



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

JUNIOR CERTIFICATE 2010

MARKING SCHEME

***MATERIALS AND TECHNOLOGY*
METALWORK**

ORDINARY LEVEL

MATERIALS AND TECHNOLOGY ***METALWORK***

ORDINARY LEVEL


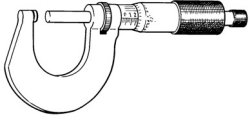
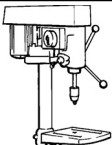
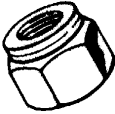
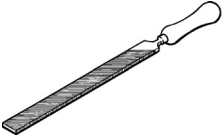

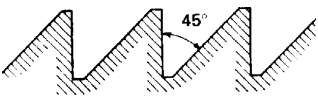
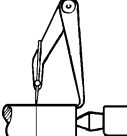
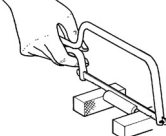

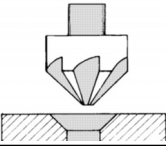
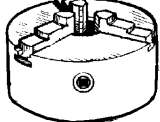
MARKING SCHEME **Written Examination and Project**

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.

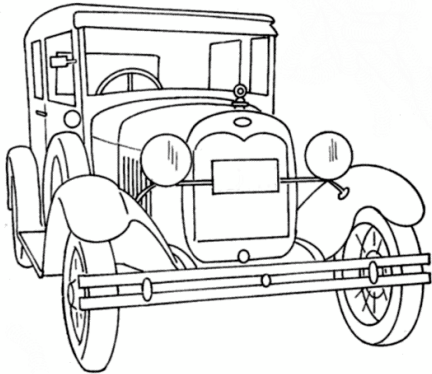
SECTION A - 20 MARKS
ANSWER ANY TEN QUESTIONS FROM THIS SECTION

40 Marks

<p>(a)</p> 	<p>Allen keys are used to turn:</p>	<table border="1"> <tr><td>Socket Head Screws</td><td>✓</td></tr> <tr><td>Round Head Screws</td><td></td></tr> <tr><td>Cheese Head Screws</td><td></td></tr> <tr><td>Raised Head Screws</td><td></td></tr> </table>	Socket Head Screws	✓	Round Head Screws		Cheese Head Screws		Raised Head Screws		<p>2</p>
Socket Head Screws	✓										
Round Head Screws											
Cheese Head Screws											
Raised Head Screws											
<p>(b)</p> 	<p>This instrument is a:</p>	<table border="1"> <tr><td>Centre Square</td><td></td></tr> <tr><td>Micrometer</td><td>✓</td></tr> <tr><td>Vernier Calipers</td><td></td></tr> <tr><td>Bevel</td><td></td></tr> </table>	Centre Square		Micrometer	✓	Vernier Calipers		Bevel		<p>2</p>
Centre Square											
Micrometer	✓										
Vernier Calipers											
Bevel											
<p>(c)</p> 	<p>This machine is a(n):</p>	<table border="1"> <tr><td>Pillar Drilling Machine</td><td>✓</td></tr> <tr><td>Electric Hand Drill</td><td></td></tr> <tr><td>Breast Drill</td><td></td></tr> <tr><td>Hand Drill</td><td></td></tr> </table>	Pillar Drilling Machine	✓	Electric Hand Drill		Breast Drill		Hand Drill		<p>2</p>
Pillar Drilling Machine	✓										
Electric Hand Drill											
Breast Drill											
Hand Drill											
<p>(d)</p> 	<p>This fastener is a:</p>	<table border="1"> <tr><td>Wing Nut</td><td></td></tr> <tr><td>Bolt</td><td></td></tr> <tr><td>Split Pin</td><td></td></tr> <tr><td>Lock Nut</td><td>✓</td></tr> </table>	Wing Nut		Bolt		Split Pin		Lock Nut	✓	<p>2</p>
Wing Nut											
Bolt											
Split Pin											
Lock Nut	✓										
<p>(e)</p> 	<p>Files are made from:</p>	<table border="1"> <tr><td>Mild Steel</td><td></td></tr> <tr><td>Stainless Steel</td><td></td></tr> <tr><td>High Carbon Steel</td><td>✓</td></tr> <tr><td>Silver Steel</td><td></td></tr> </table>	Mild Steel		Stainless Steel		High Carbon Steel	✓	Silver Steel		<p>2</p>
Mild Steel											
Stainless Steel											
High Carbon Steel	✓										
Silver Steel											
<p>(f)</p> 	<p>Before soldering you should apply:</p>	<table border="1"> <tr><td>Grease</td><td></td></tr> <tr><td>Oil</td><td></td></tr> <tr><td>Spelter</td><td></td></tr> <tr><td>Flux</td><td>✓</td></tr> </table>	Grease		Oil		Spelter		Flux	✓	<p>2</p>
Grease											
Oil											
Spelter											
Flux	✓										
<p>(g)</p> 	<p>This thread form is a(n):</p>	<table border="1"> <tr><td>Square Thread</td><td></td></tr> <tr><td>Buttress Thread</td><td>✓</td></tr> <tr><td>Acme Thread</td><td></td></tr> <tr><td>ISO Metric Thread</td><td></td></tr> </table>	Square Thread		Buttress Thread	✓	Acme Thread		ISO Metric Thread		<p>2</p>
Square Thread											
Buttress Thread	✓										
Acme Thread											
ISO Metric Thread											
<p>(h)</p> 	<p>This tool is a(n):</p>	<table border="1"> <tr><td>Outside Calipers</td><td></td></tr> <tr><td>Inside Calipers</td><td></td></tr> <tr><td>Odd Leg Calipers</td><td>✓</td></tr> <tr><td>Spring Dividers</td><td></td></tr> </table>	Outside Calipers		Inside Calipers		Odd Leg Calipers	✓	Spring Dividers		<p>2</p>
Outside Calipers											
Inside Calipers											
Odd Leg Calipers	✓										
Spring Dividers											
<p>(i)</p> 	<p>This cutting tool is a:</p>	<table border="1"> <tr><td>Pad Saw</td><td></td></tr> <tr><td>Junior Hacksaw</td><td>✓</td></tr> <tr><td>Tension File</td><td></td></tr> <tr><td>Band Saw</td><td></td></tr> </table>	Pad Saw		Junior Hacksaw	✓	Tension File		Band Saw		<p>2</p>
Pad Saw											
Junior Hacksaw	✓										
Tension File											
Band Saw											
<p>(j)</p> 	<p>This holding device is a:</p>	<table border="1"> <tr><td>Leg Vice</td><td></td></tr> <tr><td>Bench Vice</td><td></td></tr> <tr><td>Hand Vice</td><td>✓</td></tr> <tr><td>Machine Vice</td><td></td></tr> </table>	Leg Vice		Bench Vice		Hand Vice	✓	Machine Vice		<p>2</p>
Leg Vice											
Bench Vice											
Hand Vice	✓										
Machine Vice											
<p>(k)</p> 	<p>This drawing shows a:</p>	<table border="1"> <tr><td>Counterbored Hole</td><td></td></tr> <tr><td>Countersunk Hole</td><td>✓</td></tr> <tr><td>Pilot Hole</td><td></td></tr> <tr><td>Blind Hole</td><td></td></tr> </table>	Counterbored Hole		Countersunk Hole	✓	Pilot Hole		Blind Hole		<p>2</p>
Counterbored Hole											
Countersunk Hole	✓										
Pilot Hole											
Blind Hole											
<p>(l)</p> 	<p>This lathe part is a:</p>	<table border="1"> <tr><td>Toolpost</td><td></td></tr> <tr><td>Chuck</td><td>✓</td></tr> <tr><td>Tailstock</td><td></td></tr> <tr><td>Leadscrew</td><td></td></tr> </table>	Toolpost		Chuck	✓	Tailstock		Leadscrew		<p>2</p>
Toolpost											
Chuck	✓										
Tailstock											
Leadscrew											

SECTION B - 20 MARKS
ANSWER ALL QUESTIONS FROM THIS SECTION

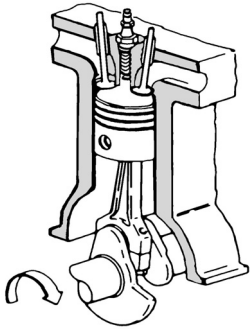
(m)



List **four** technological improvements found in modern cars. ④

1.	<i>Air bags</i>
2.	<i>Electric windows</i>
3.	<i>Automatic gear change</i>
4.	<i>Warning systems</i>

(n)



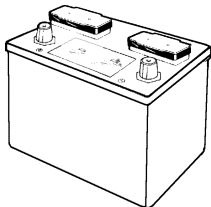
(i) Why is oil used in a car engine? ②

<i>To lubricate moving parts.</i>

(ii) Name any **two** parts of a car engine. ②

<i>1. Piston</i>	<i>2. Crankshaft</i>
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(o) (i) A car battery supplies:

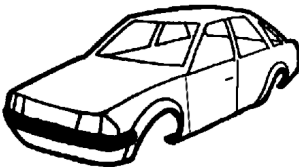


12v DC	✓
100v DC	
200v AC	
150v AC	

(ii) Name the metal used in car batteries. ④

<i>Lead</i>

(p) (i) Car bodies are made from:

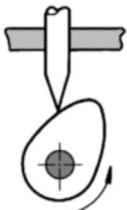


Steel	✓
Galvanised Iron	
Aluminium	
Tungsten	

(ii) Name **one** method used to prevent corrosion on a car body. ④

<i>Paint</i>

(q) (i) This mechanism is a:



Gear	
Cam	✓
Clutch	
Brake	

(ii) List a use for this mechanism. ④

<i>Opening the inlet or exhaust valve.</i>

Question 2.

20 Marks

(a)

8

(i) Steel is an alloy of:

Iron and carbon	<input checked="" type="checkbox"/>
Iron and tin	<input type="checkbox"/>
Iron and zinc	<input type="checkbox"/>

(v) A material is said to be brittle when it can be easily:

Stretched	<input type="checkbox"/>
Melted	<input type="checkbox"/>
Fractured	<input checked="" type="checkbox"/>

(ii) Bronze is an alloy of:

Copper & Zinc	<input type="checkbox"/>
Copper & Lead	<input type="checkbox"/>
Copper & Tin	<input checked="" type="checkbox"/>

(vi) Cast iron is produced from:

Iron Ore	<input type="checkbox"/>
Pig Iron	<input checked="" type="checkbox"/>
Slag	<input type="checkbox"/>

(iii) Aluminium is a(n):

Ferrous Metal	<input type="checkbox"/>
Non-Ferrous Metal	<input checked="" type="checkbox"/>
Alloy	<input type="checkbox"/>

(vii) Mild steel coated with zinc is called:

Tinplate	<input type="checkbox"/>
Galvanised Iron	<input checked="" type="checkbox"/>
Alloy Steel	<input type="checkbox"/>

(iv) High speed steel is used to make:

Cutting Tools	<input checked="" type="checkbox"/>
Gates	<input type="checkbox"/>
Coins	<input type="checkbox"/>

(viii) A material is said to be hard when it can:

Conduct Electricity	<input type="checkbox"/>
Withstand Wear	<input checked="" type="checkbox"/>
Withstand Rusting	<input type="checkbox"/>

(b)

6

(i) What mixture is fed into the Blast Furnace?

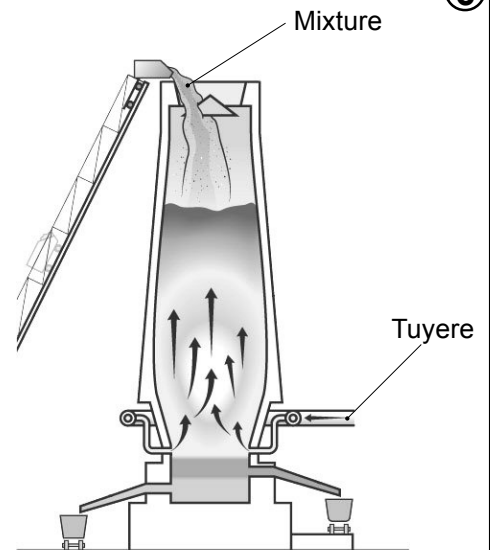
<i>Iron ore</i>
<i>Coke</i>
<i>Limestone</i>

(ii) What is the purpose of the 'Tuyere'?

<i>To blow hot air into the furnace.</i>

(iii) What happens to the molten iron?

<i>It is tapped off.</i>



(c)

6

(i) Acrylic sheet is also known as:

Polyester	<input type="checkbox"/>
Bakelite	<input type="checkbox"/>
Perspex	<input checked="" type="checkbox"/>

(iv) Which one of these is a Thermoplastic?

Polyester	<input type="checkbox"/>
PVC	<input checked="" type="checkbox"/>
Bakelite	<input type="checkbox"/>

(ii) Gears can be made from:

Nylon	<input checked="" type="checkbox"/>
Polyethylene	<input type="checkbox"/>
PVC	<input type="checkbox"/>

(v) Which one of these is a Thermosetting plastic?

Bakelite	<input checked="" type="checkbox"/>
Nylon	<input type="checkbox"/>
Polyethylene	<input type="checkbox"/>

(iii) When heated Thermosetting plastics:

Soften	<input type="checkbox"/>
Become rigid	<input checked="" type="checkbox"/>
Crack	<input type="checkbox"/>

(vi) Acrylic sheet can be used to make:

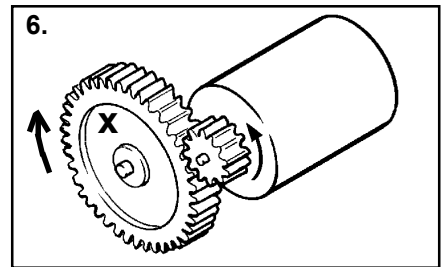
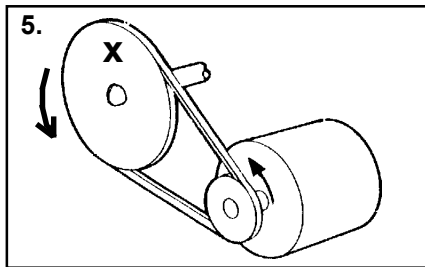
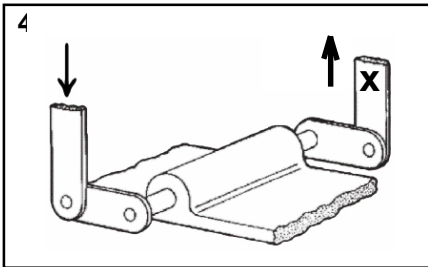
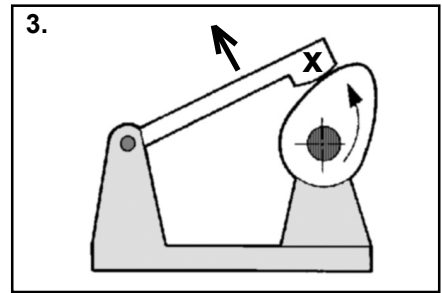
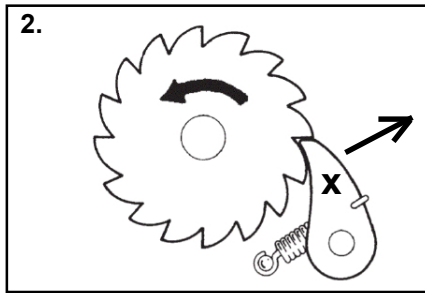
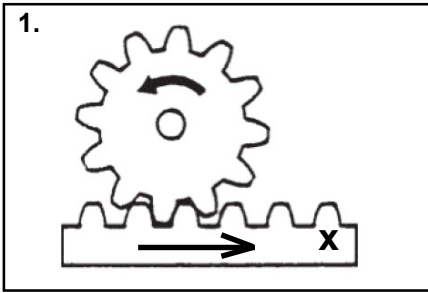
Machine Guards	<input checked="" type="checkbox"/>
Plastic Bags	<input type="checkbox"/>
Pipes	<input type="checkbox"/>

Question 3.

20 Marks

(a) (i) Indicate with an arrow the direction of movement of part 'X' in each of the following:

6

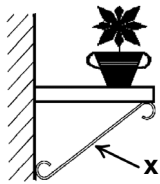


(ii) Which one of these mechanisms is a ratchet?

Number: 2

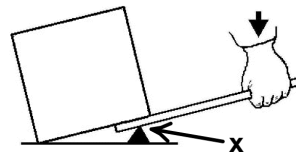
2

(b) (i) Part 'X' is a:



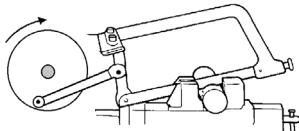
Tie	
Strut	✓
Stay	

(iv) Point 'X' is called the:



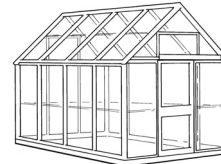
Lever	
Fulcrum	✓
Linkage	

(ii) The conversion taking place is rotary to:



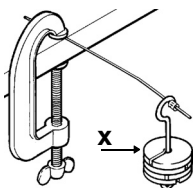
Linear	
Oscillating	
Reciprocating	✓

(v) Structures are designed to carry:



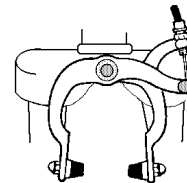
Loads	✓
Levers	
Linkages	

(iii) The type of force exerted by 'X' is a:



Shear force	
Torsion force	
Bending force	✓

(vi) Bicycle caliper brakes use:

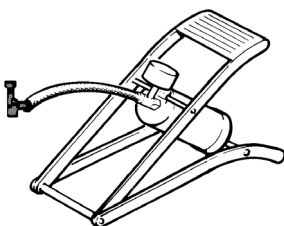


Bell Cranks	✓
Pulleys	
Gears	

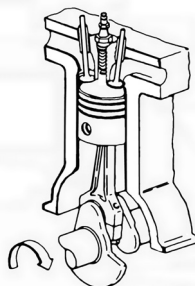
(c) Name a mechanism used in each of these machines.

6

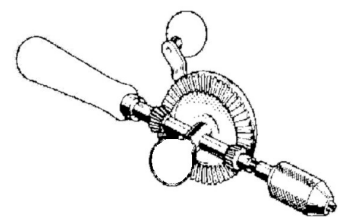
1. Lever



2. Crank and slider



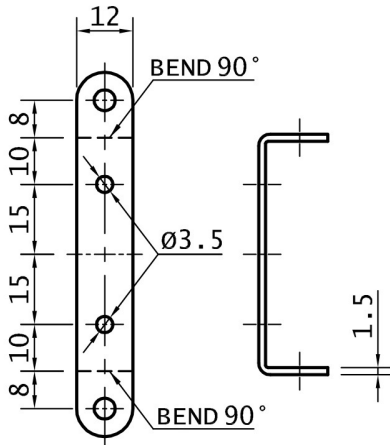
3. Bevel gear



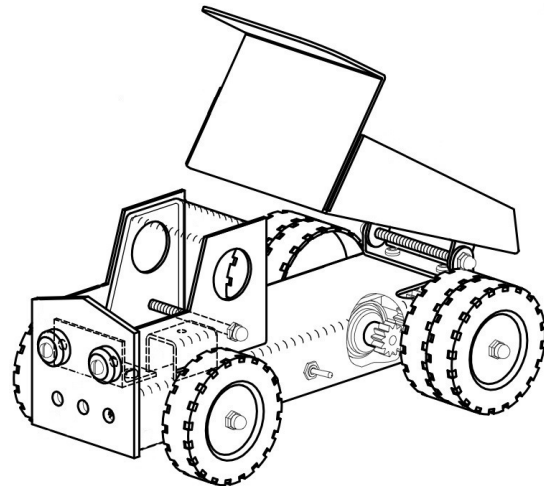
Question 4.

20 Marks

Details of a chassis bracket used in the manufacture of a model dump truck is shown.



Chassis Bracket



(i) Describe how you would accurately mark out the centre of the drill holes in the chasis bracket.

<i>Mark the centre line using an odd leg callipers.</i>	4
<i>Using a trisquare, rule and scriber mark the centre position of each hole.</i>	
<i>Dot punch where the lines intersect.</i>	

(ii) What is the overall length and width of the chasis bracket?

Length:	2
Width:	

(iii) Describe how you would accurately bend the chasis bracket.

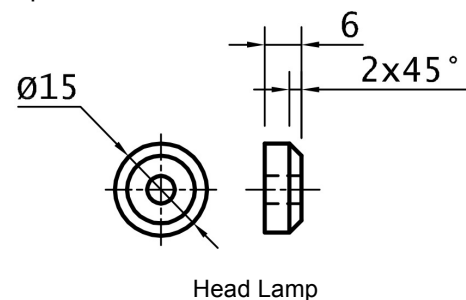
<i>Hold the bend line level with the folding bars.</i>	4
<i>Place the folding bars in the vice and tighten.</i>	
<i>Strike the piece with a mallet.</i>	
<i>Check the bend using a trisquare.</i>	

(iv) List **four** tools used in the manufacture of the chasis bracket.

1.	<i>Tin snips</i>	4
2.	<i>File</i>	
3.	<i>Drilling machine</i>	
4.	<i>Folding bars</i>	

(v) Describe how you would form the 2x45° chamfer on the head lamp.

<i>Set topslide to 45 degree angle.</i>	2
<i>Turn feed handle to cut chamfer.</i>	



Head Lamp

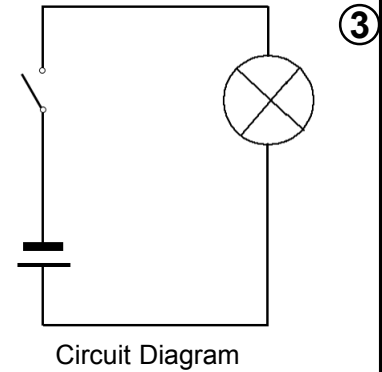
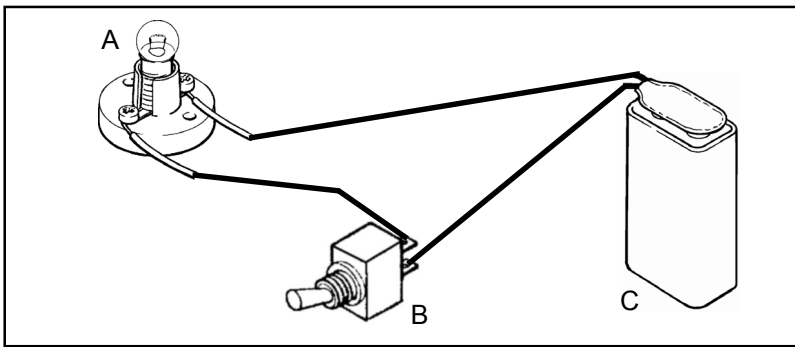
(vi) What safety precautions should be observed when drilling the chasis bracket?

<i>Wear safety glasses.</i>	4
<i>Hold bracket using hand vice.</i>	
<i>Support bracket using a piece of wood.</i>	
<i>Use correct drill speed.</i>	

Question 5.

20 Marks

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



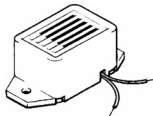
- (ii) Name the components shown above.

A	Lamp or bulb	3
B	Switch	
C	Battery	

- (iii) Does this circuit use AC or DC current?

AC	<input type="checkbox"/>	2
DC	<input checked="" type="checkbox"/>	

- (b) (i) A buzzer converts electrical energy into:



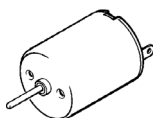
Chemical Energy	<input type="checkbox"/>
Light Energy	<input type="checkbox"/>
Sound Energy	<input checked="" type="checkbox"/>

- (iv) This component is a(n):



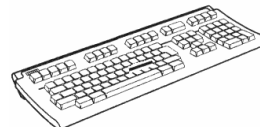
LDR	<input type="checkbox"/>
LED	<input checked="" type="checkbox"/>
Fuse	<input type="checkbox"/>

- (ii) A motor converts electrical energy into:



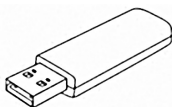
Mechanical Energy	<input checked="" type="checkbox"/>
Chemical Energy	<input type="checkbox"/>
Light Energy	<input type="checkbox"/>

- (v) A keyboard is a(n):



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

- (iii) This device is a:



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

- (vi) A printer is a(n):



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

- (c) From the history of engineering name any **two** inventors and state what they invented.

Inventor 1

Name: <i>Nicholas Otto</i>	Invention: <i>Four stroke engine</i>

Inventor 2

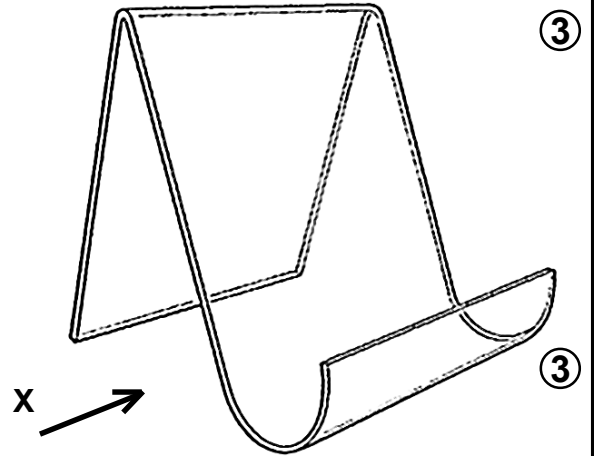
Name: <i>Michael Faraday</i>	Invention: <i>Electric motor</i>

Question 6.

20 Marks

- (i) This design shows a book stand made from acrylic.
List **three** processes involved in making the book stand.

1.	<i>Marking out</i>
2.	<i>Heating</i>
3.	<i>Forming</i>



- (ii) List **three** safety precautions that should be observed when working with acrylic sheet.

1.	<i>Wear safety glasses</i>
2.	<i>Wear gloves when heating</i>
3.	<i>Support when drilling</i>

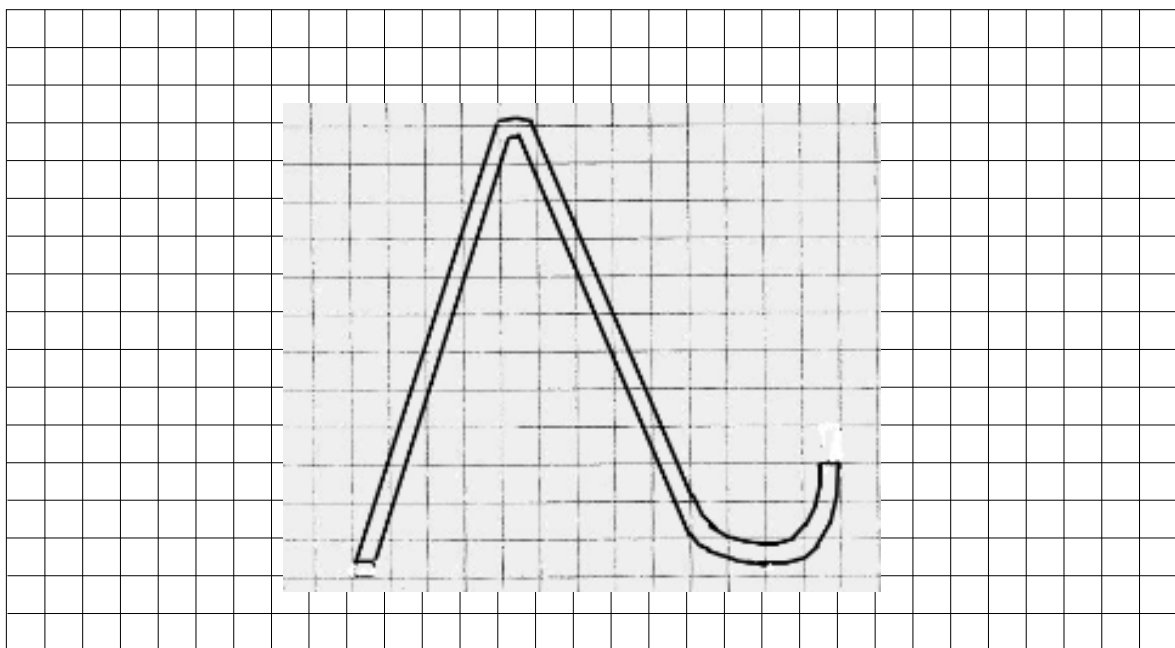
- (iii) Briefly describe how you would form the book stand to the required shape.

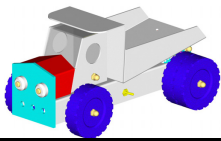
<i>Heat and shape curve over a former or jig.</i>
<i>Use a stripheater to heat and a jig to bend to the required angle.</i>

- (iv) If you were asked to design a book stand for the school library what information would you need to know before manufacture?

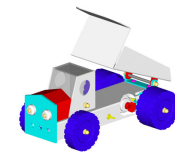
<i>Size of the block.</i>
<i>Type of material available.</i>

- (v) Draw an elevation of the book stand looking in the direction of arrow 'X' in the grid below.

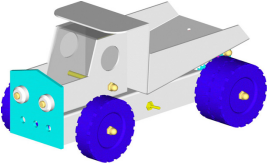
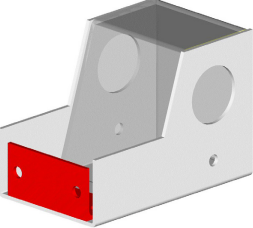
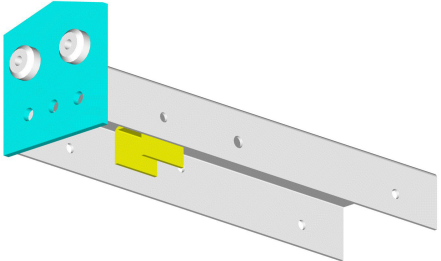
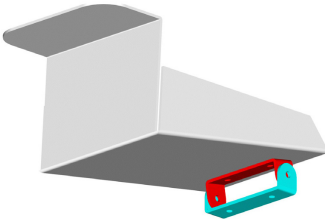




Coimisiún na Scrúduithe Stáit
State Examinations Commission



Junior Certificate Ordinary Level Metalwork Project Marking Scheme 2010

Subjective Grading /10		9 - 10 Excellent	7 - 8 Very Good	5 - 6 Good	3 - 4 Poor	1 - 2 Very Poor			
Subjective Grading /5		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 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 Feature	Design make and attach a Bonnet for the Model.			Design: Subjective Grade 1-10		10	20	
					Make: Subjective Grade 1- 5		5		
					Attach: Subjective Grade 1- 5		5		
3	Parts 2, 6 & 7				Cab	12	Marking Out	3	20
							Drill	3	
							Ø22mm Holes	3	
							Shape & Bend	3	
					Grill Bracket	3	Marking Out	1	
							Drill & Length	2	
					Windscreen	5	Marking Out	2	
							Shape & Bend	3	
							Drill & Length	2	
4	Parts 1, 3, 5 & 10				Grill	3	Marking Out	1	20
							Drill & Shape	2	
					Chassis	12	Marking Out	4	
							Slot	3	
							Drill, Shape & Bend	5	
					Headlamp	2	Turn and Drill	2	
					Battery Holder	3	Marking Out	1	
							Drill, Shape & Bend	2	
5	Parts 4, 9 & 8				Chassis Bracket	4	Marking Out	1	20
							Drill, Shape & Bend	3	
					Dumper Body Bracket	4	Marking Out	1	
							Drill, Shape & Bend	3	
					Dumper Body	12	Marking Out	4	
							Shape	4	
Drill & Bend	4								

100 Marks
(× 3 = 300 Total)