



**Coimisiún na Scrúduithe Stáit  
State Examinations Commission**

S56

**JUNIOR CERTIFICATE EXAMINATION, 2003**

**MATERIALS AND TECHNOLOGY**

**METALWORK - ORDINARY LEVEL**

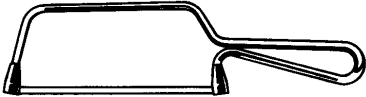
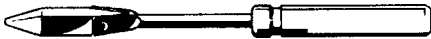
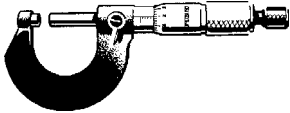
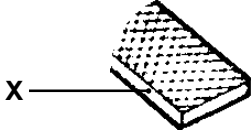
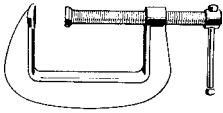

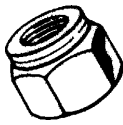
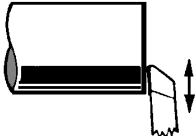
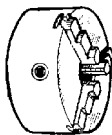


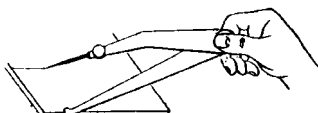
**100 Marks**

*Marking  
Scheme*

1.

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

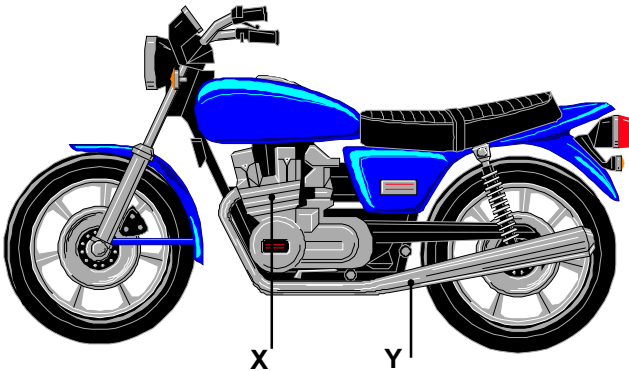
**40 Marks**  
**Best 10**  
**10 x 2 = 20 marks max.**

<p>(a) </p>	<p>This cutting tool is a:</p>	<table border="1"> <tr><td>Fret Saw</td><td></td></tr> <tr><td>Junior Hacksaw</td><td>✓</td></tr> <tr><td>Coping Saw</td><td></td></tr> <tr><td>Pad Saw</td><td></td></tr> </table>	Fret Saw		Junior Hacksaw	✓	Coping Saw		Pad Saw		<p>②</p>
Fret Saw											
Junior Hacksaw	✓										
Coping Saw											
Pad Saw											
<p>(b) </p>	<p>This tool is used when:</p>	<table border="1"> <tr><td>Riveting</td><td></td></tr> <tr><td>Drilling</td><td></td></tr> <tr><td>Threading</td><td></td></tr> <tr><td>Soldering</td><td>✓</td></tr> </table>	Riveting		Drilling		Threading		Soldering	✓	<p>②</p>
Riveting											
Drilling											
Threading											
Soldering	✓										
<p>(c) </p>	<p>This measuring instrument is a(n):</p>	<table border="1"> <tr><td>Vernier Calipers</td><td></td></tr> <tr><td>Outside Calipers</td><td></td></tr> <tr><td>Micrometer</td><td>✓</td></tr> <tr><td>Depth Gauge</td><td></td></tr> </table>	Vernier Calipers		Outside Calipers		Micrometer	✓	Depth Gauge		<p>②</p>
Vernier Calipers											
Outside Calipers											
Micrometer	✓										
Depth Gauge											
<p>(d) </p>	<p>Part 'X' is called the:</p>	<table border="1"> <tr><td>Flat Edge</td><td></td></tr> <tr><td>Safe Edge</td><td>✓</td></tr> <tr><td>Double Cut</td><td></td></tr> <tr><td>Single Cut</td><td></td></tr> </table>	Flat Edge		Safe Edge	✓	Double Cut		Single Cut		<p>②</p>
Flat Edge											
Safe Edge	✓										
Double Cut											
Single Cut											
<p>(e) </p>	<p>This tool is a:</p>	<table border="1"> <tr><td>Machine Vice</td><td></td></tr> <tr><td>Hand Vice</td><td></td></tr> <tr><td>Vice Grips</td><td></td></tr> <tr><td>G-Cramp</td><td>✓</td></tr> </table>	Machine Vice		Hand Vice		Vice Grips		G-Cramp	✓	<p>②</p>
Machine Vice											
Hand Vice											
Vice Grips											
G-Cramp	✓										
<p>(f) </p>	<p>Part 'X' of the thread is called the:</p>	<table border="1"> <tr><td>Flank</td><td></td></tr> <tr><td>Lead</td><td></td></tr> <tr><td>Pitch</td><td></td></tr> <tr><td>Crest</td><td>✓</td></tr> </table>	Flank		Lead		Pitch		Crest	✓	<p>②</p>
Flank											
Lead											
Pitch											
Crest	✓										
<p>(g) </p>	<p>This fastener is a:</p>	<table border="1"> <tr><td>Rivet</td><td></td></tr> <tr><td>Lock Nut</td><td>✓</td></tr> <tr><td>Bolt</td><td></td></tr> <tr><td>Grub Screw</td><td></td></tr> </table>	Rivet		Lock Nut	✓	Bolt		Grub Screw		<p>②</p>
Rivet											
Lock Nut	✓										
Bolt											
Grub Screw											
<p>(h) </p>	<p>This lathe operation is called:</p>	<table border="1"> <tr><td>Parting</td><td></td></tr> <tr><td>Threading</td><td></td></tr> <tr><td>Knurling</td><td></td></tr> <tr><td>Facing</td><td>✓</td></tr> </table>	Parting		Threading		Knurling		Facing	✓	<p>②</p>
Parting											
Threading											
Knurling											
Facing	✓										
<p>(i) </p>	<p>This lathe part is called a:</p>	<table border="1"> <tr><td>Tailstock</td><td></td></tr> <tr><td>Three Jaw Chuck</td><td>✓</td></tr> <tr><td>Headstock</td><td></td></tr> <tr><td>Topslide</td><td></td></tr> </table>	Tailstock		Three Jaw Chuck	✓	Headstock		Topslide		<p>②</p>
Tailstock											
Three Jaw Chuck	✓										
Headstock											
Topslide											
<p>(j) </p>	<p>This cutting tool is a:</p>	<table border="1"> <tr><td>Twist Drill</td><td></td></tr> <tr><td>Reamer</td><td></td></tr> <tr><td>Centre Drill</td><td>✓</td></tr> <tr><td>Countersinking Drill</td><td></td></tr> </table>	Twist Drill		Reamer		Centre Drill	✓	Countersinking Drill		<p>②</p>
Twist Drill											
Reamer											
Centre Drill	✓										
Countersinking Drill											
<p>(k) </p>	<p>This tool is called a(n):</p>	<table border="1"> <tr><td>Socket</td><td></td></tr> <tr><td>Ring Spanner</td><td></td></tr> <tr><td>Adjustable Spanner</td><td></td></tr> <tr><td>Ratchet</td><td></td></tr> </table>	Socket		Ring Spanner		Adjustable Spanner		Ratchet		
Socket											
Ring Spanner											
Adjustable Spanner											
Ratchet											
<p>(l) </p>	<p>This marking out tool is called a(n):</p>	<table border="1"> <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> <tr><td>Scriber</td><td></td></tr> </table>	Inside Calipers		Odd Leg Calipers	✓	Spring Dividers		Scriber		<p>②</p>
Inside Calipers											
Odd Leg Calipers	✓										
Spring Dividers											
Scriber											

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

(m)

(i) Name a metal used to make the engine case 'X':



Aluminium ①

(ii) Is this metal ferrous or non-ferrous?

Non-ferrous ①

(iii) Does this metal rust?

No ①

(iv) The exhaust pipe 'Y' is usually coated with a metal. Name this metal.

Chrome ①

4 Marks

(n)

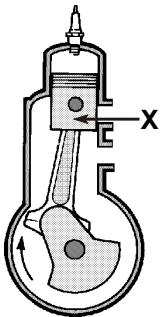


State the function of a spark plug.

To ignite the fuel mixture. ④

4 Marks

(o)

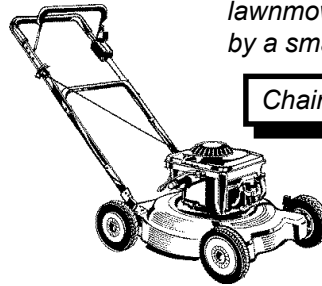


(i) Part 'X' is called the:

Valve	
Connecting Rod	
Piston	✓
Crankshaft	

②

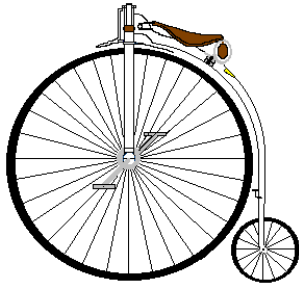
(ii) Name a device other than a lawnmower that can be driven by a small petrol engine.



Chainsaw, Strimmer. ②

4 Marks

(p) List four differences between this bicycle and a modern bicycle.

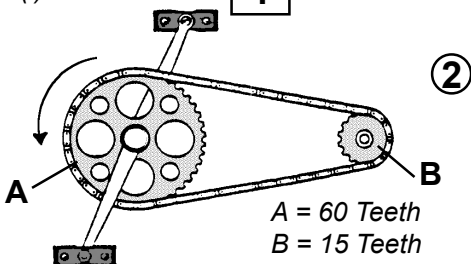


1. Wheels ①
2. Saddle ①
3. Frame ①
4. Handle bars ①

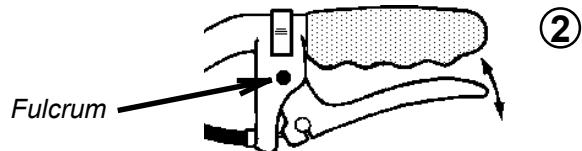
4 Marks

(q) (i) One turn of A = 4 turns of B.

(ii) Indicate with an arrow the fulcrum point of the brake lever.



②



4 Marks

**(a) Complete the chart:**

(1 mark for one use of each, 8 x 1 marks)

Material	List a use for each material
Nylon	Bearings, Gears, Brushes, Fishing Lines, Clothes, Curtains.
Copper	Electrical equipment, Water pipes, Ornaments.
PVC	Windows, Gutters, Garden hoses.
Stainless Steel	Cutlery, Kitchen sinks, Surgical instruments.
Brass	Water fittings, Screws, Ornaments, Electrical fittings.
Polythene	Bags, Bottles, Buckets, Cable insulation.
Mild Steel	Gates, Girders, General engineering applications.
Zinc	Batteries, Galvanising, Toys.

- ①
- ①
- ①
- ①
- ①
- ①
- ①
- ①

8 Marks

**(b) Complete the chart:**

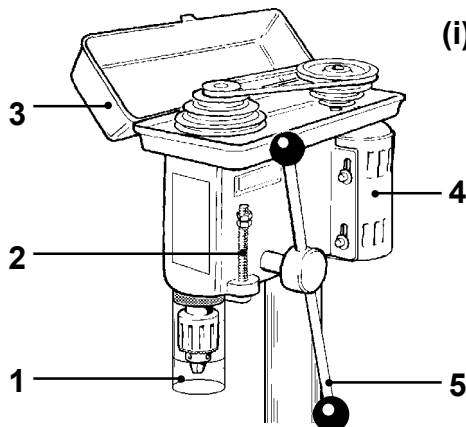
(1 mark each, 6 x 1 marks)

(i) Can thermosetting plastics be re-shaped?	Yes	
	No	✓
(ii) Is aluminium ore called bauxite?	Yes	✓
	No	
(iii) Is copper a good conductor of heat?	Yes	✓
	No	
(iv) Is bronze an alloy of copper and tin?	Yes	✓
	No	
(v) Is cast iron used to make fire grates?	Yes	✓
	No	
(vi) Is mild steel an alloy?	Yes	✓
	No	

- ①
- ①
- ①
- ①
- ①
- ①

6 Marks

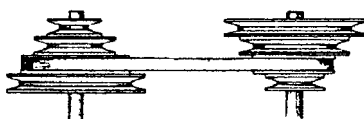
**(c)**



**(i) Complete the chart by naming the parts:**

Part No.	Name
1.	Chuck guard
2.	Depth stop
3.	Belt guard
4.	Motor
5.	Feed lever

- ①
- ①
- ①
- ①
- ①



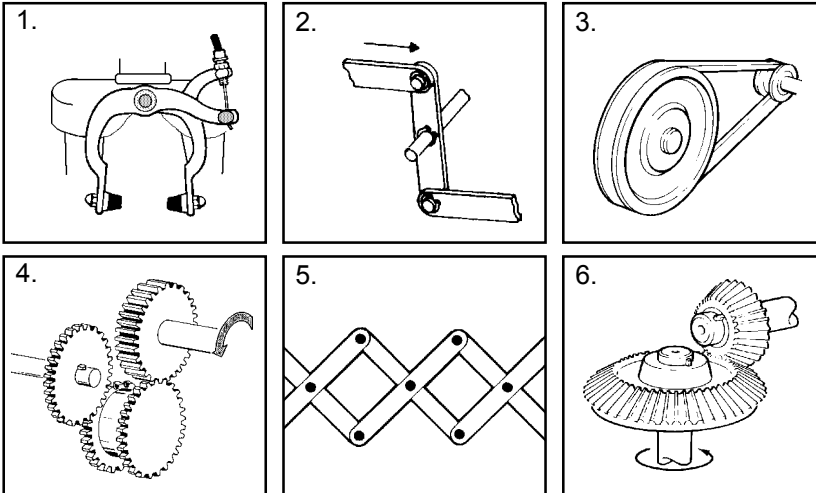
**(ii) Stepped pulleys in a pillar drill are used to:**

Change the speed	✓
Change the feed	

①

6 Marks

(a) (i) Match the number to the correct mechanism.



Mechanism	No.	
Bell Crank	2	①
Caliper Brake	1	①
Bevel Gears	6	①
Parallel Linkage	5	①
Gear Train	4	①
Pulley System	3	①

(ii) Which one of these mechanisms is used in a hand drill?

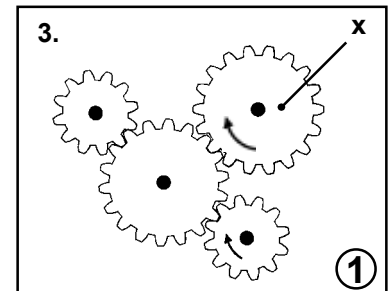
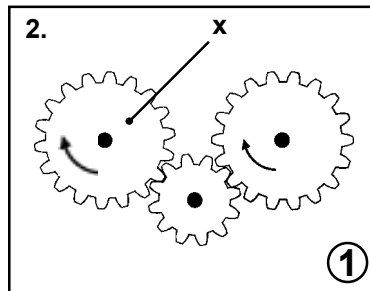
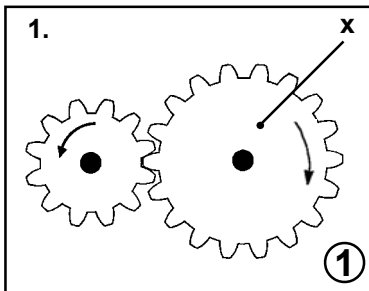
Bevel gears ①

(iii) Name another machine that uses one of these mechanisms. State the number of this mechanism.

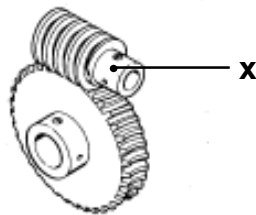
Lathe No. 4 ①

8 Marks

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



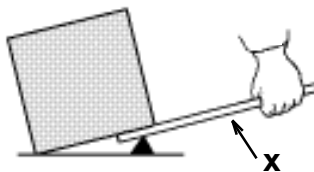
(ii) Gear 'X' is a:



Spur Gear		
Bevel Gear		
Worm Gear	✓	③
Helical Gear		

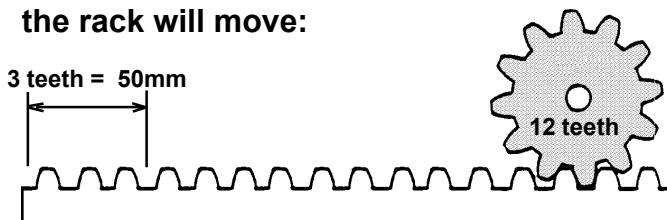
6 Marks

(c) (i) Name 'X':



Lever ②

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



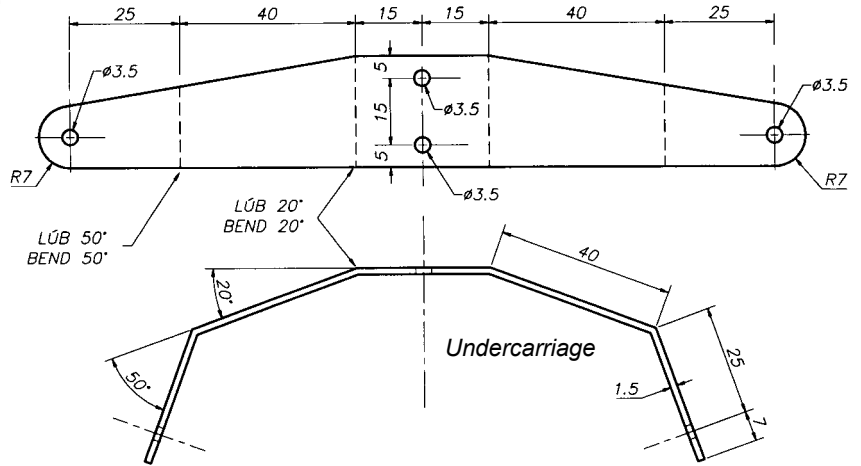
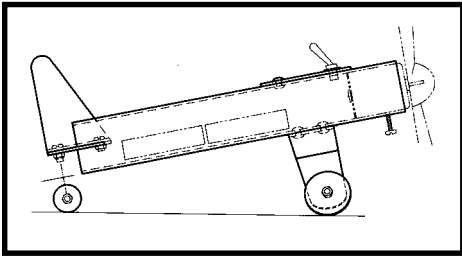
1000mm		
200mm	✓	②
600mm		
100mm		

(iii) Name a machine that uses a rack and pinion:

Drilling Machine ②

6 Marks

Details of a model aeroplane are shown.



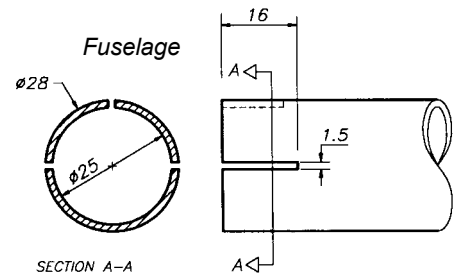
(i) Describe the stages involved in marking out and bending the undercarriage to shape

Mark out, drill holes, cut to shape, bend to shape using folding bars or former.

6

(ii) What workshop tool is used to check the angles on the undercarriage.

Engineers protractor or bevel.



3

(iii) Describe how the slots in the fuselage are marked out.

Mark out using surface plate, vee-block, surface gauge, rule, try-square, calipers.

2

(iv) Explain the function of the following components in the aeroplane.

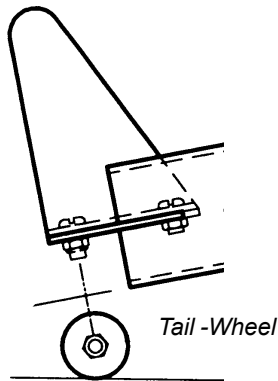
Component	Function
Battery	Supply power.
Switch	Turn on and off.
Motor	Turn propellor.

2

2

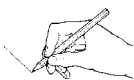
2

(v) Design a support for the tail-wheel in the grid below.



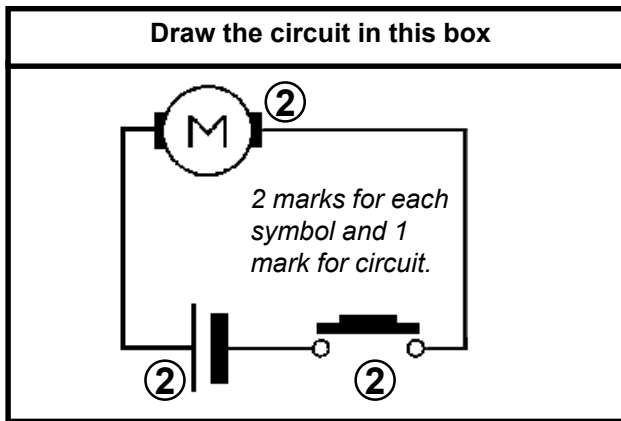
Tail -Wheel

Design = 2 marks  
Standard of sketch = 1 mark



USE A PENCIL ONLY

(a) (i) Select the correct symbols from the chart and complete the circuit diagram for the battery operated drill.



Component	Symbol

8 Marks

(ii) State one advantage of battery operated drills.

No cable attached, low voltage, safe,  
no power point required.

(b) (i) Match the number to the correct symbol.

1.	2.	3.
4.	5.	6.

Component	No.
Bulb	6
LDR	3
LED	4
Switch	2
Buzzer	5
Transistor	1

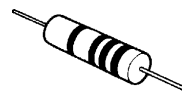
①  
①  
①  
①  
①  
①

(ii) What does the electrical term A.C mean?

Alternating Current

①

(iii) Is this component a resistor?



Yes

No

①

8 Marks

(c) (i) Name one famous Engineering inventor:

e.g. Rudolf Diesel

②

(ii) What did this person invent?

Diesel engine

①

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

Improved transport - cars - lorries - trains - boats.

①

4 Marks

(i) This design shows a desk ornament. List three tools used to make Part 'A'.

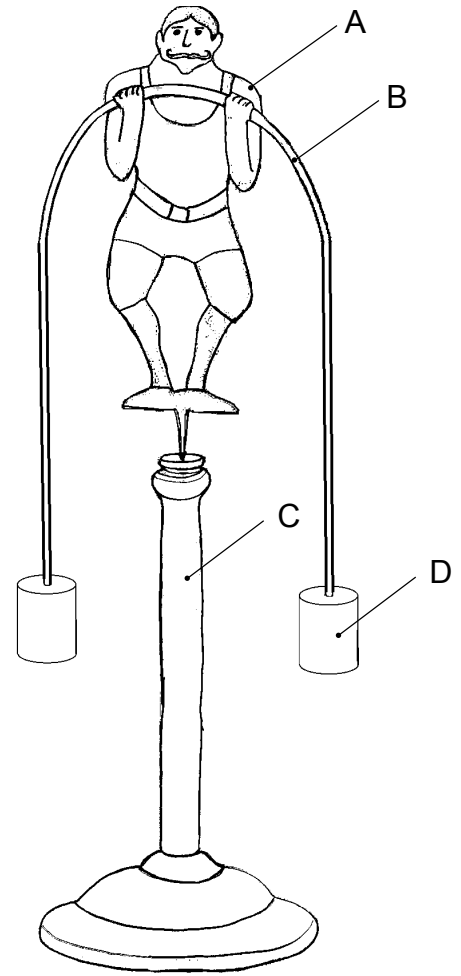
1.	Scriber, Pencil, Engraver	②
2.	Snips, Piercing Saw	②
3.	File	②

(ii) List suitable materials for the parts labelled 'A', 'B', and 'C'.

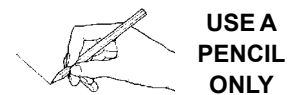
A.	Copper, Brass, Aluminium	②
B.	Brass, Copper, Steel	②
C.	Copper, Aluminium, Wood	②

(iii) Briefly describe the stages involved in making Part 'D' on the lathe.

Face end	③
Centre drill	
Drill correct diameter	
Part off	
Tap hole	



(iv) You are required to design a different base for the ornament. Using good proportions make a neat freehand drawing of your design in the grid below.



Alternative design = 2 marks Standard of sketch = 1 mark	
---	--

(v) Can the Tailstock on the lathe be used for drilling?

Yes	<input checked="" type="checkbox"/>	②
No	<input type="checkbox"/>	