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 test its functionality
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
- record of outcome of testing the functionality of the physical model of the circuit and any changes if necessary
- bill of materials.

Additional evidence

- any notes produced of research undertaken including citation of sources and internet search history must be submitted to ensure the authenticity of evidence produced.

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, cables, connectors and cable terminations
- access to appropriate circuit modelling methods
- DC power supply unit.