Adders ➕

15.2 Boolean Algebra and Logic Circuits	
Candidates should be able to:	Notes and guidance
Produce truth tables for logic circuits including half adders and full adders	May include logic gates with more than two inputs.
Show understanding of a flip-flop (SR, JK)	Draw a logic circuit and derive a truth table for a flip-flop Understand of the role of flip-flops as data storage elements
Show understanding of Boolean algebra	Understand De Morgan's laws. Perform Boolean algebra using De Morgan's laws. Simplify a logic circuit/expression using Boolean algebra
Show understanding of Karnaugh maps (K-map)	Understand of the benefits of using Karnaugh maps Solve logic problems using Karnaugh maps

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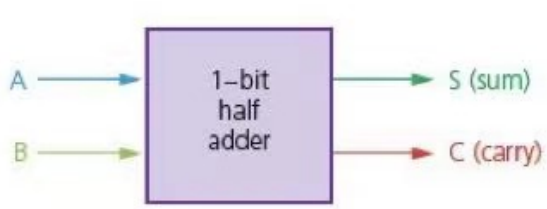
Half adder

> Carries out binary addition on 2 bits generating two outputs

- The sum bit `S`
- The carry bit `C`

Input		Output	
A	B	S	C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1



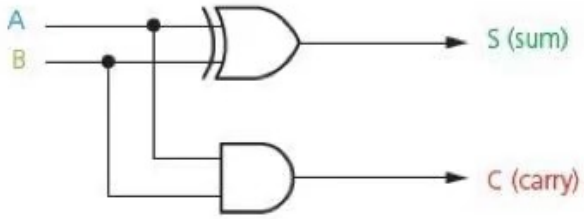


Figure 15.10

Full adder

> The half adder is unable to deal with the addition of several binary bits (e.g. an 8-bit byte). To enable this, we have considered the full adder circuit

Inputs			**Outputs**	
A	B	Cin	S	Cout
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

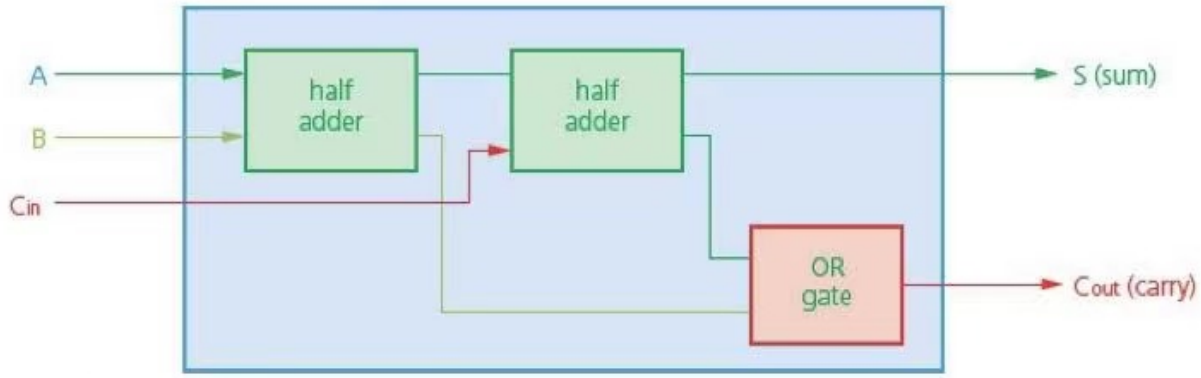


Figure 15.12