

Task 1 - Design

You must:

- a) produce a design specification that builds on the design criteria for the circuitry, including any references to research used
- b) generate a suitable design for the circuitry, including:
 - selection of appropriate sensors with justifications
 - calculations of the values required for successful operation, including the power required by the circuitry and the motors, timings and values for at least two different types of component
 - configuration of the circuitry including a circuit diagram and wiring diagram.
 - printed circuitry board (PCB) layout for the circuitry
- c) simulate the performance of the proposed design using CAD software
- d) assemble a physical model of the circuitry and validate its operation
- e) produce a bill of materials (BoM) listing all of the parts required in your final design proposal.

Conditions of assessment:

- the time allocated for this task is **14 hours**
- you must carry out the task on your own, under **controlled conditions**.

Controlled conditions:

- you must only work on the tasks in the allocated times
- assessment evidence must be handed in at the end of each session for secure storage which cannot be accessed
- you must not share or discuss your work with other candidates
- you are not permitted to bring any materials into the assessment session.

What must be produced for marking:

- design specification
- design calculations, including all workings
- justifications of design options for the sensors
- circuit diagram and wiring diagram
- PCB layout
- outcomes of the virtual modelling of the proposed circuit design, either as screen captures or printouts
- records of the results of testing the physical model of the circuit
- bill of materials
- any notes produced of research undertaken including citation of sources and internet search history.

Resources:

- access to internet
- access to PCB software
- access to appropriate CAD software suitable for circuit design and simulation
- manufacturer's datasheets (for electronic components)
- scientific calculator for design calculations
- basic electronic components including: capacitors, resistors, sensor components, integrated and discrete components, wiring and terminal pins
- access to appropriate circuit modelling methods
- DC power supply unit.

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