



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

JUNIOR CERTIFICATE 2011

MARKING SCHEME

MATERIALS AND TECHNOLOGY
METALWORK

ORDINARY LEVEL

MATERIALS AND TECHNOLOGY ***METALWORK***

ORDINARY LEVEL

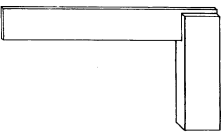
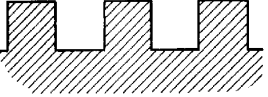

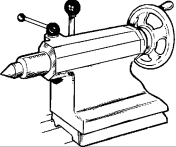
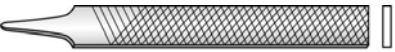

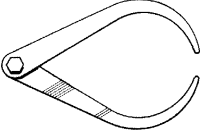
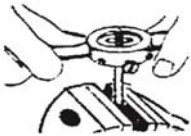


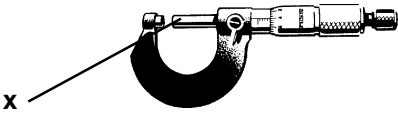
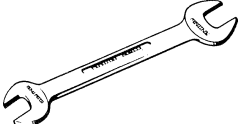
MARKING SCHEME **Written Examination and Project**

Note: For the written examination - Answer Question 1, Sections A and B and any three other questions.
The solutions presented are examples only.
All other valid solutions are acceptable and are marked accordingly.

Question 1.

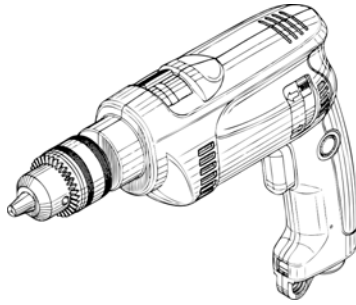
SECTION A - 20 MARKS
ANSWER ANY TEN QUESTIONS FROM THIS SECTION

40 Marks

(a) 	The tool is a:	<table border="1"> <tr><td>Centre Square</td><td></td></tr> <tr><td>Try Square</td><td>✓</td></tr> <tr><td>Protractor</td><td></td></tr> <tr><td>Bevel</td><td></td></tr> </table>	Centre Square		Try Square	✓	Protractor		Bevel		②
Centre Square											
Try Square	✓										
Protractor											
Bevel											
(b) 	The thread form is a(n):	<table border="1"> <tr><td>Acme Thread</td><td></td></tr> <tr><td>Square Thread</td><td>✓</td></tr> <tr><td>ISO Metric Thread</td><td></td></tr> <tr><td>Butress Thread</td><td></td></tr> </table>	Acme Thread		Square Thread	✓	ISO Metric Thread		Butress Thread		②
Acme Thread											
Square Thread	✓										
ISO Metric Thread											
Butress Thread											
(c) 	Part 'X' is called the:	<table border="1"> <tr><td>Flute</td><td></td></tr> <tr><td>Land</td><td></td></tr> <tr><td>Flank</td><td></td></tr> <tr><td>Shank</td><td>✓</td></tr> </table>	Flute		Land		Flank		Shank	✓	②
Flute											
Land											
Flank											
Shank	✓										
(d) 	A lathe tailstock can also be used for:	<table border="1"> <tr><td>Knurling</td><td></td></tr> <tr><td>Drilling</td><td>✓</td></tr> <tr><td>Undercutting</td><td></td></tr> <tr><td>Facing</td><td></td></tr> </table>	Knurling		Drilling	✓	Undercutting		Facing		②
Knurling											
Drilling	✓										
Undercutting											
Facing											
(e) 	This file is:	<table border="1"> <tr><td>Single Cut</td><td></td></tr> <tr><td>Double Cut</td><td>✓</td></tr> <tr><td>Three Square</td><td></td></tr> <tr><td>Half-Round</td><td></td></tr> </table>	Single Cut		Double Cut	✓	Three Square		Half-Round		②
Single Cut											
Double Cut	✓										
Three Square											
Half-Round											
(f) 	Part 'X' is a:	<table border="1"> <tr><td>Bick Iron</td><td></td></tr> <tr><td>Hatchet Stake</td><td></td></tr> <tr><td>Folding Bars</td><td>✓</td></tr> <tr><td>Groove Punch</td><td></td></tr> </table>	Bick Iron		Hatchet Stake		Folding Bars	✓	Groove Punch		②
Bick Iron											
Hatchet Stake											
Folding Bars	✓										
Groove Punch											
(g) 	This instrument is a(n):	<table border="1"> <tr><td>Odd-Leg Calipers</td><td></td></tr> <tr><td>Outside Calipers</td><td>✓</td></tr> <tr><td>Inside Calipers</td><td></td></tr> <tr><td>Vernier Calipers</td><td></td></tr> </table>	Odd-Leg Calipers		Outside Calipers	✓	Inside Calipers		Vernier Calipers		②
Odd-Leg Calipers											
Outside Calipers	✓										
Inside Calipers											
Vernier Calipers											
(h) 	Stocks and dies are used to make:	<table border="1"> <tr><td>Blind Holes</td><td></td></tr> <tr><td>Internal Threads</td><td></td></tr> <tr><td>External Threads</td><td>✓</td></tr> <tr><td>Countersunk Holes</td><td></td></tr> </table>	Blind Holes		Internal Threads		External Threads	✓	Countersunk Holes		②
Blind Holes											
Internal Threads											
External Threads	✓										
Countersunk Holes											
(i) 	This fastener is a:	<table border="1"> <tr><td>Spring Washer</td><td></td></tr> <tr><td>Split Pin</td><td>✓</td></tr> <tr><td>Grub Screw</td><td></td></tr> <tr><td>Set Screw</td><td></td></tr> </table>	Spring Washer		Split Pin	✓	Grub Screw		Set Screw		②
Spring Washer											
Split Pin	✓										
Grub Screw											
Set Screw											
(j) 	This technique is called:	<table border="1"> <tr><td>Planishing</td><td></td></tr> <tr><td>Hollowing</td><td>✓</td></tr> <tr><td>Punching</td><td></td></tr> <tr><td>Mottling</td><td></td></tr> </table>	Planishing		Hollowing	✓	Punching		Mottling		②
Planishing											
Hollowing	✓										
Punching											
Mottling											
(k) 	Part 'X' is called the:	<table border="1"> <tr><td>Spindle</td><td>✓</td></tr> <tr><td>Ratchet</td><td></td></tr> <tr><td>Thimble</td><td></td></tr> <tr><td>Anvil</td><td></td></tr> </table>	Spindle	✓	Ratchet		Thimble		Anvil		②
Spindle	✓										
Ratchet											
Thimble											
Anvil											
(l) 	This tool is a(n):	<table border="1"> <tr><td>Open Spanner</td><td>✓</td></tr> <tr><td>Ring Spanner</td><td></td></tr> <tr><td>Adjustable Spanner</td><td></td></tr> <tr><td>Box Spanner</td><td></td></tr> </table>	Open Spanner	✓	Ring Spanner		Adjustable Spanner		Box Spanner		②
Open Spanner	✓										
Ring Spanner											
Adjustable Spanner											
Box Spanner											

SECTION B - 20 MARKS
ANSWER ALL QUESTIONS FROM THIS SECTION

(m)



Complete the chart by listing **four** other items used in the home that contain electric motors.

6

1.	<i>Washing machine</i>
2.	<i>Food mixer</i>
3.	<i>Water pump</i>
4.	<i>Clothes dryer</i>

(n)



List **three** design features of a modern bicycle.

5

1.	<i>Quick release wheel</i>
2.	<i>Disc brake</i>
3.	<i>Lighter frame</i>

(o) (i) The guitar strings shown are normally in:



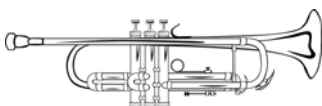
Tension	<input checked="" type="checkbox"/>
Torsion	<input type="checkbox"/>
Compression	<input type="checkbox"/>
Shear	<input type="checkbox"/>

(ii) Name a metal used for roof flashing.

3

Lead

(p) (i) Brass is an alloy of:



Copper and Steel	<input type="checkbox"/>
Copper and Zinc	<input checked="" type="checkbox"/>
Copper and Aluminium	<input type="checkbox"/>
Copper and Tin	<input type="checkbox"/>

(ii) Name **one** other alloy.

3

Bronze

(q) (i) Household cutlery is made from:



Cast Iron	<input type="checkbox"/>
Silver Steel	<input type="checkbox"/>
Stainless Steel	<input checked="" type="checkbox"/>
Galvanised Steel	<input type="checkbox"/>

(ii) What is galvanised iron?

3

Steel coated with zinc

Question 2.

20 Marks

(a) Answer the following by ticking the correct box:

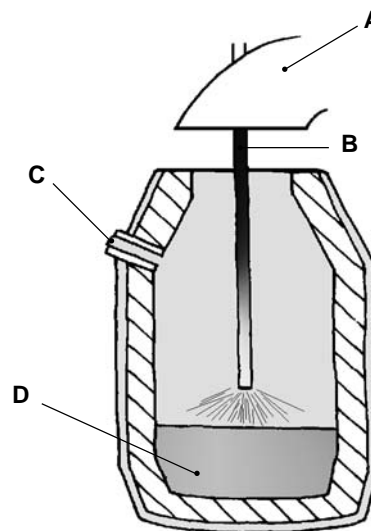
8

(i) Is cutting a design into metal with a sharp tool called engraving?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
(ii) Does aluminium have a good resistance to corrosion?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
(iii) Do thermosetting plastics soften when heated?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
(iv) Is the Electric Arc Furnace used to make pig iron?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
(v) Is copper a non-ferrous metal?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
(vi) Is the melting of a plastic material onto metal called lacquering?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
(vii) Is ductility the ability of a metal to resist wear?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
(viii) Is aluminium ore called bauxite?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

(b) The diagram shows a Basic Oxygen Furnace. Name **any three** of the parts labelled.

6

Part	Name
A	<i>Fume hood</i>
B	<i>Oxygen lance</i>
C	<i>Tapping hole</i>
D	<i>Molten steel</i>



Basic Oxygen Furnace

(c) Complete the chart by listing a tool for each task.

6

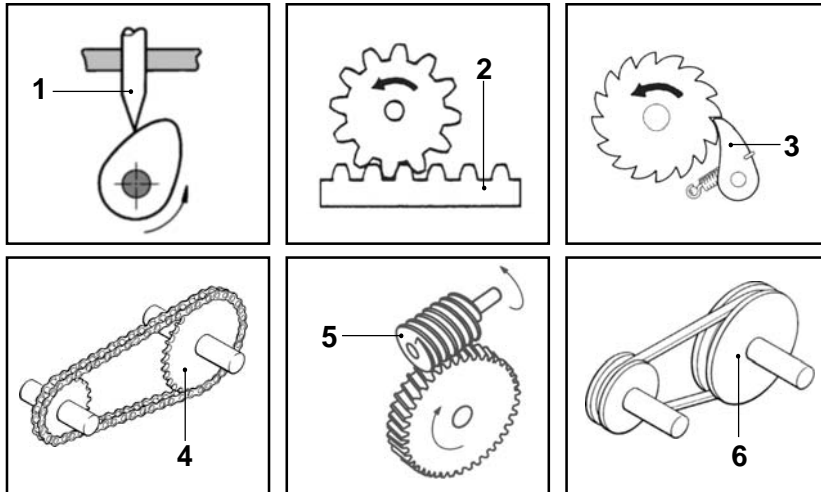
Task	Tool
To draw a line on a piece of metal.	<i>Scriber</i>
To flatten copper sheet without causing damage.	<i>Mallet</i>
To check drill bit sizes.	<i>Drill gauge</i>
To prevent damage caused by the jaw faces of a bench vice.	<i>Vice clamps</i>
To cut thin sheet metal by hand.	<i>Tin snips</i>
To cut a 25 mm mild steel pipe.	<i>Hacksaw</i>

Question 3.

20 Marks

8

(a) (i) Match the number to the correct mechanism part.



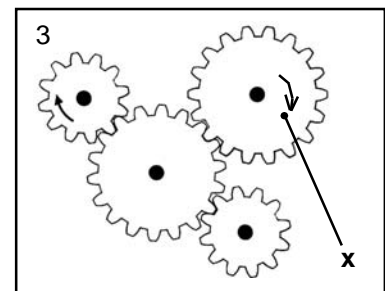
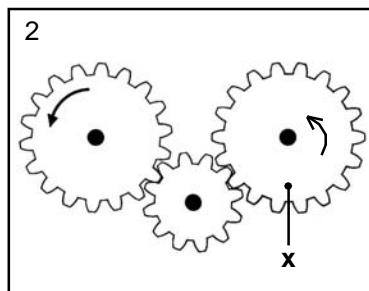
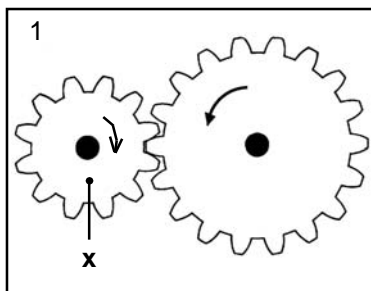
Mechanism Part	No.
Rack	2
Sprocket	4
Pawl	3
Follower	1
Pulley	6
Worm	5

(ii) Name a machine that uses bevel gears.

Hand drill

(b) (i) Use an arrow to indicate the direction of gear 'X' in each of the following:

6



(ii) Name any **two** mechanisms that could be used in the operation of a lawn-mower.



1. Pulley and belt
2. Clutch

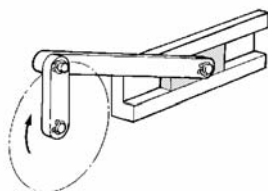
(iii) Name a machine that uses a rack and pinion.

Drilling machine

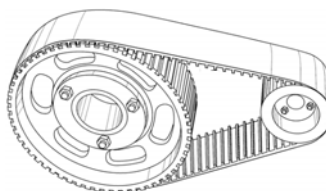
(c) Name a use for each of these mechanisms:

6

Use: *Engine*



Use: *CNC lathe*



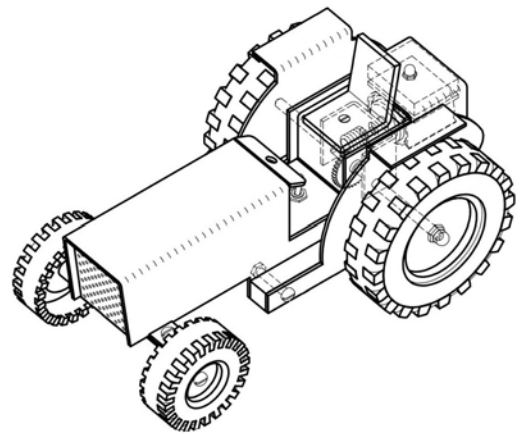
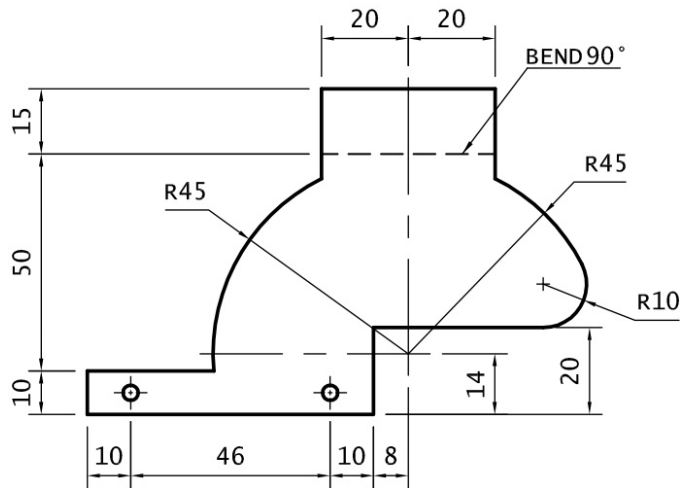
Use: *Gearbox*



Question 4.

20 Marks

Details of a mudguard used in the manufacture of a model vintage tractor are shown.



(i) With reference to the drawing above, describe how you would accurately mark out the R45 curve.

Measure in correct distance from left side and scribe a vertical line. ④
 Draw a 14mm line parallel to the base of the piece.
 Where both lines intersect, dot punch. Set spring dividers to R45mm,
 position at dot punch mark and draw arc.

(ii) What is the overall length and width of the piece of metal used to make the mudguard?

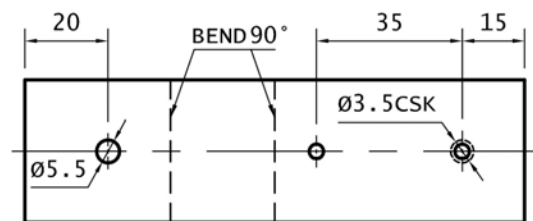
Length: 119mm or ②
 Width: 75mm

(iii) List **four** tools used in the manufacture of the mudguard.

1. Drill ④
 2. File
 3. Folding bars
 4. Mallet

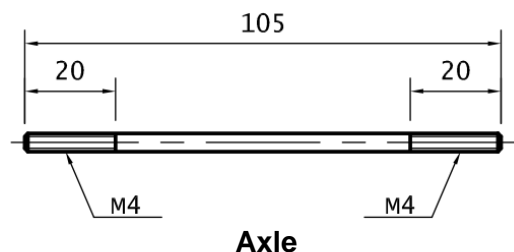
(iv) What does 'Ø3.5 CSK' mean?

Drill diameter 3.5mm
 Countersink



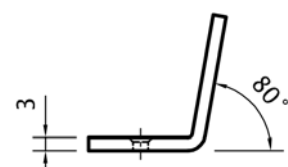
(v) Describe how to cut the M4 threads on the axle.

Hold in vice
 File chamfer
 Fit die in the stock, then place on the bar
 Rotate the die clockwise, reversing to
 break the chip.



(vi) What precautions would you need to take when drilling the acrylic seat?

Hold firmly
 Support properly
 Use correct speed

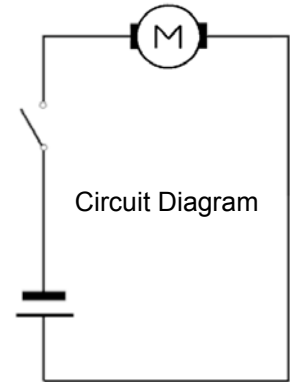
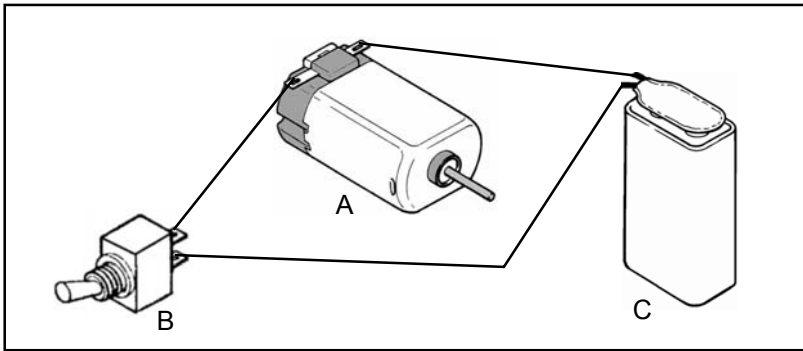


Question 5.

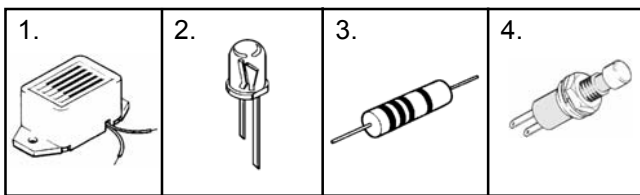
20 Marks

- (a)** (i) Using the circuit diagram as a reference, draw the connecting wires between the components in the box below.

8



- (ii) Match the number to the component in the table opposite.



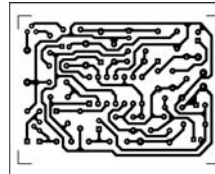
Component	No.
Resistor	3
LED	2
Push Switch	4
Buzzer	1

- (b)** (i) An electric kettle converts electrical energy into:



Mechanical Energy	<input type="checkbox"/>
Light Energy	<input type="checkbox"/>
Heat Energy	<input checked="" type="checkbox"/>

- (iv) This is a(n):



Printed Circuit	<input checked="" type="checkbox"/>
Integrated Circuit	<input type="checkbox"/>
Strip Board	<input type="checkbox"/>

6

- (ii) Mobile phone keypads use:



Slide Switches	<input type="checkbox"/>
Toggle Switches	<input type="checkbox"/>
Push Switches	<input checked="" type="checkbox"/>

- (v) A game controller is a(n):



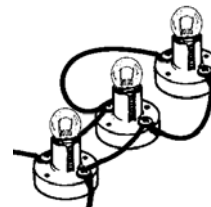
Output Device	<input type="checkbox"/>
Input Device	<input checked="" type="checkbox"/>
Process Device	<input type="checkbox"/>

- (iii) Which of these devices stores the largest amount of computer data?



USB drive	<input type="checkbox"/>
CD ROM	<input type="checkbox"/>
Floppy Disk	<input checked="" type="checkbox"/>

- (vi) These bulbs are connected in:



Parallel	<input checked="" type="checkbox"/>
Series	<input type="checkbox"/>
Parallel and Series	<input type="checkbox"/>

- (c)** Name one famous Engineering inventor. Write a brief note about this person's invention.

6

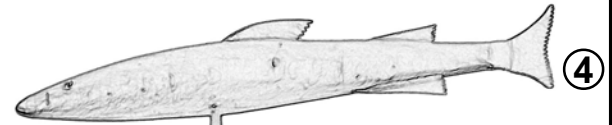
Inventor's Name:	<i>Rudolf Diesel</i>
Invention:	<i>Diesel engine</i>
	<i>Used in different modes of transport, cars buses, boats, trains</i>

Question 6.

20 Marks

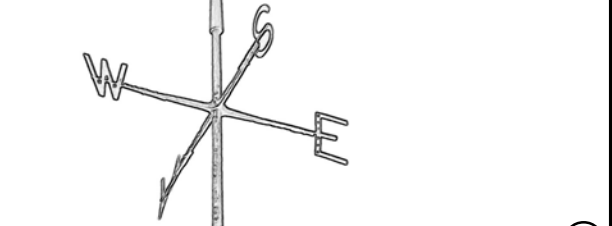
(i) The design shows a weather vane. List **three** workshop processes involved in making the letter 'E'.

1.	<i>Marking out</i>
2.	<i>Cutting</i>
3.	<i>Filing</i>



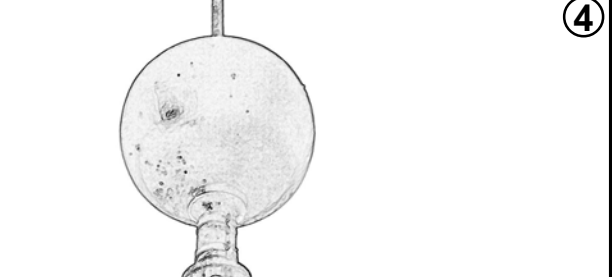
(ii) All the letters are to be made from mild steel. State how best to protect the letters from corrosion.

<i>Paint</i>



(iii) What method should be used to permanently attach the letters to the weather vane?

<i>Brazing</i>



(iv) Using the grid below draw an alternative design to replace the salmon on top of the weather vane.

Alternative Design	
<i>Excellent</i>	<i>5 marks</i>
<i>Very Good</i>	<i>4 marks</i>
<i>Good</i>	<i>3 marks</i>
<i>Fair</i>	<i>2 marks</i>
<i>Poor</i>	<i>1 mark</i>

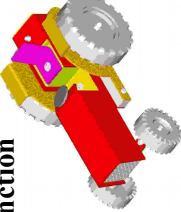
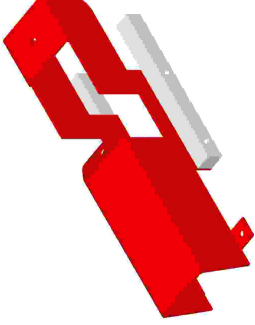
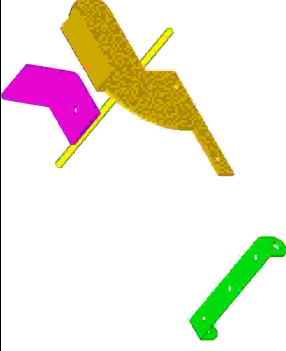
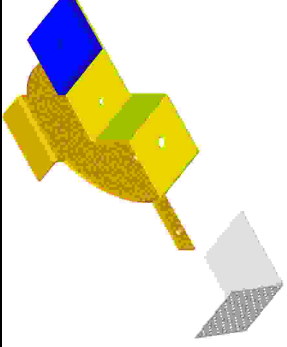
(v) What materials and processes would you use to make this alternative design?

<i>Brass / Copper</i>
<i>Process relevant to alternative design</i>
<i>e.g. filing, drilling, soldering</i>



Coimisiún na Scrúduithe Stáit
State Examinations Commission
Junior Certificate Metalwork, Ordinary Level Project, Marking Scheme 2011



		9 - 10 Excellent	7 - 8 Very Good	5 - 6 Good	3 - 4 Poor	1 - 2 Very Poor					
		5 Excellent	4 Very Good	3 Good	2 Poor	1 Very Poor					
Section	Part Number	Pictorial Sketch / Description					Concept	Mark	Mark		
1	Complete Model (Not including Design Element)						Assembly: Subjective Marking 1- 5			5	20
							Finish: Subjective Marking 1- 5			5	
							Mechanical Function			5	
							Electrical Function			5	
2	Design Feature	Design, make and attach a Steering Wheel and an Exhaust Pipe for the model.					Design: Subjective Marking 1-10	10	20		
3	Parts 2 & 10						Attach: Subjective Marking 1-5			5	
							Part 2			3	
							Main Body			4	
							Internal Profile			5	
							External Profile			2	
							Bends			2	
Holes			4								
Lengths & Holes			4								
4	Parts 6, 3, 8 & 1						Part 6			8	20
							Left Mudguard			4	
							Part 3			3	
							Seat			3	
							Rear Axle			5	
Front Axle Support			3								
5	Parts 5, 9, 7 & 4						Part 5			3	20
							Grill/Battery Support			8	
							Part 9			2	
							Right Mudguard			7	
							Motor Mount Spacer			3	
							Part 4			8	
							Support Unit			7	

Total: 100 Marks
(× 3 = 300 Total)