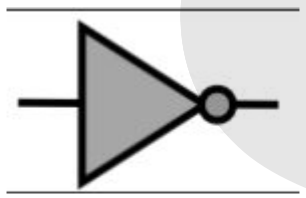
Exam revision — Unit 2 Logical operations

<table>
<tr><th colspan="3">5 binary logic gates</th></tr>
<tr><td>AND</td><td></td><td></td></tr>
<tr><td></td><td></td><td><table><tr><th>Input A</th><th>Input B</th><th>Output Q</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>XOR</td><td></td><td></td></tr>
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Boolean identities and rules

	AND	**OR**
Commutative law	A.B= ____	A+B= B+A
Associate law	(A . __) . C= __ . (__ . ___)	(A+___)____= A+(B+C)
Distributive law	(A+B) . C= (A+C) . _______	(A+B) . C=(A+____) + (B . ____)
Identity law	A.1= A	
Zero and 1 law		A.1= 1
Inverse law	A . $\bar{A}$=0	
Idempotent law		A + A= A
Absorption law	A(A+B)= A	
Double complement law	$\bar{A}$= A	

SJHS

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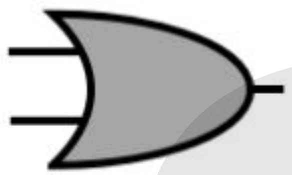
<tr><td></td><td></td><td></td></tr>
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Boolean identities and rules	AND	OR
Commutative law	A.B= B.A	
Associate law	(A.___) . C= __ . (__ . ___)	(A+B)+C= A+(B+C)
Distributive law	(__+__)+C= (__+__) . (B+___)	(A+B).C= (A.B)+(A.C)
Identity law	A.1= A	
Zero and 1 law		A.1= 1
Inverse law	A . $\bar{A}$=0	
Idempotent law		A + A= A
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Using the following identities:

$$P.1 = P$$

$$P.Q + P.R = P.(Q + R)$$

$$P + \overline{P} = 1$$

simplify the Boolean expression: [3]

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

Complete the following truth table. [4]

P	Q	$P+Q$	$P.Q$	$\overline{P.Q}$	$\overline{P.Q}+(P+Q)$
1	1				
1	0				
0	1				
0	0				

Draw a truth table for the expression: [4]

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

(a) (i) Complete the following truth table. [4]

A	B	$\overline{B}$	$A.B$	$A.\overline{B}$	$B+(A.\overline{B})$
1	1				
1	0				
0	1				
0	0				

(ii) Use this truth table to simplify the expression. [1]

$$B + (A.\overline{B})$$

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