



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate 2015

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

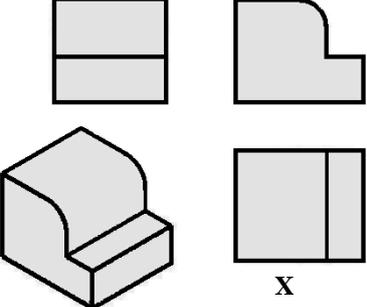
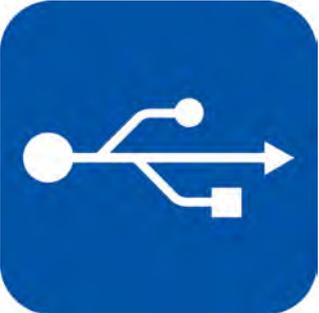
Junior Certificate Examination, 2015

Technology

Ordinary Level

Marking Scheme

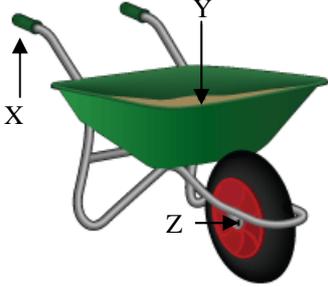
Section A – 80 Marks. Answer **any sixteen** questions in this section.

<p>1.</p> 	<p>The view marked X is a/an:</p>	<p>Elevation</p>	
		<p>Plan</p>	5
		<p>End View</p>	
<p>2.</p> 	<p>The symbol shown represents a:</p>	<p>USB connection</p>	5
		<p>VGA connection</p>	
		<p>HDMI connection</p>	
<p>3.</p> 	<p>A software application used for 3D solid modelling is:</p>	<p>Microsoft Excel</p>	
		<p>SolidWorks</p>	5
		<p>Adobe Reader</p>	
<p>4.</p> 	<p>Stainless steel is used in guitar strings because:</p>	<p>It is a conductor</p>	
		<p>It is an insulator</p>	
		<p>It does not corrode</p>	5
<p>5.</p> 	<p>Lenses for sunglasses that darken in bright sunlight are made from:</p>	<p>'Smart' Materials</p>	5
		<p>'Clever' Materials</p>	
		<p>'Intelligent' Materials</p>	

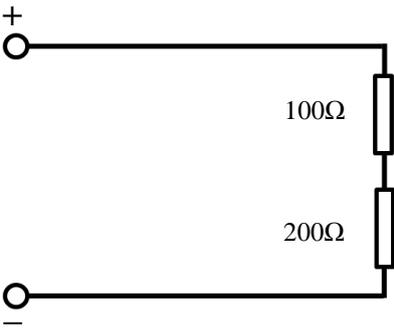
<p>6.</p> 	<p>Drinks bottles are made from:</p>	<p>Rubber</p>	
		<p>Thermosetting plastic</p>	
		<p>Thermoplastic</p>	<p>5</p>
<p>7.</p> 	<p>The tool shown here is:</p>	<p>An adjustable spanner</p>	
		<p>A combination spanner</p>	<p>5</p>
		<p>A torque wrench</p>	
<p>8.</p> 	<p>A hydraulic Jack uses:</p>	<p>Oil pressure</p>	<p>5</p>
		<p>Air pressure</p>	
		<p>Water pressure</p>	
<p>9.</p> 	<p>Sail cloth must be strong in:</p>	<p>Compression</p>	
		<p>Tension</p>	<p>5</p>
		<p>Both of the above</p>	
<p>10.</p> 	<p>Water meters are used to measure:</p>	<p>Water usage</p>	<p>5</p>
		<p>Water quality</p>	
		<p>Water pressure</p>	

11.		Waste batteries should be disposed of in:	A landfill site	
			A recycling centre	5
			A household bin	
12.		The device shown is used on a:	Drill	5
			Band saw	
			Vacuum former	
13.		The outer spheres on Newton's Cradle:	Oscillate	5
			Float	
			Reciprocate	
14.		Car designs that showcase new technology and futuristic styling are known as:	Modern designs	
			New idea designs	
			Concept designs	5
15.		Dynamo torches do not use:	Disposable Batteries	5
			Electricity	
			Energy	

16. 	LED stands for:	Light Energised Diode	
		Light Emitting Diode	5
		Light Energy Diffusion	

17. 	The <i>effort</i> force is positioned at:	Position Z	
		Position Y	
		Position X	5

18. 	The resistance of an LDR varies with:	Temperature	
		Humidity	
		Light intensity	5

19. 	The total resistance in this circuit is:	200 Ohms	
		20000 Ohms	
		300 Ohms	5

20. 	The dual-cyclone bagless vacuum cleaner was invented by:	Sir James Dyson	5
		Sir Walter Raleigh	
		Sir Tim Berners-Lee	

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

Question 1

40 Marks

(a) An image of an acrylic toast rack is shown. 12 marks

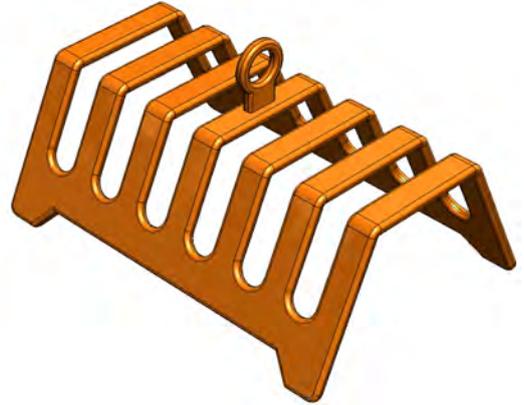
(i) Give **two** reasons for selecting acrylic as the material for the toast rack.

1. *Attractive and easily cleaned.* 2 mks
2. *Can be bent on a strip heater.* 2 mks

(ii) Name a suitable alternative material and give a reason for your choice.

Material: *Stainless steel, brass, aluminium, High Impact Polystyrene etc.* 2 mks

Reason: *This material can be shaped and bent into the form of the toast rack.* 2 mks



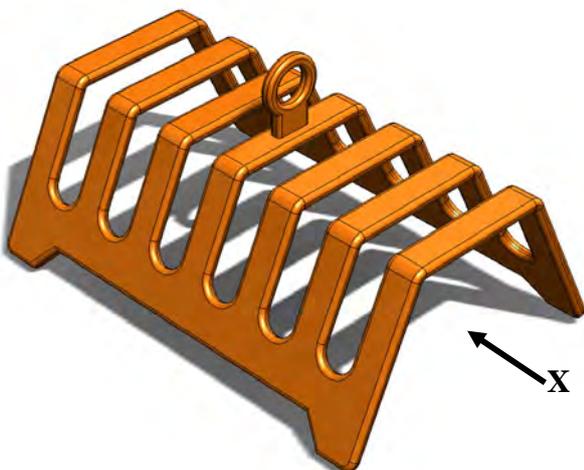
Toast Rack

(iii) Identify a design feature of this toast rack that you like, and give a reason why.

Feature: *Any feature such as: Economical design, the handle, the number of slots for toast.* 2 mks

Reason: *Uses very little material, easy to carry, can hold up to six slices of toast.* 2 mks

(b) In the space provided draw an End View of the toast rack in the direction of arrow X. 8 marks



No Attempt	0	←	→	2
Fair	4	←	→	6
Good	8	←		

Question 1

(c) An alternative design for a toast rack is shown.

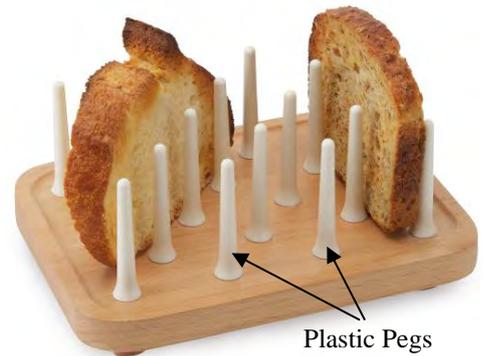
10 marks

- (i) Name a suitable hardwood for the base of this toast rack.

Hardwood: *Any Hardwood.* 3 mks

- (ii) Describe a method of attaching the pegs to the base of the toast rack. Use sketches to illustrate your answer.

Method: *Insert the pegs into tight fitting holes in the wood. Screw the pegs from the underside.*
3 mks



Sketches

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

(d) Evaluate the design of the toast rack shown at (c) above under the following headings. 10 marks

Evaluate the design of the toast rack shown at (c) above under the following headings.

Appearance: *Eg. The toast rack is attractive to look at. The wood gives it a natural look. The pegs make it look too busy.* 2 mks

How well it works (functionality): *Eg. This toast rack functions well, allowing for different sizes and thicknesses of toast.* 2 mks

Safety: *Eg. All edges are rounded smoothly and is thereby safe to handle.* 2 mks

Hygiene: *Eg. This toast rack may be difficult to clean with all the pegs. It cannot be put into the dish washer because of the wooden base.* 2 mks

Suitability of materials: *Eg. The materials are suitable. The pegs can be easily inserted into the wood and possibly removed for cleaning. It would not break easily.*
2 mks

Question 2

40 Marks

(a) An image of an electronic 'Steady Hand Game' is shown.

12 marks

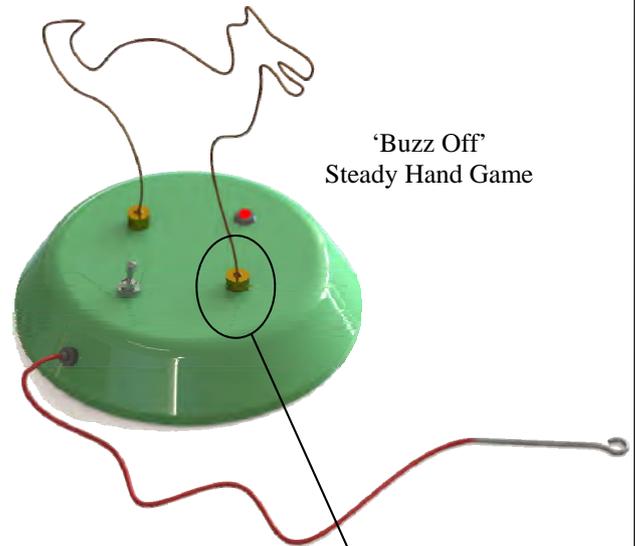
- (i) Name a suitable material for the base and for the dinosaur figure. Give a reason for your choice of **each** material.

Base Material: *High Impact Polystyrene. 2 mks*

Reason: *It can be vacuum formed easily into the shape of the base. 2 mks*

Dinosaur Material: *Any metal wire. 2 mks*

Reason: *It is a good conductor of electricity. 2 mks*

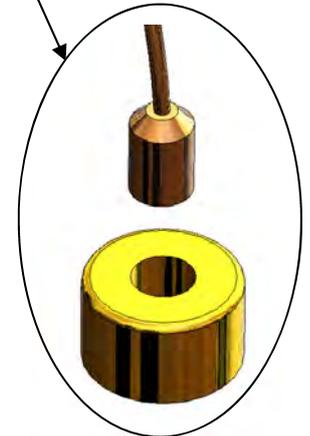


'Buzz Off'
Steady Hand Game

- (ii) A detail view of the method used to connect the dinosaur to the base unit is shown. Suggest **one** advantage of this method of attachment and explain why brass is a good choice of material for the socket.

Advantage: *The dinosaur can be easily fitted or removed. Different shapes can be fitted. 2 mks*

Brass is a good choice of material because:
It is a good conductor and is attractive in appearance. 2 mks



Brass Socket

(b) In the space below sketch an alternative shape to use in the 'Steady Hand Game' instead of the dinosaur.

6 marks

Quality of the sketch	
No Attempt	0
Fair	2
Good	4

Idea: *0 to 2 mks*



Question 2

- (c) The base unit opposite has been vacuum formed using high impact polystyrene (HIPS).

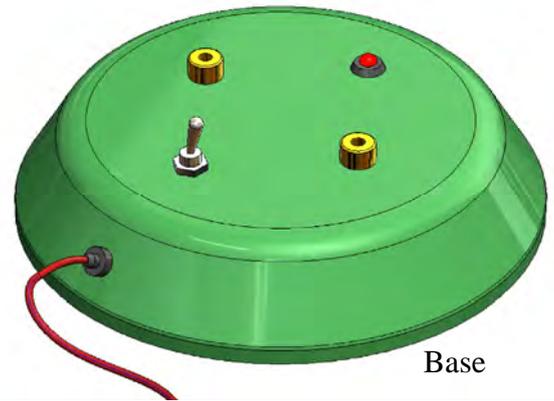
8 marks

Outline **three** steps in the process of vacuum forming and make a sketch of the mould/plug needed to make the base unit.

Step 1: *Pre-heat the vacuum former and place the mould/plug into the vacuum former. 2 mks*

Step 2: *Clamp the HIP and pull over the hood until the plastic is soft enough to form. 2 mks*

Step 3: *Push back the heater hood, switch on the pump and raise the mould/plug into the plastic. Allow to cool and vac-blow the plastic to release the mould. 2 mks*



Mould

Quality of the sketch 1 - 2 mks

No Sketch 0 mks

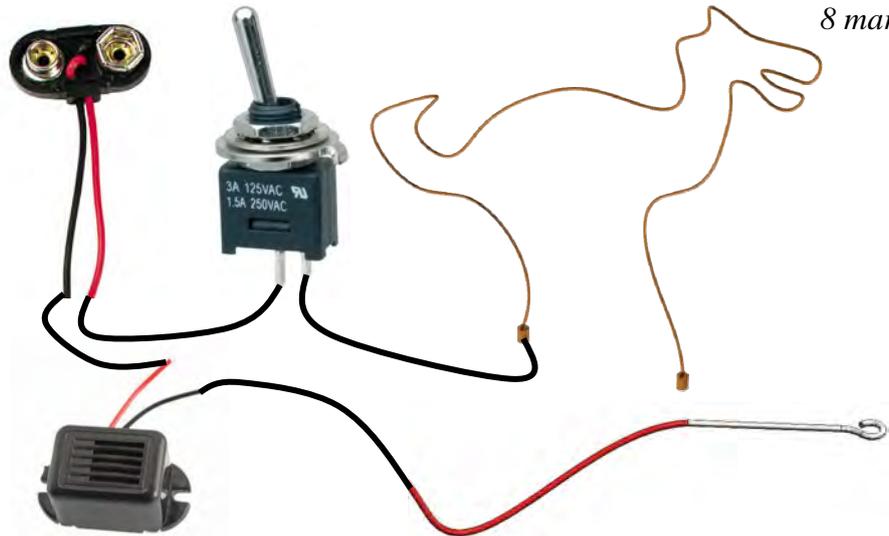
- (d) The components for the operation of the Steady Hand Game are shown.

8 marks

Draw in the connections between the components to complete the circuit for the game.

(The LED has been omitted.)

Each connection equals 2mks.
Variety of possible solutions.
Paper in Black and white so polarity should be ignored.



- (e) Suggest **two** ways in which this game could be improved to make it more exciting to play.

6 marks

Improvement 1: *Any valid improvement (eg. A number of shapes of different complexities should be included). 3mks*

Improvement 2: *Any valid improvement (eg. A counter could be included in the circuit to count the number of times the wire is touched). 3 mks*

Question 3

40 Marks

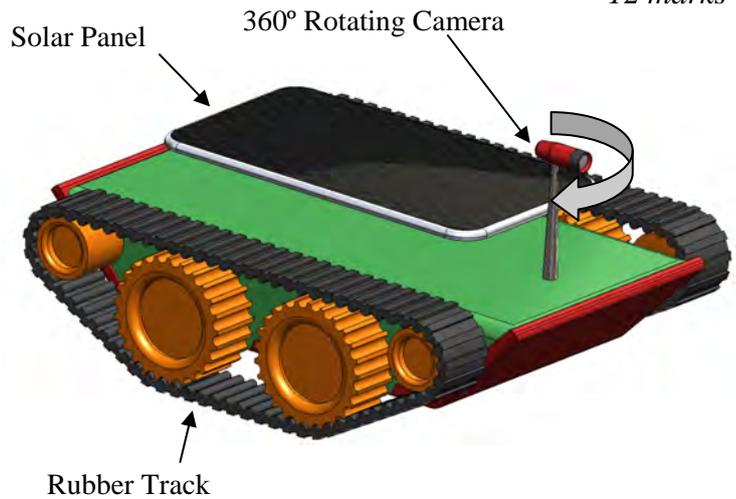
(a) A working model of a ‘Mars Rover’ is shown. This vehicle is designed to run on solar power and is also capable of taking panoramic photographs through 360°.

12 marks

(i) Explain why tracks are used on the Rover instead of wheels and tyres.

Answer: *Better grip/traction. Easier to turn on its own axis. Can climb over obstacles more easily (or any other plausible answer).*

4 mks



Mars Rover with Rotating Camera

(ii) In the space below describe, using notes and sketches, a bracket that could be used to connect the solar panel to the top surface of the Rover.

No Attempt	0	←	
		→	2
Fair	4	←	
		→	6
Good	8	←	

(b) The camera on the Rover must be capable of rotating through 360°.

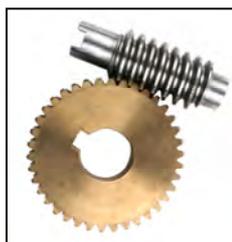
8 marks

From the images below, choose the most suitable mechanism for this purpose.

Name the mechanism you have chosen and explain why you consider it to be suitable.

Mechanism name: *Worm and worm wheel, simple gear train or the bevel gears correctly named.* 4mks

This mechanism is suitable because: *Any valid reason.* 4 mks



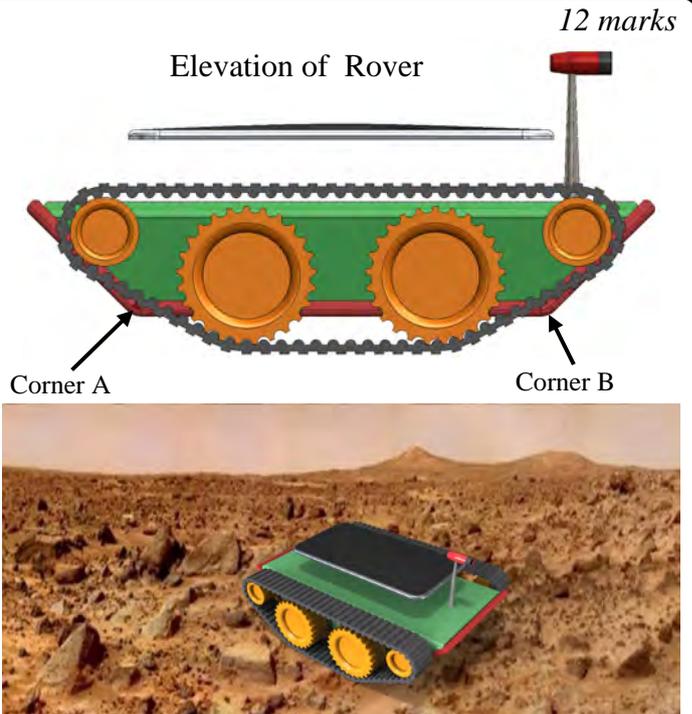
Question 3

- (c) (i) When testing the vehicle it was found that corners A and B tended to cause the Rover to get stuck when going over rough terrain. Suggest **two** changes that could be made to the design to prevent this problem.

Change 1: *Any valid modification.* 2 mks

Change 2: *Any valid modification.* 2 mks

- (ii) Draw a new Elevation of the Rover below showing the changes you have made to the design.



Elevation showing your changes.

No Attempt	0	←	
		→	2
Fair	4	←	
		→	6
Good	8	←	

- (d) (i) The Rover sends back images from Mars. List **two** other types of data that Rover vehicles such as this typically send back to Earth. 8 marks

1. *Scientific data from soil and rock sampling.* 1 mk

2. *Climate and weather data.* 1mk

- (ii) In part (c) above an *Elevation* of the Rover is shown. In the spaces provided, name each projection of the Rover shown below.

<i>Plan/Top View</i> 2mks	<i>End Elevation/View</i> 2mks	<i>Isometric/3D</i> 2mks

Question 4

40 Marks

(a) One of the more recent developments in car technology is the production of cars that run on compressed air.

12 marks

(i) Suggest **two** advantages of this type of technology.

Advantage 1: *Clean with no pollutants.* 3mks



Advantage 2: *Very few mechanical parts compared to a diesel or petrol engine.* 3mks

(ii) Name **two** other ways to power cars without using fossil fuels (diesel, petrol or gas).

1: *Solar cells/photovoltaic cells.* 3mks 2: *Biofuels such as bio-ethanol or bio-diesel.* 3mks

(b) Many car companies produce concept designs before introducing a new model.

12 marks

(i) Suggest **two** reasons for this.

Reason 1: *To prototype the car, to test the market or any other valid reason.* 3 mks



Reason 2: *To try out the production process, costs or any other valid reason.* 3mks

(ii) Many car designers are experimenting with materials other than metals for the body of the car. Suggest **two** reasons for this.

Reason 1: *To make the body stiffer and lighter for fuel economy or any other valid reason.* 3mks

Reason 2: *To reduce the costs of producing the car or any other valid reason.* 3mks

(c) Many cities, including Dublin, provide specially designed bicycles for hire and use.

16 marks

(i) Suggest **two** advantages of this system of transport in cities.

Advantage 1: *Any valid advantage.* 4mks

Advantage 2: *Any valid advantage.* 4mks



(ii) Underground rail systems are used in many large cities. Suggest **two** reasons for this.

Reason 1: *Reduce traffic congestion or any other valid reason.* 4mks

Reason 2: *Fast and efficient means of moving people from place to place or other valid reason.* 4mks