Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate 2018

Marking Scheme

METALWORK
MATERIALS AND TECHNOLOGY

Higher 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

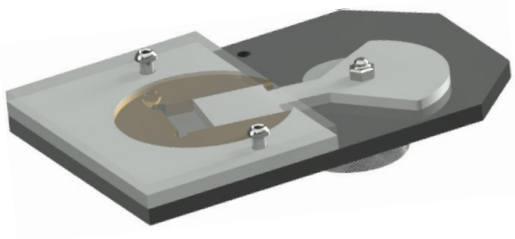
Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in 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.

JUNIOR CERTIFICATE EXAMINATION, 2018

METALWORK
MATERIALS AND TECHNOLOGY

HIGHER LEVEL

MARKING SCHEME
Written Examination, Practical Examination and Project



Written Examination - Answer Question 1, Section A and B, and three other questions.
Note: **The solutions presented are examples only.**
All other valid solutions are acceptable and are marked accordingly.

Question 1 – Section A (5 parts only)

(a) (i) Name part **A** @ 2 marks
(ii) Function @ 2 marks **4 MARKS**

(b) (i) Name **B** @ 1 mark, Name **C** @ 1 mark
(ii) Any **one** purpose @ 2 marks **4 MARKS**

(c) (i) Description @ 2 marks
(ii) Explain @ 2 marks **4 MARKS**

(d) Two ways @ 2 marks each **4 MARKS**

(e) Any **one** @ 4 marks **4 MARKS**

(f) (i) One material @ 2 marks
(ii) One difference @ 2 marks
4 MARKS

(g) (i) Explain @ 2 marks
(ii) Draw symbol @ 2 marks **4 MARKS**

Question 1 – Section B (5 parts only)

(a) (i) Explain @ 2 marks
(ii) Two steps @ 1 mark each **4 MARKS**

(b) (i) Outline @ 2 marks
(ii) Description @ 2 marks **4 MARKS**

(c) (i) Two stages @ 1 mark each
(ii) Explain @ 2 marks **4 MARKS**

(d) (i) Name **X** @ 1 mark, Name **Y** @ 1 mark
(ii) Function **X** @ 1 mark
Function **Y** @ 1 mark **4 MARKS**

(e) Design @ 2 marks, Diagram @ 2 marks
4 MARKS

(f) (i) Two advantages @ 1 mark each
(ii) One reason @ 2 marks **4 MARKS**

Question 2

(a) (i) Name @ 2 marks
(ii) Any **two** factors @ 1 mark each
(iii) Any **three** factors @ 1 mark each
7 MARKS

(b) (i) Design which protects @ 2 marks
Design with full vision @ 1 mark
Diagram @ 3 marks
(ii) Seat, attach, diagram @ 1 mark each
(iii) Suitable dugout material @ 1 mark
Suitable seat material @ 1 mark
(iv) Two suitable finishes @ 1 mark each
13 MARKS

Question 3

(a) (i) Name **A**, **B**, **C** and **D** @ 1 mark each
(ii) Name @ 1 mark, Describe @ 1 mark
(iii) Any **two** @ 1 mark each
(iv) Name @ 1 mark, Reason @ 1 mark
10 MARKS

(b) Substitution @ 2 marks,
Calculation @ 2 marks **4 MARKS**

(c) (i) Name **X** @ 1 mark
Name **Y** @ 1 mark
(ii) Describe @ 4 marks
6 MARKS

Question 4

(a) (i) Identify @ 1 marks
(ii) Charge material @ 3 marks
(iii) Describe @ 2 marks, Diagram @ 1 mark
(iv) Name **A** @ 1 mark, Function @ 1 mark
(v) Function **B** @ 1 mark **10 MARKS**

(b) (i) Explain @ 3 marks
(ii) Describe @ 3 marks **6 MARKS**

(c) (i) Name @ 2 marks
(ii) Two properties @ 1 mark each
4 MARKS

Question 5

(a) (i) Material **A**, **B**, **C** @ 1 mark each
(ii) Reason for **A**, **B**, **C** @ 1 mark each
(iii) Any **two** safety @ 1 mark each
(iv) Function @ 2 marks
10 MARKS

(b) (i) Identify @ 2 marks
(ii) Gear ratio @ 2 marks
(iii) One hazard @ 2 marks
(iv) Describe @ 2 marks, diagram @ 2 marks
10 MARKS

Question 6

(a) (i) Terminal **A**, **B**, **C** @ 1 mark each
(ii) Colour **A**, **B**, **C** @ 1 mark each
(iii) Function @ 1 mark
(iv) Metal @ 1 mark, Reason @ 1 mark
(v) Explain @ 1 mark **10 MARKS**

(b) Heating @ 2 marks, finish @ 3 marks
Any **two** safety @ 1 mark each
Diagram @ 3 marks
10 MARKS

Question 7

(a) (i) Identify **4** functions @ 1 mark each
(ii) Describe @ 3 marks
(iii) Explain @ 3 marks
(iv) Any **one** @ 2 marks **12 MARKS**

(b) (i) Instrument **A** and **B** @ 1 mark each
(ii) One application @ 2 marks
(iii) Part **C** and **D** @ 1 mark each
(iv) Reading @ 2 marks
8 MARKS

Question 1, Section A - Compulsory — 20 Marks

Five parts only to be counted

(a) (i) Part **A** is the Piston *Name @ 2 marks*

(ii) The main functions of the piston rings include-

- to provide good sealing between piston and engine cylinder.
- to regulate the amount of lubricant into engine cylinder.
- to provide proper lubrication.
- to transfer heat of piston through engine wall and fins.
- to minimize friction between piston and engine wall.

Explain the function @ 2 marks

4 marks

(b) (i) Part **B** is the Gudgeon Pin *1 mark*

Part **C** is the Connecting Rod *1 mark*

(ii) The gudgeon pin connects the piston to the connecting rod and provides a bearing for the connecting rod to pivot upon as the piston moves. *Explain the purpose @ 2 marks*

4 marks

(c) (i) In the compression stroke the piston, moving upward, compresses the air-fuel mixture in preparation for ignition during the power stroke. Both the intake and exhaust valves are closed during this stoke. *2 marks*

(ii) Four-stroke engines are lubricated by oil held in an oil sump. The oil is distributed through the engine by splash lubrication or a pressurised pump system. *2 marks*

4 marks

(d) Electric cars help in the reduction of pollution in the following ways –

- Pollution caused by the extraction of fossil fuels is reduced as fossil fuels are not used in electric cars
- CO2 emissions produced by combustion engines are not produced by electric engines
- Noise pollution is greatly reduced in electric cars.

*Any **two** ways @ 2 marks each*

4 marks

(e) (i) ***Harry Ferguson***; was an Irish-born British engineer and inventor who developed the modern agricultural tractor and its three point linkage system. He was the first person in Ireland to build and fly his own aeroplane. He also developed the first four-wheel drive Formula One car, the Ferguson P99.

(ii) ***James Dyson***; is a British inventor, industrial designer and founder of the Dyson company. He is best known as the inventor of the Dual Cyclone bagless vacuum cleaner, which works on the principle of cyclonic separation.

(iii) ***Neil Papworth***; is a software architect, designer and developer who is best known as the sender of the first text message (also known as SMS message) in 1992. *Any **one** @ 4 marks*

4 marks

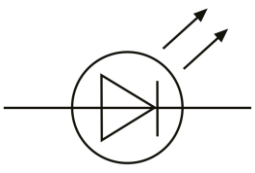
(f) (i) Phone cases are commonly manufactured from polycarbonate, polypropylene and polyurethane. *Any **one** material @ 2 marks*

(ii) Thermoplastic materials soften when heated and this allows these materials to be moulded into required shapes. Thermosetting materials will not soften when they are heated. *Any **one** difference @ 2 marks*

4 marks

(g) (i) LED is a Light Emitting Diode *2 marks*

(ii)



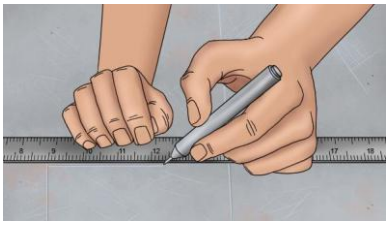
Electronic symbol @ 2 marks

4 marks

Question 1, Section B - Compulsory — 20 Marks

*Five parts **only** to be counted*

(a) (i) The window labelled **A** may be marked-out as follows: –



- Mark-out the 3 holes for drilling by drawing 3 lines parallel to the top edge down 20mm, 28mm and 35mm. Then draw 2 lines parallel to the left side 35° angle at 20mm and 30mm. Mark a line parallel to the right side 75° angle at 20mm.
- Punch the 5 centres in preparation for drilling the Ø6mm holes
- The outline of the window is finished by drawing lines tangential to the drilled holes.

Explain @ 2 marks

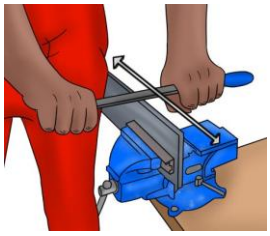
(ii) The window labelled **A** may be produces as follows: –

- Drill the 5 Ø6mm holes previously marked-out
- Draw lines tangential to the holes to complete the outline of the window
- Cut-out the sections between each hole
- File to the marked shape
- Smooth file to finish the window.

*Any **two** steps @ 1 mark each*

4 marks

(b) (i) A high quality finish is achieved on the edge profile of the side panel by smooth filing (draw filing) and ensuring that all rough edges are removed using a smooth file. A polish may then be applied to achieve a high quality finish.



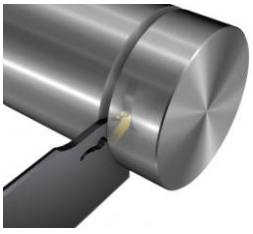
Outline @ 2 marks

(ii) The 90° bend on the side panel may be completed by holding the work in a folding bar and striking the work with a mallet. Alternatively the support can be bent to shape using a folding machine. The accuracy of the finished bend can be checked using an engineers protractor.

Describe @ 2 marks

4 marks

(c) (i) The undercut may be produces as follows: –



- Measure 8mm from the end using an odd-leg callipers
- Feed in a 3mm parting tool a depth of 3mm to complete the undercut.

*Any **two** stages @ 1 mark each*

(ii) The undercut provides a guide for the track of the snowcat and thus prevents the track from slipping off the track wheel.

Explain @ 2 marks

4 marks

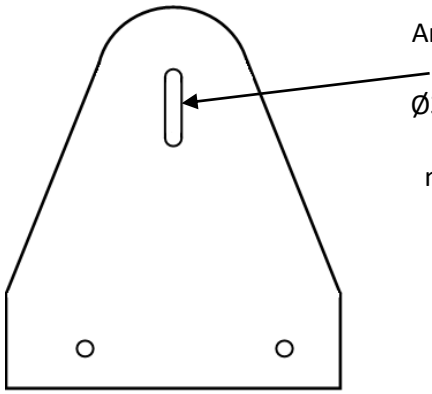
(d) **(i)** Component **X** is a variable resistor / potentiometer *1 mark*
Component **Y** is a push to break switch *1 mark*

(ii) A ***potentiometer*** is a three-terminal resistor with a sliding or rotating contact that allows it to act as a variable resistor. In the operation of the model snowcat the potentiometer is used to control the output speed of the motors. *1 mark*

When the button of a ***push to break*** switch is not pressed, electricity can flow, but when it is pressed the circuit is broken. In the operation of the model snowcat the push to break switches are used to control the steering of the model. *1 mark*

4 marks

(e)



An adjustable tensioning system may be created by converting the Ø3.5mm hole to a slot as shown. This will allow the track wheel to be moved up or down on the support, thus changing the tension of the caterpillar track.

Suitable design @2 marks
Diagram @2 marks

4 marks

(f) **(i)** Advantages of using caterpillar tracks on the model snowcat include:

- ability to move up a steep incline
- ability to traverse across soft snow.

*Any **two** advantages @ 1 mark each*

(ii) The inclusion of two rear axles allows for independent drive of each side of the snowcat. This independent drive allowed for steering of the model.

***One** reason @ 2 marks*

4 marks

Question 2 — 20 Marks

(a) (i) Stage one is the **"**Analysis of the brief". *Name of stage @ 2 marks*

(ii) Factors to consider during the "Evaluation" stage include:

- Does the solution satisfy the original brief?
- Is the product/materials safe for use?
- How well does the final solution function?
- Is the quality of finish satisfactory?

*Any **two** factors @ 1 mark each*

(iii) Factors to be considered when selecting material for the toy car include:

- The suitability of the material for the proposed application, e.g. safe for use by children, etc.
- The cost of the material.
- The availability of the material.
- Weight of the material.

*Any **three** suitable factors @ 1 mark each*

7 marks

(b) (i) & (ii) Solutions may be presented in one diagram.

Overhang design provides protection from the elements

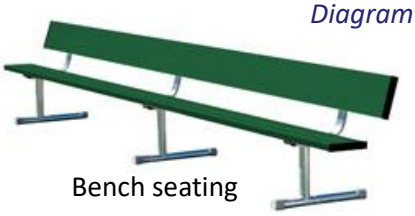
Transparent sides allow for full viewing of the playing area

Bench seating, attached to the structure, which will accommodate five players

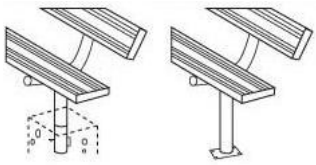
Any suitable design which protects from the elements @ 2 marks
Suitable method to enable full vision of playing area @ 1 mark
Diagram @ 3 marks

(ii)

Individual seats



Bench seating



Any suitable seat design @ 1 mark, diagram @ 1 mark
Any suitable method of attachment @ 1 mark

(iii) Materials used to manufacture the dugout may include steel, aluminium, stainless steel, polycarbonate and toughened glass.
Seat materials may include wood or polypropylene.

Any suitable dugout material @ 1 mark
Any suitable seat material @ 1 mark

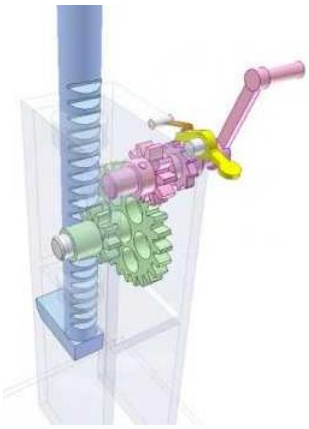
(iv) Finishes applied will depend on the material(s) selected. A steel frame for example could be painted of galvanised, while a wooden seat could be painted or varnished.

*Any **two** suitable finishes @ 1 mark each*

13 marks

Question 3 — 20 Marks

(a) **(i)** Part **A** is the Motor — *1 mark*
Part **B** is the Chuck — *1 mark*
Part **C** is the Table — *1 mark*
Part **D** is the Base — *1 mark*



(ii) The table is raised with the aid of a rack and pinion mechanism. — *Name @ 1 mark*

The pinion is connected to the handle and meshes with the rack fixed to the pillar. The table is raised or lowered by rotating the handle. — *Describe @ 1 mark*

(iii) Integrated safety features on the pillar drill include an emergency stop button and chuck guard.
*Any **two** safety features @ 1 mark each*

(iv) Drill bits are manufactured from high speed steel (HSS). — *1 mark*

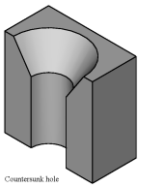
This material is suitable as it has a high hardness and excellent resistance to wear.
Reason @ 1 mark

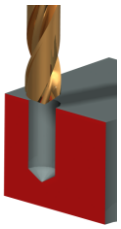
10 marks

(b) The speed is 2500 rpm.
Correct substitution @ 2 marks
Correct calculation @ 2 marks

4 marks

(c) **(i)** Hole **X** is a countersunk hole. — *1 mark*
Hole **Y** is a blind hole. — *1 mark*



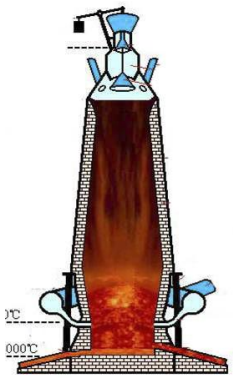


(ii) When threading a blind hole, you start with a taper or second tap. The hole should then be cleaned out before finishing with a bottoming / plug tap.
Description @ 4 marks

6 marks

Question 4 — 20 Marks

(a) **(i)** The furnace shown is a Blast furnace. *1 mark*



(ii) The charge is made up of coke, limestone and Iron ore. *3 marks*

(iii) The double-bell charging system helps to prevent heat loss. When charging, the first bell is open, the charge is loaded, it then closes. The second bell is then opened to let the charge into the furnace. The second bell closes when the charge is fully in the furnace. This system ensures that the top of the furnace remains sealed, thus preventing heat loss.

Description @ 2 marks
Diagram @ 1 mark

(iv) Part **A** is the **bustle pipe** and tuyere. The function of the bustle pipe and tuyere is to input a blast of hot air, which is used to increase the efficiency of the blast furnace and melt the charge. The hot blast is directed into the furnace through the tuyeres which are water-cooled copper nozzles near the base. The hot blast temperature can be from 900 °C to 1300 °C.

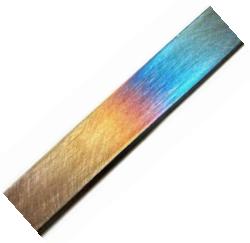
*Name of part **A** @ 1 mark*
*Function of part **A** @ 1 mark*

(v) Part **B** is a tap hole/chute where molten pig iron exits the blast furnace.

*Function of part **B** @ 1 mark*

10 marks

(b) **(i)** Heat treatment is applied to metal in order to change the mechanical properties of the metal. Heat treatment may also be applied to a metal in order to change the appearance of the metal.



Explain @ 3 marks

(ii) *Hardening* – a piece of high carbon steel is heated to a cherry red. It is then quenched rapidly in water or oil to make the steel hard. The hard steel will also be brittle and may need to be tempered to make it suitable for use.

Description @ 3 marks

6 marks

(c) **(i)** Aluminium is typically used for disposable food trays.

Name @ 2 marks

(ii) Properties of aluminium that make it suitable for disposable food trays include:-

- light material
- easy to shape
- good conductor of heat
- possible to recycle
- relatively cheap material.

*Any **two** properties @ 1 mark each*

4 marks

Question 5 — 20 Marks

(a) **(i)** Suitable materials for each buggy part are:

- Part **A**: Poly Vinyl Chloride (PVC), Poly Tetra Fluoro Ethylene (PTFE) or Nylon.
- Part **B**: Tubular steel
- Part **C**: Rubber.

Suitable material @ 1 mark each

(ii) Buggy Seats (part **A**) are commonly made from polymer materials such as Poly Vinyl Chloride (PVC), Poly Tetra Fluoro Ethylene (PTFE) and Nylon. These materials are suitable due to their strength, water resistance and UV-resistance. Their combination of cost effectiveness and strength make them the most common upholstery materials used.

The roll cage (part **B**) would be made from tubular steel as it has a high strength-to-weight ratio.

The buggy tyres (part **C**) would be manufactured from rubber providing good grip and allowing a smoother ride over rough surfaces.

Reason for selection @ 1 mark each

(iii) Safety features of an off-road buggy include:

- Tubular steel roll cage and surround.
- Racing seats.
- Five-point safety harnesses.
- Deeply threaded rubber wheels for off-road grip.
- Steel side protection from side impacts.
- Headlights for night time driving.

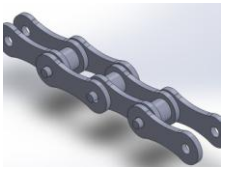
*Any **two** safety features @ 1 mark each*

(iv) A coil spring is a mechanical device which is typically used to store energy and subsequently release it, to absorb shock and provide a smoother drive over rough surfaces.

Function @ 2 marks

10 marks

(b) **(i)** The drive mechanism is a chain and sprocket. *2 marks*



(ii) The gear ratio is $\frac{\text{Driven}}{\text{Driver}} = \frac{15}{90} = \frac{1}{6}$ = **1:6**. *2 marks*

(iii) The chain and sprocket mechanism has numerous nip or pinch points. Users must be careful not to put body parts or loose clothing near the mechanism. *2 marks*

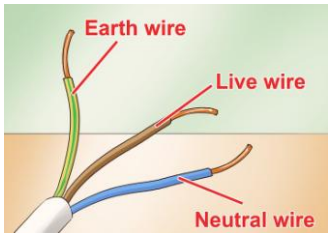
(iv) The chain and sprocket mechanism should have a safety guard installed that encloses both sprockets and the chain.

Description @ 2 marks
Diagram @ 2 marks

10 marks

Question 6 — 20 Marks

(a) **(i)** Terminal **A** is called neutral *1 mark*
Terminal **B** is called earth *1 mark*
Terminal **C** is called live *1 mark*

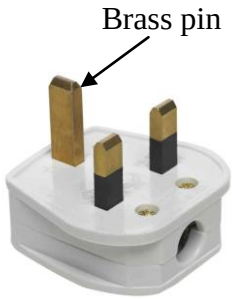


(ii) Terminal **A**, the neutral is coloured blue *1 mark*
Terminal **B**, the earth is coloured yellow / green *1 mark*
Terminal **C**, the live is coloured brown *1 mark*

(iii) If a fault develops, the fuse will blow and cut off the electrical supply. *Function @ 1 mark*

(iv) A suitable material for the plug pin would be brass as it is an excellent conductor and is hard wearing.

Suitable metal @ 1 mark
Reason @ 1 mark



(v) Reasons thermosetting plastics such as urea formaldehyde are used for electrical plug and fittings include:

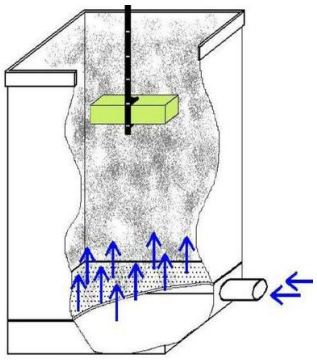
- Very good electrical insulator, making it safe to use.
- Physical properties of high hardness and high toughness, making it suitable for strong, knock-resistant electrical fittings

*Any **one** reason @ 1 mark*

10 marks

(b) Plastic dip coating provides an attractive appearance to articles as well as providing good resistance to corrosion. The key steps to be taken to in the process include:

Heating **–** prior to heating the article is attached to a fine wire. The article should be heated to 180°. Even heating is best achieved in an oven. The article may also be heated using a gas torch. *Outline of heating @ 2 marks*



Applying the plastic finish **–** the heated article is dipped into the fluidised powder (air is blown into the chamber to fluidise the powder). The article is then removed and the surplus powder is shaken off. When all the powder has fused, the article is allowed to cool. *Application of finish @ 3 marks*

Safety precautions- appropriate safety precautions, such as wearing the correct clothing, eye protections and ensuring that warning signs are displayed to indicate that material is hot, should be taken. *Any **two** safety precautions @ 1 mark each*

Diagram @ 3 marks

10 marks

Question 7 — 20 Marks

(a) **(i)** The primary function of each device is classified as follows:

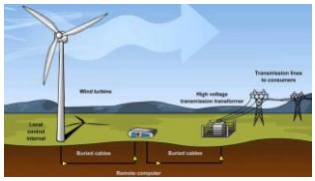
- Code scanner - input *1 mark*
- Drone controller - input *1 mark*
- Robotic arm - output *1 mark*
- Virtual reality goggles - output *1 mark*

(ii) Stepper motors are used to control the movement of the robotic arm due to their high level of accuracy and ability to move at a very fast speed.

Description of benefits @ 3 marks

(iii) The solar charger uses a solar panel to convert light energy (photons) from the Sun into electricity that can be used to power/charge the battery in the phone.

Explanation @ 3 marks



(iv) Forms of renewable energy include:

- Wind power
- Hydroelectric power
- Biomass
- Geothermal power

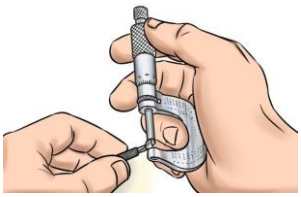
*Any **one** form of renewable energy @ 2 marks*

12 marks

(b) **(i)** Instrument **A** is an Engineer's protractor. *1 mark*
Instrument **B** is a micrometer. *1 mark*

(ii) The Engineer's protractor can be used to:

- Measure angles
- Mark-out angles.



The micrometer can be used to:

- Measure length
- Measure an outside diameter.

*Application of **one** instrument @ 2 marks*

(iii) Part **C** is the spindle. *1 mark*
Part **D** is the ratchet *1 mark*

(iv) The value of the micrometer reading is 4.20mm.

Micrometer reading @ 2 marks

8 marks

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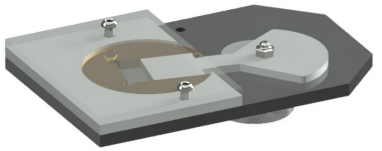

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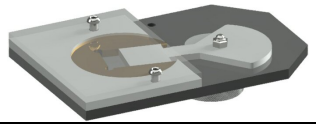
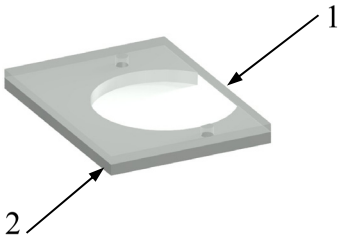
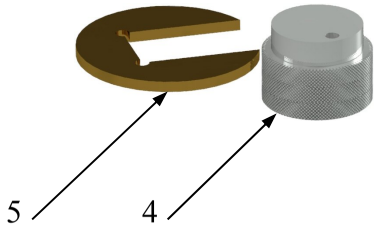
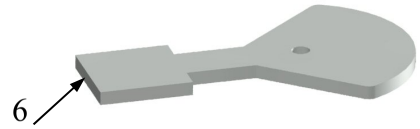
Subjective Marking 1 - 10	9-10 Excellent	7-8 Very Good	5-6 Good	3-4 Poor	1-2 Very Poor
Subjective Marking 1 - 5	5 Excellent	4 Very Good	3 Good	2 Poor	1 Very Poor

Section	Part Number	Pictorial Sketch / Description	Concept			Mark	Marks
1	**Parts 1, 2, 3, 4, 5 & 6**		**Complete** Piece		**Assembly:** Subjective Marking 1 - 5	5	20
					Finish: Subjective Marking 1 - 5	5	
					Function: Subjective Marking 1 - 10	10	
2	**Parts 1 & 2**		**Part 1** Cover	5	Mark Out	1	20
					Profile	2	
					Holes	2	
			Part 2 Valve Casing	15	Mark Out	2	
					External Profile	5	
					Internal Circular Profile	6	
					Holes	2	
3	**Part 3**		**Part 3** Backplate	20	Mark Out	3	20
					External Profile	7	
					Ø25 Hole	6	
					Holes	4	
4	**Parts 4 & 5**		**Part 4** Knob	10	Mark Out	1	20
					Lengths & Diameters	2	
					Hole & CSK	2	
					Chamfer	1	
					Knurl	4	
			Part 5 Valve Cylinder	10	Mark Out	2	
					External Profile Ø50	2	
					Internal Profile (Cylinder)	4	
					Holes	2	
5	**Part 6**		**Part 6** Piston & Crank	20	Mark Out	3	20
					Piston & Extension Profile	8	
					Crank Profile	8	
					Hole	1	

100 Marks (× 1.5 = 150 Total)

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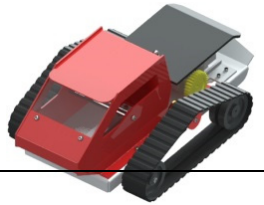
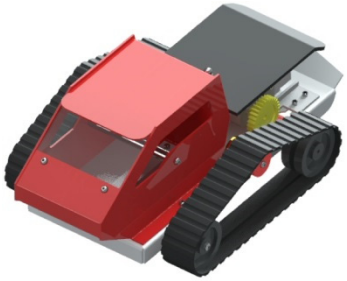
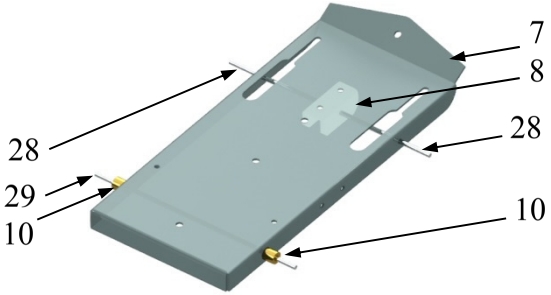


Subjective Grading 1 – 10	9-10 Excellent	7-8 Very Good	5-6 Good	3-4 Poor	1-2 Very Poor	
Subjective Grading 1 – 5	5 Excellent	4 Very Good	3 Good	2 Poor	1 Very Poor	

Section	Part Number	Pictorial Sketch/Description	Concept		Mark	Marks
1	**Complete Model** (Design Element not included)	Assembly Finish Function 	**Assembly:** Subjective Grade 1 – 5		**5**	**20**
			Finish: Subjective Grade 1 – 5		**5**	
			Mechanical Function: Subjective Grade 1 – 5		**5**	
			Electrical Function: Subjective Grade 1 – 5		**5**	
2	**Design**	(i) Design and make a control console for the model. The control console must contain the electronic components **(Parts 32 – 35)** and be attached to the model using ribbon cable. (ii) Design, make and attach an adjustable tensioning system for each Caterpillar Track. Your design solution can include adjustments to already manufactured components. (**Note: 20% of the marks will be awarded for this section.)**	**Control Console:** Design: 5 Subjective Grade 1 – 5 Make, Finish & Attach: 5 Subjective Grade 1 – 5		**10**	**20**
			Adjustable Tensioning System: Design: 5 Subjective Grade 1 – 5 Make, Finish & Attach: 5 Subjective Grade 1 – 5		**10**	
3	**Parts 7, 8, 10, 28** & **29**		**Part 7** Chassis	Mark Out, Drill & Shape	**10**	**20**
				Bend	**4**	
			Parts 8 & 28 Half Axle Support & Rear Half Axles	Mark Out, Drill & Shape	**3**	
			Parts 10 & 29 Spacers × 2 & Front Axle	Mark Out, Turn, Drill & Shape	**3**	

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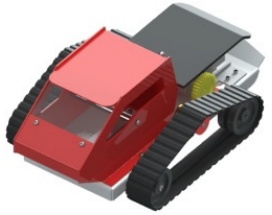

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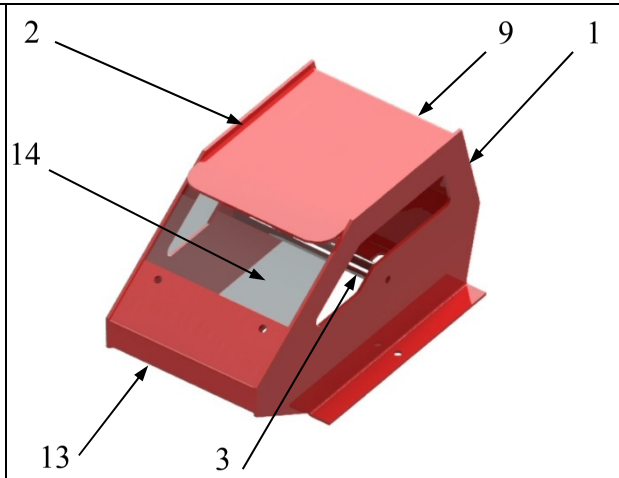
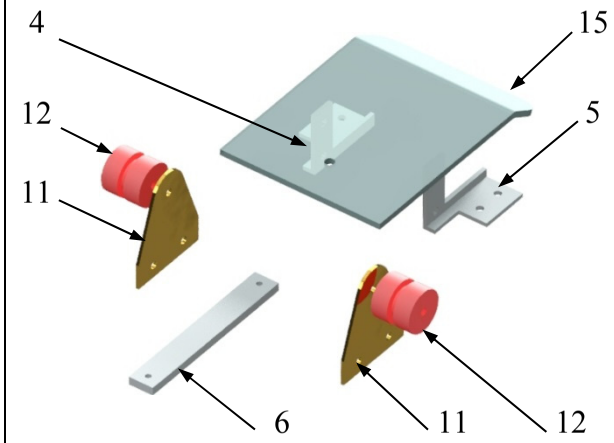
4	**Parts 1, 2, 3, 9, 13** & **14**		**Parts 1 & 2** Left & Right Side Panels	Mark Out, Drill, Shape & Bend	**8**	**20**
			Part 3 Side Panel Support	Mark Out, Turn, Drill & Tap	**2**	
			Part 9 Roof / Rear Panel	Mark Out, Drill, Shape & Bend	**4**	
			Part 13 Front Panel	Mark Out, Drill, Shape & Bend	**4**	
			Part 14 Windscreen	Mark Out, Drill & Shape	**2**	
5	**Parts 4, 5, 6, 11, 12** & **15**		**Parts 4 & 5** Right & Left Motor Supports	Mark Out, Drill, Tap & Shape	**6**	**20**
			Part 6 Plate Nut	Mark Out, Drill, Tap & Shape	**2**	
			Part 11 Track Wheel Support × 2	Mark Out, Drill & Shape	**4**	
			Part 12 Track Wheel × 2	Mark Out, Turn & Drill	**4**	
			Part 15 Transmission Cover	Mark Out, Drill, Shape & Bend	**4**	

100 Marks (× 1.5 = 150 Total)