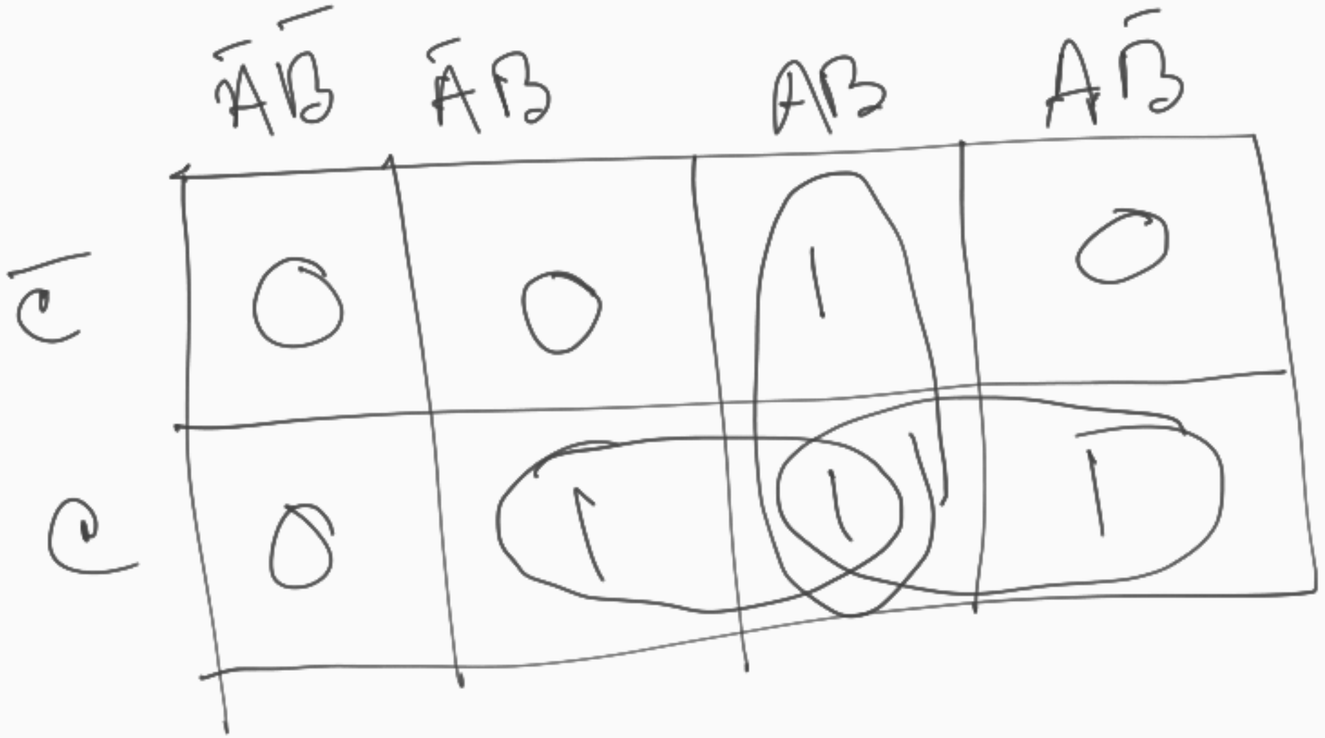
$$S = \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$$

Through k-Map:



$S = A \oplus B \oplus C$

Carry out :



$C = AB + BC + AC$

Sketch for FA:

```
byte A,B,C;
void setup(){
pinMode (13, OUTPUT);
pinMode (12, OUTPUT);
pinMode (7, INPUT);
pinMode (8, INPUT);
pinMode (9, INPUT);}
```

OR => |

```
void loop() {
A = digitalWrite (7);
B = digitalWrite (8);
C = digitalWrite (9);

digitalWrite(12, A^B^C);
digitalWrite (13, (A&B) |
                  (B&C) |(A&C))

}
```

Suppose, 6 is the number you have. Now, you have to take the last 3-bits of this number as input and show the Full adder operation

→ 6 = | 0 | 1 | 1 | 0 |