



Coimisiún na Scrúduithe Stáit  
State Examinations Commission

**LEAVING CERTIFICATE EXAMINATION, 2017**

**ENGINEERING – TECHNOLOGY PROJECT: DESIGN**

Higher Level – 150 marks

**PROJECT MUST BE COMPLETED BY FRIDAY 10th MARCH, 2017**

**PLEASE READ CAREFULLY**

**General directions to candidates**

1. The project you design, make and submit for examination must be unique and be **your own individual work**, carried out in the school under the supervision of the teacher.

**Your own individual work** is intended to include the intellectual activity of design along with the practical activities of making the model and compiling a folio.

Proof of **your own individual work** must be obvious from both the model and folio presented for examination otherwise marks will be lost.

2. A detailed Marking Scheme is included on this paper. Your teacher will help you to familiarise yourself with the Marking Scheme.
3. Read the Design Brief carefully commencing with the **Introduction**. Plan and present your individual solution as outlined in the instructions given under the headings **Design Process** and **Design Realisation**.
4. Your completed project consisting of a model and design folio, **both clearly identified with your examination number**, must be available to the visiting examiner.

# Design Brief

## 1. Introduction

The Irish Coast Guard operates one of the world's most sophisticated Search and Rescue services. It directly manages and controls three marine rescue coordination centres, using a national paging and shipping monitoring network. Central to its Search and Rescue operations are Helicopters, the most modern of which is the Sikorsky S92. There are six located at four bases around Ireland. Each of the aircraft is fitted with a variable speed rescue winch/hoist, which allow rescue personnel to be lowered and raised safely to and from the rescue scene. The versatility of the aircraft is also enhanced by the fitting of an automated rear ramp. The ramp can be used for the deployment and recovery of personnel when the helicopter has landed on the ground.

Design a model Search and Rescue Helicopter to the general specifications outlined below. The Helicopter should be your own unique design and should:

- (a) Have one sliding door;
- (b) Incorporate an electric variable-speed winch/hoist;
- (c) Include an automated rear ramp.

**Special Notes: (i) It is not required that the model Helicopter should fly.  
(ii) Modified toys or recycled projects are not acceptable.**

Presentation of the completed project should ensure that:

- (a) All main operating features are **clearly visible without dismantling**;
- (b) The longest dimension does not exceed **350 mm**;
- (c) Electric power does not exceed **9 volts**.

## 2. Design Process (40 marks)

A design folio must be compiled which will detail your:

- (a) **Analysis of the given brief and investigation of possible solutions**;
- (b) **Criteria for selection of your own individual solution and production drawings/plans**;
- (c) **Testing and evaluation** of your design solution;
- (d) Special instructions, if required, regarding the testing of the solution by the examiner.

**Note: Marks are awarded as shown in Marking Scheme (Page 3 of 3).  
Computer-aided design (CAD) should be used where possible.**

## 3. Design Realisation (110 marks)

Using appropriate materials, make the model according to your own individual design plans. Computer numerical control (CNC) technology should be used, where possible, to support manufacture. You are required to manufacture and assemble all the parts, subject to the following guidelines:

- (a) Standard components may be used to support the assembly and interconnection of various parts;
- (b) Unnecessary recycling will result in lost marks. Recycling will be acceptable **only** in cases where a complex **part** cannot readily be made in the school;
- (c) **Bought-in electronic solutions will result in lost marks**;
- (d) Adhesives, if used, should be applied sparingly.

**Note: Marks are awarded as shown in Marking Scheme (Page 3 of 3).**

#### 4. Project presentation

Your completed project consisting of the model and design folio, **both clearly identified with your examination number**, must be available to the visiting examiner.

**Marks are awarded for quality of presentation and finished appearance of both the model and folio.**

### MARKING SCHEME

<b>HIGHER LEVEL</b>	
<b>MARKING CRITERIA - FOLIO</b>	
Analysis of brief	5 marks
Investigation of solutions	10 marks
Criteria for selection of solution	5 marks
Production drawings/plans	10 marks
Testing and evaluation	5 marks
Presentation of folio	5 marks
<b>TOTAL</b>	<b>40 marks</b>

<b>HIGHER LEVEL</b>	
<b>MARKING CRITERIA - MODEL</b>	
Model satisfies brief	5 marks
Constraints observed	5 marks
Mock-up/Inventiveness	10 marks
Function (does it work?)	10 marks
Choice of materials	10 marks
Choice of processes	10 marks
Suitability of assembly techniques	10 marks
Suitability of parts and functions	10 marks
Application of skills	10 marks
Safety considerations	10 marks
Quality of work	10 marks
Presentation of model	10 marks
<b>TOTAL</b>	<b>110 marks</b>