MODULE Q BOOLEAN LOGIC · Q2

NAND, NOR and XOR gates

Original practice questions · 21 marks · ~25 minutes · Cambridge 0478 syllabus 10.1, 10.2, 10.3

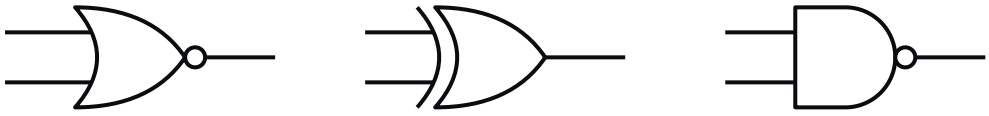
Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **21 marks**. In every logic circuit, NOT has one input and every other logic gate has exactly two inputs. All scenarios on this sheet are made up.

1

Total: 3 marks

Here are the symbols for three logic gates.



Gate 1 Gate 2 Gate 3

(a) Identify each logic gate. **[3]**

Symbol	Name of logic gate
Gate 1	
Gate 2	
Gate 3	

2

Total: 3 marks

(a) Complete the truth table to show the output of each logic gate for every combination of the inputs A and B. **[3]**

A	B	A NAND B	A NOR B	A XOR B
0	0			
0	1			
1	0			
1	1			

3 **Total: 4 marks**

(a) Describe the function of a NAND gate. **[2]**

(b) Explain how the output of an XOR gate is different from the output of an OR gate. **[2]**

4 **Total: 5 marks**

A loading bay has two roller doors. A control system uses these inputs:

Input	Binary value	Condition
A	1	Door A is open
	0	Door A is closed
B	1	Door B is open
	0	Door B is closed

It has three outputs:

- the heater **H** is on (1) when neither door is open
- the indicator lamp **L** is on (1) when either door A or door B is open, but not both
- the ready signal **R** is 1 except when both doors are open.

(a) Write a logic expression for each output. **[3]**

H =

L =

R =

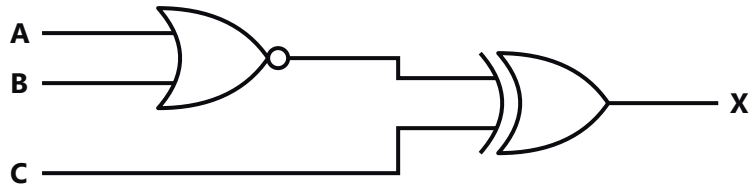
(b) Draw the logic gate for the heater H and the logic gate for the indicator lamp L. Use **one** logic gate for each output. **[2]**





5 **Total: 6 marks**

Consider this logic circuit.



(a) Write the logic expression for this logic circuit. **[2]**

X =

(b) Complete the truth table for this logic circuit. **[4]**

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

Total for this worksheet: 21 marks