MODULE Q BOOLEAN LOGIC · Q3

Truth tables for single gates

Original practice questions · 21 marks · ~25 minutes · OCR J277 specification 2.4.1

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. Write truth table values as 1 and 0 (T and F are also accepted). The total for this worksheet is **21 marks**.

1

Total: 3 marks

(a) State what a truth table shows. **[1]**

(b) A logic gate has **two** inputs, A and B. State how many rows (not counting the heading row) its truth table needs, and explain why. **[2]**

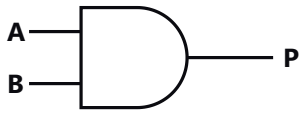
2

Total: 5 marks

Three logic gate symbols are shown. Each gate has output P.

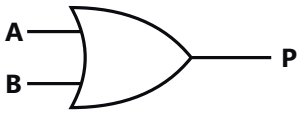
(a) Complete the truth table for **each** gate. **[5]**

Gate 1



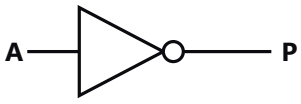
A	B	P
0	0	
0	1	
1	0	
1	1	

Gate 2



A	B	P
0	0	
0	1	
1	0	
1	1	

Gate 3



A	P
0	
1	

3 **Total: 3 marks**

A technician has tested three logic gates, J, K and L, and recorded the results using T for true and F for false. Gates J and K have two inputs. Gate L has one input.

A	B	Output of gate J	Output of gate K
F	F	F	F
F	T	T	F
T	F	T	F
T	T	T	T

A	Output of gate L
F	T
T	F

(a) Identify the logic gate used for J, K and L. **[3]**

Gate J .....

Gate K .....

Gate L .....

4 **Total: 4 marks**

A paint workshop has an extractor fan. The fan is controlled by **one** logic gate with two inputs and one output.

Input / output	1 means	0 means
H (heat sensor)	the room is too hot	the room is not too hot
F (fume sensor)	fumes are detected	no fumes are detected
E (fan)	the fan is on	the fan is off

The fan is on if the room is too hot, or fumes are detected, or both.

(a) Identify the logic gate needed. **[1]**

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(b) Complete the truth table for the fan. **[2]**

H	F	E
0	0	
0	1	
1	0	
1	1	

(c) Use your truth table to state the values of H and F when the fan is off. **[1]**

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5 Total: 4 marks

A technician has written this truth table for an AND gate. It contains **two** errors.

Row	A	B	P = A AND B
1	0	0	0
2	0	1	0
3	0	1	0
4	1	1	0

(a) Identify each error and state the correction needed. **[4]**

Error 1

Error 2

6 Total: 2 marks

(a) An AND gate and an OR gate are both given the inputs A = 1 and B = 0. Explain why the two gates give different outputs. **[2]**

Total for this worksheet: 21 marks