



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate 2013

Marking Scheme

Technology

Ordinary 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.



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.

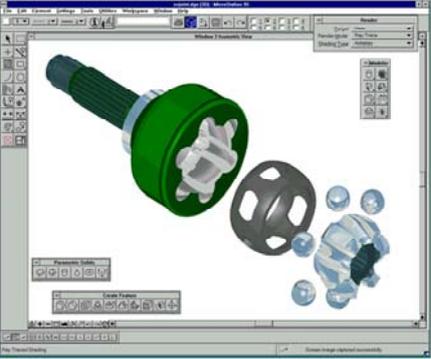
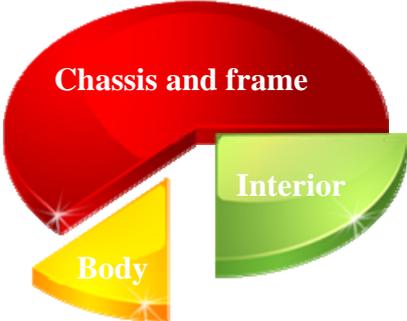
Centre Number

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.

<p>1.</p> 	<p>The image shown is an:</p>	<p>Exploded view</p>	<p>5</p>
<p>2.</p> 	<p>In computing, IT stands for:</p>	<p>Information Transmission</p>	
<p>3.</p> 	<p>SD memory cards are commonly used in:</p>	<p>Televisions</p>	
<p>4.</p> 	<p>A lightweight wood suitable for model making is:</p>	<p>Balsa</p>	<p>5</p>
<p>5.</p> 	<p>The graphic comparing the production times for car parts is an example of a:</p>	<p>Bar chart</p>	
		<p>Trend graph</p>	
		<p>Pie chart</p>	<p>5</p>

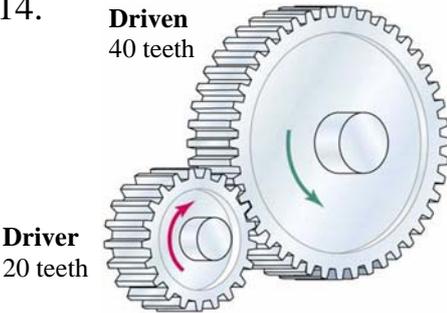
6.		Carbon fibre was used in the making of this racing bike because:	It is light and strong	5
			It is heavy and strong	
			It is attractive to look at	

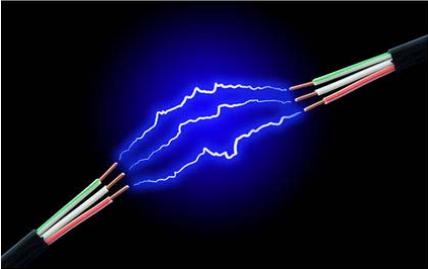
7.		The tool shown is a:	Scriber	
			Calipers	5
			Screw gauge	

8.		Liquid solvent cement is used to bond:	Wood to wood	
			Wood to plastic	
			Plastic to plastic	5

9.		The process of cutting a thread in a hole is called:	Tapping	5
			Riveting	
			Turning	

10.		The mountain bike disc brakes shown convert kinetic energy to:	Electrical energy	
			Chemical energy	
			Heat energy	5

<p>11.</p> 	<p>The force applied when twisting a Rubik's cube is called:</p>	<p>Compression</p>	
		<p>Torsion</p>	<p>5</p>
		<p>Bending</p>	
<p>12.</p> 	<p>When in motion a rocking horse:</p>	<p>Rotates</p>	
		<p>Oscillates</p>	<p>5</p>
		<p>Reciprocates</p>	
<p>13.</p> 	<p>The mechanism shown is a:</p>	<p>Rack and pinion</p>	<p>5</p>
		<p>Crank and slider</p>	
		<p>Worm and worm-wheel</p>	
<p>14.</p>  <p>Driven 40 teeth</p> <p>Driver 20 teeth</p>	<p>The driven gear will rotate at:</p>	<p>Double the speed of the driver</p>	
		<p>Half the speed of the driver</p>	<p>5</p>
		<p>The same speed as the driver</p>	
<p>15.</p> 	<p>The formula</p> $R = \frac{V}{I}$ <p>is based on:</p>	<p>Kirchhoff's Law</p>	
		<p>Ohm's Law</p>	<p>5</p>
		<p>Newton's Law</p>	

<p>16.</p> 	<p>The Amp is the unit of:</p>	<p>Electrical current</p>	<p>5</p>
<p>17.</p> 	<p>The transistor has three pins. These are the base, the collector and the:</p>	<p>Anode</p>	
<p>18.</p> 	<p>The hydraulic rams in a digger are powered using:</p>	<p>Oil pressure</p>	<p>5</p>
<p>19.</p> 	<p>Filament light bulbs are gradually going out of production because:</p>	<p>They are too costly to make</p>	
<p>20.</p> 	<p>The first car was invented in 1885 by:</p>	<p>Louis Pasteur</p>	
		<p>John Starley</p>	
		<p>Karl Benz</p>	<p>5</p>

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

Question 1

40 Marks

(a) An image of a child’s wooden rocking chair is shown. 12 marks

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

② 1. Plywood, MDF

② 2. Pine, beech

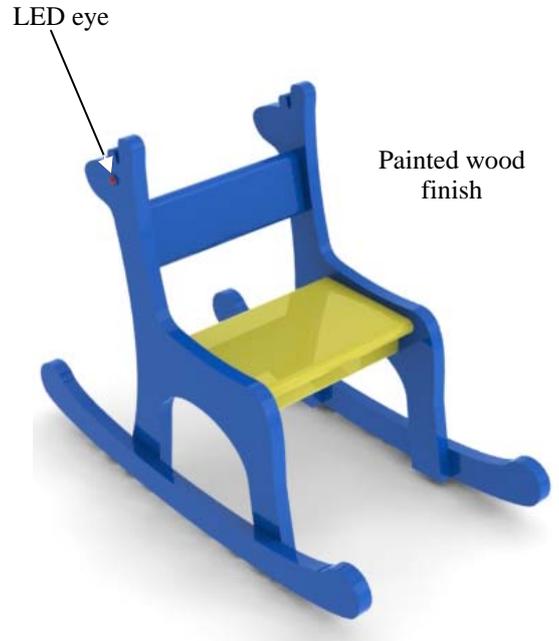
(ii) The wood is painted. Suggest two important reasons for this.

③ 1. To make the surface more hygienic, easier to clean.

③ 2. Easier to maintain a nice appearance. Reduce possibility of splintering.

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

② Answer: A thin piece of material, such as plastic, with the shape cut out of it, that can be used for tracing out the shape as many times as needed.



Child’s Rocking Chair

(b) (i) Name a machine that could be used to cut out the rocker shown and explain the method involved. 8 marks

② Machine: Bandsaw, scrollsaw, jigsaw.

② Method: Mark out the rocker.

Keeping you fingers away from the blade, carefully and slowly cut out the shape close to the line. Make sure to wear ear protection.



Rocker

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

② Feature 1: All corners and edges had to be rounded so that a child would not get hurt.

② Feature 2: Non toxic paints, strong method of assembly.

Question 1

12 marks

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

③ Method 1: Wood glue, dowels

③ Method 2: Screw them together,



Giraffe-shaped side panel.

(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.

⑥ Safe Rocker Design

Any effective modification = 4

Quality of the sketch = 2

(d) 8 marks

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: _____ ②

⑥

No Attempt	0	←		
			→	1
Fair	2	←		
			→	3
Good	4	←		

Quality of the design/sketch = 2max

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.

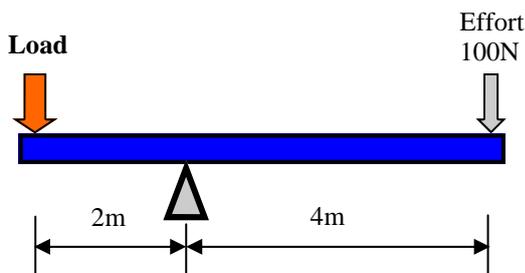
② 1. The brakes

② 2. The pedal cranks, the handlebars



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

Diagram 1

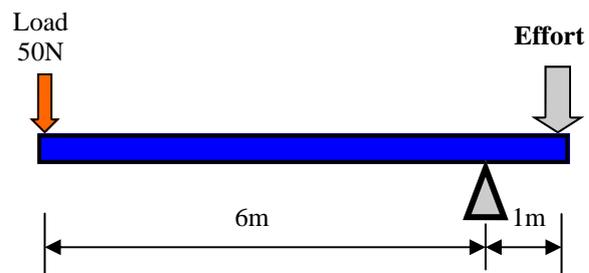


Calculation

$$\begin{aligned} \text{Load} \times 2 &= 100 \times 4 \\ \text{Load} &= 400/2 \\ \text{Load} &= 200\text{N} \end{aligned}$$

④

Diagram 2



Calculation

$$\begin{aligned} \text{Effort} \times 1 &= 50 \times 6 \\ \text{Effort} &= 300\text{N} \end{aligned}$$

④

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

8 marks

(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.

② Advantage: It is strong, good traction, easy to maintain, doesn't slip,

② Maintenance: Lubricate with oil, clean the chain regularly, replace the chain when worn.

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

Calculation

$$\begin{aligned} 60/20 &= 3 \\ \text{Driven sprocket rotates 3 times faster} \\ \text{Answer} &= 90\text{rpm} \end{aligned}$$

④



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

Name: Electricity pylon ①

No Attempt	0	←
Fair	1	←
Good	2	←
Very good	3	←

Structure 2

Name: Steel frame bridge ①

No Attempt	0	←
Fair	1	←
Good	2	←
Very good	3	←

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

6 marks

- ② (i) Name the force acting in the spokes of a bicycle wheel.

Force: Tension force

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

Alloy: An alloy is a mixture of two or more metals

Everyday use: Car wheels, bicycle frame, anything made from steel,

Brass, bronze etc.



Racing bike wheel

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

6 marks

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



- ③ Device 1. Winch, ratchet straps, wire tensioner,

- ③ Device 2. Fishing reel, clothes line mechanism, ratchet socket set, ratchet screw driver,

Question 3

40 Marks

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

12 marks

(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.



Child's Toy Car

② Plastic: Acrylic, polystyrene, nylon etc.

② Reason: Acrylic has a good finish, plastics like nylon and polythene can be injection moulded.

Name a suitable metal for the axles.

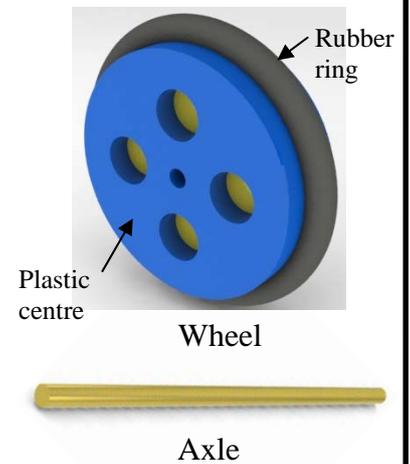
② Metal: Steel, brass, aluminium, copper

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

⑥ Answer: Thread the ends of the axle using a stock and die.

Place a nut and washer on each side of the wheel when connected to the axle. A cap-nut or locknut could be used on the outside.

Or use a star-lock retainer on the inside of the wheel and and axle cap retainer on the outside.



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

8 marks

	<table style="margin: auto;"> <tr> <td>No Attempt</td> <td style="width: 20px;">0</td> <td style="width: 20px;">←</td> <td style="width: 20px;">→</td> <td style="width: 20px;">1</td> </tr> <tr> <td>Fair</td> <td>2</td> <td>←</td> <td>→</td> <td>3</td> </tr> <tr> <td>Good</td> <td>4</td> <td>←</td> <td>→</td> <td>5</td> </tr> <tr> <td>Very Good</td> <td>6</td> <td>←</td> <td>→</td> <td></td> </tr> </table>	No Attempt	0	←	→	1	Fair	2	←	→	3	Good	4	←	→	5	Very Good	6	←	→		
No Attempt	0	←	→	1																		
Fair	2	←	→	3																		
Good	4	←	→	5																		
Very Good	6	←	→																			
Quality of the design/sketch = 2max																						

Question 3

12 marks

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



Miniature Gearbox

② (i) Name a suitable drive mechanism.

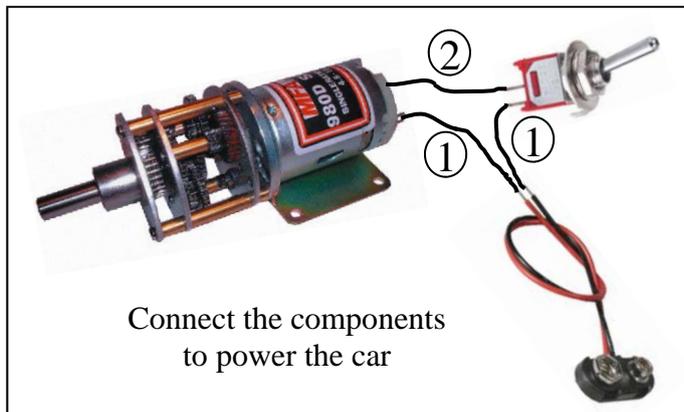
Mechanism: Pulley drive, chain and sprocket

② (ii) Give a valid reason for choosing this mechanism.

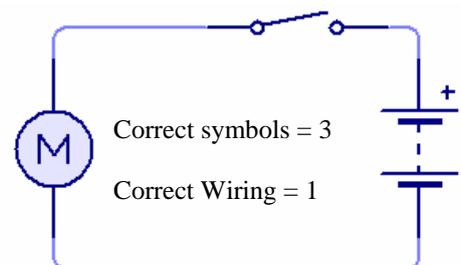
Reason: Pulley drives are not expensive. They are quiet and need little maintenance.

(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.



Circuit Diagram



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

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

8 marks

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

③ Carbon footprint: In the case of an engine, the total greenhouse gases caused by the engine in its production, use and end of life.

③ Hybrid car: A car that uses two or more power sources to move it. Hybrid cars use both an internal combustion engine and an electric motor.

② Fuel crop: These are crops such as oil seed rape and sugar beet that can be used to make bio-fuels

② Electric car: These cars are powered by rechargeable battery units and instead of an engine they are propelled using an electric motor.

Question 4

40 Marks

(a) 12 marks

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

④ Describe **three** recent developments in mobile phone technology.

1. The facility to download Apps. HD resolution screens.

④ 2. Touch screens, waterproof phones.

④ 3. GPS features such as SATNAV.



(b) 12 marks

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

Answer: A place or area where Wi-Fi is being transmitted allowing mobile phone/laptop etc

④ To access the Internet.

(ii) Describe **two** useful mobile phone “Apps”.

1. A cycling training App that tracks your distance, elevations, split times, calorie burn etc.

④ _____

2. Skype allows the user to call anyone else using Skype for free anywhere in the world.

④ _____

(c) 16 marks

Electronics play a vital role in music technology.

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

② 1. Personal music devices such as Ipods allow the user to listen to high quality music on the go.

② 2. Youtube enable us to watch the latest music videos, made possible by modern electronics.

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

③ 	③ 	③ 	③ 
Potentiometer/V.R.	Resistor	Speaker	Jack Plug