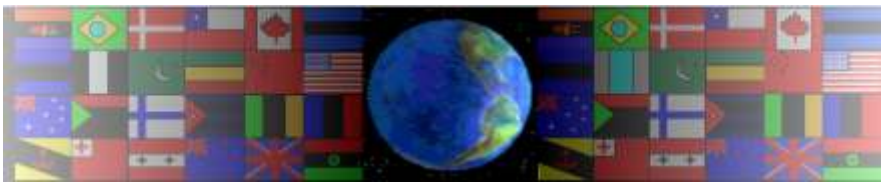
DIGITAL LOGIC CIRCUITS

On behalf of The World Association of Technology Teachers

W.A.T.T.



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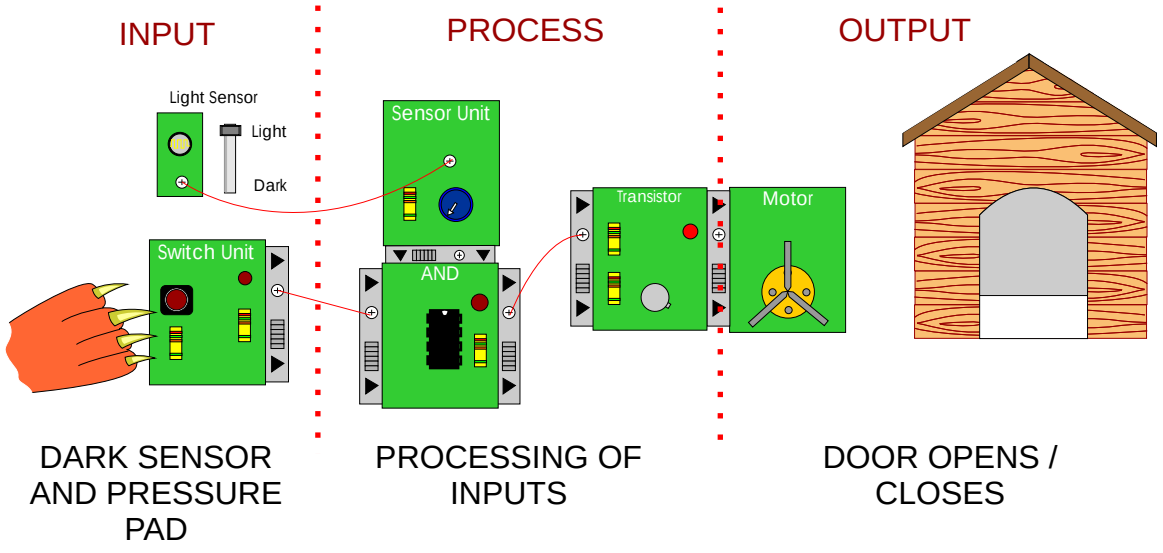
This exercise can be printed and used by teachers and students. It is recommended that you view the website (www.technologystudent.com) before attempting the design sheet .

SAMPLE AND GATE LOGIC CIRCUIT

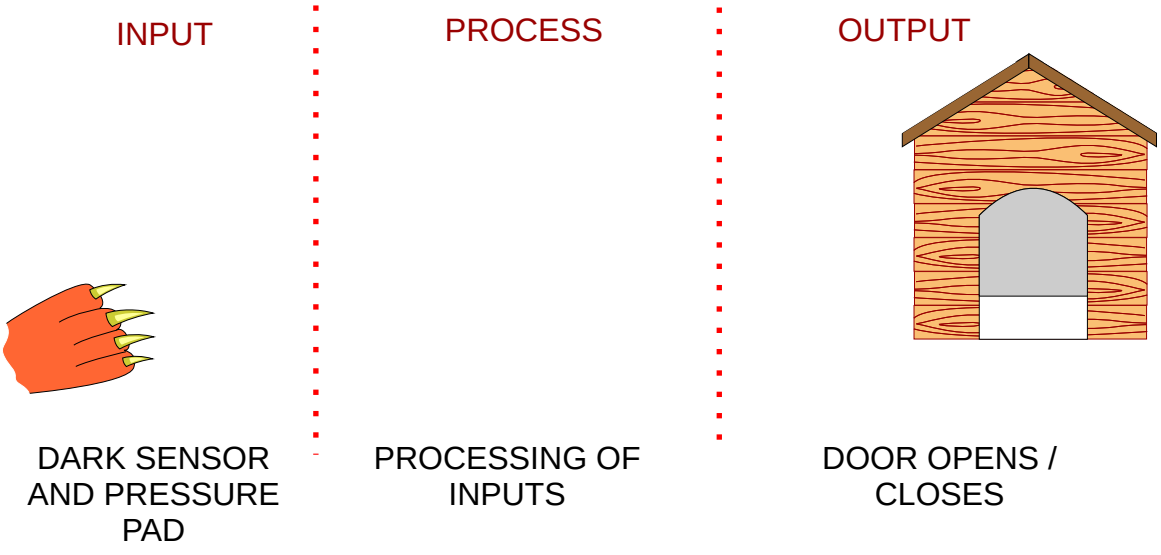
Below is a simple AND gate logic circuit designed for a dog. The dog's owner is very concerned that when he is at work he can gain entrance to the kennel he has made. The kennel is situated outside. However, recently a cat has been entering the kennel and eating the dogs food. The owner has fitted an electronic device that is activated when the dog passes close to a light / dark sensor and presses a hidden pressure pad. Once this has been completed successfully, a motor opens the kennel door.

1. The prototype circuit is built from a kit of modules eg. a light/dark sensor module, an AND gate etc... However, the circuit has failed. Clearly identify the module that is likely to be the cause of the failure.



2. Why is it likely that this part of the circuit will fail?

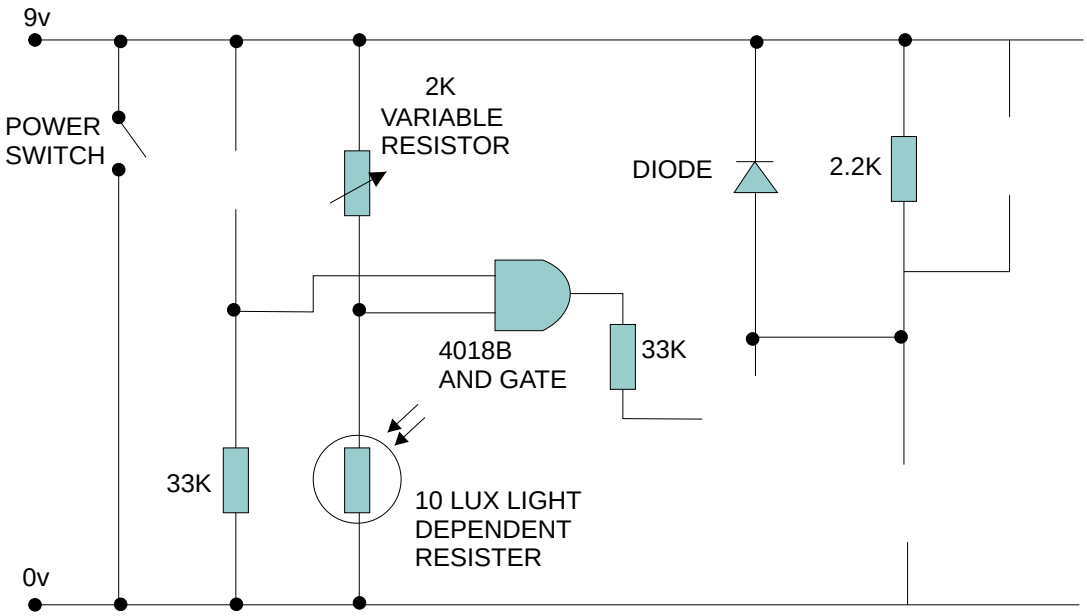
In the space below, draw the circuit built from modules, with a replacement module which makes it much more likely that the circuit will work successfully. Label the new module.



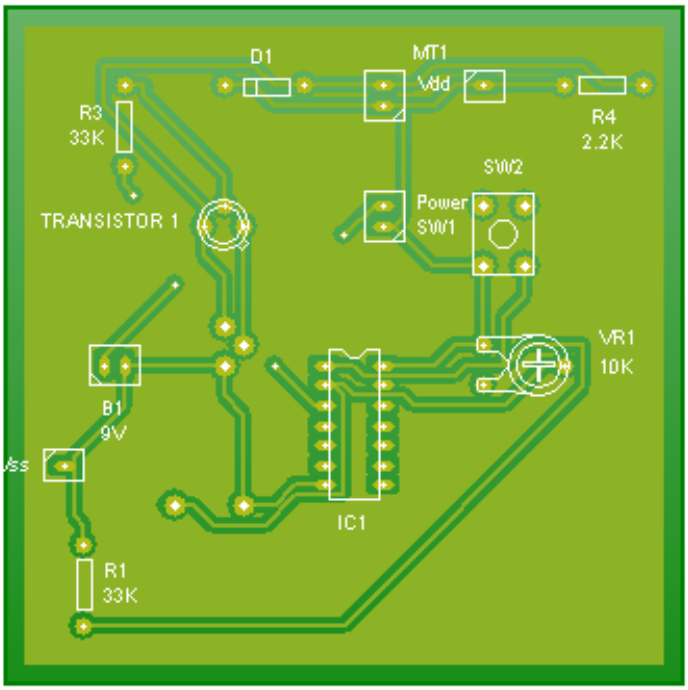
3. Why is the new module likely to be successful?

SAMPLE AND GATE LOGIC CIRCUIT

4. The prototype circuit made from modules such as a light/dark sensor and AND gate module etc... has be converted into a circuit diagram. This is shown below. However, four key components are missing. Complete the diagram by adding the four correct symbols.



5. The complete circuit diagram has been converted to a PCB layout, shown below. However, two key components are missing. They are still to be soldered into position. Draw the missing components in position. Label the components.



6. Explain why it may be advisable to use a low voltage (transformer) to operate the circuit and motor.