

Coimisiún na Scrúduithe Stáit State Examinations Commission

Junior Cycle Examination 2023

Engineering

Project Coursework Common Level

To be completed by 21 April 2023

210 marks

- 1. The project coursework for Junior Cycle Engineering consists of the:
 - manufacture of a Model Helix Elevator 210 marks.
- 2. Please familiarise yourself with the adjusted assessment arrangements for candidates taking the state examinations in the 2022/23 school year, that were issued by the Department of Education. As a result of these adjustments the 'Design Element' of this coursework, consisting of a Design Brief, Design Folio and Design Realisation, is not examinable and will not have marks allocated to it in 2023. Therefore, candidates are not required to complete this element of the coursework.
- 3. As a result of these changes, the total mark allocation for this coursework in 2023 is 210 marks, instead of the usual 280 mark total. However, the relative weighting between the coursework (70%) and the written paper (30%) will be retained. This will be achieved by reweighting the coursework mark before it is combined with the mark for the written component.
- 4. An outline marking scheme is shown on page 8.
- 5. Details of the *Model Helix Elevator* are shown on the accompanying drawings, pages 4 6.
- 6. Make and assemble the Model using the materials specified in the **Parts List** (page 7).
- 7. Note: Please ensure the Motor Adaptor (Part 12) is secured to the shaft of the 3V Motorised Gearbox (Part 39), using the grub screws provided.
- 8. Complete, test and solder the Electric Circuit.
- 9. Your **Examination Number** must be clearly shown, on the model, in the position indicated on the drawing (page 4).
- 10. Your completed coursework must be available for assessment by **21 April 2023**.
- 11. Note: So as to authenticate **your own individual work**, where specialist processes (e.g. CAD CAM) are used, these must be supported by the inclusion of drawings and/or descriptions as appropriate.
- 12. For further information on this project please see the video at the URL shown below. https://www.examinations.ie/video/index.php/JCEngineering2023

Authentication of coursework:

- 1. The coursework you submit for assessment must be **your own individual work** and must be completed in school under the supervision of your teacher.
- 2. Your model must not be removed from the school under any circumstances as doing so may result in the coursework being considered invalid and no marks will be awarded.
- 3. It is your responsibility, as the candidate, to comply with these instructions. If you fail to comply with these instructions, your teacher will not be able to validate and sign off on your coursework and you will not receive any marks for it.
- 4. **Note**: So as to authenticate **your own individual work**, where specialist processes (e.g. CAD CAM) are used, these must be supported by the inclusion of drawings and/or descriptions as appropriate.

Note:

- The circumstances in which the Minister for Education may withhold marks from candidates are set out in the "Rules and Programme for Secondary Schools".
- Anyone who helps a candidate to break examination rules can be prosecuted under the Education Act 1998.

Storage of Coursework

On completion of the coursework, school authorities should ensure that the finished Model is kept in a secure place until the examining process (including appeals) has concluded.

Note to Teachers:

- * Part 4 Compression Spring:
 - Steel/Stainless Steel; Ø2.5 mm; Length 140 mm; Internal Diameter 20 mm 20.4 mm; 12 mm – 13 mm spring pitch; with ground ends.
- ** Part 24 Marble Return Slide
 - This part may be finished using vinyl wrap, polished or painted.
- *** Part 28 Marble Return Chute
 - Schools may choose to 3D print this component or make alternative arrangements to source this component.
 - The STL File for 3D Printing the Marble Return Chute (Part 28) is available to download on the SEC website at the URL shown below. https://www.examinations.ie/video/index.php/JCEngineering2023



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Model Helix Elevator – Assembly Drawing



Junior Cycle - Engineering Project Common Level

PARTS LIST				
Part No.	Part Name	Required	Material and Description	
1	Top Support	1	4 mm, Aluminium (polished)	
2	Elevator Stanchion	1	Ø10 mm, Aluminium (polished)	
3	Spring Insert	1	Ø20 mm, Acrylic, Acetal or Aluminium (polished)	
4	Compression Spring	1	As supplied *(See note page 3)	
5	Elevator Track	1	2 mm, Aluminium (polished)	
6	Mixer	1	1.5 mm, Aluminium (polished or painted)	
7	Tower Slide	2	12 mm, Clear Acrylic (polished)	
8	Tower Base	1	12 mm, Clear Acrylic (polished)	
9	Mixer Funnel	2	Ø30 mm, Aluminium (polished)	
10	Separator	1	3 mm, Brass (polished)	
11	Separator Axle	1	M4 Threaded Bar	
12	Motor Adaptor	1	$Ø12 \times 12$ mm, with M3 Hole and Grub Screws	
13	Drive Pin	1	Ø2 mm, Steel Rod	
14	Adaptor Locator Pin	1	M3 Threaded Bar	
15	Elevator Track Clamp	1	4 mm, Aluminium (polished)	
16	Funnel Spacer	4	Ø6 mm, Aluminium Tube (polished)	
17	Funnel Support	1	4 mm, Aluminium (polished)	
18	Tower Cover	2	3 mm, Clear Acrylic (polished)	
19	Battery Holder Support	1	1.5 mm, Aluminium (polished)	
20	Base	1	5 mm, Coloured Acrylic (polished)	
21	Guide Rail	2	1.5 mm, Aluminium (polished)	
22	Marble Guide	1	$10 \times 10 \times 10 \times 1.5$ mm, U-Aluminium (polished)	
23	Motor Spacer	1	14 × 6 mm, Aluminium (polished)	
24	Marble Return Slide	1	1.5 mm, Aluminium **(See note page 3)	
25	Adjuster Nut	1	Ø20 mm, Aluminium (polished)	
26	Adjuster Spacer	1	Ø8 mm, Aluminium (polished)	
As Supplied				
27	Marble	8	Ø10 mm, Steel Ball Bearings	
28	Marble Return Chute	1	3D Printed *** (See note page 3)	
29	Base Support	4	Golf Ball with $Ø3 \times 15$ mm hole (painted)	
30	Base Support Screw	4	Mirror screw with cap	
31	Screw	10	M4 × 6, Allen Button Head or Pan Head, Steel	
32	Screw	9	M4 × 10, Allen Button Head or Pan Head, Steel	
33	Screw	8	M4 × 16, Allen Button Head or Pan Head, Steel	
34	Screw (Adjuster Nut)	1	M4 × 40, Allen Button Head or Pan Head, Steel	
35	Screw	10	M3 × 20, Allen Button Head or Pan Head, Steel	
36	Nut	15	M4, Steel	
37	Nut	10	M3, Steel	
38	Cap Nut	2	M4, Steel (Separator Axle)	
39	3V Motorised Gearbox	1	Inline Motor, Single Shaft – Ratio 200:1	
40	Motor Bracket	1	Plastic Inline Motor Bracket	
41	Switch	1	Toggle	
42	Battery Holder	1	2 × AA	

Outline Marking Scheme

The table below gives an outline of the marking headings that will be used to assess your completed coursework. While the general headings and marks below will largely remain the same, mark allocations may vary depending on the actual project and *'Design Element'* for any given year.

Model Helix Elevator – Outline Marking Scheme					
Section 1: Complete Model					
Headings	Marks				
Assembly	20				
Finish	20				
Mechanical Function	15				
Electrical Function	15				
Section	1 - Total	70			
Section 2: 'Design Element' (Not required for 2023 – See page 2)					
Section	2 - Total	-			
Section 3: Manufacture					
Headings	Marks				
Parts 1 & 2	5				
Parts 3, 12, 13 & 14	10				
Parts 5 & 15	10				
Part 6	10				
Parts 7	10				
Part 8	10				
Parts 9	5				
Parts 10 & 11	10				
Section 3 - Total					
Section 4: Manufacture					
Headings	Marks				
Parts 16 & Part 17	10				
Parts 18	10				
Parts 19 & 23	5				
Part 20 & Parts 29	10				
Parts 21 & Part 22	10				
Part 24	15				
Parts 25 & 26	10				
Section 4 – Total 70					
Overall Total in 2023 21					