Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate 2017

Marking Scheme

Technology Tasks

Ordinary and Higher Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.

Instructions to candidates:

- Design and make any **one** of the design tasks listed opposite.
- The design task submitted for assessment must consist of two components:
  - a design folder *and*
  - an artefact
- All work submitted for assessment must be clearly identified with your examination number.
- Tasks submitted for assessment must be the candidates **own individual work**.
- The design task must be completed in school under the supervision of the class teacher.
- When using research sources, including the Internet, the sources must be acknowledged. Research material copied directly from the Internet or from other sources and presented as your own work will not receive any marks.
- Shading and colour should be used where appropriate in your design folder.
- Coursework which does not demonstrate a range of manual processing skills and assembly techniques as outlined in the syllabus will lose marks.
- Coursework where specialist processes (e.g. CAD CAM) are used, but are not supported in the design folder by the inclusion of drawings and/or descriptions as appropriate will lose marks.
- If micro-processors are used in the electronic sub-system a diagram showing Inputs and Outputs as well as any relevant flowsheet/program should be included in your design folder.
- All important operating features must be clearly visible without dismantling.
- Presentation and finished appearance of both folder and artefact are important.

The Design Task must be available for assessment by Friday 28 April 2017.

Storage of design tasks:

On completion of the design task, school authorities should ensure that the finished artefact and design folder are kept in a safe place under lock and key until the examining process (including appeals) has concluded.

Allocation of marks:

Design Tasks

240 marks are allocated for design tasks at Ordinary Level.
200 marks are allocated for design tasks at Higher Level.

The Design Folder

Forty percent (40%) of the marks are allocated for the design folder.

The Artefact

Sixty percent (60%) of the marks are allocated for the artefact.

Information for examination candidates:

Marking Scheme Headings

The table below gives an outline of the marking headings used to assess your task. While the same headings apply at both levels, the marking criteria at Higher Level demand greater detail and precision in both the design folder and the artefact. While the general headings and marks will largely remain the same, assumptions about future marking schemes on the basis of past schemes should be avoided. (Ordinary and Higher Level marking schemes are available on www.examinations.ie).

It is recommended that evidence of each stage is reflected in your design folder.

Folder		
Analysis of brief	Analysis should incorporate the following features: Breakdown of the brief and design specification/list of objectives specific to the task.	***5***
Investigation of possible solutions	Evidence of investigation: (sketches, photos, descriptions, etc.) Relevant research on the task itself and its mechanical/electronic systems.	***5***
Design Ideas	One Design Idea presented in 3D format (Ordinary level). Two Design Ideas presented in 3D format (Higher level).	***6***
Criteria for selection of solution	Valid justification of your selected idea and the sub-system/s.	***4***
Sketches /drawings for manufacture	Working drawings of the chosen solution and circuit drawing/s (flow-sheet where applicable).	***6***
Manufacturing sequence/processes	Sequence of events for the manufacture of the chosen solution. Materials List with sizes and costs.	***5***
Testing and Evaluation	Evidence of testing/modification during manufacture and evaluation against the brief/design specification and/or third party evaluation.	***5***
Presentation of folder	Layout: use of diagrams, sketches, photographs, neat and orderly.	***4***
Artefact		
Artefact satisfies brief	Does the artefact produced by the candidate satisfy the brief?	***5***
Suitability, Functionality	Do all the necessary elements of the artefact function?	***5***
Design/Inventiveness	Inventive design of the artefact and sub-system?	***5***
Originality, commercial comp.	Creative use of materials/recycled parts/electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	***5***
Appropriateness of materials	Materials selected suited to their respective functions?	***5***
Appropriate sub-system(s)	Appropriate electro-mechanical/electronic sub-system?	***5***
App. manufacturing processes	Complete artefact and sub-system manufactured using appropriate processes?	***5***
Quality of processes	Quality of the artefact after manufacture?	***5***
Assembly	Appropriate methods of assembly used? Quality of assembly.	***5***
Detailed finish/Safety Considerations	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	***5***
Tech. competencies/ Application of skills	Appropriate level and range of skills/technological competencies?	***5***
Overall presentation	Attractive, well presented artefact?	***5***

A	Marionette
	Design and make an **electro-mechanically controlled marionette** using a theme of your choice.

Ordinary Level Folder		
Analysis of brief	Design should incorporate the following features: Marionette style puppet (suspended). Theme of choice. Should be electro-mechanically controlled.	***5***
Investigation of possible solutions	Evidence of investigation: (sketches, photos, etc.) Examples of marionette style puppets and relevant mechanical/electronic systems.	***5***
Design Ideas	Electro-mechanically controlled marionette : Sketch of one design shown.	6
Criteria for selection of solution	Valid justification of this idea (at least two reasons).	***4***
Sketches /drawings for manufacture	Manufacture drawing of the chosen solution and sub-system.	***6***
Manufacturing sequence/processes	Sequence of events for manufacture of the chosen solution.	***5***
Testing and Evaluation	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	***5***
Presentation of folder	Layout: use of diagrams, sketches, photographs, neat and orderly.	***4***

Ordinary Level Product		
Product satisfies brief	Is the product a marionette with an electro-mechanical sub-system?	***5***
Suitability, Functional	Do all the necessary elements of the marionette function?	***5***
Design/Inventiveness	Inventive design of the marionette and sub-system?	***5***
Originality, commercial comp.	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	***5***
Appropriateness of materials	Materials selected suited to their respective functions?	***5***
Appropriate sub-system(s)	Appropriate electro-mechanical sub-system?	***5***
App. manufacturing processes	Complete marionette and sub-system manufactured using an appropriate range of processes?	***5***
Quality of processes	Quality of the product after manufacture?	***5***
Assembly	Appropriate methods of assembly used? Quality of assembly.	***5***
Detailed finish/Safety Considerations	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	***5***
Tech. competencies/ Application of skills	Appropriate level and range of skills/technological competencies?	***5***
Overall presentation	Attractive, well presented product?	***5***

A	Marionette
	Design and make an **electro-mechanically controlled marionette** using a theme of your choice.

Higher Level Folder		
Analysis of brief	Problem posed by brief broken down into identifiable units? **A.** Design should incorporate the following features: Electro-mechanically controlled marionette of any given theme ..... **(0-3)** **B.** Design specification generated/list of objectives..... **(0-2)** (Restate brief: Total mark = 1)	***5***
Investigation of possible solutions	Evidence of investigation/identification/research: (sketches, photos, etc.) **A.** Various types of marionette of various themes, etc. ..... **(0-3)** **B.** electro-mechanical sub-system/electronic system..... **(0-2)**	***5***
Design Ideas	**A.** Marionette Design 1 - well sketched & annotated..... **(0-3)** **B.** Marionette Design 2 - well sketched & annotated..... **(0-3)**	***6***
Criteria for selection of solution	**A.** Selected design identified. ..... **(0-2)** **B.** Valid justification of selected design idea and sub-system ..... **(0-2)**	***4***
Sketches /drawings for manufacture	Dimensioned/scaled drawings-sketches associated with manufacture. **A.** Detailed drawings of the chosen solution..... **(0-3)** **B.** Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . **(0-3)**	***6***
Manufacturing sequence/processes	**A.** Sequence of events for manufacture of the chosen solution ..... **(0-2)** **B.** Materials list with sizes and costing..... **(0-3)**	***5***
Testing and Evaluation	**A.** Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation ..... **(0-3)** **B.** Possible improvements identified..... **(0-2)**	***5***
Presentation of folder	**A.** Layout: use of diagrams, sketches, photographs, neat and orderly ..... **(0-3)** **B.** Correct sequence of presentation as outlined in form S.67 (Design Tasks)... **(0-1)**	***4***
Higher Level Product		
Product satisfies brief	**A.** Is the product a marionette with a recognisable theme? ..... **(0-3)** **B.** Does it incorporate an electro-mechanical sub-system? ..... **(0-2)**	***5***
Suitability, Functional	**A.** Does the marionette function? ..... **(0-3)** **B.** Does the electro-mechanical system work? ..... **(0-2)**	***5***
Design/Inventiveness	**A.** Inventive design of the marionette and subsystem and/or mock-up of all or part of the solution? (model = 2) ..... **(0-5)**	***5***
Originality, commercial comp.	**A.** Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components?..... **(0-5)**	***5***
Appropriateness of materials	**A.** Materials selected suited to their respective functions? (strong, robust, rigid, etc.)..... **(0-5)**	***5***
Appropriate sub-system(s)	**A.** Appropriate electro-mechanical sub-system, reliable? ..... **(0-5)** (Not working max. mark 4)	***5***
App. manufacturing processes	**A.** Marionette manufactured using an appropriate range of processes? ..... **(0-3)** **B.** sub-system manufactured using an appropriate range of processes? ..... **(0-2)**	***5***
Quality of processes	**A.** Quality of Marionette after manufacture using stated processes? ..... **(0-3)** **B.** Quality of the sub-system after manufacture? ..... **(0-2)**	***5***
Assembly	**A.** Appropriate methods of assembly used? ..... **(0-3)** **B.** Quality of assembly ..... **(0-2)**	***5***
Detailed finish/Safety Considerations	**A.** No sharp edges or other safety hazards?..... **(0-3)** **B.** All parts well finished? ..... **(0-2)**	***5***
Tech. competencies/ Application of skills	Does the product demonstrate that the candidate has an: **A.** Appropriate range & level of technological competencies? (Marionette)..... **(0-3)** **B.** Appropriate range & level of technological competencies? (sub-system) .... **(0-2)**	***5***
Overall presentation	**A.** Attractive well presented product?..... **(0-4)** **B.** Instructions for use (if needed), controls labelled?..... **(0-1)**	***5***

B	Novelty Toy
	Design and make an **electro-mechanical novelty toy** powered using a renewable energy source.

Ordinary Level Folder		
Analysis of brief	Design should incorporate the following features: Novelty toy. Powered using a renewable energy source. Should be electro-mechanical in operation.	***5***
Investigation of possible solutions	Evidence of investigation: (sketches, photos, etc.) Various types of novelty toys, possible electro-mechanical sub-systems and renewable energy sources.	***5***
Design Ideas	Electro-mechanical novelty toy powered using a renewable energy source. Sketch of one design shown.	6
Criteria for selection of solution	Valid justification of this idea (at least two reasons).	***4***
Sketches /drawings for manufacture	Manufacture drawing of the chosen solution and sub-system.	***6***
Manufacturing sequence/processes	Sequence of events for manufacture of the chosen solution.	***5***
Testing and Evaluation	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	***5***
Presentation of folder	Layout: use of diagrams, sketches, photographs, neat and orderly.	***4***

Ordinary Level Product		
Product satisfies brief	Is the product an electro-mechanical novelty toy with powered by a renewable energy source?	***5***
Suitability, Functional	Do all the necessary elements of the novelty toy and energy source function?	***5***
Design/Inventiveness	Inventive design of the novelty toy and sub-system?	***5***
Originality, commercial comp.	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	***5***
Appropriateness of materials	Materials selected suited to their respective functions?	***5***
Appropriate sub-system(s)	Appropriate electro-mechanical sub-system powered by a renewable energy source?	***5***
App. manufacturing processes	Complete novelty toy and sub-system manufactured using an appropriate range of processes?	***5***
Quality of processes	Quality of the product after manufacture?	***5***
Assembly	Appropriate methods of assembly used? Quality of assembly.	***5***
Detailed finish/Safety Considerations	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	***5***
Tech. competencies/ Application of skills	Appropriate level and range of skills/technological competencies?	***5***
Overall presentation	Attractive, well presented product?	***5***

B	Novelty Toy
	Design and make an **electro-mechanical novelty toy** powered using a renewable energy source.

Higher Level Folder		
Analysis of brief	Problem posed by brief broken down into identifiable units? (Restate: mark = 1) **A.** Novelty, electro-mechanical with renewable energy source ..... **(0-3)** **B.** Design specification generated/list of objectives..... **(0-2)**	***5***
Investigation of possible solutions	Evidence of investigation/identification/research: (sketches, photos, etc.) **A.** Various types of novelty toy, ... **(0-3)** **B.** Electro-mechanical sub-systems, renewable energy sources.. ..... **(0-2)**	***5***
Design Ideas	**A.** Novelty Toy & sub-system design 1 - well sketched & annotated ..... **(0-3)** **B.** Novelty Toy & sub system design 2 - well sketched & annotated ..... **(0-3)**	***6***
Criteria for selection of solution	**A.** Selected design identified. ..... **(0-2)** **B.** Valid justification of selected design idea and sub-system ..... **(0-2)**	***4***
Sketches /drawings for manufacture	Dimensioned/scaled drawings-sketches associated with manufacture. **A.** Detailed drawings of the chosen solution ..... **(0-3)** **B.** Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . **(0-3)**	***6***
Manufacturing sequence/processes	**A.** Sequence of events for manufacture of the chosen solution. ..... **(0-2)** **B.** Materials list with sizes and costing ..... **(0-3)**	***5***
Testing and Evaluation	**A.** Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation ..... **(0-3)** **B.** Possible improvements identified..... **(0-2)**	***5***
Presentation of folder	**A.** Layout: use of diagrams, sketches, photographs, neat and orderly ..... **(0-3)** **B.** Correct sequence of presentation as outlined in form S.67 (Design Tasks)... **(0-1)**	***4***

Higher Level Product		
Product satisfies brief	**A.** Is the product a novelty toy and is it complete? ..... **(0-3)** **B.** Is it electro-mechanically operated with a renewable energy source? ..... **(0-2)**	***5***
Suitability, Functional	**A.** Does the novelty Toy function?..... **(0-3)** **B.** Is the renewable energy source functional/have the potential to function? **(0-2)**	***5***
Design/Inventiveness	**A.** Inventive design of the Novelty Toy and sub-system and/or mock-up of all or part of the solution? (model = 2) ..... **(0-5)**	***5***
Originality, commercial comp.	**A.** Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components?..... **(0-5)**	***5***
Appropriateness of materials	**A.** Materials selected suited to their respective functions? (strong, robust, rigid, etc.)..... **(0-5)**	***5***
Appropriate sub-system(s)	**A.** Appropriate electro-mechanical sub-system? ..... **(0-3)** **B.** Appropriate renewable energy source?..... **(0-2)** (Not working max. mark 4)	***5***
App. manufacturing processes	**A.** Novelty Toy manufactured using an appropriate range of processes?..... **(0-3)** **B.** Sub-system manufactured using an appropriate range of processes? ..... **(0-2)**	***5***
Quality of processes	**A.** Quality of Novelty Toy after manufacture..... **(0-3)** **B.** Quality of the control system after manufacture?..... **(0-2)**	***5***
Assembly	**A.** Appropriate methods of assembly used? ..... **(0-3)** **B.** Quality of assembly ..... **(0-2)**	***5***
Detailed finish/Safety Considerations	**A.** No sharp edges or other safety hazards?..... **(0-3)** **B.** All parts well finished? ..... **(0-2)**	***5***
Tech. competencies/ Application of skillss	Does the product demonstrate that the candidate has an: **A.** Appropriate range & level of technological competencies? (Novelty Toy).... **(0-3)** **B.** Appropriate range & level of technological competencies? (sub-system) .... **(0-2)**	***5***
Overall presentation	**A.** Attractive well presented product?..... **(0-4)** **B.** Instructions for use (if needed), controls labelled?..... **(0-1)**	***5***

C	Wheelie Bin Scales
	Globally many people pay for their household waste disposal, based on weight. Build **a mechanical and/or electronic working model of a scales** for a wheelie bin. The scales should indicate visually if a maximum weight has been exceeded and if so, an audible warning should be given.

Ordinary Level Folder		
Analysis of brief	Design should incorporate the following features: Working model of a scales for a wheelie bin, visual indication if maximum weight exceeded, audible warning if maximum weight exceeded.	***5***
Investigation of possible solutions	Evidence of investigation: (sketches, photos, etc.) Various types of wheelie bin scales, visual displays and audible warning systems.	***5***
Design Ideas	Wheelie bin scales with visual and audible warning: Sketch of one design shown.	6
Criteria for selection of solution	Valid justification of this idea (at least two reasons).	***4***
Sketches /drawings for manufacture	Manufacture drawing of the chosen solution and sub-system.	***6***
Manufacturing sequence/processes	Sequence of events for manufacture of the chosen solution.	***5***
Testing and Evaluation	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	***5***
Presentation of folder	Layout: use of diagrams, sketches, photographs, neat and orderly.	***4***

Ordinary Level Product		
Product satisfies brief	Is the product a wheelie bin scales with both a visual and audible warning system if the maximum load is exceeded?	***5***
Suitability, Functional	Do all the necessary elements of the wheelie bin scales function?	***5***
Design/Inventiveness	Inventive design of the wheelie bin scales and excessive load warning system?	***5***
Originality, commercial comp.	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	***5***
Appropriateness of materials	Materials selected suited to their respective functions?	***5***
Appropriate sub-system(s)	Appropriate mechanical and or electronic sub-system?	***5***
App. manufacturing processes	Complete wheelie bin scales and sub-system manufactured using an appropriate range of processes?	***5***
Quality of processes	Quality of the product after manufacture?	***5***
Assembly	Appropriate methods of assembly used? Quality of assembly.	***5***
Detailed finish/Safety Considerations	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	***5***
Tech. competencies/ Application of skills	Appropriate level and range of skills/technological competencies?	***5***
Overall presentation	Attractive, well presented product?	***5***

C — Wheelie Bin Scales

Globally many people pay for their household waste disposal, based on weight.
Build **a mechanical and/or electronic working model of a scales** for a wheelie bin.
The scales should indicate visually if a maximum weight has been exceeded and if so, an audible warning should be given.

Higher Level Folder

Analysis of brief	Problem posed by brief broken down into identifiable units? (Restate: mark = 1) **A.** Weighing Scales, mechanical/electronic for a Wheelie Bin ..... **(0-3)** **B.** Design specification generated/list of objectives..... **(0-2)**	***5***
Investigation of possible solutions	Evidence of investigation/identification/research: (sketches, photos, etc.) **A.** Various types of wheelie bin scales, ... **(0-3)** **B.** Existing mechanical/electronic solutions.. ..... **(0-2)**	***5***
Design Ideas	**A.** Scales & sub-system design 1 - well sketched & annotated ..... **(0-3)** **B.** Scales & sub system design 2 - well sketched & annotated..... **(0-3)**	***6***
Criteria for selection of solution	**A.** Selected design identified. ..... **(0-2)** **B.** Valid justification of selected design idea and sub-system ..... **(0-2)**	***4***
Sketches /drawings for manufacture	Dimensioned/scaled drawings-sketches associated with manufacture. **A.** Detailed drawings of the chosen solution..... **(0-3)** **B.** Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . **(0-3)**	***6***
Manufacturing sequence/processes	**A.** Sequence of events for manufacture of the chosen solution. ..... **(0-2)** **B.** Materials list with sizes and costing..... **(0-3)**	***5***
Testing and Evaluation	**A.** Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation ..... **(0-3)** **B.** Possible improvements identified..... **(0-2)**	***5***
Presentation of folder	**A.** Layout: use of diagrams, sketches, photographs, neat and orderly ..... **(0-3)** **B.** Correct sequence of presentation as outlined in form S.67 (Design Tasks)... **(0-1)**	***4***

Higher Level Product

Product satisfies brief	**A.** Is the product a Wheelie Bin Scales and is it complete?..... **(0-3)** **B.** Does it have a visual and audible warning system for excessive weight?..... **(0-2)**	***5***
Suitability, Functional	**A.** Is the Wheelie Bin Scales suitable for use? ..... **(0-3)** **B.** Does it have a functional visual and audible warning system?..... **(0-2)**	***5***
Design/Inventiveness	**A.** Inventive design of the Wheelie Bin Scales and sub-system and/or mock-up of all or part of the solution? (model = 2) ..... **(0-5)**	***5***
Originality, commercial comp.	**A.** Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components?..... **(0-5)**	***5***
Appropriateness of materials	**A.** Materials selected suited to their respective functions? (strong, robust, rigid, etc.)..... **(0-5)**	***5***
Appropriate sub-system(s)	**A.** Appropriate mechanical sub-system?..... **(0-3)** **B.** Appropriate electronic sub-system? ..... **(0-2)** (Not working max. mark 4)	***5***
App. manufacturing processes	**A.** Scales manufactured using an appropriate range of processes?..... **(0-3)** **B.** sub-system manufactured using an appropriate range of processes? ..... **(0-2)**	***5***
Quality of processes	**A.** Quality of Scales after manufacture..... **(0-3)** **B.** Quality of the Visual and audible warning system after manufacture?..... **(0-2)**	***5***
Assembly	**A.** Appropriate methods of assembly used? ..... **(0-3)** **B.** Quality of assembly..... **(0-2)**	***5***
Detailed finish/Safety Considerations	**A.** No sharp edges or other safety hazards?..... **(0-3)** **B.** All parts well finished? ..... **(0-2)**	***5***
Tech. competencies/ Application of skillss	Does the product demonstrate that the candidate has an: **A.** Appropriate range & level of technological competencies? (Scales)..... **(0-3)** **B.** Appropriate range & level of technological competencies? (sub-system) .... **(0-2)**	***5***
Overall presentation	**A.** Attractive well presented product?..... **(0-4)** **B.** Instructions for use (if needed), controls labelled?..... **(0-1)**	***5***

D — Entry Gate System

Safety at light rail platforms is of utmost importance. With this in mind, design and make a **working model of an entry gate system** to control access to the boarding platform area. The gate should only open when a train comes to a halt at the platform and the station-master activates a switch.

Ordinary Level Folder

Analysis of brief	Design should incorporate the following features: Working model of a Light rail platform entry gate system. Must not activate until the train has come to a halt And a manual switch is activated.	***5***
Investigation of possible solutions	Evidence of investigation: (sketches, photos, etc.) Various types of entry gate systems and/or relevant mechanical/electronic systems.	***5***
Design Ideas	Working model of entry gate system with specified safety features: Sketch of one design shown.	6
Criteria for selection of solution	Valid justification of this idea (at least two reasons).	***4***
Sketches /drawings for manufacture	Manufacture drawing of the chosen solution and sub-system.	***6***
Manufacturing sequence/processes	Sequence of events for manufacture of the chosen solution.	***5***
Testing and Evaluation	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	***5***
Presentation of folder	Layout: use of diagrams, sketches, photographs, neat and orderly.	***4***

Ordinary Level Product

Product satisfies brief	Is the product an entry gate system suitable for a light rail platform? Does it have the prescribed safety features?	***5***
Suitability, Functional	Do all the necessary elements of the entry gate system function?	***5***
Design/Inventiveness	Inventive design of the entry gate system and sub-system?	***5***
Originality, commercial comp.	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	***5***
Appropriateness of materials	Materials selected suited to their respective functions?	***5***
Appropriate sub-system(s)	Appropriate sub-system?	***5***
App. manufacturing processes	Complete entry gate system and sub-system manufactured using an appropriate range of processes?	***5***
Quality of processes	Quality of the product after manufacture?	***5***
Assembly	Appropriate methods of assembly used? Quality of assembly.	***5***
Detailed finish/Safety Considerations	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	***5***
Tech. competencies/ Application of skills	Appropriate level and range of skills/technological competencies?	***5***
Overall presentation	Attractive, well presented product?	***5***

D	Entry Gate System
	Safety at light rail platforms is of utmost importance. With this in mind, design and make a **working model of an entry gate system** to control access to the boarding platform area. The gate should only open when a train comes to a halt at the platform and the station-master activates a switch.

Higher Level Folder

Analysis of brief	Problem posed by brief broken down into identifiable units? (Restate: mark = 1) **A.** Entry gate to boarding platform over ridden by automatic & manual switch **(0-3)** **B.** Design specification generated/list of objectives..... **(0-2)**	***5***
Investigation of possible solutions	Evidence of investigation/identification/research: (sketches, photos, etc.) **A.** Various types of entry gate systems for pedestrians, ... **(0-3)** **B.** Electro-mechanical sub-systems, various mechanisms & switches.. ..... **(0-2)**	***5***
Design Ideas	**A.** Entry Gate & sub-system design 1 - well sketched & annotated ..... **(0-3)** **B.** Entry Gate & sub system design 2 - well sketched & annotated ..... **(0-3)**	***6***
Criteria for selection of solution	**A.** Selected design identified. ..... **(0-2)** **B.** Valid justification of selected design idea and sub-system ..... **(0-2)**	***4***
Sketches /drawings for manufacture	Dimensioned/scaled drawings-sketches associated with manufacture. **A.** Detailed drawings of the chosen solution ..... **(0-3)** **B.** Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . **(0-3)**	***6***
Manufacturing sequence/processes	**A.** Sequence of events for manufacture of the chosen solution. ..... **(0-2)** **B.** Materials list with sizes and costing ..... **(0-3)**	***5***
Testing and Evaluation	**A.** Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation ..... **(0-3)** **B.** Possible improvements identified..... **(0-2)**	***5***
Presentation of folder	**A.** Layout: use of diagrams, sketches, photographs, neat and orderly ..... **(0-3)** **B.** Correct sequence of presentation as outlined in form S.67 (Design Tasks)... **(0-1)**	***4***

Higher Level Product

Product satisfies brief	**A.** Is the product an Entry Gate to a platform and is it complete?..... **(0-3)** **B.** Does it have the outlined safety features? ..... **(0-2)**	***5***
Suitability, Functional	**A.** Is the Entry Gate suitable for use? ..... **(0-3)** **B.** Do the automatic and manual switches work as prescribed?..... **(0-2)**	***5***
Design/Inventiveness	**A.** Inventive design of the Entry gate system and sub-system and/or mock-up of all or part of the solution? (model = 2) ..... **(0-5)**	***5***
Originality, commercial comp.	**A.** Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components?..... **(0-5)**	***5***
Appropriateness of materials	**A.** Materials selected suited to their respective functions? (strong, robust, rigid, etc.)..... **(0-5)**	***5***
Appropriate sub-system(s)	**A.** Appropriate mechanical sub-system?..... **(0-3)** **B.** Appropriate electronic sub-system? ..... **(0-2)** (Not working max. mark 4)	***5***
App. manufacturing processes	**A.** Entry Gate manufactured using an appropriate range of processes?..... **(0-3)** **B.** sub-system manufactured using an appropriate range of processes? ..... **(0-2)**	***5***
Quality of processes	**A.** Quality of Entry Gate after manufacture..... **(0-3)** **B.** Quality of the control system after manufacture?..... **(0-2)**	***5***
Assembly	**A.** Appropriate methods of assembly used? ..... **(0-3)** **B.** Quality of assembly ..... **(0-2)**	***5***
Detailed finish/Safety Considerations	**A.** No sharp edges or other safety hazards?..... **(0-3)** **B.** All parts well finished? ..... **(0-2)**	***5***
Tech. competencies/ Application of skillss	Does the product demonstrate that the candidate has an: **A.** Appropriate range & level of technological competencies? (Entry Gate)..... **(0-3)** **B.** Appropriate range & level of technological competencies? (sub-system) .... **(0-2)**	***5***
Overall presentation	**A.** Attractive well presented product?..... **(0-4)** **B.** Instructions for use (if needed), controls labelled?..... **(0-1)**	***5***

E	Hoist
	Design and make a **working model of an electro-mechanical hoist** to move building materials from the ground to first floor work-stations on a building site. The model should include suitable safety features.

Ordinary Level Folder		
Analysis of brief	Design should incorporate the following features: Electro-mechanical hoist. Be capable of transferring materials from a ground floor to the first floor. It must have appropriate safety features.	***5***
Investigation of possible solutions	Evidence of investigation: (sketches, photos, etc.) Various types of building site hoists and/or relevant mechanical/electronic systems.	***5***
Design Ideas	Electro-mechanical hoist to satisfy the brief: Sketch of one design shown.	6
Criteria for selection of solution	Valid justification of this idea (at least two reasons).	***4***
Sketches /drawings for manufacture	Manufacture drawing of the chosen solution and sub-system.	***6***
Manufacturing sequence/processes	Sequence of events for manufacture of the chosen solution.	***5***
Testing and Evaluation	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	***5***
Presentation of folder	Layout: use of diagrams, sketches, photographs, neat and orderly.	***4***

Ordinary Level Product		
Product satisfies brief	Is the product a working model of an electro-mechanical hoist capable of transferring materials from ground floor to first floor levels?	***5***
Suitability, Functional	Do all the necessary elements of the hoist function?	***5***
Design/Inventiveness	Inventive design of the hoist and sub-system?	***5***
Originality, commercial comp.	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	***5***
Appropriateness of materials	Materials selected suited to their respective functions?	***5***
Appropriate sub-system(s)	Appropriate electro-mechanical sub-system?	***5***
App. manufacturing processes	Complete hoist and sub-system manufactured using an appropriate range of processes?	***5***
Quality of processes	Quality of the product after manufacture?	***5***
Assembly	Appropriate methods of assembly used? Quality of assembly.	***5***
Detailed finish/Safety Considerations	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	***5***
Tech. competencies/ Application of skills	Appropriate level and range of skills/technological competencies?	***5***
Overall presentation	Attractive, well presented product?	***5***

E	Hoist
	Design and make a **working model of an electro-mechanical hoist** to move building materials from the ground to first floor work-stations on a building site. The model should include suitable safety features.

Higher Level Folder

Analysis of brief	Problem posed by brief broken down into identifiable units? (Restate: mark = 1) **A.** Ground to first floor Hoist, electro-mechanical with safety features ..... **(0-3)** **B.** Design specification generated/list of objectives..... **(0-2)**	***5***
Investigation of possible solutions	Evidence of investigation/identification/research: (sketches, photos, etc.) **A.** Various types of Hoist, ... **(0-3)** **B.** Electro-mechanical sub-systems, various mechanisms..... **(0-2)**	***5***
Design Ideas	**A.** Hoist & sub-system design 1 - well sketched & annotated..... **(0-3)** **B.** Hoist & sub system design 2 - well sketched & annotated ..... **(0-3)**	***6***
Criteria for selection of solution	**A.** Selected design identified. ..... **(0-2)** **B.** Valid justification of selected design idea and sub-system..... **(0-2)**	***4***
Sketches /drawings for manufacture	Dimensioned/scaled drawings-sketches associated with manufacture. **A.** Detailed drawings of the chosen solution..... **(0-3)** **B.** Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . **(0-3)**	***6***
Manufacturing sequence/processes	**A.** Sequence of events for manufacture of the chosen solution. ..... **(0-2)** **B.** Materials list with sizes and costing..... **(0-3)**	***5***
Testing and Evaluation	**A.** Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation ..... **(0-3)** **B.** Possible improvements identified..... **(0-2)**	***5***
Presentation of folder	**A.** Layout: use of diagrams, sketches, photographs, neat and orderly ..... **(0-3)** **B.** Correct sequence of presentation as outlined in form S.67 (Design Tasks)... **(0-1)**	***4***

Higher Level Product

Product satisfies brief	**A.** Is the product a Hoist and is it complete?.....**(0-3)** **B.** Does it have an electro-mechanical sub-system with app. safety features? ..**(0-2)**	***5***
Suitability, Functional	**A.** Is the Hoist suitable for use?.....**(0-3)** **B.** Can it transfer loads from ground to first floor with app. safety features?....**(0-2)**	***5***
Design/Inventiveness	**A.** Inventive design of the Hoist and sub-system and/or mock-up of all or part of the solution? (model = 2) .....**(0-5)**	***5***
Originality, commercial comp.	**A.** Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components?.....**(0-5)**	***5***
Appropriateness of materials	**A.** Materials selected suited to their respective functions? (strong, robust, rigid, etc.).....**(0-5)**	***5***
Appropriate sub-system(s)	**A.** Appropriate mechanical sub-system?.....**(0-3)** **B.** Appropriate electronic sub-system? .....**(0-2)** (Not working max. mark 4)	***5***
App. manufacturing processes	**A.** Hoist manufactured using an appropriate range of processes? .....**(0-3)** **B.** sub-system manufactured using an appropriate range of processes? .....**(0-2)**	***5***
Quality of processes	**A.** Quality of Hoist after manufacture .....**(0-3)** **B.** Quality of the control system after manufacture?.....**(0-2)**	***5***
Assembly	**A.** Appropriate methods of assembly used? .....**(0-3)** **B.** Quality of assembly.....**(0-2)**	***5***
Detailed finish/Safety Considerations	**A.** No sharp edges or other safety hazards?.....**(0-3)** **B.** All parts well finished? .....**(0-2)**	***5***
Tech. competencies/ Application of skillss	Does the product demonstrate that the candidate has an: **A.** Appropriate range & level of technological competencies? (Hoist) .....**(0-3)** **B.** Appropriate range & level of technological competencies? (sub-system) .....**(0-2)**	***5***
Overall presentation	**A.** Attractive well presented product? .....**(0-4)** **B.** Instructions for use (if needed), controls labelled? .....**(0-1)**	***5***

F	Automatic Vent
	Design and make a **working model of an automatic vent** that opens when the internal temperature in a dog kennel exceeds a given pre-set value. Note: It is only necessary to construct the relevant portion of the kennel.

Ordinary Level Folder		
Analysis of brief	Design should incorporate the following features: Automatic opening vent that responds to a rise in temperature. Suitable for a dog kennel. Working model of relevant portion of the kennel and vent.	***5***
Investigation of possible solutions	Evidence of investigation: (sketches, photos, etc.) Various types of automatic and manual vents and relevant mechanical/electronic systems.	***5***
Design Ideas	Working model of automatic vent: Sketch of one design shown.	6
Criteria for selection of solution	Valid justification of this idea (at least two reasons).	***4***
Sketches /drawings for manufacture	Manufacture drawing of the chosen solution and sub-system.	***6***
Manufacturing sequence/processes	Sequence of events for manufacture of the chosen solution.	***5***
Testing and Evaluation	Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation.	***5***
Presentation of folder	Layout: use of diagrams, sketches, photographs, neat and orderly.	***4***

Ordinary Level Product		
Product satisfies brief	Is the product an automatic vent suitable for a dog kennel. Is it designed to open in response to temperature gain?	***5***
Suitability, Functional	Do all the necessary elements of the automatic vent function?	***5***
Design/Inventiveness	Inventive design of the automatic vent and sub-system?	***5***
Originality, commercial comp.	Creative use of materials/recycled parts/ electro-mechanical components/ mechanisms/colour/shape. Acceptable use of commercial components?	***5***
Appropriateness of materials	Materials selected suited to their respective functions?	***5***
Appropriate sub-system(s)	Appropriate electro-mechanical sub-system?	***5***
App. manufacturing processes	Complete automatic vent and sub-system manufactured using an appropriate range of processes?	***5***
Quality of processes	Quality of the product after manufacture?	***5***
Assembly	Appropriate methods of assembly used? Quality of assembly.	***5***
Detailed finish/Safety Considerations	No sharp edges or safety hazards (loose parts, toxic paints etc.?)	***5***
Tech. competencies/ Application of skills	Appropriate level and range of skills/technological competencies?	***5***
Overall presentation	Attractive, well presented product?	***5***

F	Automatic Vent
	Design and make a **working model of an automatic vent** that opens when the internal temperature in a dog kennel exceeds a given pre-set value. Note: It is only necessary to construct the relevant portion of the kennel.

Higher Level Folder

Analysis of brief	Problem posed by brief broken down into identifiable units? (Restate: mark = 1) **A.** Automatic Vent, opens when temp exceeds a given value in a dog kennel .. **(0-3)** **B.** Design specification generated/list of objectives..... **(0-2)**	***5***
Investigation of possible solutions	Evidence of investigation/identification/research: (sketches, photos, etc.) **A.** Various types of vent, ... **(0-3)** **B.** Automatic control systems, various mechanisms.. ..... **(0-2)**	***5***
Design Ideas	**A.** Vent & sub-system design 1 - well sketched & annotated..... **(0-3)** **B.** Vent & sub system design 2 - well sketched & annotated..... **(0-3)**	***6***
Criteria for selection of solution	**A.** Selected design identified. ..... **(0-2)** **B.** Valid justification of selected design idea and sub-system..... **(0-2)**	***4***
Sketches /drawings for manufacture	Dimensioned/scaled drawings-sketches associated with manufacture. **A.** Detailed drawings of the chosen solution..... **(0-3)** **B.** Circuit drawings/Graphic of PIC circuit with inputs & outputs & Flowsheet . **(0-3)**	***6***
Manufacturing sequence/processes	**A.** Sequence of events for manufacture of the chosen solution. ..... **(0-2)** **B.** Materials list with sizes and costing..... **(0-3)**	***5***
Testing and Evaluation	**A.** Evidence of testing/modification during manufacture and/or evaluation against the brief/design specification and/or third party evaluation ..... **(0-3)** **B.** Possible improvements identified..... **(0-2)**	***5***
Presentation of folder	**A.** Layout: use of diagrams, sketches, photographs, neat and orderly ..... **(0-3)** **B.** Correct sequence of presentation as outlined in form S.67 (Design Tasks)... **(0-1)**	***4***

Higher Level Product

Product satisfies brief	**A.** Is the product an automatic vent and is it complete?..... **(0-3)** **B.** Does it open when the temperature rises in the dog kennel?..... **(0-2)**	***5***
Suitability, Functional	**A.** Is the Automatic Vent suitable for use?..... **(0-3)** **B.** Does it open automatically when the temp exceeds a given pre-set value?. **(0-2)**	***5***
Design/Inventiveness	**A.** Inventive design of the Automatic Vent and sub-system and/or mock-up of all or part of the solution? (model = 2) ..... **(0-5)**	***5***
Originality, commercial comp.	**A.** Creative use of materials/recycled parts/electronic components, mechanisms, colour, shape. Acceptable use of commercial components?..... **(0-5)**	***5***
Appropriateness of materials	**A.** Materials selected suited to their respective functions? (strong, robust, rigid, etc.)..... **(0-5)**	***5***
Appropriate sub-system(s)	**A.** Appropriate mechanical sub-system?..... **(0-3)** **B.** Appropriate electronic sub-system? ..... **(0-2)** (Not working max. mark 4)	***5***
App. manufacturing processes	**A.** Vent manufactured using an appropriate range of processes?..... **(0-3)** **B.** sub-system manufactured using an appropriate range of processes? ..... **(0-2)**	***5***
Quality of processes	**A.** Quality of Vent after manufacture..... **(0-3)** **B.** Quality of the control system after manufacture?..... **(0-2)**	***5***
Assembly	**A.** Appropriate methods of assembly used? ..... **(0-3)** **B.** Quality of assembly..... **(0-2)**	***5***
Detailed finish/Safety Considerations	**A.** No sharp edges or other safety hazards?..... **(0-3)** **B.** All parts well finished? ..... **(0-2)**	***5***
Tech. competencies/ Application of skillss	Does the product demonstrate that the candidate has an: **A.** Appropriate range & level of technological competencies? (Vent) ..... **(0-3)** **B.** Appropriate range & level of technological competencies? (sub-system) .... **(0-2)**	***5***
Overall presentation	**A.** Attractive well presented product?..... **(0-4)** **B.** Instructions for use (if needed), controls labelled?..... **(0-1)**	***5***