



**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

JUNIOR CERTIFICATE EXAMINATION, 2009

MATERIALS AND TECHNOLOGY

METALWORK - ORDINARY LEVEL

100 Marks

Tuesday 16 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 style="width: 50px; height: 30px;" type="text"/>
Question	Mark
1A	
1B	
2	
3	
4	
5	
6	
Total	
Grade	

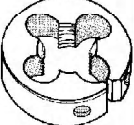
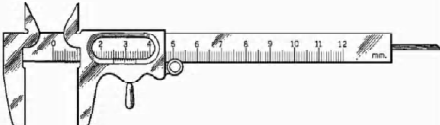


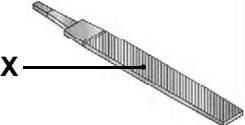
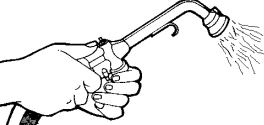
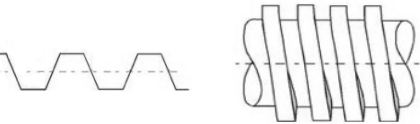
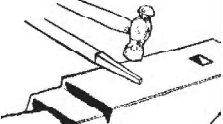

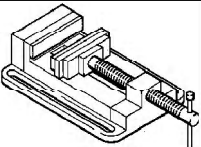
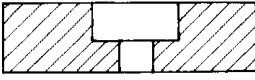

1. Total of end of page totals	
2. Aggregate total marks for all disallowed question(s)	
3. Total mark awarded (1 minus 2)	
4. Bonus mark for answering through Irish (if applicable)	
5. Total mark awarded if Irish Bonus (3+4)	
<p>Note: The mark in row 3 (or row 5 if an Irish Bonus is awarded) must equal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

**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

<p>(a)</p> 	<p>A die is used for:</p>	<table border="1"> <tr><td>Tapping</td><td></td></tr> <tr><td>Reaming</td><td></td></tr> <tr><td>Screwing</td><td></td></tr> <tr><td>Riveting</td><td></td></tr> </table>	Tapping		Reaming		Screwing		Riveting	
Tapping										
Reaming										
Screwing										
Riveting										
<p>(b)</p> 	<p>This instrument is a:</p>	<table border="1"> <tr><td>Micrometer</td><td></td></tr> <tr><td>Vernier Calipers</td><td></td></tr> <tr><td>Bevel Gauge</td><td></td></tr> <tr><td>Feeler Gauge</td><td></td></tr> </table>	Micrometer		Vernier Calipers		Bevel Gauge		Feeler Gauge	
Micrometer										
Vernier Calipers										
Bevel Gauge										
Feeler Gauge										
<p>(c)</p> 	<p>A centre drill is used with a:</p>	<table border="1"> <tr><td>Pillar Drilling Machine</td><td></td></tr> <tr><td>Lathe</td><td></td></tr> <tr><td>Hand Drill</td><td></td></tr> <tr><td>Tap Wrench</td><td></td></tr> </table>	Pillar Drilling Machine		Lathe		Hand Drill		Tap Wrench	
Pillar Drilling Machine										
Lathe										
Hand Drill										
Tap Wrench										
<p>(d)</p> 	<p>This fastener is a:</p>	<table border="1"> <tr><td>Wing Nut</td><td></td></tr> <tr><td>Spring Washer</td><td></td></tr> <tr><td>Split Pin</td><td></td></tr> <tr><td>Lock Nut</td><td></td></tr> </table>	Wing Nut		Spring Washer		Split Pin		Lock Nut	
Wing Nut										
Spring Washer										
Split Pin										
Lock Nut										
<p>(e)</p> 	<p>Part 'X' is called the:</p>	<table border="1"> <tr><td>Point</td><td></td></tr> <tr><td>Face</td><td></td></tr> <tr><td>Edge</td><td></td></tr> <tr><td>Tang</td><td></td></tr> </table>	Point		Face		Edge		Tang	
Point										
Face										
Edge										
Tang										
<p>(f)</p> 	<p>A gas torch is used when:</p>	<table border="1"> <tr><td>Threading</td><td></td></tr> <tr><td>Soldering</td><td></td></tr> <tr><td>Welding</td><td></td></tr> <tr><td>Riveting</td><td></td></tr> </table>	Threading		Soldering		Welding		Riveting	
Threading										
Soldering										
Welding										
Riveting										
<p>(g)</p> 	<p>This thread form is a(n):</p>	<table border="1"> <tr><td>Square Thread</td><td></td></tr> <tr><td>Butress 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		Butress Thread		Acme Thread		ISO Metric Thread	
Square Thread										
Butress Thread										
Acme Thread										
ISO Metric Thread										
<p>(h)</p> 	<p>This technique is called:</p>	<table border="1"> <tr><td>Drawing Down</td><td></td></tr> <tr><td>Hardening</td><td></td></tr> <tr><td>Forming an Eye</td><td></td></tr> <tr><td>Upsetting</td><td></td></tr> </table>	Drawing Down		Hardening		Forming an Eye		Upsetting	
Drawing Down										
Hardening										
Forming an Eye										
Upsetting										
<p>(i)</p> 	<p>Hammers are classified by:</p>	<table border="1"> <tr><td>Length of Shaft</td><td></td></tr> <tr><td>Diameter of Head</td><td></td></tr> <tr><td>Total Weight</td><td></td></tr> <tr><td>Weight of Head</td><td></td></tr> </table>	Length of Shaft		Diameter of Head		Total Weight		Weight of Head	
Length of Shaft										
Diameter of Head										
Total Weight										
Weight of Head										
<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	
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	
Counterbored Hole										
Countersunk Hole										
Pilot Hole										
Blind Hole										
<p>(l)</p> 	<p>This technique is called:</p>	<table border="1"> <tr><td>Taper Turning</td><td></td></tr> <tr><td>Parallel Turning</td><td></td></tr> <tr><td>Facing</td><td></td></tr> <tr><td>Knurling</td><td></td></tr> </table>	Taper Turning		Parallel Turning		Facing		Knurling	
Taper Turning										
Parallel Turning										
Facing										
Knurling										

SECTION B - 20 MARKS
ANSWER ALL QUESTIONS FROM THIS SECTION

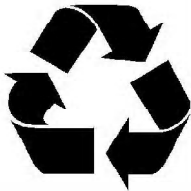
(m)



Complete the chart by listing a different metal for the body of each item.

Item	Metal
Stove	
Saucepan	
Padlock	
Hot Water Cylinder	

(n)

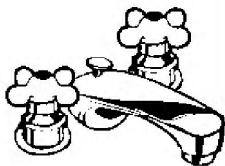


(i) Why should we recycle plastics?

(ii) Name **two** plastic items that can be recycled.

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(o) (i) Bathroom taps are coated with:



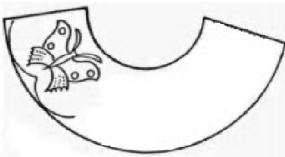
Tin	
Steel	
Lead	
Chrome	

(ii) Name the metal used to galvanise gates.



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(p) (i) Placing a design into metal with a sharp tool is called:

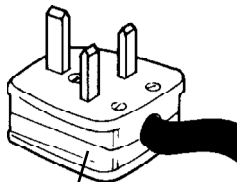


Enamelling	
Engraving	
Etching	
Repoussé	

(ii) Why is lacquering applied to copper jewellery?



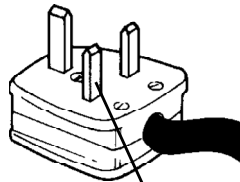
(q) (i) The case is a(n):



Case

Insulator	
Conductor	
Semi-conductor	

(ii) The pin is a(n):



Pin

Insulator	
Conductor	
Semi-conductor	

Question 2.

20 Marks

(a)

(i) Complete the chart (The first row has been completed for you, as an example):

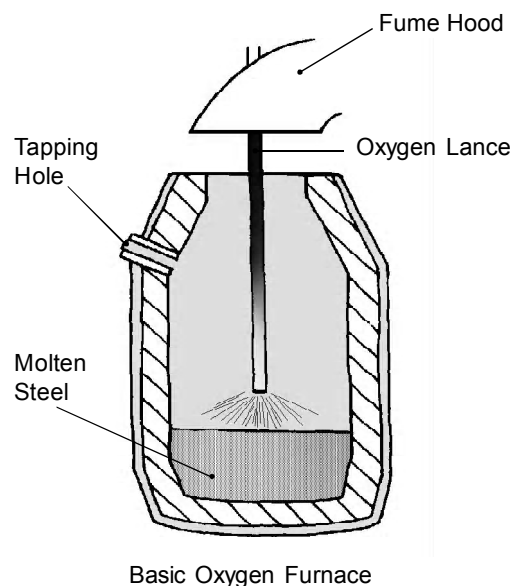
Component Metals	Alloy Formed	List a use for each alloy
Aluminium and Copper	<i>Duralumin</i>	<i>Aircraft manufacture</i>
Lead and Tin		
Copper and Tin		
Copper and Zinc		

(ii) What happens to a thermoplastic material when heated?

(iii) Name **one** thermoplastic material.

(b)

Describe how steel is produced using the basic oxygen process.



(c)

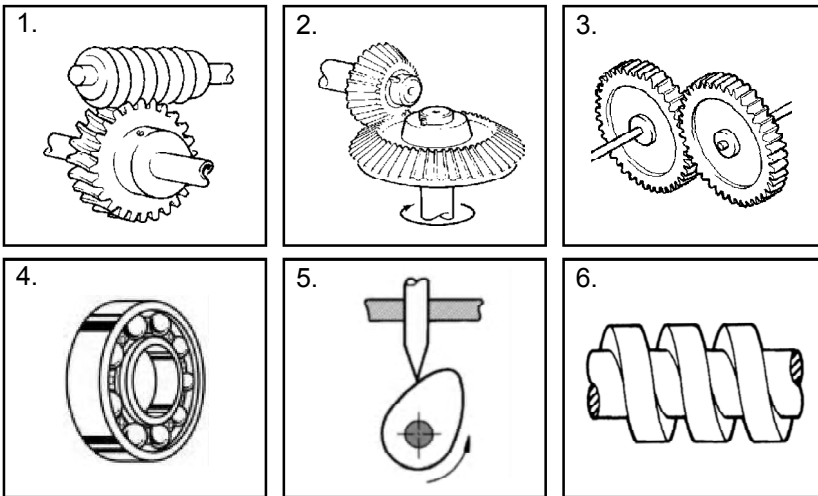
Complete the chart:

(i) Can brittle materials bend easily?	Yes	<input type="checkbox"/>
	No	<input type="checkbox"/>
(ii) Can steel be hardened and tempered?	Yes	<input type="checkbox"/>
	No	<input type="checkbox"/>
(iii) Are non-ferrous metals magnetic?	Yes	<input type="checkbox"/>
	No	<input type="checkbox"/>
(iv) Is the malleability of most metals increased by heating?	Yes	<input type="checkbox"/>
	No	<input type="checkbox"/>
(v) Is toughness the ability of a material to withstand blows?	Yes	<input type="checkbox"/>
	No	<input type="checkbox"/>
(vi) Is hardness the ability of a material to resist wear?	Yes	<input type="checkbox"/>
	No	<input type="checkbox"/>

Question 3.

20 Marks

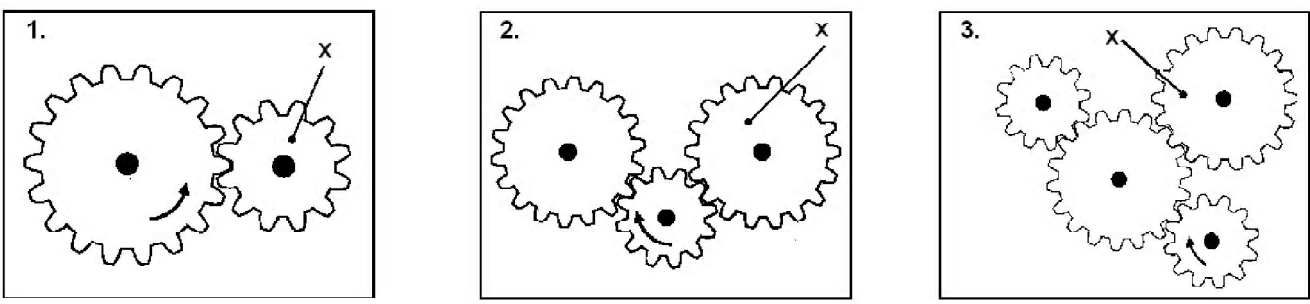
(a) (i) Match each of the numbers below to the correct mechanism part listed on the table.



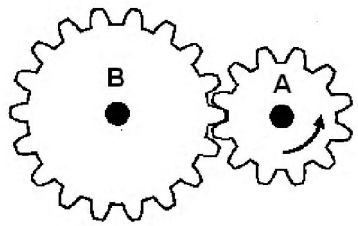
Mechanism	No.
Bearing	
Gear Train	
Leadscrew	
Cam	
Worm and Wormwheel	
Bevel Gears	

(ii) Name a machine that uses a rack and pinion mechanism.

(b) (i) Indicate with an arrow the direction of gear 'X' in each of the following:



(ii) If gear 'A' rotates at 10 RPM how fast will gear 'B' rotate? (A = 10 Teeth, B = 20 Teeth.)



100 RPM	
10 RPM	
50 RPM	
5 RPM	

(iii) Is gear 'A' known as a pinion?

Yes No

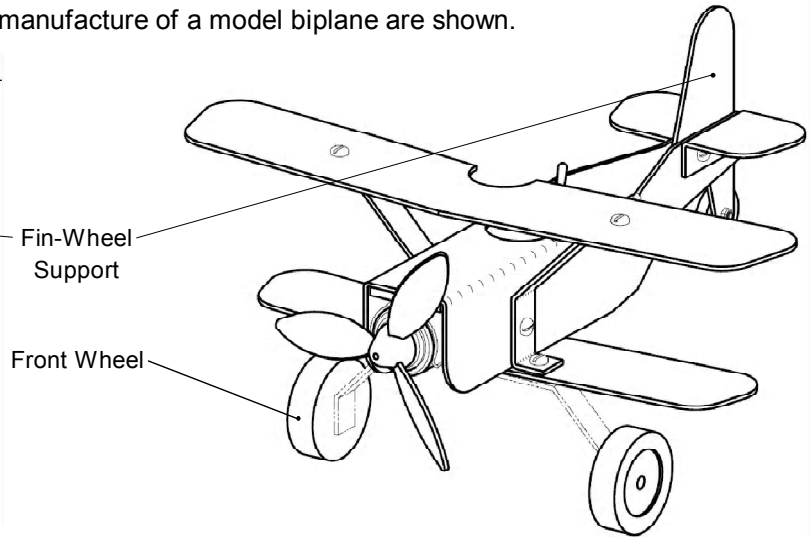
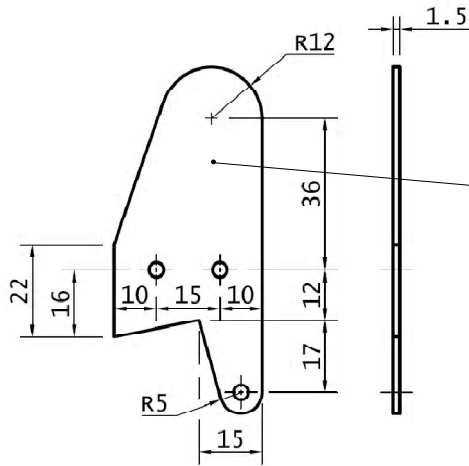
(c) Complete the chart by listing devices that use the following mechanisms. The first row has been completed for you, as an example.

Mechanism	Device
Lever	<i>Nutcracker</i>
Ratchet and Pawl	
Pulleys	
Linkages	
Spur Gears	
Rack & Pinion	
Crankshaft	

Question 4.

20 Marks

Details of the fin-wheel support used in the manufacture of a model biplane are shown.



(i) List the tools that you would use when marking out the fin-wheel support.

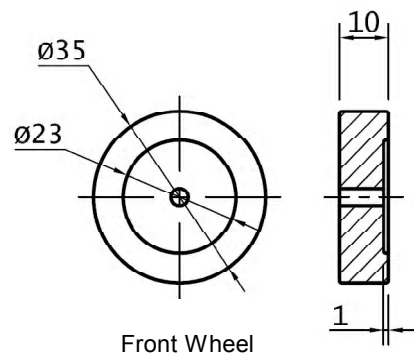
(ii) What is the overall length and width of the fin-wheel support?

Length:	
Width:	

(iii) Describe how you would cut out and shape the fin-wheel support.

(iv) Describe how you would safely drill the holes in the fin-wheel support.

(v) Describe how you would make the front wheel.

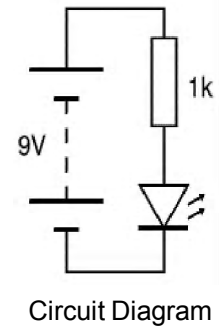
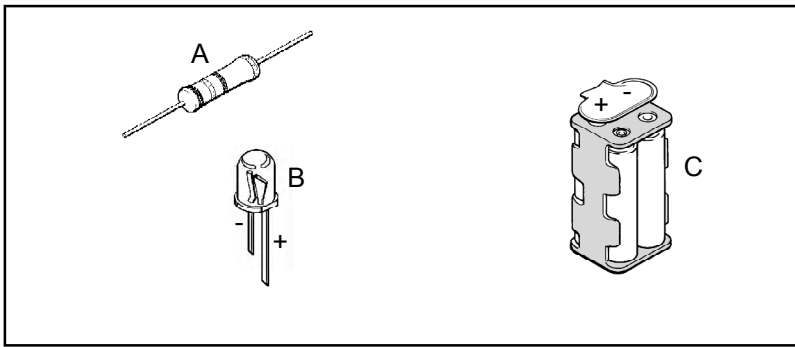


(vi) What safety precautions should you take when operating a lathe?

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	
B	
C	

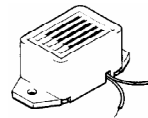
- (iii) State a use for component 'C'.

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



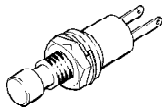
Chemical Energy	
Mechanical Energy	
Light Energy	

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



Integrated Circuit	
Buzzer	
Relay	

- (ii) This device is a:



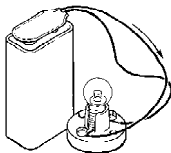
Slide Switch	
Toggle Switch	
Push Switch	

- (v) A computer monitor is a(n):



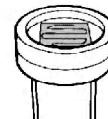
Output Device	
Input Device	
Process Device	

- (iii) Electric current is measured in:



Ohms	
Volts	
Amps	

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



LDR	
Fuse	
Transistor	

- (c) (i) From the history of transport name one famous inventor:

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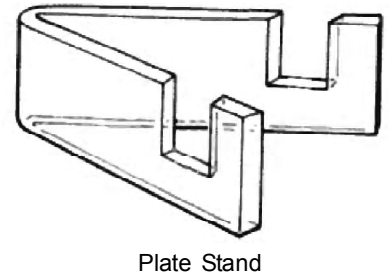
- (ii) What did this person invent?

- (iii) How has this person's invention changed the way we live?

Question 6.

20 Marks

(i) A design for a plate stand made from clear acrylic is shown. Why is acrylic a suitable material for this project?



(ii) Describe how you could get the best finish possible on the edges of the plate stand.

(iii) Using the chart below describe the cutting and shaping processes to be used to make the plate stand. List the tools used at each stage.

Cutting:	Tools used:

Shaping:	Tools used:

(iv) Draw a development of the plate stand in this box.

