



**Coimisiún na Scrúduithe Stáit  
State Examinations Commission**

**JUNIOR CERTIFICATE EXAMINATION, 2006**

**MATERIALS AND TECHNOLOGY**

**METALWORK - ORDINARY LEVEL**

**100 Marks**

**Tuesday, 20 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	
<b>Total</b>	
<b>Grade</b>	

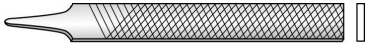
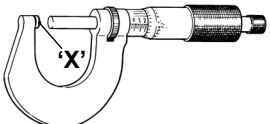
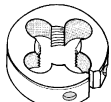
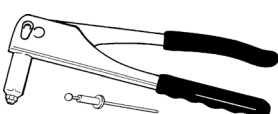
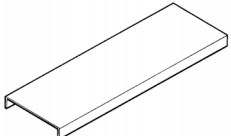
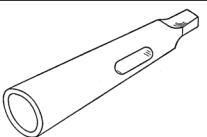
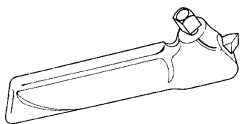
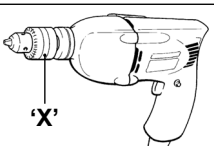
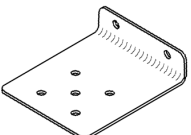
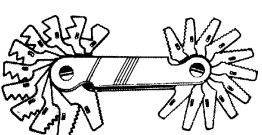
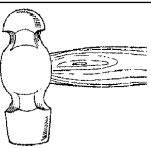

1. Total of end of page totals	
2. Aggregate total of all disallowed question(s)	
3. Total mark awarded (1 minus 2)	
4. Bonus mark for answering through Irish (if applicable)	
5. Total mark awarded if Irish Bonus (3+4)	
<b>Note:</b> The mark in row 3 (or row 5 if an Irish Bonus is awarded) must equal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

1.

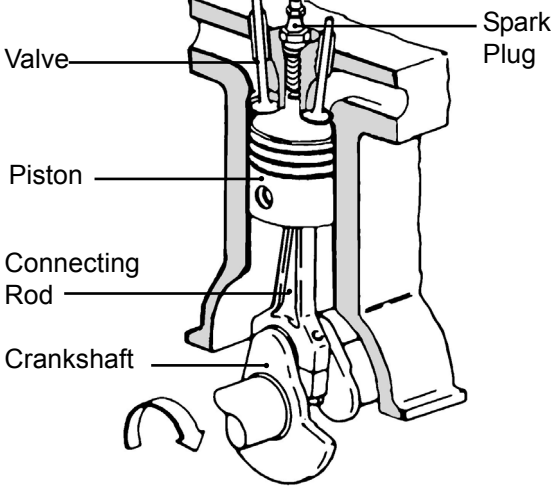
**SECTION A - 20 MARKS**  
ANSWER ANY TEN QUESTIONS FROM THIS SECTION

**40 Marks**

<p>(a)</p> 	<p>This is a:</p>	<table border="1"> <tr><td>Hand File</td><td></td></tr> <tr><td>Flat File</td><td></td></tr> <tr><td>Square File</td><td></td></tr> <tr><td>Round File</td><td></td></tr> </table>	Hand File		Flat File		Square File		Round File	
Hand File										
Flat File										
Square File										
Round File										
<p>(b)</p> 	<p>Part 'X' is called the:</p>	<table border="1"> <tr><td>Frame</td><td></td></tr> <tr><td>Spindle</td><td></td></tr> <tr><td>Anvil</td><td></td></tr> <tr><td>Sleeve</td><td></td></tr> </table>	Frame		Spindle		Anvil		Sleeve	
Frame										
Spindle										
Anvil										
Sleeve										
<p>(c)</p> 	<p>A die should be used with a(n):</p>	<table border="1"> <tr><td>Tap Wrench</td><td></td></tr> <tr><td>Box Spanner</td><td></td></tr> <tr><td>Adjustable Wrench</td><td></td></tr> <tr><td>Stock</td><td></td></tr> </table>	Tap Wrench		Box Spanner		Adjustable Wrench		Stock	
Tap Wrench										
Box Spanner										
Adjustable Wrench										
Stock										
<p>(d)</p> 	<p>This is a:</p>	<table border="1"> <tr><td>Rivet Snap</td><td></td></tr> <tr><td>Pop Riveter</td><td></td></tr> <tr><td>Rivet Set</td><td></td></tr> <tr><td>Bolster</td><td></td></tr> </table>	Rivet Snap		Pop Riveter		Rivet Set		Bolster	
Rivet Snap										
Pop Riveter										
Rivet Set										
Bolster										
<p>(e)</p> 	<p>This brass sheet part can be formed using (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>Folding Bars</td><td></td></tr> </table>	Bench Vice		Hand Vice		Toolmaker's Clamp		Folding Bars	
Bench Vice										
Hand Vice										
Toolmaker's Clamp										
Folding Bars										
<p>(f)</p> 	<p>This is a:</p>	<table border="1"> <tr><td>Morse Taper Sleeve</td><td></td></tr> <tr><td>Drill Drift</td><td></td></tr> <tr><td>Reamer</td><td></td></tr> <tr><td>Chuck Guard</td><td></td></tr> </table>	Morse Taper Sleeve		Drill Drift		Reamer		Chuck Guard	
Morse Taper Sleeve										
Drill Drift										
Reamer										
Chuck Guard										
<p>(g)</p> 	<p>This lathe part is known as a(n):</p>	<table border="1"> <tr><td>Top Slide</td><td></td></tr> <tr><td>Tool Post</td><td></td></tr> <tr><td>Tool Holder</td><td></td></tr> <tr><td>Tailstock</td><td></td></tr> </table>	Top Slide		Tool Post		Tool Holder		Tailstock	
Top Slide										
Tool Post										
Tool Holder										
Tailstock										
<p>(h)</p> 	<p>Part 'X' is called the:</p>	<table border="1"> <tr><td>Chuck Key</td><td></td></tr> <tr><td>Chuck</td><td></td></tr> <tr><td>Spindle</td><td></td></tr> <tr><td>Motor</td><td></td></tr> </table>	Chuck Key		Chuck		Spindle		Motor	
Chuck Key										
Chuck										
Spindle										
Motor										
<p>(i)</p> 	<p>Before drilling, hole centres should be marked with a(n):</p>	<table border="1"> <tr><td>Pin Punch</td><td></td></tr> <tr><td>Outside Calipers</td><td></td></tr> <tr><td>Centre Punch</td><td></td></tr> <tr><td>Inside Calipers</td><td></td></tr> </table>	Pin Punch		Outside Calipers		Centre Punch		Inside Calipers	
Pin Punch										
Outside Calipers										
Centre Punch										
Inside Calipers										
<p>(j)</p> 	<p>This instrument is a:</p>	<table border="1"> <tr><td>Radius Gauge</td><td></td></tr> <tr><td>Wire Gauge</td><td></td></tr> <tr><td>Screw Pitch Gauge</td><td></td></tr> <tr><td>Feeler Gauge</td><td></td></tr> </table>	Radius Gauge		Wire Gauge		Screw Pitch Gauge		Feeler Gauge	
Radius Gauge										
Wire Gauge										
Screw Pitch Gauge										
Feeler Gauge										
<p>(k)</p> 	<p>This hammer head is made from:</p>	<table border="1"> <tr><td>Cast Iron</td><td></td></tr> <tr><td>High Speed Steel</td><td></td></tr> <tr><td>High Carbon Steel</td><td></td></tr> <tr><td>Stainless Steel</td><td></td></tr> </table>	Cast Iron		High Speed Steel		High Carbon Steel		Stainless Steel	
Cast Iron										
High Speed Steel										
High Carbon Steel										
Stainless Steel										
<p>(l)</p> 	<p>This fastener should be adjusted using a(n):</p>	<table border="1"> <tr><td>Ring Spanner</td><td></td></tr> <tr><td>Vice Grips</td><td></td></tr> <tr><td>Allen Key</td><td></td></tr> <tr><td>Box Spanner</td><td></td></tr> </table>	Ring Spanner		Vice Grips		Allen Key		Box Spanner	
Ring Spanner										
Vice Grips										
Allen Key										
Box Spanner										

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

(m)

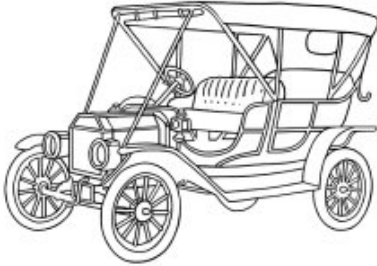


(i) Using the labels briefly describe how this engine works.

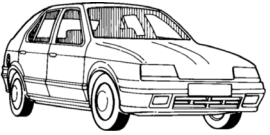

(ii) What type of fuel does this engine use?

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(n) From the history of transport, briefly describe the contribution of one engineer.

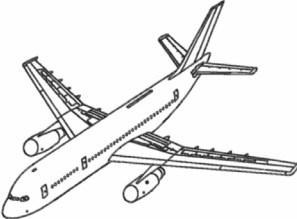



(o) List **four** safety features found in modern cars.

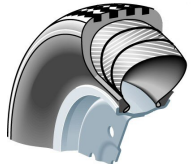


1.	
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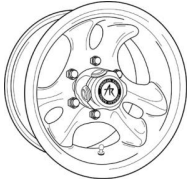
(p) (i) Why is aluminium used to make planes?




(ii) Why is rubber used to make tyres?

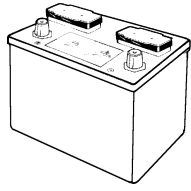



(q) (i) Alloy wheels contain:



Steel	
Tungsten	
Copper	
Aluminum	

(ii) Car batteries contain:



Brass	
Lead	
Steel	
Bronze	

**(a)**

(i) The Basic Oxygen process is used to produce:

Pig Iron	
Steel	
Cast Iron	

(v) The ability of a material to resist wear is called:

Toughness	
Hardness	
Ductility	

(ii) Steel is an alloy of iron and:

Limestone	
Coke	
Carbon	

(vi) Soft solder is an alloy of lead and:

Tin	
Silver	
Zinc	

(iii) Silver steel contains:

Silver	
Chromium	
Lead	

(vii) Zinc is a(n):

Alloy	
Ferrous Metal	
Non-Ferrous Metal	

(iv) Bronze is an alloy of:

Copper & Tin	
Copper & Zinc	
Copper & Lead	

(viii) Cast Iron is:

Ductile	
Brittle	
Malleable	

**(b)**

(i) Low density polyethylene softens at about:

85°C	
285°C	
485°C	

(iv) In the workshop, a strip heater is used to bend:

Perspex	
Foam	
Bakelite	

(ii) High density polyethylene can be used to make:

Bottles	
Gears	
Adhesives	

(v) Enamel is made from:

Polyester Resin	
Glass	
PVC	

(iii) Which one of these is a Thermoplastic?

Polyester Resin	
Nylon	
Phenolic Resin	

(vi) Polyester Resin is used to make:

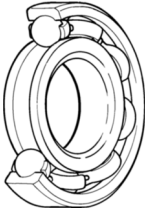
Raincoats	
Ornamental Castings	
Shopping Bags	

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

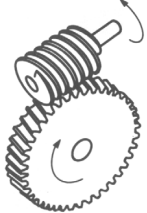
Task	Tool
To check drill sizes.	Drill Gauge
To cut a thin piece of copper sheet.	
To hold metal while forging.	
To hold work firmly while drilling.	
To find the depth of a hole.	
To find the diameter of a small drill.	
To tighten a nut.	

(a) (i) Name the mechanism in each box.

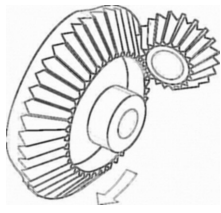
Name: \_\_\_\_\_



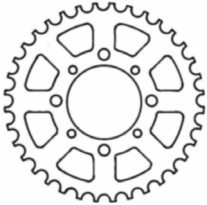
Name: \_\_\_\_\_



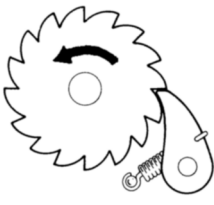
Name: \_\_\_\_\_




Name: \_\_\_\_\_



Name: \_\_\_\_\_

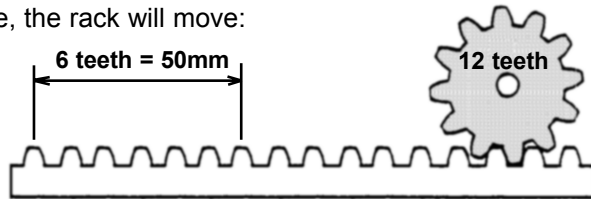


Name: \_\_\_\_\_



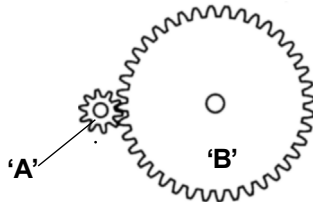
(ii) What is the purpose of an idler gear?


(b) (i) When the pinion turns once, the rack will move:



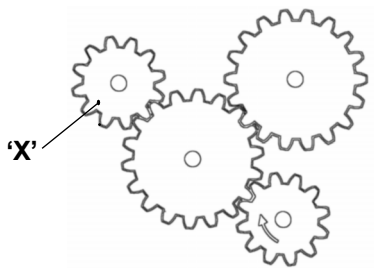
1000 mm	
100 mm	
600 mm	
200 mm	

(ii) If gear 'A' rotates at 400 RPM how fast will gear 'B' rotate? (A = 10 Teeth, B = 40 Teeth)



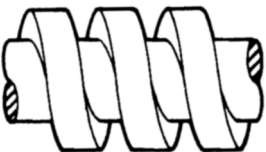
400 RPM	
300 RPM	
100 RPM	
40 RPM	

(iii) Indicate with an arrow the direction of gear 'X'.

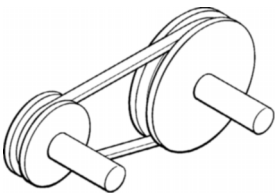


(c) Name a machine that uses each of these mechanisms:

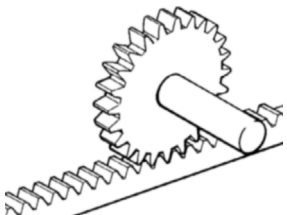
Machine: \_\_\_\_\_



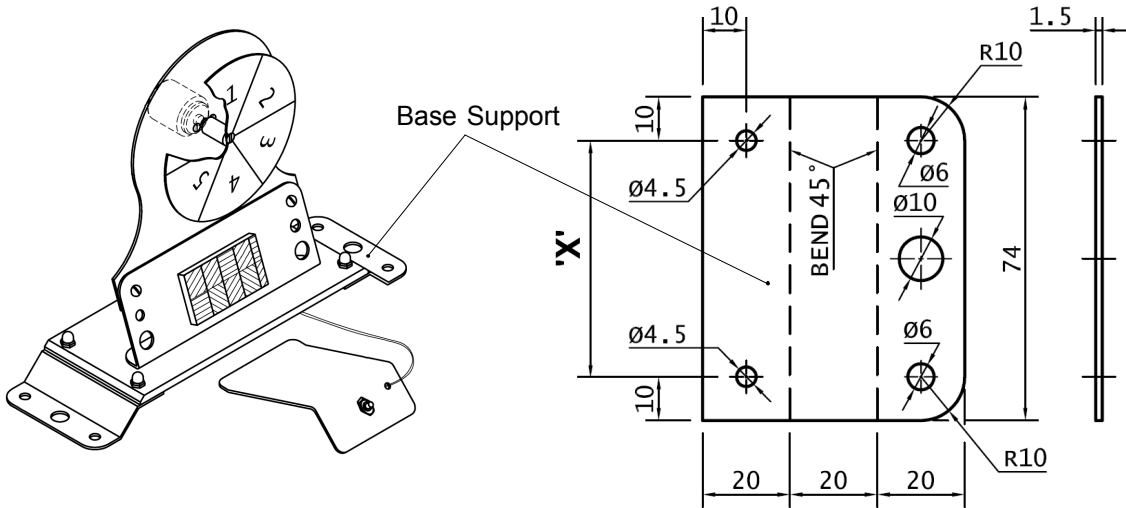
Machine: \_\_\_\_\_



Machine: \_\_\_\_\_



Details of the base support used in the manufacture of the solar powered dice game are shown.



(i) Calculate the measurement 'X' in the drawing above.

(ii) Describe the procedure for drilling the Ø10 hole.

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(iii) What energy conversion is taking place when the motor rotates?

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(iv) What tool would you use to mark out the R55 circle?

(v) List the steps involved in forming the R40 curve.

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(vi) How would you form the 20° bend?

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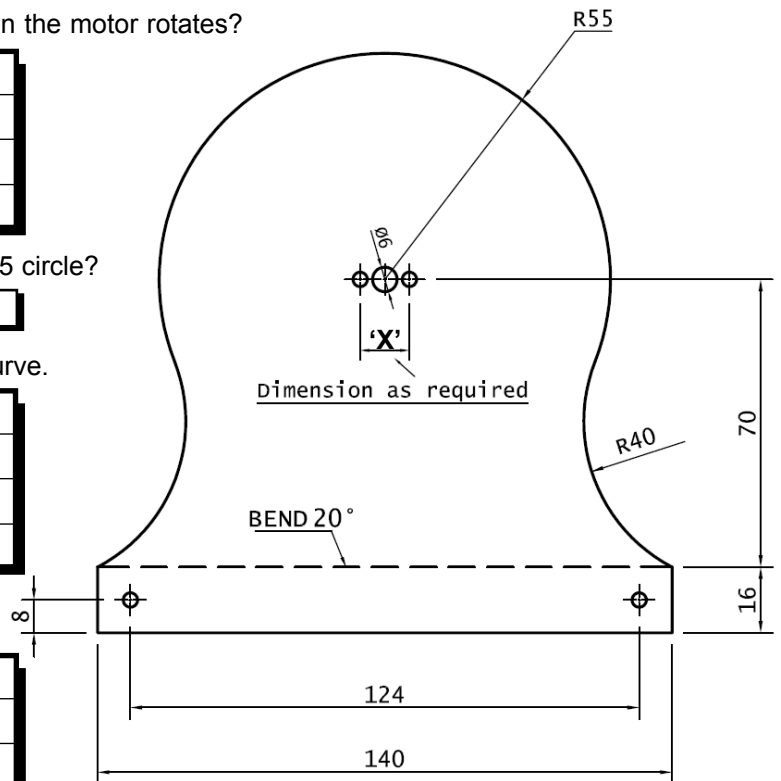
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(vii) What safety precautions should you take when drilling acrylic?

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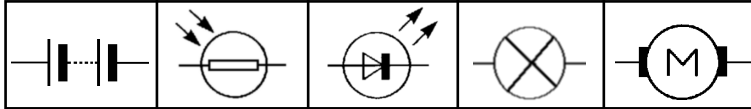
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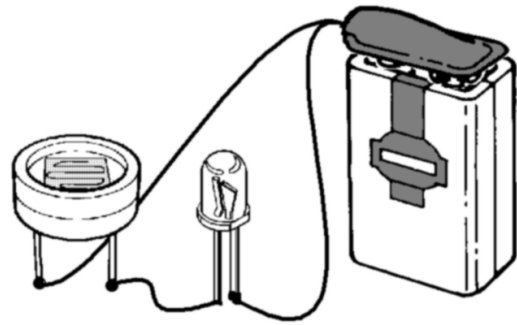
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(a) (i) Select the correct symbols from the chart and complete the electrical circuit diagram for this project.



Draw the circuit in this box

(ii) What flows in the wires when the LED lights?

(iii) What should happen when you place your hand over the LDR?

(b) (i) A mouse is a(n):



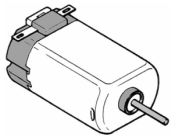
Output Device	
Input Device	
Process Device	

(iv) The filament produces:



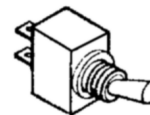
Current	
Voltage	
Light	

(ii) This device is a:



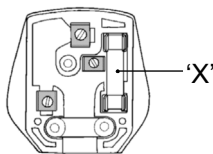
Motor	
Battery	
Capacitor	

(v) This is a:



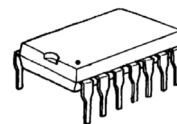
Push Switch	
Toggle Switch	
Slide Switch	

(iii) Part 'X' is a:



Resistor	
Fuse	
Terminal	

(vi) This component is a(n):



Integrated Circuit	
PCB	
LCD Display	

(c) (i) State **three** uses for computers in schools.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

(ii) State **three** uses of electronics in the home.

1. \_\_\_\_\_

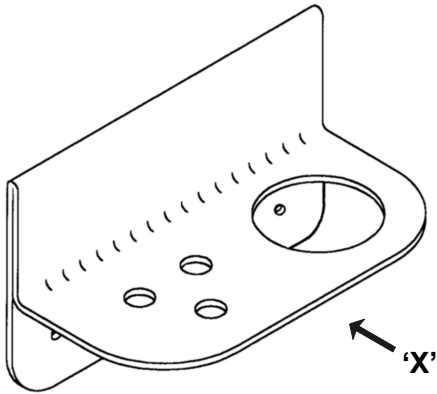
2. \_\_\_\_\_

3. \_\_\_\_\_

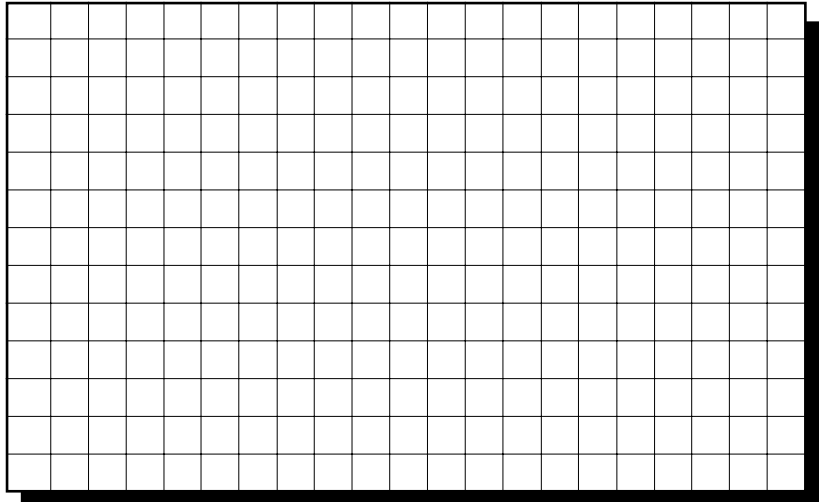
(i) A design for an acrylic toothbrush holder is shown. State **three** reasons for selecting this material and also state **one** disadvantage.

1.
2.
3.
Disadvantage:

(ii) Draw an elevation of the toothbrush holder when viewed from arrow 'X'.



Width = 150, Height = 100



(iii) Describe how you could get the best finish possible on the edges of the holder.


(iv) Describe how the hole for the glass is formed.


(v) How is the toothbrush holder bent to shape? Describe this process.
