Boolean Logic Expressions

Logic gates are part of electrical circuits. They allow decisions to be made

4 logic gates: AND; OR; XOR; NOT

Each gate takes up to two **inputs** and gives one **output**

Each input or output is a **Boolean data type** - it can be True or False

1 = True
0 = False

Boolean Logic Expressions

Boolean expressions use the mathematical symbols for the gates

$A \cdot B$

$B + C$

$C \oplus D$

$\overline{C}$

Boolean Logic Expressions

You need to be able to write more complex Boolean expressions:

$B + C + D$

$(A \cdot B) + \overline{C}$

$(B \oplus D) + (C \cdot A)$

Boolean Logic Expressions

The outside door to my classroom is locked. It can be opened if either the green button on the inside is pressed (A) or if a valid passcard is touched on the pad on the outside (B)

Write the Boolean expression for this system

Boolean Logic Expressions

A burglar alarm system operates using two movement sensors, A and B. The system will trigger the alarm if either sensor is set off

Write the Boolean expression for this system

Boolean Logic Expressions

A burglar alarm system operates using two movement sensors, A and B, **and a manual switch, C**. The system will trigger the alarm if either sensor is set off and the switch is turned on

Write the Boolean expression for this system

Boolean Logic Expressions

My neighbour Steve has a light outside his house. It has a light sensor, A, and a movement sensor, B. The light turns on if it is dark (i.e. there is no light) **and** something moves

Write the Boolean expression for this system

Boolean Logic Expressions

My neighbour Steve has a light outside his house. It has a light sensor, A, a movement sensor, B, **and a manual switch inside the house, C**. The light turns on if it is dark (i.e. there is no light) **and** something moves **and** the inside switch is turned on

Write the Boolean expression for this system

0 8 . 2 A logic circuit is being developed for an audio advert in a shop that plays automatically if a customer is detected nearby.

- The system has two sensors, A_1 and A_2, that detect if a customer is near. The audio plays if either of these sensors is activated.
- The system should only play if another audio system, S, is not playing.
- The output from the circuit, for whether the advert should play or not, is Q.

Complete the logic circuit for this system.

[3 marks]

Write the Boolean expression for this system