# Challenges ­– 2.4 Computational Logic

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## Specification Content:

**2.4 Computational logic Learners should have studied the following:**

* Why data is represented in computer systems in binary form
* Simple logic diagrams using the operations AND, OR and NOT
* Truth tables
* Combining Boolean operators using AND, OR and NOT to two levels.

## Easy challenges!

### Question 1:

What is the name of the component that allows us to use electrical pulses in a computer?***(1 mark)***

|  |
| --- |
|  |

### Question 2:

Which of these is not a logic gate? *(Tick the correct box)* ***(1 mark)***

| **Logic Gate** |  | **** |
| --- | --- | --- |
| NOD |  |  |
| AND |  |  |
| OR |  |  |

### Question 3:

Complete the following truth table for a NOT gate: ***(2 marks)***

| **Input** | **Output** |
| --- | --- |
| 0 |  |
|  | 0 |

### Question 4:

What does the following notation mean: **A B *(1 mark)***

| **Answer** |  | **** |
| --- | --- | --- |
| NOT A OR B |  |  |
| A OR B |  |  |
| A AND B |  |  |

### Question 5:

How many rows should an AND gate have in the truth table? ***(1 mark)***

| **Answer** |  | **** |
| --- | --- | --- |
| 1 |  |  |
| 3 |  |  |
| 2 |  |  |

**TOTAL: \_\_\_\_ / 6**

## Medium challenges!

### Question 6:

How many gates would you expect to draw in a logic circuit for the following statement?***(1 mark)***

**( A B ) C**

| **Answer** |  | **** |
| --- | --- | --- |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |

### Question 7:

Draw the logic circuit for the following logic statement:***(6 marks)***

**( A B )**

|  |
| --- |
|  |

### Question 8:

Draw the truth table for the following logic statement: ***(5 marks)***

**( A B )**

|  |
| --- |
|  |

### Question 9:

A truth table has 8 inputs and 5 logic gates.  
How many rows will you need for your truth table?   
Show your working. ***(3 marks)***

|  |
| --- |
|  |

**TOTAL: \_\_\_\_ / 15**

## Stretch / Extension Challenges!

### Challenge 1:

Create a guide on completing truth tables. Show this to 2 other members of your group and see if they like it. Get some peer assessment on it and then redevelop it as needed.

### Challenge 2:

1. Create a logic circuit and truth table for the following logic statement:

**(( A B ) C)**

|  |
| --- |
|  |

1. Use <http://www.edumedia.rmit.edu.au/emg/gallery/Project/LogicGates/logic_builder.htm> to test and check your truth table
2. Compare your answers to a peer and see if you have any differences. Discuss who was correct and evaluate any mistakes you may have made.

### Challenge 3:

Investigate a real life situation which mimics simple logic gates. For example a home security system: If Pressure Pad or Heat Sensor are active, or Panic alarm pressed, trigger alarm.

Can you build up a complex logic circuit of the situation you have found? Labelling it with real life inputs, rather than A, B, C etc?