Smart Automatic Headlight Control System

* Indicates required question

1. Email *

2. You are part of 4 engineer team working on a smart control system for car headlights. 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

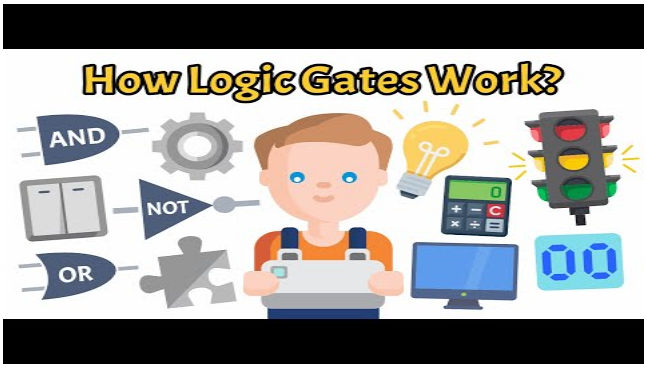
Mark only one oval.

- Low light and rain sensors *Skip to question 3*
- Ignition and power connections *Skip to question 6*
- Manual override control *Skip to question 9*
- Systems integration specialist *Skip to question 12*

Low Light and Rain Sensors

3. Your task is to create a logic gate that will turn on the headlights when either the exterior photosensor gets too little light input or the windshield wipers are turned on. 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.

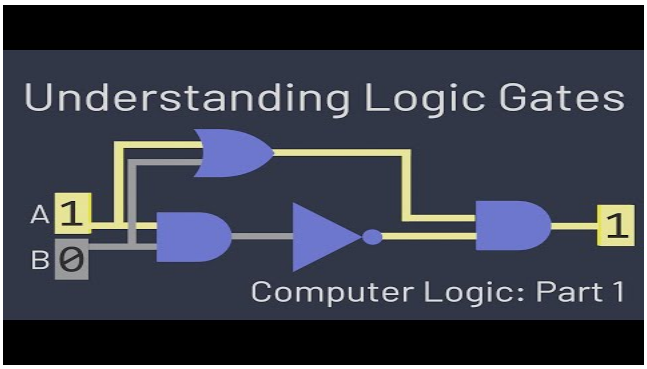
Input A	Input B	Output
0	0	0
1	0	0
0	1	0
1	1	1

C.

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

4. Which truth table represents the logic gate that you are designing? **Type your answer using an uppercase letter** * 1 point

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 click the "ready to move on" option below * 1 point

Mark only one oval.

- ◯ Ready to move on *Skip to question 15*
- ◯ I can't get my gate to work. *Skip to question 3*

Skip to question 15

Ignition and Power Connections

6. You don't want the headlights to drain the car's battery by running when they are not supposed to. Your task is to create a logic gate that allows the headlight to turn on only when the engine is running (high input) and it gets a high input from the light and rain sensor (your partner is building this and you will integrate it later). What kind of logic gate will you build? * 1 point
Type your answer using all uppercase letters

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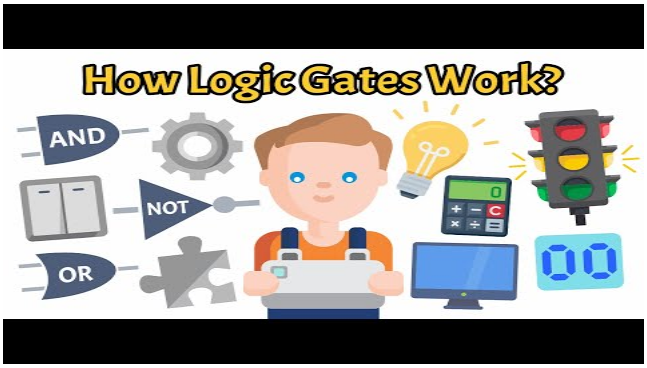

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Input A	Input B	Output
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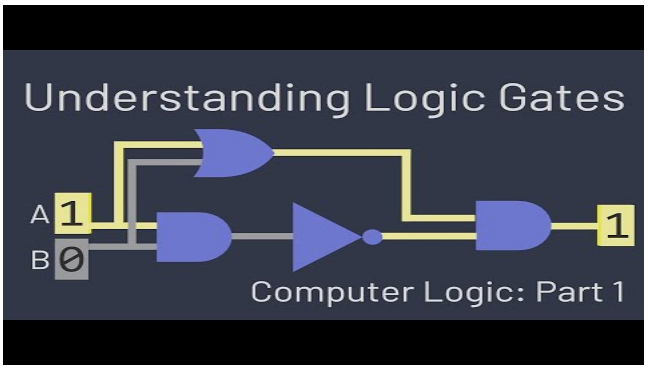
1	0	0
0	1	0
1	1	1

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? **Type your answer using an uppercase letter** * 1 point

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.

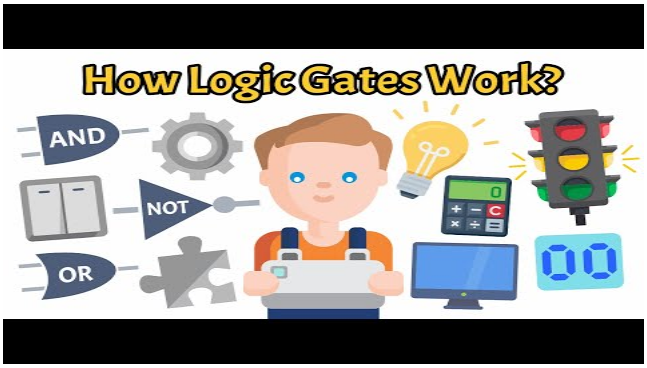
- ◯ Ready to move on
- ◯ I can't get my gate to work.

Skip to question 15

Manual Override Control

9. Sometimes you may want to control the headlights yourself rather than using this Automatic Headlight Control system. Your task is to create a gate that which will normally (with low input) allow the smart automatic control to work as long as the other conditions are met. However, if you want to switch to Manual Override control, you flip a switch (high input) which disengages the Automatic Control system (low output) What kind of logic gate will you build? **Type your answer using all uppercase letters** * 1 point

Watch this video if you need more help understanding logic gates



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B.

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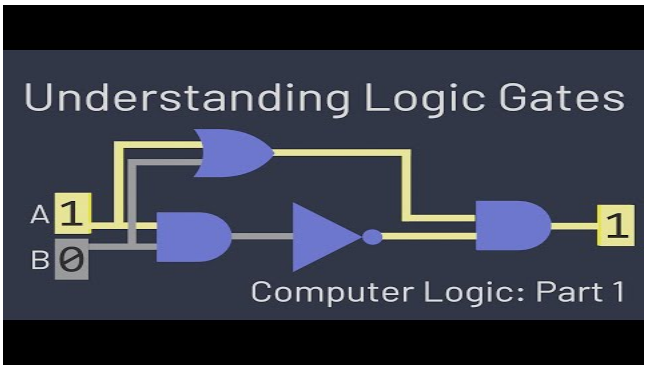
1	0	0
0	1	0
1	1	1

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? **Type your answer using an uppercase letter** * 1 point

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.

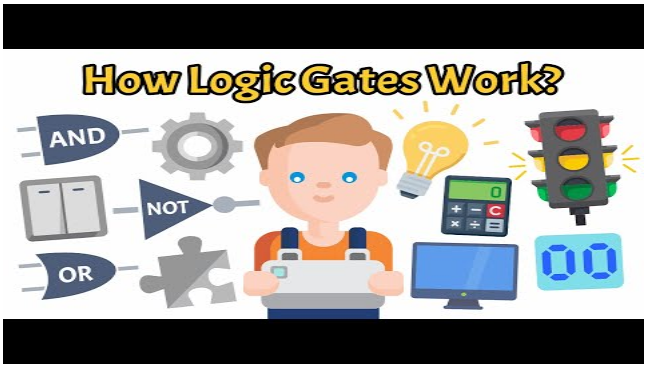
- ◯ Ready to move on
- ◯ I can't get my gate to work

Skip to question 15

Systems Integration Specialist

12. Your task is to create a gate that will integrate the inputs from the ignition and power connections gate and manual override gate. Your gate needs to work when the ignition and power connections gate is giving a high output and when the manual override control has not been pressed and is therefore giving a high output. However, if the manual override control is engages, and is giving a low output, your gate should not allow the smart automatic headlights control system to operate. What type of gate will you build? **Type your answer using all uppercase letters** * 1 point

Watch this video if you need more help understanding logic gates



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B.

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

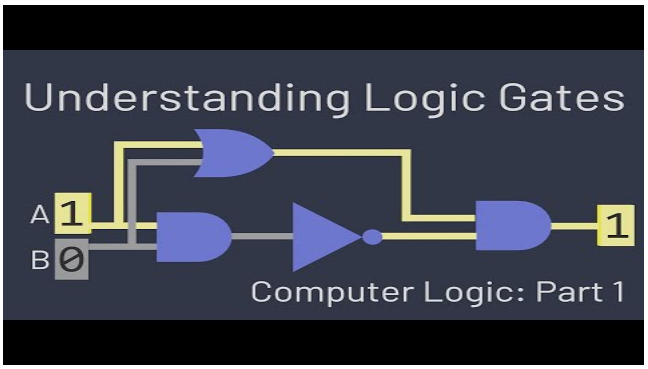
C.

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

13. Which truth table represents the logic gate that you are designing? **Type your answer using an uppercase letter** * 1 point

_____

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



http://youtube.com/watch?v=INEtYZqtjTo

14. 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 15

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 smart automatic headlight control system.

15. Your smart automatic headlight control system should turn on when: * 1 point

-The manual override is not engaged
And
-The car's engine is running
And
-Either the light intensity is low or the headlights are turned on.

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.