

Smart Chemical Manufacturing Safety System

* Indicates required question

1. Email *

2. You are part of 3 engineer team working on a smart control for a chemical manufacturing plant's emergency safety system. A good design could save many lives. Decide with your team which member will take each section and then click on your section below to begin your part. You will later be directed on how to combine your design with the other members of your team. * 1 point

Mark only one oval.

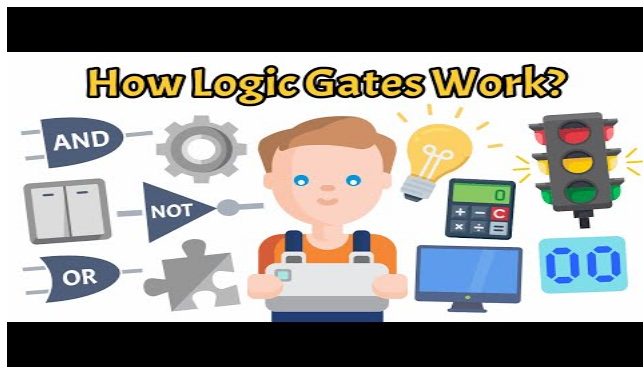
- Pressure and temperature sensors *Skip to question 3*
- Gas leak detection system *Skip to question 6*
- System shutdown initiation *Skip to question 9*

Pressure and temperature sensors

3. Your task is to create a logic gate that will shut down the machines (light the LED) when both the pressure and the temperature sensors are reading high. What kind of logic gate will you build? * 1 point

Type your answer using all uppercase letters

Watch this for more info if you need it!



<http://youtube.com/watch?v=9kNO9iKgT1I>

Logic Gates

A.

Input	Output
0	1
1	0

B.

Input A	Input B	Output
0	0	0
1	0	0
0	1	0
1	1	1

C.

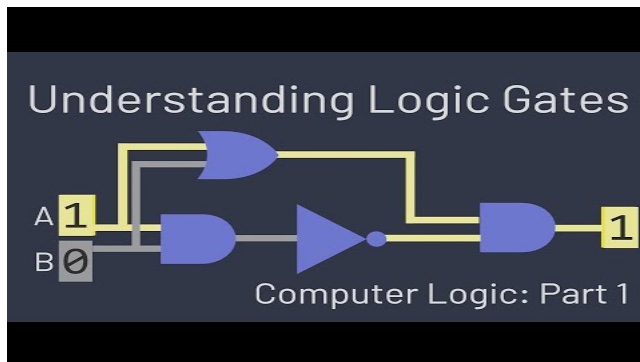
Input A	Input B	Output
0	0	0
1	0	1
0	1	1
1	1	1

4. Which truth table represents the logic gate that you are designing? *

1 point

Type your answer using an uppercase letter

Watch this video if you need more help understanding how truth tables relate to logic gates



<http://youtube.com/watch?v=INetYZqtjTo>

5. Use your instructions and build your gate. Once you have built your gate and its outputs match your truth table type "done" in the space below. * 1 point
If you are struggling, ask a teammate or call your instructor over for help.
-

Skip to question 12

Gas Leak Detection System

6. Your task is to create a logic gate that will shut down the machinery (light the LED) when there is a gas leak detected or the temperature and pressure sensor gives a high output (your partner is building the temp and pressure sensor and you will integrate it with your gate later. For now just focus on that giving you a high input for your gate.) What kind of logic gate will you build? * 1 point

Type your answer using all uppercase letters

Watch this video if you need more help understanding logic gates



<http://youtube.com/watch?v=9kNO9iKgT1I>

TRUTH TABLES

A.

Input	Output
0	1
1	0

B.

Input A	Input B	Output
0	0	0
1	0	0
0	1	0
1	1	1

C.

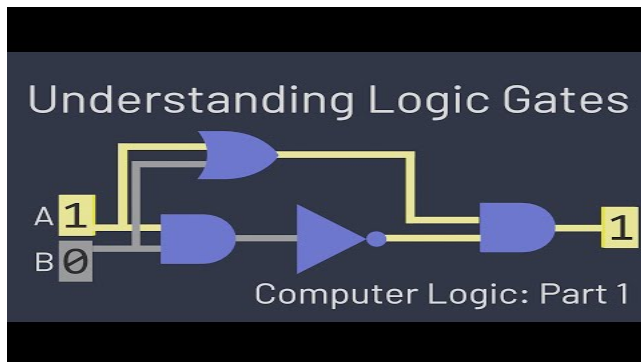
Input A	Input B	Output
0	0	0
1	0	1
0	1	1
1	1	1

7. Which truth table represents the logic gate that you are designing? *

1 point

Type your answer using an uppercase letter

Watch this video if you need more help understanding how truth tables relate to logic gates



<http://youtube.com/watch?v=INetYZqtjTo>

8. Use your instructions and build your gate. Once you have built your gate and its outputs match your truth table click the "ready to move on" option below *

1 point

Mark only one oval.

- Ready to move on
- I can't get my gate to work.

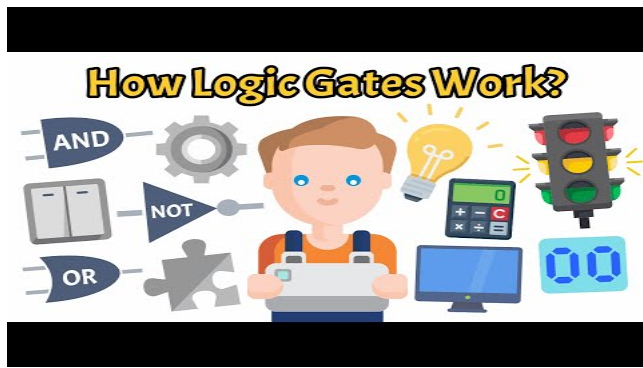
Skip to question 12

System shutdown initiation

9. Your task is to create a gate that will take the high output from the gas leak and pressure temperature gates and turn them into a low output. In other words if the prior sensors are sensing an issue, your gate shuts the whole system down (LED off). If the other sensors are reading normal (giving low inputs to your gate) the machinery runs normally (high output to your gate). *

1 point

Watch this video if you need more help understanding logic gates



<http://youtube.com/watch?v=9kNO9iKgT1I>

TRUTH TABLES

A.

Input	Output
0	1
1	0

B.

Input A	Input B	Output
0	0	0
1	0	0
0	1	0
1	1	1

C.

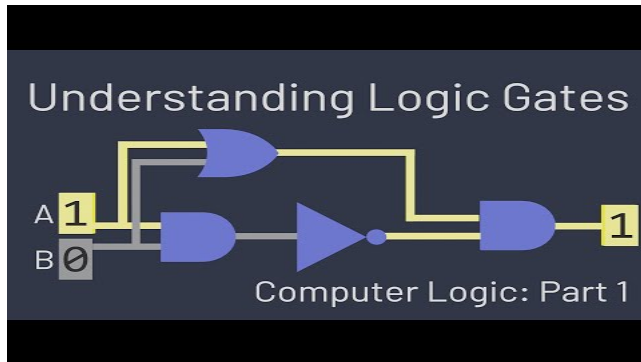
Input A	Input B	Output
0	0	0
1	0	1
0	1	1
1	1	1

10. Which truth table represents the logic gate that you are designing? *

1 point

Type your answer using an uppercase letter

Watch this video if you need more help understanding how truth tables relate to logic gates



<http://youtube.com/watch?v=INetYZqtjTo>

11. Use your instructions and build your gate. Once you have built your gate and its outputs match your truth table click the "ready to move on" option below *

1 point

Mark only one oval.

- Ready to move on
- I can't get my gate to work

[Skip to question 12](#)

Final Design Integration

Here you will discuss with your teammates and use the information below to combine your logic gates into a final design for a chemical manufacturing safety system.

12. Your smart chemical manufacturing safety system should shut down the machines when: * 1 point
- Both the temperature and the pressure sensors are reading too high
 - or
 - There is a chemical leak detected
 - Then the machinery should shut down the production process.

Create a diagram on your worksheet using Boolean logic symbols to show how you can combine your gates to solve the problem.

On your worksheet, create truth tables for each gate to indicate how the gates work together to meet the design requirements.

Wire your gates together to create your final product.

Then call your instructor over to check your work.

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