



Coimisiún na Scrúduithe Stáit

State Examinations Commission

Junior Certificate Examination, 2018

Technology

Ordinary Level

Wednesday, 20 June
Afternoon, 2:00 - 4:00

Instructions:

1. Answer **Section A** (short answer questions). 80 marks
2. Answer **two** questions from **Section B**. 80 marks
3. Hand up this paper at the end of the examination.
4. Write your examination number in the box below.

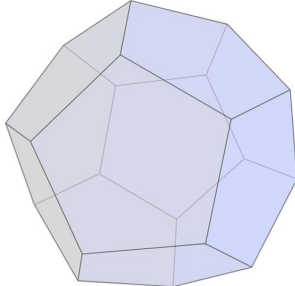
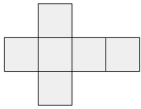
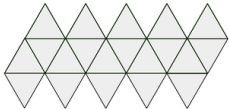
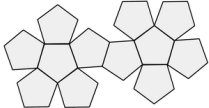
Centre Number

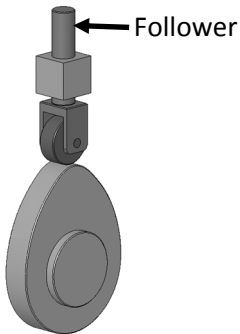
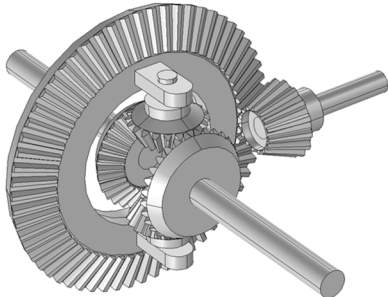
Examination Number

1.	Total of end of page totals	
2.	Aggregate total of all disallowed question(s)	
3.	Total mark awarded (1 minus 2)	
4.	Bonus mark for answers through Irish (if applicable)	
5.	Total mark awarded if Irish Bonus (3+4)	
	Note: The mark in row 3 (or row 5 if an Irish bonus is awarded) must equal the mark in the Mór-iomlán box on the script	

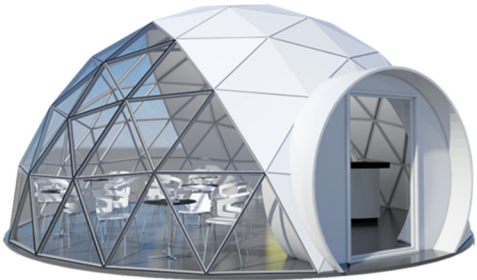
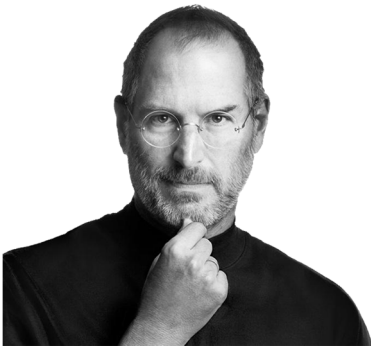
Total Mark	
Question	Mark
Section A	
Section B Q 1	
Q 2	
Q 3	
Q 4	
Total	
Grade	

Section A – 80 marks. Answer **any sixteen** questions in this section.

1.		The surface development (net) of this 3D solid is:		
				
				
2.		This digital device is:	A Router/Modem	
			A Radio	
			An External Hard Drive	
3.		This device is a:	Visual Reality Headset	
			Virtual Reality Headset	
			Visible Reality Headset	
4.		Alloy wheels are typically made from:	Steel Alloys	
			Aluminium Alloys	
			Copper Alloys	
5.		Of the three materials, wood, plastic and metal, wood has:	The highest Carbon Footprint	
			The lowest Carbon Footprint	
			The second highest Carbon Footprint	

6.		The force exerted on the leg by the knee support is:	Torsion	
			Shear	
			Compression	
7.		The measuring tool shown is a:	Vernier Calliper	
			Micrometre Screw Gauge	
			Feeler Gauge	
8.		The follower of this cam mechanism:	Oscillates	
			Reciprocates	
			Rotates	
9.		The gears in this differential gearbox are:	Rack gears	
			Crown gears	
			Bevel gears	
10.		This see-saw is a:	Class 1 Lever	
			Class 2 Lever	
			Class 3 Lever	

11.		Batteries convert:	Chemical energy to light energy	
			Chemical energy to electrical energy	
			Electrical energy to chemical energy	
12.		The COM pin on the lever micro switch stands for:	Computer	
			Communication	
			Common	
13.		This is a:	Variable Resistor	
			Fixed Resistor	
			Variable Capacitor	
14.		This is a:	Toggle Switch	
			Push Switch	
			Rocker Switch	
15.		With four AA cells in series (each of 1.5 V) in this battery holder, the total Voltage will be:	1.5 Volts	
			6 Volts	
			12 Volts	

16.		The grips on a tractor tyre provide good:	Traction	
			Abrasion	
			Slippage	
17.		Bicycle wheels with carbon fibre rims have:	A low strength to weight ratio	
			A high strength to weight ratio	
			A medium strength to weight ratio	
18.		Wind power is an example of:	Non-renewable energy	
			Geo-thermal energy	
			Renewable energy	
19.		The triangles in this dome framework make it:	Unstable	
			Flexible	
			Strong	
20.		This man was the main inventor of Apple products:	Steve Lindsey	
			Steve Jobs	
			Steve Wilhite	

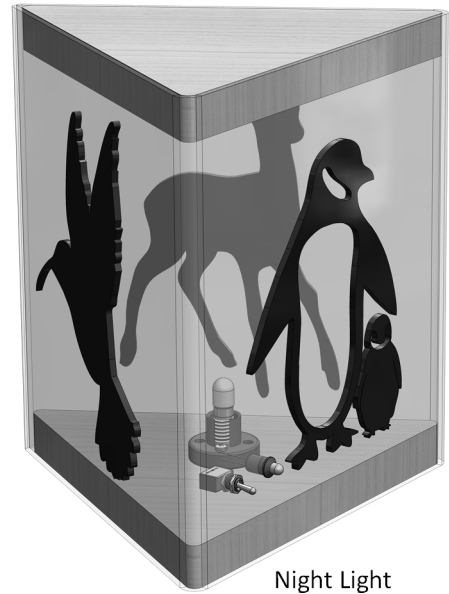
Section B – 80 Marks.

Question 1

Answer **any two** questions from this Section.

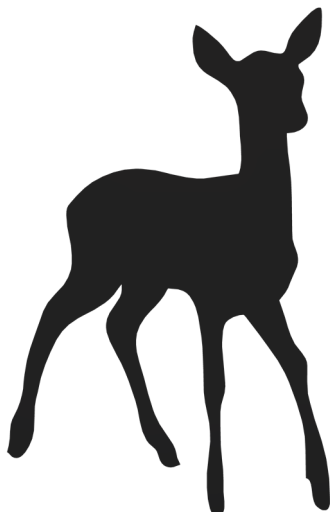
40 Marks

- (a) An image of a child's night light is shown. The top and base are made from hardwood and the sides are made from a clear plastic. 10 marks
- (i) Suggest a suitable hardwood from which to make the top and base and give a reason for your choice.
- Material: _____
- Reason: _____
- _____
- (ii) The plastic must be clear and must be bent at the corners. Name a suitable plastic for the sides.
- Name: _____
- (iii) Describe a suitable means of securing the plastic sides to the wooden top and base.
- Note:** The sides must be removable to allow for battery changing.
- Answer: _____
- _____



Night Light

- (b) Using notes and sketches describe how you would:
- (i) Cut out the shape of the deer from a flat piece of plastic.
- (ii) Produce a smooth finish on the edges of the deer.



Notes and Sketches for parts (i) and (ii)

Question 1

8 marks

- (c) The top of the night light is shown below. The night light needs a suitable handle so that it can be picked up. On the image below make a sketch of your design for a handle for the night light.

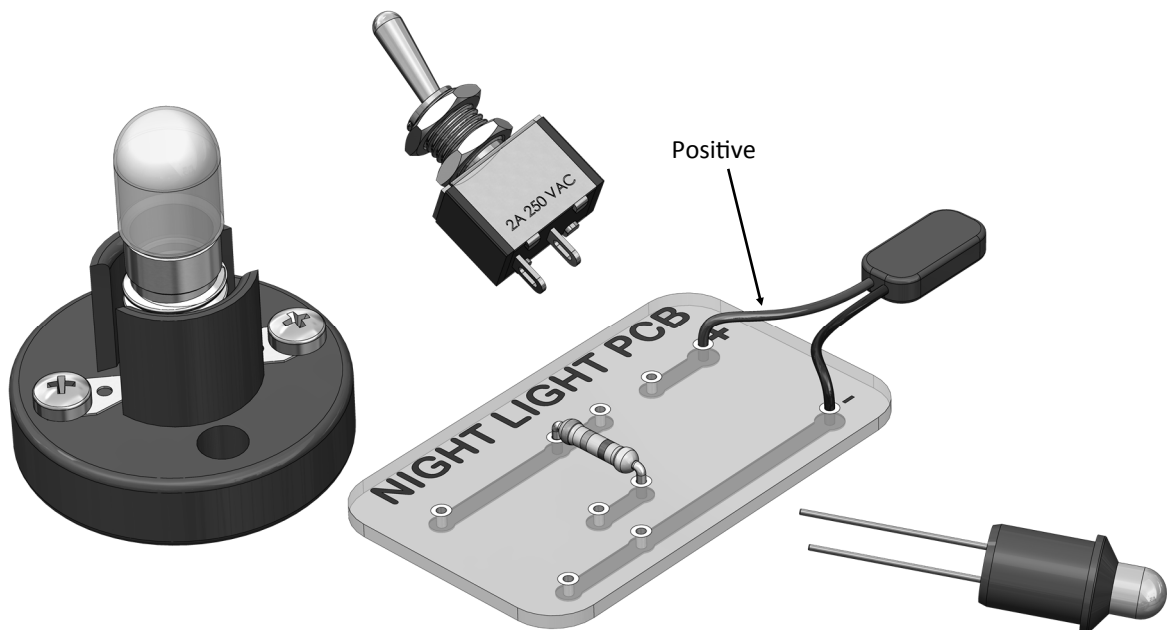
Note: you may make practice sketches in the space on the left if you wish.

Handle Design



12 marks

- (d) A bulb, LED and switch must be connected to the Printed Circuit Board shown below. Sketch in the wire connections from each component to the PCB so that the switch activates both the bulb and the LED.



Question 2

40 Marks

- (a) A model of a wind turbine is shown. The wind turns the blade which then moves the gears. The gear train drives the motor shaft to generate power.

10 marks

- (i) Select the correct energy conversion for the model from the columns below by connecting **one** energy on the left to **one** on the right.

Chemical	Electrical
Kinetic	Light
Light	Sound

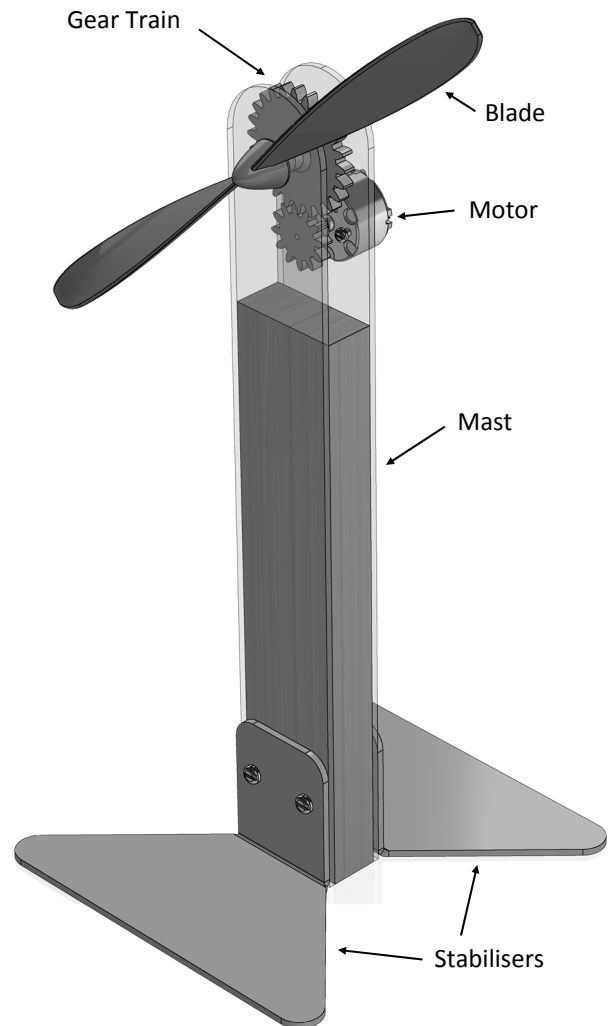
- (ii) Wind is a renewable energy source. Explain the term 'renewable'.

Renewable: _____

- (iii) Name **two** other sources of renewable energy.

Source 1: _____

Source 2: _____



Model Wind Turbine

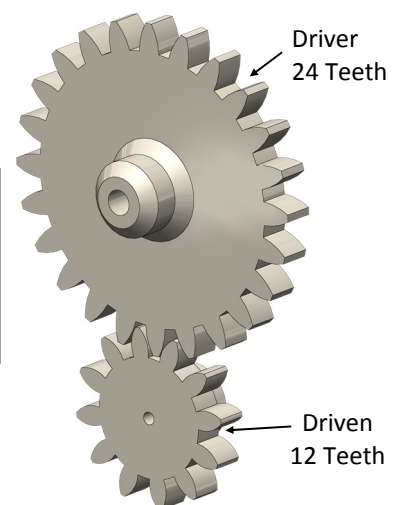
- (b) (i) The driver gear attached to the turbine blade has 24 teeth and the driven gear attached to the motor has 12 teeth. If the blade rotates at a speed of 60 RPM, calculate the speed of the driven gear.

8 marks

Calculation

- (ii) If the blade of the turbine rotates in a clockwise direction, in what direction will the driven gear rotate?

Answer: _____

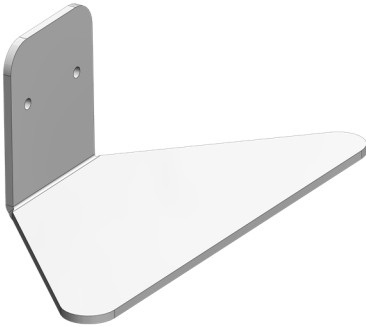


Simple Gear Train

Question 2

8 marks

- (c) An image of one of the stabilisers is shown below. In the space opposite make a well-proportioned sketch of the development of the stabiliser.

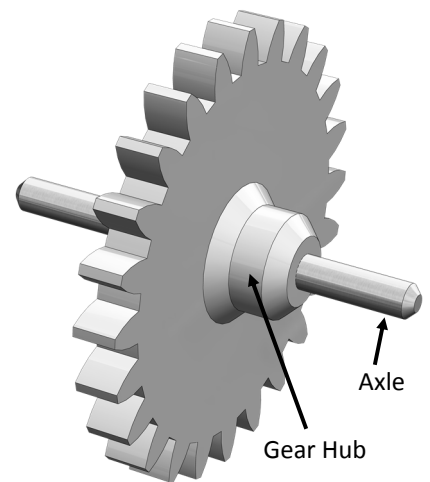


Development of stabiliser

- (d) When in use it was found that the gear slipped on the axle shown opposite. In the space below show how you would modify the gear hub to prevent it slipping on the axle (Glue is not permitted).

8 marks

Sketch of Modified Hub Design



- (e) Suggest **two** advantages Ireland has for the generation of wind energy.

6 marks

- 1: _____

- 2: _____

Question 3

40 Marks

(a) A working model of the body of a quadcopter drone is shown.

12 marks

- (i) The frame is made from a hollow box-section material. Name a suitable lightweight material and explain why it should be hollow.

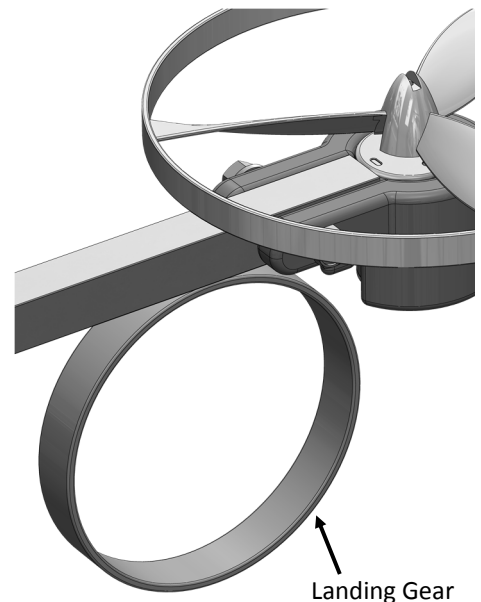
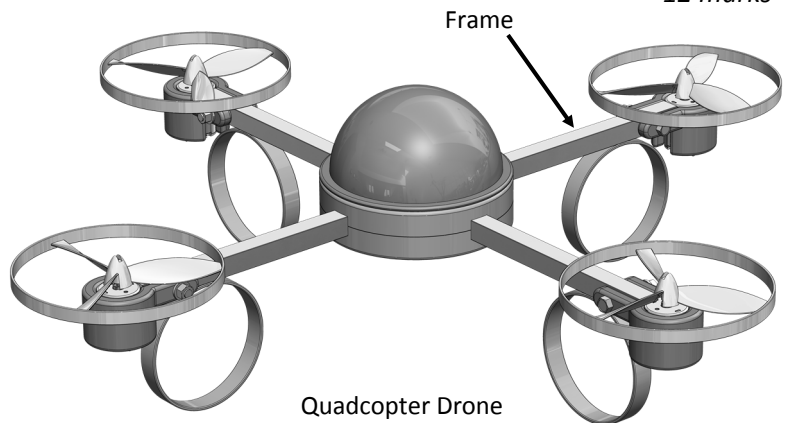
Material: _____

Reason for being hollow: _____

- (ii) The landing gear for the drone is made from rings of plastic as shown opposite. Suggest **two** reasons why these rings are suitable for the landing gear.

Reason 1: _____

Reason 2: _____



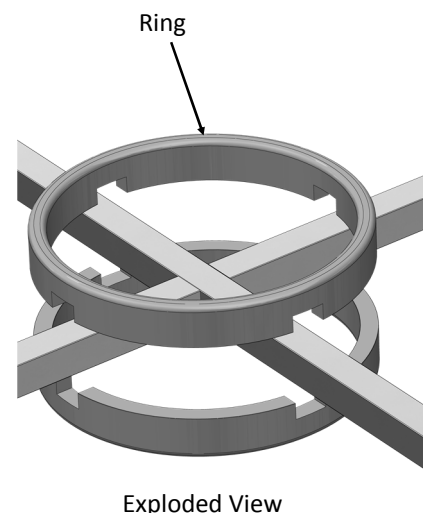
(b) The centre of the drone is shown opposite.

6 marks

What is the purpose of the two rings and how could they be joined?

Purpose: _____

Joining method: _____

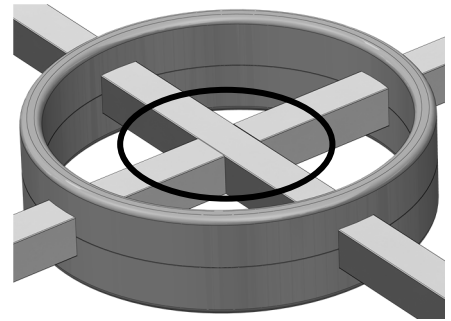


Question 3

12 marks

- (c) (i) The two lengths of box section material that make the frame are joined in the centre as shown (circled). In the space below make a sketch that clearly shows the type of joint used.

Frame joining method

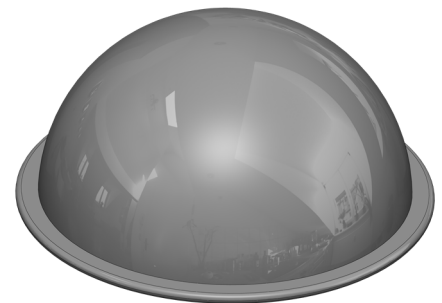


Frame Centre

- (ii) The control circuit is contained in a dome shaped housing. Suggest a suitable plastic for the dome housing and name a machine that could be used to produce the dome shape.

Suitable Plastic: _____

Machine: _____



Dome Housing

- (d) An image of one of the motor brackets is shown. The brackets have been 3D printed from PLA plastic. PLA is a plastic that is biodegradable and can be made from sugar cane.

10 marks

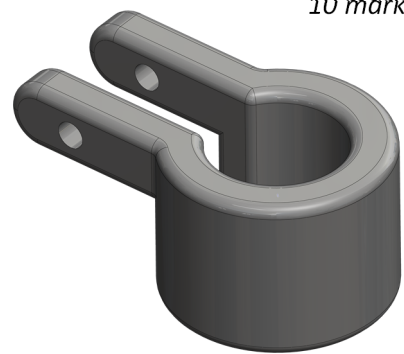
- (i) Explain the term 'biodegradable'.

Answer: _____

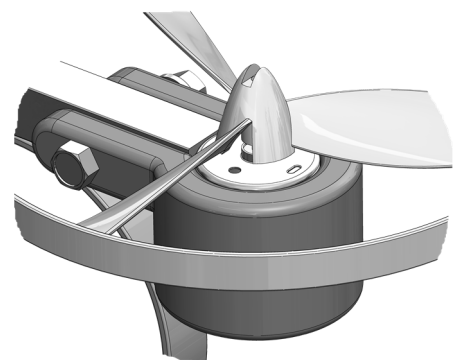
- (ii) When designing the shape and size of the bracket list **two** things that the designer had to take into account.

1: _____

2: _____



Motor Bracket



Bracket Assembly

Question 4

40 Marks

(a) Honda have developed a very advanced humanoid robot called Asimo. 12 marks

(i) List **two** possible uses for humanoid robots like Asimo.

Use 1: _____

Use 2: _____

(ii) Asimo is carefully designed to be stable and have a low 'centre of gravity'. Explain the term 'centre of gravity'.

Answer: _____



(b) The German automation company Festo has created a number of bionic creatures such as the Festo SmartBird shown opposite. The design is based on a sea gull and it flies similarly to a living bird. It is extremely energy efficient and aerodynamic. 12 marks

(i) Explain the terms 'energy efficient' and 'aerodynamic'.

Energy Efficient: _____

Aerodynamic: _____

(ii) The body and wings of the bird are made from carbon fibre. Give a reason for this.

Reason: _____



Festo SmartBird

(c) An image of a miniature robot named MiP is shown. It is controlled using a mobile phone App and has a number of inbuilt sensors. 16 marks

(i) Name a communication technology that could connect MiP to your mobile phone.

Answer: _____

(ii) Where is most of MiP's weight likely to be? Tick the correct box.

Head ☐ Chest ☐ Lower Body ☐

(iii) MiP uses infrared sensors as 'eyes'. Name **one** other use for infrared sensors.

Answer: _____

(iv) MiP uses two DC motors to drive its wheels. Explain the term 'DC'.

Answer: _____

