Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination, 2013

Technology

Ordinary Level

Wednesday, 19 June
Afternoon, 2:00 - 4:00

Instructions:

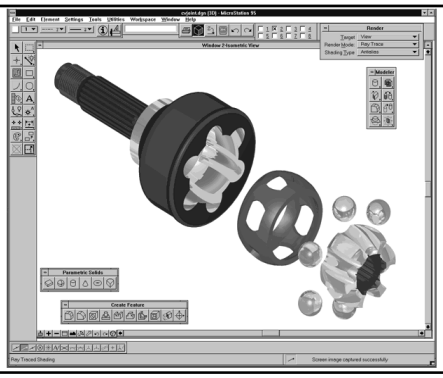
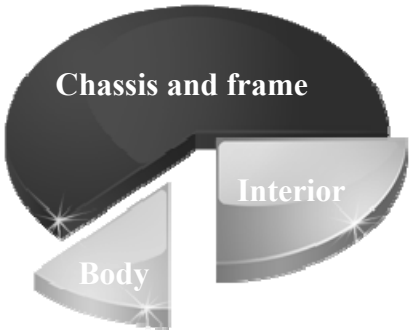
1. Answer **Section A** (short answer questions). 80 marks
2. Answer **two** questions from **Section B**. 80 marks
3. Hand up this paper at the end of the examination.
4. Write your examination number in the box below.

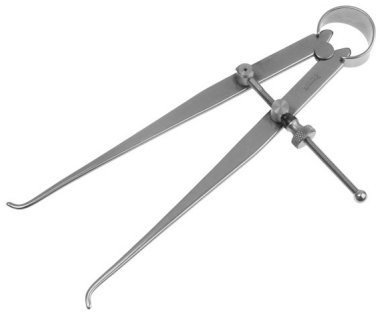
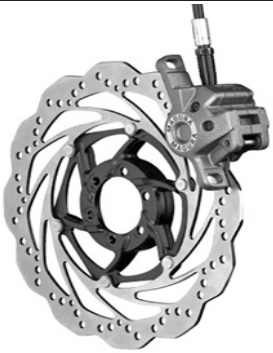
Centre Number	**Examination Number**

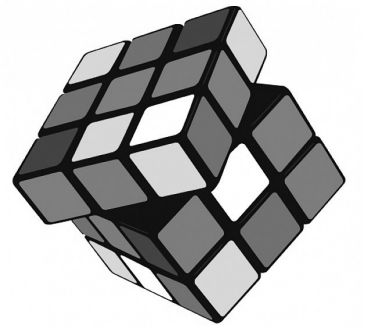
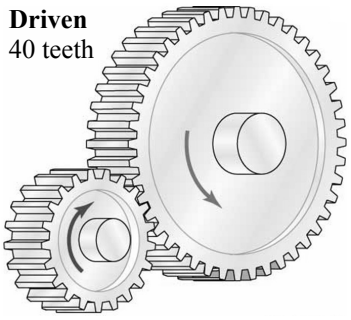
1.	Total of end of page totals	
2.	Aggregate total of all disallowed question(s)	
3.	Total mark awarded (1 minus 2)	
4.	Bonus mark for answering through Irish (if applicable)	
5.	Total mark awarded if Irish Bonus (3+4)	
	Note: The mark in row 3 (or row 5 if an Irish bonus is awarded) must equal the mark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

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

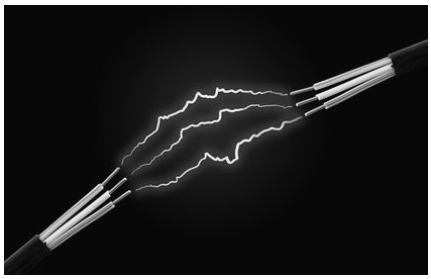
Section A – 80 Marks. Answer **any sixteen** questions in this section.

1.		The image shown is an:	Exploded view	
			Elevation	
			End view	
2.		In computing, IT stands for:	Information Transmission	
			Information Technology	
			Information Terminal	
3.		SD memory cards are commonly used in:	Televisions	
			DVD players	
			Digital Cameras	
4.		A lightweight wood suitable for model making is:	Balsa	
			Oak	
			Teak	
5.		The graphic shown, comparing the production times for car parts, is an example of a:	Bar chart	
			Trend graph	
			Pie chart	

6. 	Carbon fibre was used in the making of this racing bike because:	It is light and strong	
		It is heavy and strong	
		It is attractive to look at	
7. 	The tool shown is a:	Scriber	
		Calipers	
		Screw gauge	
8. 	Liquid solvent cement is used to bond:	Wood to wood	
		Wood to plastic	
		Plastic to plastic	
9. 	The process of cutting a thread in a hole is called:	Tapping	
		Riveting	
		Turning	
10. 	The mountain bike disc brakes shown convert kinetic energy to:	Electrical energy	
		Chemical energy	
		Heat energy	

11. 	The force applied when twisting a Rubik's cube is called:	Compression	
		Torsion	
		Bending	
12. 	When in motion a rocking horse:	Rotates	
		Oscillates	
		Reciprocates	
13. 	The mechanism shown is a:	Rack and pinion	
		Crank and slider	
		Worm and worm-wheel	
14. 	The driven gear will rotate at:	Double the speed of the driver	
		Half the speed of the driver	
		The same speed as the driver	
15. 	The formula $R = \frac{V}{I}$ is based on:	Kirchhoff's Law	
		Ohm's Law	
		Newton's Law	

16.



The Amp is the unit of:	Electrical current	
	Voltage	
	Resistance	

17.

The transistor has three pins. These are the base, the collector and the:	Anode	
	Cathode	
	Emitter	

18.

The hydraulic rams in a digger are powered using:	Oil pressure	
	Water pressure	
	Air pressure	

19.

Filament light bulbs are gradually going out of production because:	They are too costly to make	
	They waste a lot of electricity	
	The materials are no longer available	

20.

The first car was invented in 1885 by:	Louis Pasteur	
	John Starley	
	Karl Benz	

Question 1

Section B – 80 Marks.
Answer **any two** questions from this section.

40 Marks

12 marks

(a) An image of a child's wooden rocking chair is shown.

(i) Name **two** types of wood suitable for the manufacture of the chair.

1. _____

2. _____

(ii) The wood is painted. Suggest **two** important reasons for this.

1. _____

_____

2. _____

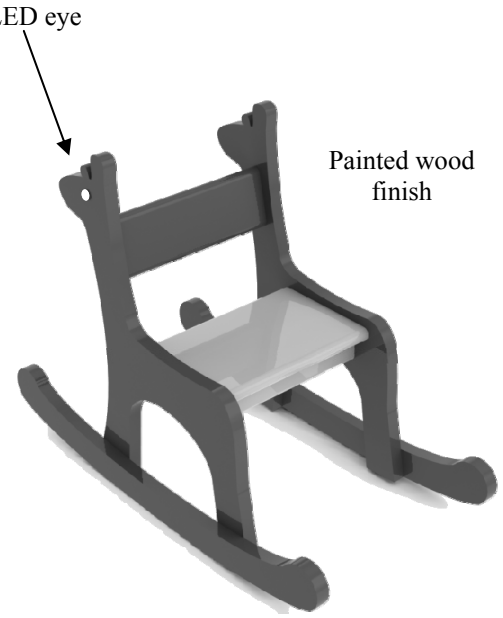
_____

(iii) A template of a giraffe was used in the making of the chair. What is a template?

Answer: _____

_____

_____



Child's Rocking Chair

8 marks

(b) (i) Name a machine that could be used to cut out the rocker shown and explain the method involved.

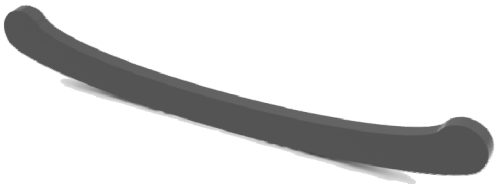
Machine: _____

Method: _____

_____

_____

_____



Rocker

(ii) Describe **two** safety features that had to be included in the design of this rocking chair.

Feature 1: _____

_____

Feature 2: _____

_____

Question 1

12 marks

(c) (i) Suggest **two** suitable methods of joining the side panel of the chair to the rocker.

Method 1: _____

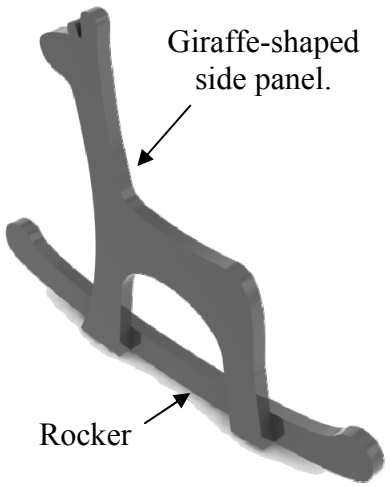
_____

_____

Method 2: _____

_____

_____



(ii) When in use, it was found that the chair could topple over if a child was rocking it too hard. Sketch your design for the rocker so that the possibility of toppling over is reduced.

Safe Rocker Design

8 marks

(d) Two flashing LEDs were used as eyes for the giraffe-shaped side panels. Sketch a suitable housing for the LED circuit which could be attached to the back of the chair. Indicate how this housing could be attached and name a suitable material for the housing.

Design for circuit housing

Material: _____

Question 2 — 40 Marks

12 marks

(a) An image of a mountain bike is shown.

(i) Name **two** parts of the bike that use a lever mechanism.

1. _____

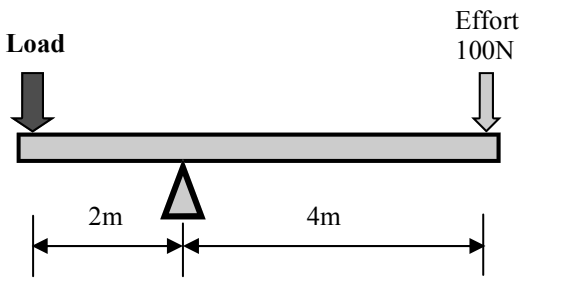
_____

2. _____

_____

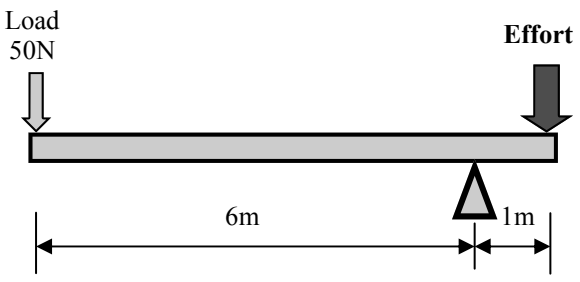
(ii) Two lever diagrams are shown below. For Diagram 1 calculate the **load** force and for Diagram 2 calculate the **effort** force.

Diagram 1



Calculation

Diagram 2



Calculation

8 marks

(b) The Chain and Sprocket is the main drive mechanism on a bicycle.

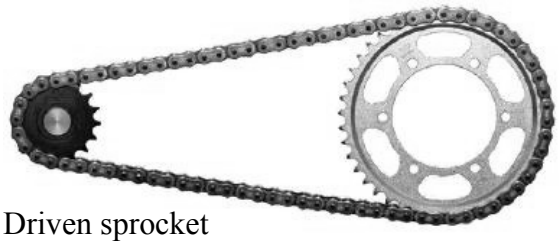
(i) Suggest **one** advantage of using this mechanism on a bicycle and suggest **one** way to maintain the chain to keep it in good working order.

Advantage: _____

Maintenance: _____

(ii) A chain and sprocket mechanism is shown. Calculate the speed of the driven sprocket if the driver sprocket rotates at 30 rpm.

Calculation



Driven sprocket (*20 teeth*)

Driver - 30 rpm (*60 teeth*)

Question 2

8 marks

(c) A bicycle frame uses triangles (triangulation) to make it rigid. Name and sketch in 2D, **two** other structures that use triangles to make them rigid.

Structure 1	Structure 2
Name: _____	Name: _____

6 marks

(d) The spokes in the wheels of a bicycle help to make them strong and lightweight.

(i) Name the force acting in the spokes of a bicycle wheel.

Force: _____

(ii) The rims of racing bike wheels are made from special lightweight alloys. Explain what is meant by an alloy.

Alloy: _____

_____

_____

Racing bike wheel

6 marks

(e) The free-wheel (free hub) on the back wheel of a bicycle uses a ratchet mechanism.

Name **two** other everyday devices that use ratchet mechanisms.

Device 1. _____

Device 2. _____

Question 3 — 40 Marks

(a) A design for a child's toy car is shown. *12 marks*

Child's Toy Car

(i) The wheels have plastic centres with a rubber ring fitted. Name a suitable plastic for the wheel centre giving a reason for your choice.

Plastic: _____

Reason: _____

_____

Name a suitable metal for the axles.

Metal: _____

(ii) Describe a suitable method (other than gluing) of connecting the axles to the wheels. Name the equipment used in your suggested method.

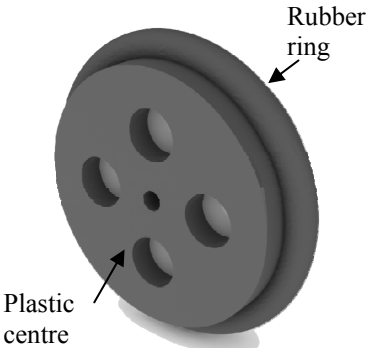
Answer: _____

_____

_____

_____

_____



Wheel

Axle

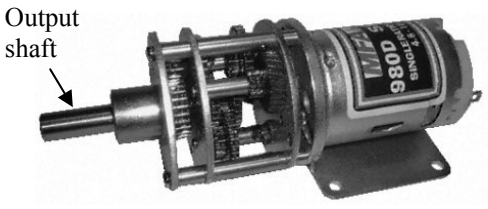
8 marks

(b) Draw an Elevation of the toy car on the square grid below (looking in the direction of the arrow A).

Question 3

12 marks

(c) A miniature gearbox is to be placed inside the car and its output shaft connected to the back axle using a suitable drive mechanism.



Miniature Gearbox

(i) Name a suitable drive mechanism.

Mechanism: _____

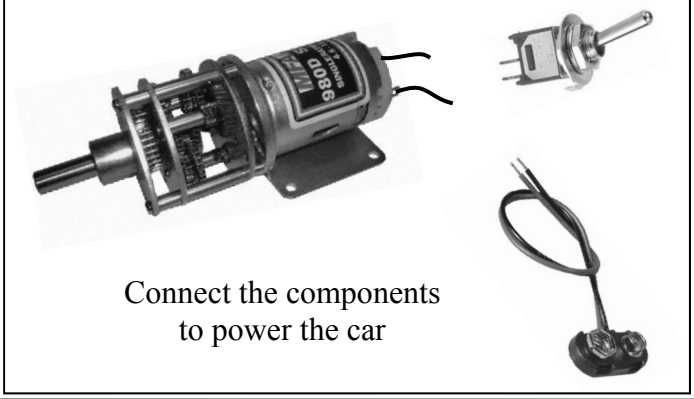
(ii) Give a valid reason for choosing this mechanism.

Reason: _____

_____

(iii) In the spaces below:

- Show how the components for the control circuit should be connected to power the car
- Draw the circuit diagram using the correct symbol for each component.


Connect the components to power the car

Circuit Diagram

Note: You may use the symbol for a motor to represent the gearbox.

8 marks

(d) Modern car engines are engineered to have a lower "carbon footprint" than older car engines.

Explain what is meant by **any three** of the following terms:

Carbon footprint: _____

_____

Hybrid car: _____

_____

Fuel crop: _____

_____

Electric car: _____

_____

Question 4 — 40 Marks

12 marks

(a) Mobile phone technology is changing rapidly in response to consumer demand and the ideas of product designers.

Describe **three** recent developments in mobile phone technology.

1. _____

_____

2. _____

_____

3. _____

_____

12 marks

(b) (i) Outline the meaning of the term "Wi-Fi Hotspot" in relation to communication devices.

_____

_____

_____

(ii) Describe **two** useful mobile phone "Apps".

1. _____

_____

2. _____

_____

16 marks

(c) Electronics play a vital role in music technology.

(i) Suggest **two** ways in which electronics enhance our experience of music.

1. _____

2. _____

(ii) Name the following components which are often used in electronic music devices.