



Coimisiún na Scrúduithe Stáit  
State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2010

MATERIALS AND TECHNOLOGY  
METALWORK

ORDINARY LEVEL - 100 Marks

Tuesday 22 June, Afternoon 2:00 to 3:30

Centre  
Number 

Examination  
Number 

INSTRUCTIONS

1. Answer **Question 1, Sections A and B** and **any three** other questions.
2. Write your answers in the spaces provided or tick the appropriate box.
3. Hand up this paper at the end of the examination.

For Examiner	
Total Mark	<input type="text"/>
Question	Mark
1A	
1B	
2	
3	
4	
5	
6	
Total	
Grade	


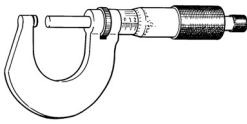
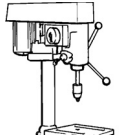
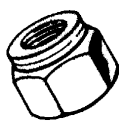
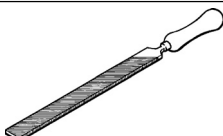

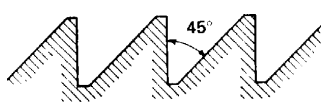
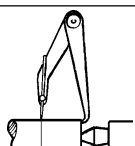
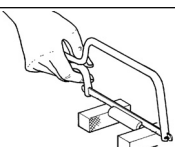

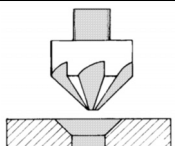
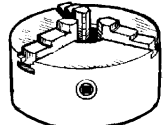
1. Total of end of page totals	
2. Aggregate total marks for all disallowed question(s)	
3. Total mark awarded (1 minus 2)	
4. Bonus mark for answering through Irish (if applicable)	
5. Total mark awarded if Irish Bonus (3+4)	
<b>Note:</b> The mark in row 3 (or row 5 if an Irish Bonus is awarded) must equal the mark in the <u>Total Mark</u> box on the script	

MAKE SURE TO WRITE YOUR EXAMINATION NUMBER IN THE  
BOX PROVIDED ON THIS PAGE

**Question 1.**

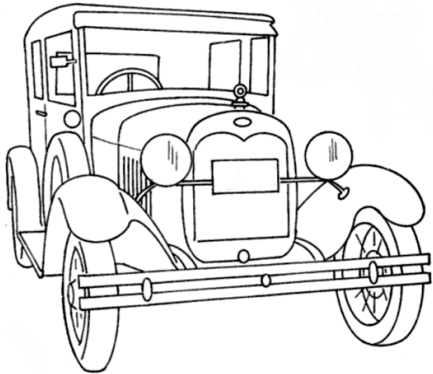
**SECTION A - 20 MARKS**  
ANSWER ANY TEN QUESTIONS FROM THIS SECTION

**40 Marks**

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

**SECTION B - 20 MARKS**  
ANSWER ALL QUESTIONS FROM THIS SECTION

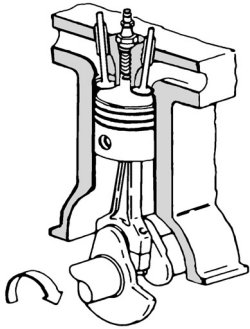
(m)



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

1.	
2.	
3.	
4.	

(n)

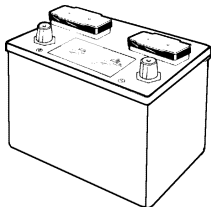


(i) Why is oil used in a car engine?


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

1.	2.
----	----

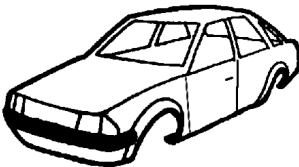
(o) (i) A car battery supplies:



12v DC	
100v DC	
200v AC	
150v AC	

(ii) Name the metal used in car batteries.

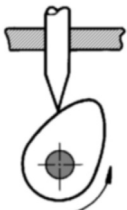

(p) (i) Car bodies are made from:



Steel	
Galvanised Iron	
Aluminium	
Tungsten	

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


(q) (i) This mechanism is a:



Gear	
Cam	
Clutch	
Brake	

(ii) List a use for this mechanism.


**Question 2.**

**20 Marks**

**(a)**

(i) Steel is an alloy of:

Iron and carbon	
Iron and tin	
Iron and zinc	

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

Stretched	
Melted	
Fractured	

(ii) Bronze is an alloy of:

Copper & Zinc	
Copper & Lead	
Copper & Tin	

(vi) Cast iron is produced from:

Iron Ore	
Pig Iron	
Slag	

(iii) Aluminium is a(n):

Ferrous Metal	
Non-Ferrous Metal	
Alloy	

(vii) Mild steel coated with zinc is called:

Tinplate	
Galvanised Iron	
Alloy Steel	

(iv) High speed steel is used to make:

Cutting Tools	
Gates	
Coins	

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

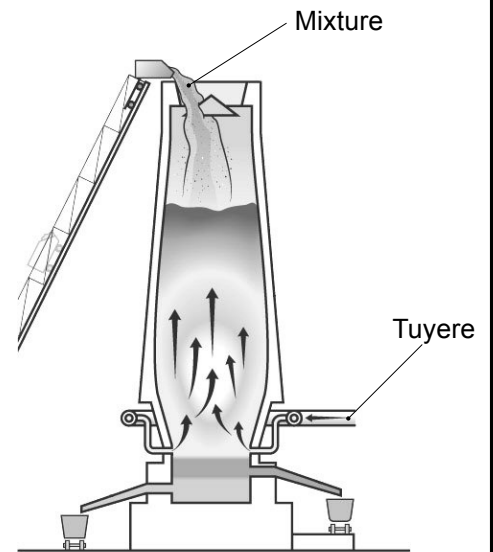
Conduct Electricity	
Withstand Wear	
Withstand Rusting	

**(b)**

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


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


(iii) What happens to the molten iron?

**(c)**

(i) Acrylic sheet is also known as:

Polyester	
Bakelite	
Perspex	

(iv) Which one of these is a Thermoplastic?

Polyester	
PVC	
Bakelite	

(ii) Gears can be made from:

Nylon	
Polyethylene	
PVC	

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

Bakelite	
Nylon	
Polyethylene	

(iii) When heated Thermosetting plastics:

Soften	
Become rigid	
Crack	

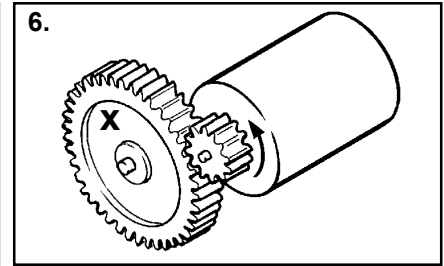
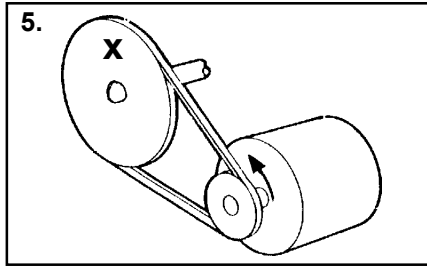
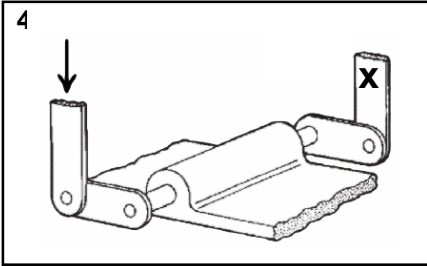
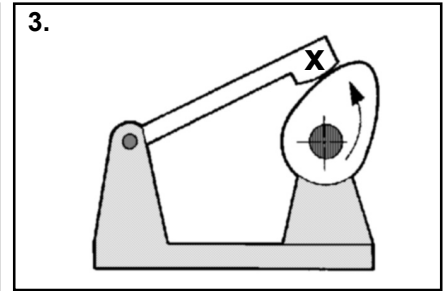
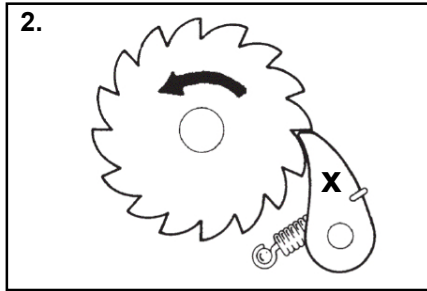
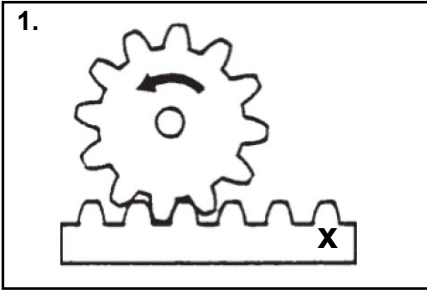
(vi) Acrylic sheet can be used to make:

Machine Guards	
Plastic Bags	
Pipes	

**Question 3.**

**20 Marks**

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

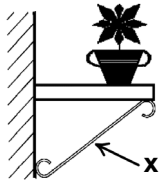


(ii) Which one of these mechanisms is a ratchet?

Number: 

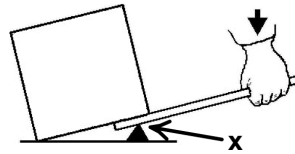
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**(b)** (i) Part 'X' is a:



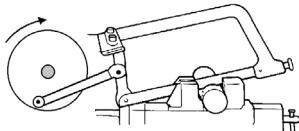
Tie	
Strut	
Stay	

(iv) Point 'X' is called the:



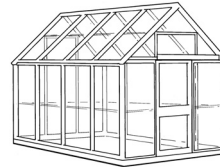
Lever	
Fulcrum	
Linkage	

(ii) The conversion taking place is rotary to:



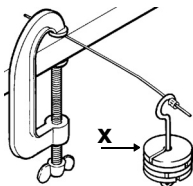
Linear	
Oscillating	
Reciprocating	

(v) Structures are designed to carry:



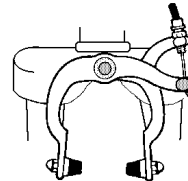
Loads	
Levers	
Linkages	

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



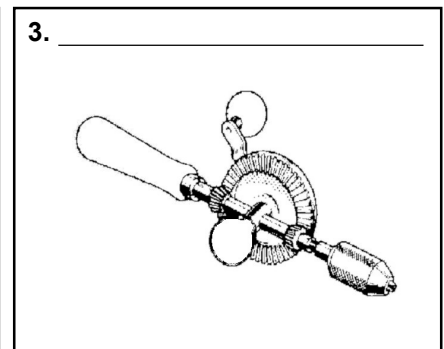
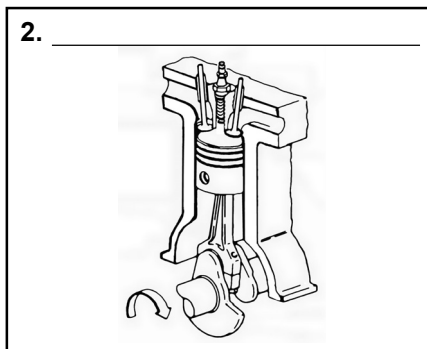
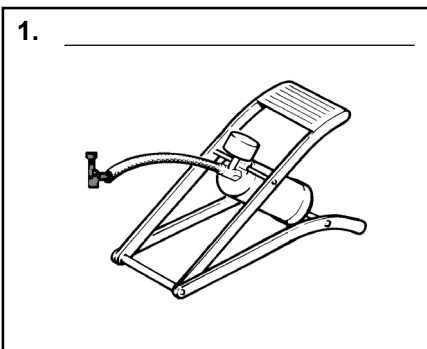
Shear force	
Torsion force	
Bending force	

(vi) Bicycle caliper brakes use:



Bell Cranks	
Pulleys	
Gears	

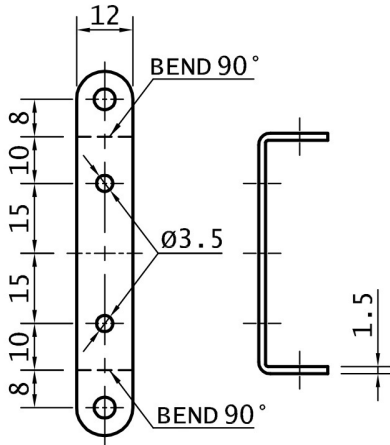
**(c)** Name a mechanism used in each of these machines.



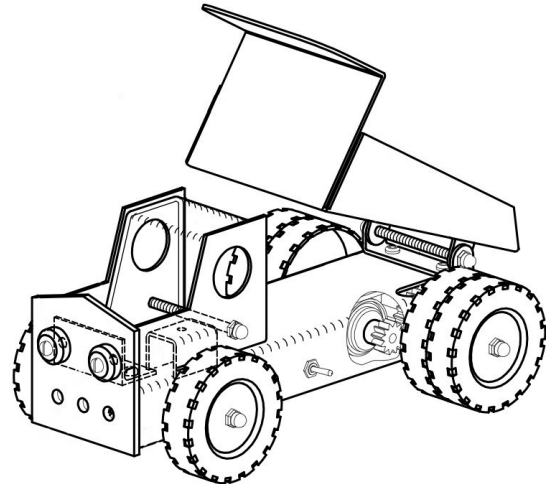
**Question 4.**

**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 chassis bracket.


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

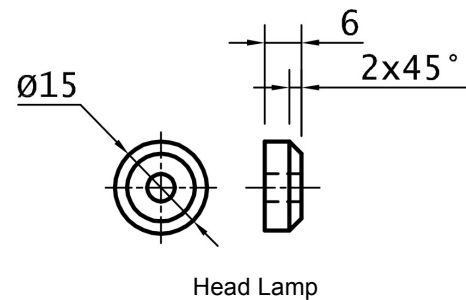
Length:	
Width:	

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


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

1.	
2.	
3.	
4.	

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

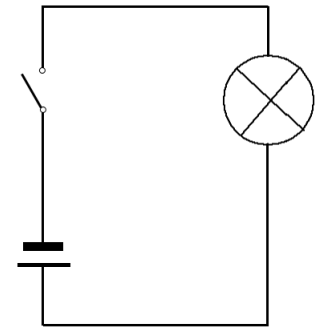
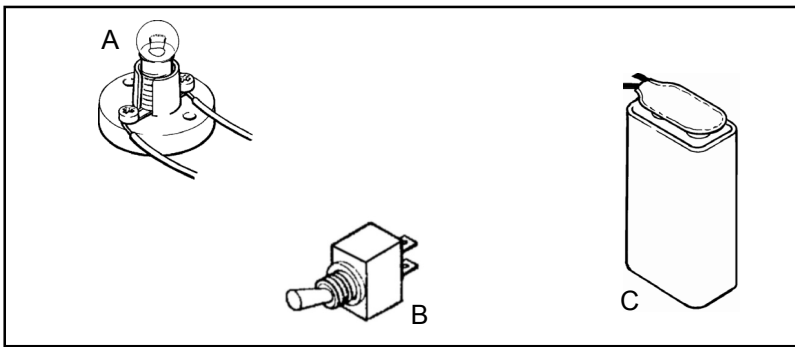
Head Lamp

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


**Question 5.**

**20 Marks**

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



Circuit Diagram

- (ii) Name the components shown above.

A	
B	
C	

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

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

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



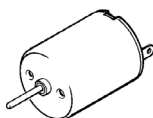
Chemical Energy	<input type="checkbox"/>
Light Energy	<input type="checkbox"/>
Sound Energy	<input type="checkbox"/>

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



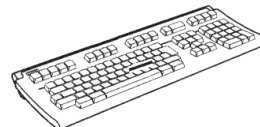
LDR	<input type="checkbox"/>
LED	<input type="checkbox"/>
Fuse	<input type="checkbox"/>

- (ii) A motor converts electrical energy into:



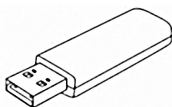
Mechanical Energy	<input type="checkbox"/>
Chemical Energy	<input type="checkbox"/>
Light Energy	<input type="checkbox"/>

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



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

- (iii) This device is a:



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

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



Output Device	<input 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:	Invention:

Inventor 2

Name:	Invention:

**Question 6.**

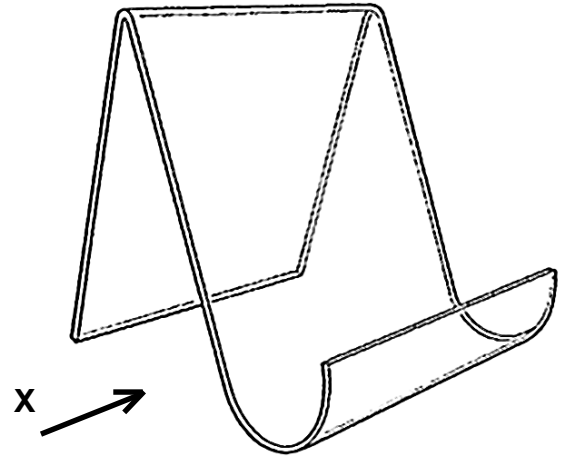
**20 Marks**

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

1.	
2.	
3.	

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

1.	
2.	
3.	



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


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


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

