



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

JUNIOR CERTIFICATE EXAMINATION, 2005

MATERIALS AND TECHNOLOGY

METALWORK - ORDINARY LEVEL

100 Marks

Tuesday, 21 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	


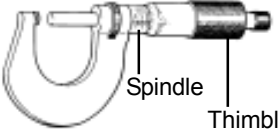
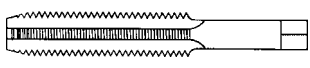
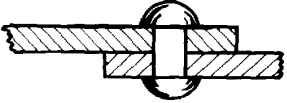
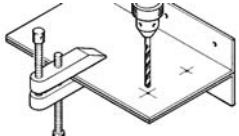
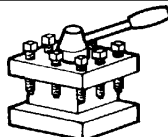
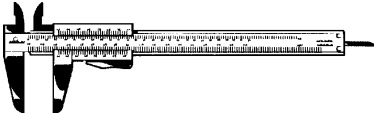


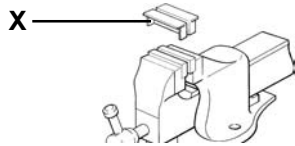
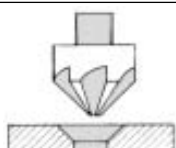

1. Total of end of page totals	
2. Aggregate total of all disallowed question(s)	
3. Total mark awarded (1 minus 2)	
4. Bonus mark for answering through Irish (if applicable)	
5. Total mark awarded if Irish Bonus (3+4)	
Note: The mark in row 3 (or row 5 if an Irish Bonus is awarded) must equal the mark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

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

1.

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

40 Marks

<p>(a) </p>	<p>This screw can be turned using a(n):</p>	<table border="1"> <tr><td>Allen Key</td><td></td></tr> <tr><td>Open Spanner</td><td></td></tr> <tr><td>Adjustable Spanner</td><td></td></tr> <tr><td>Ring Spanner</td><td></td></tr> </table>	Allen Key		Open Spanner		Adjustable Spanner		Ring Spanner	
Allen Key										
Open Spanner										
Adjustable Spanner										
Ring Spanner										
<p>(b) </p>	<p>One complete turn of the Thimble will move the Spindle:</p>	<table border="1"> <tr><td>0.01 mm</td><td></td></tr> <tr><td>0.11 mm</td><td></td></tr> <tr><td>0.10 mm</td><td></td></tr> <tr><td>1.00 mm</td><td></td></tr> </table>	0.01 mm		0.11 mm		0.10 mm		1.00 mm	
0.01 mm										
0.11 mm										
0.10 mm										
1.00 mm										
<p>(c) </p>	<p>This is a:</p>	<table border="1"> <tr><td>Taper Tap</td><td></td></tr> <tr><td>Split Die</td><td></td></tr> <tr><td>Tap Wrench</td><td></td></tr> <tr><td>Plug Tap</td><td></td></tr> </table>	Taper Tap		Split Die		Tap Wrench		Plug Tap	
Taper Tap										
Split Die										
Tap Wrench										
Plug Tap										
<p>(d) </p>	<p>These plates were joined by:</p>	<table border="1"> <tr><td>Brazing</td><td></td></tr> <tr><td>Soldering</td><td></td></tr> <tr><td>Bolting</td><td></td></tr> <tr><td>Riveting</td><td></td></tr> </table>	Brazing		Soldering		Bolting		Riveting	
Brazing										
Soldering										
Bolting										
Riveting										
<p>(e) </p>	<p>This tool is a:</p>	<table border="1"> <tr><td>Bench Vice</td><td></td></tr> <tr><td>Hand Vice</td><td></td></tr> <tr><td>Toolmaker's Clamp</td><td></td></tr> <tr><td>Pin Vice</td><td></td></tr> </table>	Bench Vice		Hand Vice		Toolmaker's Clamp		Pin Vice	
Bench Vice										
Hand Vice										
Toolmaker's Clamp										
Pin Vice										
<p>(f) </p>	<p>A lathe toolholder is held in a:</p>	<table border="1"> <tr><td>Tailstock</td><td></td></tr> <tr><td>Chuck</td><td></td></tr> <tr><td>Toolpost</td><td></td></tr> <tr><td>Headstock</td><td></td></tr> </table>	Tailstock		Chuck		Toolpost		Headstock	
Tailstock										
Chuck										
Toolpost										
Headstock										
<p>(g) </p>	<p>This instrument is a(n):</p>	<table border="1"> <tr><td>Inside Calipers</td><td></td></tr> <tr><td>Vernier Calipers</td><td></td></tr> <tr><td>Outside Calipers</td><td></td></tr> <tr><td>Odd-Leg Calipers</td><td></td></tr> </table>	Inside Calipers		Vernier Calipers		Outside Calipers		Odd-Leg Calipers	
Inside Calipers										
Vernier Calipers										
Outside Calipers										
Odd-Leg Calipers										
<p>(h) </p>	<p>Part 'X' is called the:</p>	<table border="1"> <tr><td>Body</td><td></td></tr> <tr><td>Flute</td><td></td></tr> <tr><td>Shank</td><td></td></tr> <tr><td>Flank</td><td></td></tr> </table>	Body		Flute		Shank		Flank	
Body										
Flute										
Shank										
Flank										
<p>(i) </p>	<p>Brass used for brazing is called:</p>	<table border="1"> <tr><td>Solder</td><td></td></tr> <tr><td>Flux</td><td></td></tr> <tr><td>Silver Solder</td><td></td></tr> <tr><td>Spelter</td><td></td></tr> </table>	Solder		Flux		Silver Solder		Spelter	
Solder										
Flux										
Silver Solder										
Spelter										
<p>(j) </p>	<p>Part 'X' is called a:</p>	<table border="1"> <tr><td>Vice Clamp</td><td></td></tr> <tr><td>Vice Grips</td><td></td></tr> <tr><td>Jaw Face</td><td></td></tr> <tr><td>Fixed Jaw</td><td></td></tr> </table>	Vice Clamp		Vice Grips		Jaw Face		Fixed Jaw	
Vice Clamp										
Vice Grips										
Jaw Face										
Fixed Jaw										
<p>(k) </p>	<p>This technique is called:</p>	<table border="1"> <tr><td>Drilling</td><td></td></tr> <tr><td>Counterboring</td><td></td></tr> <tr><td>Reaming</td><td></td></tr> <tr><td>Countersinking</td><td></td></tr> </table>	Drilling		Counterboring		Reaming		Countersinking	
Drilling										
Counterboring										
Reaming										
Countersinking										
<p>(l) </p>	<p>This fastener is a:</p>	<table border="1"> <tr><td>Bolt</td><td></td></tr> <tr><td>Grub Screw</td><td></td></tr> <tr><td>Thumb Screw</td><td></td></tr> <tr><td>Lock Nut</td><td></td></tr> </table>	Bolt		Grub Screw		Thumb Screw		Lock Nut	
Bolt										
Grub Screw										
Thumb Screw										
Lock Nut										

SECTION B - 20 MARKS
ANSWER ALL QUESTIONS FROM THIS SECTION

(m) (i) List three materials used in the manufacture of this computer system:



1.	
2.	
3.	

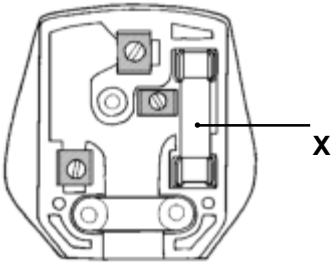
(ii) Name the labelled parts:

X.	
Y.	
Z.	

(iii) Which one of the labelled parts is an input device?

--

(n) Name part 'X' and briefly describe its function.



(o) (i) Domestic heaters are rated at:



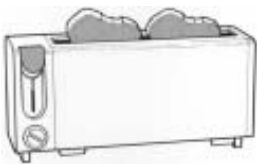
100 Volts	
110 Volts	
200 Volts	
220 Volts	

(ii) What type of current does a battery operated drill use?



--

(p) (i) A toaster converts electrical energy into:



Potential Energy	
Electrical Energy	
Chemical Energy	
Heat Energy	

(ii) The filament in a bulb is made from:



Steel	
Tungsten	
Copper	
Aluminum	

(q) Scrolls are used to decorate the side panels of this table. Where else would you see scrollwork? List three examples.



1.	
2.	
3.	

(a)

(i) Iron ore is Iron that is chemically combined with:

Oxygen	
Nitrogen	
Sulphur	

(v) Cast Iron is produced in the:

Cupola Furnace	
Basic Oxygen Converter	
Electric Arc Furnace	

(ii) Brass is an alloy of:

Copper & Zinc	
Copper & Lead	
Copper & Tin	

(vi) High Speed Steel is used to make:

Gates	
Pipes	
Cutting Tools	

(iii) Silver Steel contains about:

1% Carbon	
3% Carbon	
6% Carbon	

(vii) Which one of these metals is the best conductor of heat?

Steel	
Lead	
Copper	

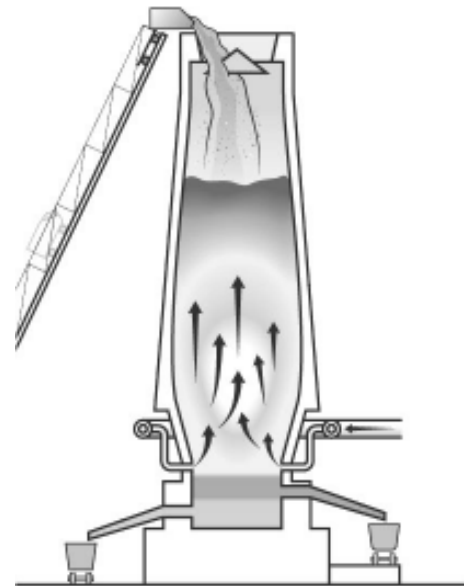
(iv) Galvanised Iron is coated with:

Tin	
Aluminium	
Zinc	

(viii) Cooking foil is made from:

Tin	
Aluminium	
Steel	

(b) Describe how steel is produced in the Blast Furnace.



(c)

(i) Acrylic sheet is also known as:

Bakelite	
Perspex	
Fibreglass	

(iv) The main raw material for plastic is:

Gas	
Oil	
Silk	

(ii) Bearings and gears can be made from:

Nylon	
Acrylic	
PVC	

(v) Which one of these is a Thermoplastic?

Polyester Resin	
Phenolic Resin	
Polyethylene	

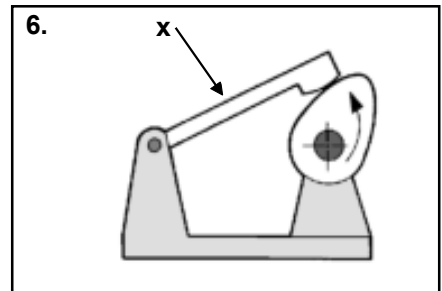
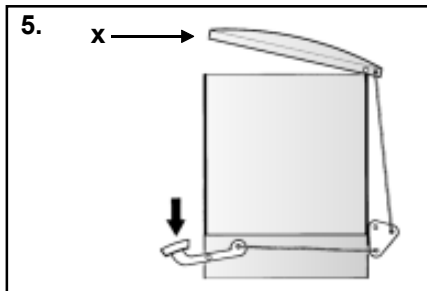
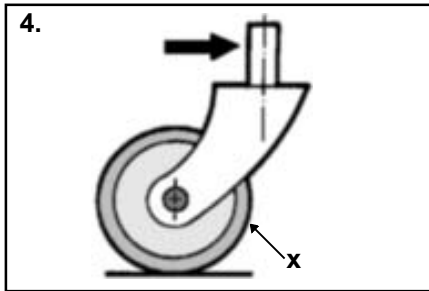
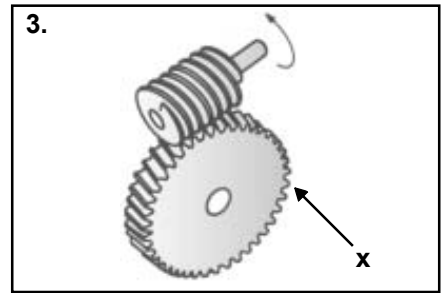
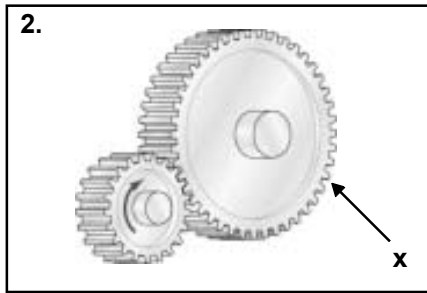
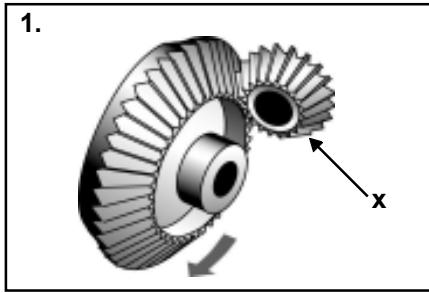
(iii) Which one of these is a Thermosetting Plastic?

Bakelite	
Nylon	
Acrylic	

(vi) Sheet Acrylic is a:

Hard material	
Brittle material	
Tough material	

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



(ii) There are four basic types of motion; name one:

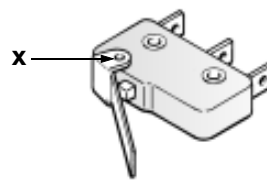
--

(b) (i) Structures are used to carry:



Loads	
Levers	
Mechanisms	

(iv) Point 'X' is called the:



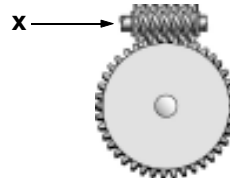
Lever	
Fulcrum	
Linkage	

(ii) This spring is in:



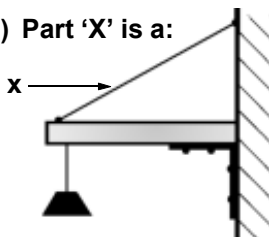
Shear	
Tension	
Compression	

(v) Gear 'X' is called the:



Worm	
Pinion	
Idler	

(iii) Part 'X' is a:



Strut	
Tie	
Truss	

(vi) The linkages used are:



Perpendicular	
Parallel	
Fixed	

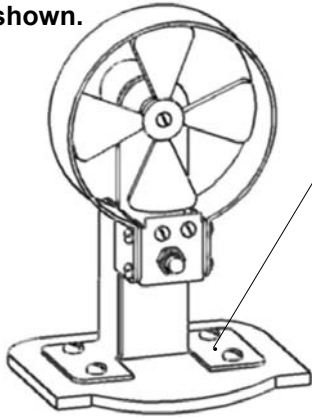
(c) Complete the chart by listing devices that use the following mechanisms.

Mechanism	Device
Rack & Pinion	<i>Pillar Drill.</i>
Cam	
Crank & Slider	
Spring	
Sprocket	
Ratchet	
Clutch	

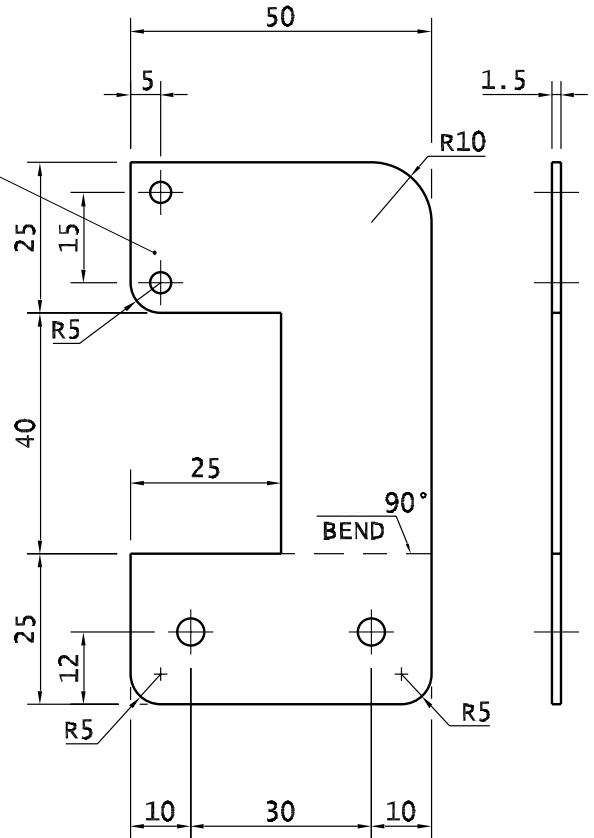
4.

20 Marks

Details of a bracket used in the manufacture of the desk fan are shown.



Bracket



(i) What is the overall width and height of the bracket?

(ii) What safety precautions should be taken when drilling sheet metal?

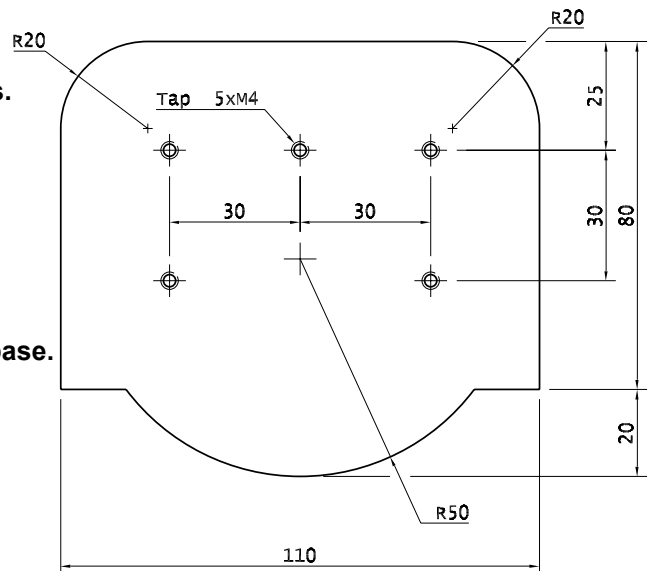
(iii) Describe how the 40mm x 25mm slot is formed in the bracket.

(iv) What does R20 refer to in the drawing of the base?

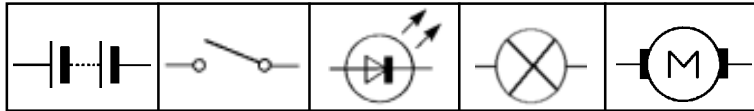
(v) List the steps involved in producing the 5xM4 holes.

(vi) List some disadvantages of using perspex for the base.

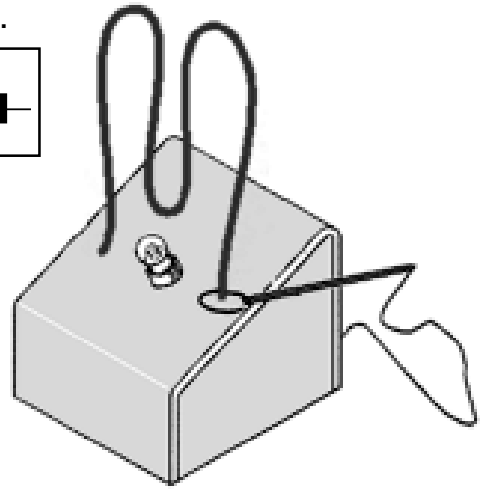
(vii) Describe how a high quality finish can be achieved on the edge of the base.



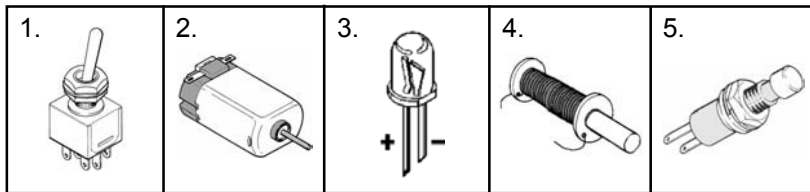
(a) (i) Select the correct symbols from the chart and complete the electrical circuit diagram for this project.



Draw the circuit in this box

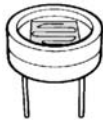


(ii) Match the number to the component.



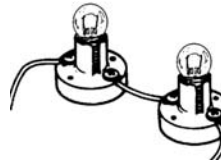
Component	No.
Motor	
LED	
Solenoid	
Push Switch	
Toggle Switch	

(b) (i) An LDR is a(n):



Output Device	
Input Device	
Process Device	

(iv) These bulbs are connected in:



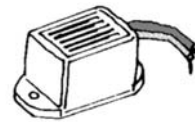
Parallel	
Series	
Series & Parallel	

(ii) This device is a:



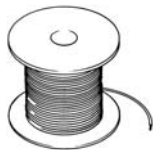
Motor	
Dynamo	
Battery	

(v) A buzzer is a(n):



Output Device	
Input Device	
Process Device	

(iii) Electrical solder has a core of:



Tin	
Flux	
Lead	

(vi) Electric current is produced by the movement of:



Protons	
Neutrons	
Electrons	

(c) Name any two inventors and briefly describe their achievements.

Inventor 1:

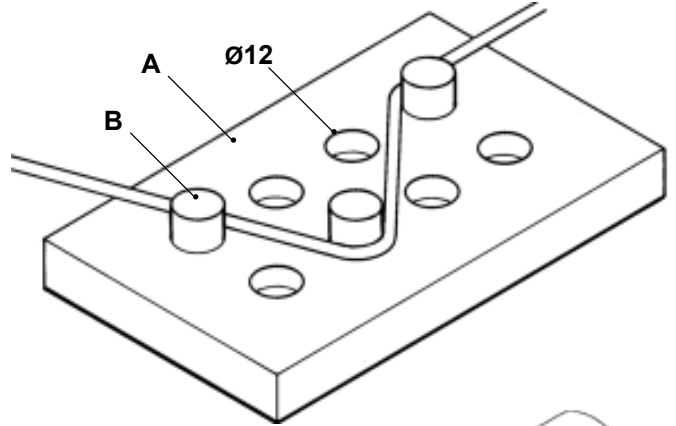
Inventor 2:

(i) A design for a bending jig made from steel is shown. Describe how you would drill the $\text{\O}12$ holes.

Blank writing area for describing the drilling process.

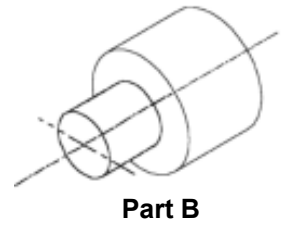
(ii) How would you hold part 'A' when drilling?

Blank writing area for describing how to hold part A.



(iii) Briefly describe the steps involved in making Part 'B' on a Centre Lathe.

Blank writing area for describing the steps to make Part B.

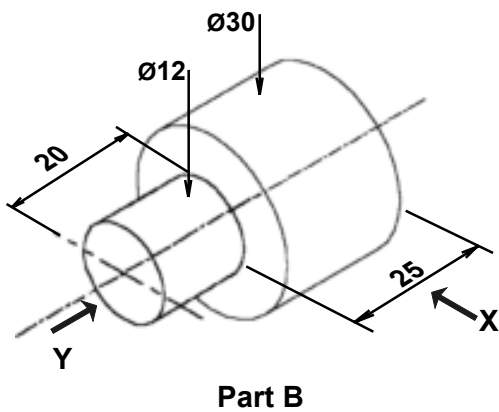


(iv) What safety precautions should be observed when operating a Centre Lathe?

Blank writing area for listing safety precautions.

(v) Draw an elevation of part (B) when viewed from arrow 'X' and then project an end elevation viewed from arrow 'Y'.

USE A PENCIL ONLY



Grid area for drawing the elevation and end view of Part B.

(vi) List the main differences between a Centre Lathe and a CNC lathe.

Blank writing area for listing differences between Centre Lathe and CNC lathe.