Coimisiún na Scrúduithe Stáit
State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2004

MATERIALS AND TECHNOLOGY

METALWORK - ORDINARY LEVEL

100 Marks

Tuesday, 22 June, Afternoon, 2.00 to 3.30

Centre Number

Examination Number

For Examiner	
Total Mark	
Question	**Mark**
1A	
1B	
2	
3	
4	
5	
6	
Total	
Grade	

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.**

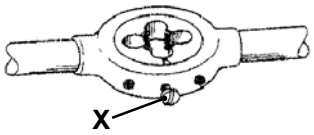
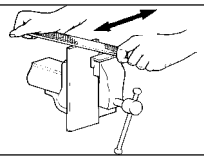
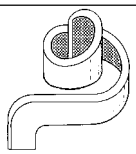
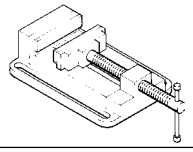
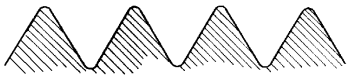
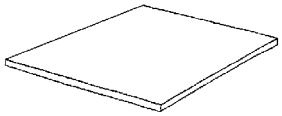
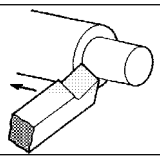
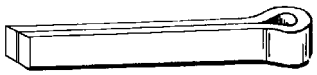
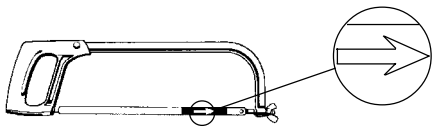
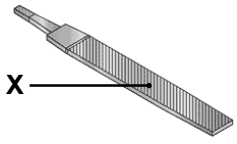
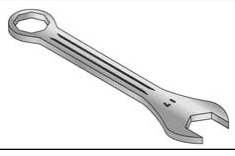
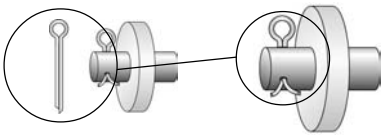
1. Total of end of page totals	
2. Aggregate total of all disallowed question(s)	
3. Total mark awarded (1 minus 2)	
4. Bonus mark for answering through Irish (if applicable)	
5. Total mark awarded if Irish Bonus (3+4)	
Note: The mark in row 3 (or row 5 if an Irish Bonus is awarded) must equal the mark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

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

1.

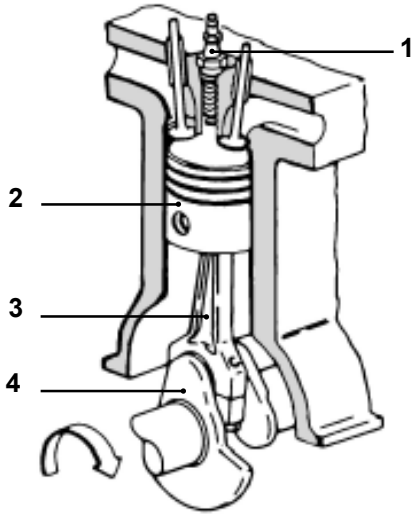
SECTION A - 20 MARKS
ANSWER ANY TEN QUESTIONS FROM THIS SECTION

40 Marks

(a) 	*Screw 'X' is used to adjust the:*	Plug Tap Thumb Screw Split Die Tap Wrench	
(b) 	*This technique is called:*	Cross Filing Draw Filing Concave Filing Pinning	
(c) 	*This tool is used for:*	Bending Cutting Scrolling Folding	
(d) 	*This holding device is a:*	Pin Vice Bench Vice Hand Vice Machine Vice	
(e) 	*This is a(n):*	Square Thread Acme Thread ButtressThread Metric Thread	
(f) 	*3mm steel plate is cut using:*	Straight Snips Bench Shears Brazing Torch Piercing Saw	
(g) 	*Lathe tool bits are made from:*	Stainless Steel Chrome Aluminium High Speed Steel	
(h) 	*This tool is used for:*	Bending Sheet Metal Forging Steel Riveting Steel Plates Holding Work	
(i) 	*The arrow on the hacksaw blade indicates:*	A Coarse Tooth Blade The Direction of Cut A Worn Blade A Fine Tooth Blade	
(j) 	*Part 'X' is called the:*	Point Face Edge Tang	
(k) 	*This tool is a(n):*	Allen Key Spanner Adjustable Spanner Combination Pliers	
(l) 	*This fastener is a:*	Bolt Rivet Split Pin Lock Nut	

SECTION B - 20 MARKS
ANSWER ALL QUESTIONS FROM THIS SECTION

(m)



Name the labelled engine parts.

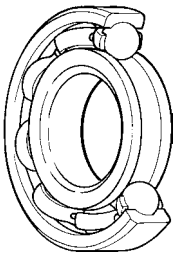
1.	
2.	
3.	
4.	

(n)

List four different machines that use petrol engines.

1.	
2.	
3.	
4.	

(o)

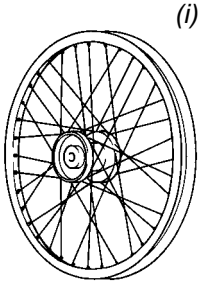


(i) This is a:

Slider	
Bearing	
Shaft	
Clutch	

(ii) Lubrication is used to reduce:

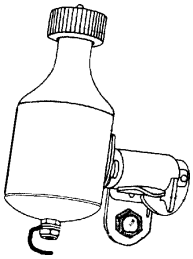
(p)



(i) Bicycle wheels are made from:

Copper	
Brass	
Steel	
Zinc	

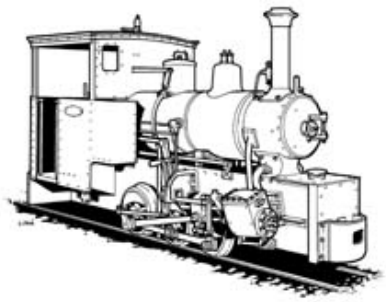
(ii) A dynamo converts mechanical energy into:



Potential Energy	
Electrical Energy	
Chemical Energy	
Heat Energy	

(q)

List four differences between a modern locomotive and this locomotive.



1.	
2.	
3.	
4.	

2. **20 Marks**

(a)

(i) Steel is produced by combining iron with:

Copper	
Carbon	
Ore	

(ii) Copper is a(n):

Ferrous Metal	
Non-Ferrous Metal	
Alloy	

(iii) Metal gates are made from:

Mild Steel	
Iron	
Tin	

(iv) Plastic curtain rails are made from:

Acrylic	
Nylon	
Polyester Resins	

(v) Iron is produced in the:

Basic Oxygen Furnace	
Electric Arc Furnace	
Blast Furnace	

(vi) Battery plates are made from:

Zinc	
Lead	
Aluminium	

(vii) Plastics that cannot be softened when reheated are called:

Hard Plastics	
Thermoplastics	
Thermosetting Plastics	

(viii) Another name for glass reinforced polyester is:

Fibre Glass	
Polyvinyl Chloride	
Polyethylene	

(b) **Complete the chart by matching each property to the correct definition below.**

Property	Definition
Toughness	*The ability to*
Malleability	*The ability to*
Ductility	*The ability to*
Brittleness	*The tendency to*
Hardness	*The ability to*
Conductivity	*The ability to*

Descriptions:

- *break easily when struck.*
- *resist wear and scratching.*
- *allow electricity to pass through.*
- *withstand blows or an impact.*
- *be hammered into a sheet without breaking.*
- *be stretched into thin wire.*

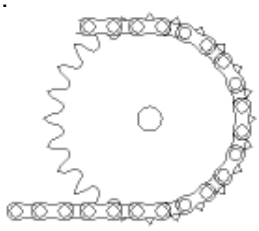
(c) **Complete the chart by listing a tool for each process.**

Process	Tool
To flatten aluminium sheet without causing damage.	*Mallet*
To cut an internal thread.	
To mark the position of a hole before drilling.	
To clean a pinned file.	
To draw a circle on a piece of metal.	
To cut a 20mm round mild steel bar.	
To mark out and check angles on a piece of metal.	

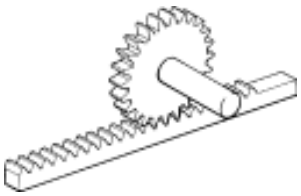
3. **20 Marks**

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

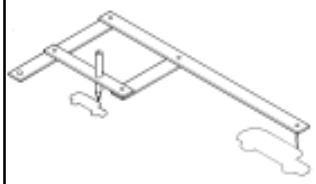
1.



2.

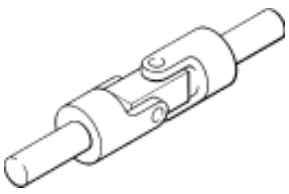


3.

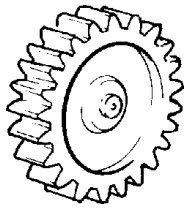


4.

5.

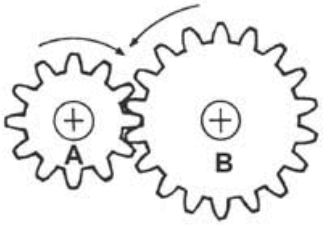


6.



Mechanism	No.
Universal Joint	
Sprocket	
Worm Gear	
Spur Gear	
Rack and Pinion	
Parallel Linkage	

(ii) How many times will gear A have to rotate in order that gear B completes one full rotation?



A = 12 Teeth **B = 18 Teeth**

(b) **The sketch shows a machine with an input and an output.**

(i) Name the input mechanism.

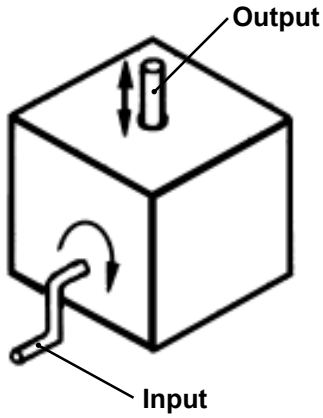
Ratchet	
Crank	
Pinion	

(ii) What kind of input motion is required?

Oscillating	
Reciprocating	
Rotary	

(iii) Name the output motion produced.

Linear	
Rotary	
Reciprocating	



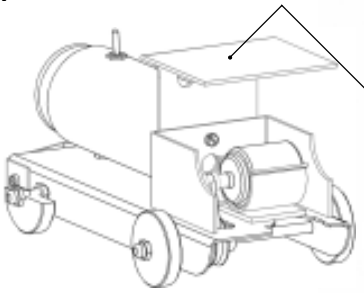
(iv) Name the internal mechanism used to produce the output motion.

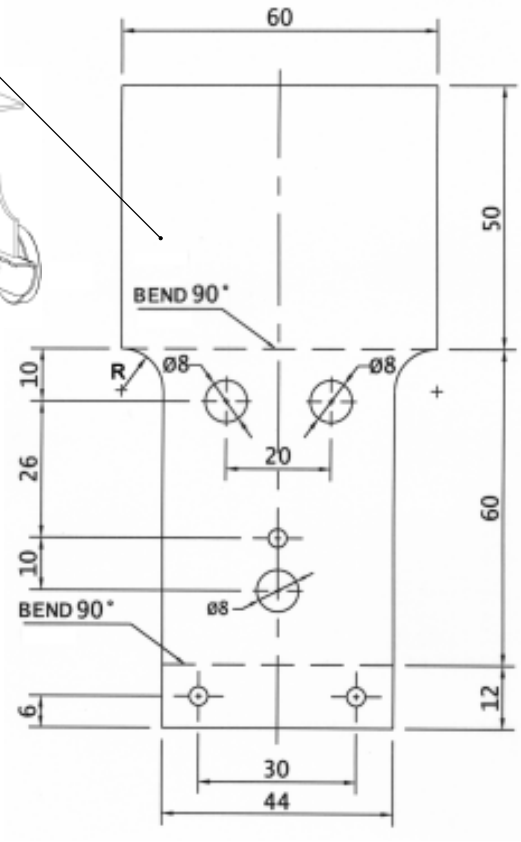
(c) **Complete the chart by listing devices that use the following mechanisms.**

Mechanism	Device
Ratchet	*Fishing reel.*
Lever	
Pulley	
Gear Train	
Bevel Gears	
Rack & Pinion	
Square Thread	

4. **20 Marks**

Details of a model locomotive are shown.





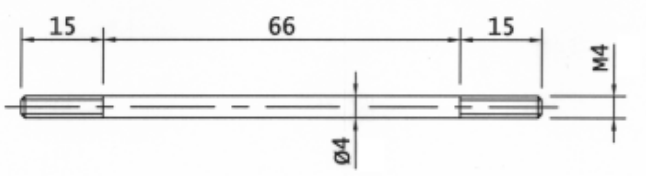
(i) **What is the overall width and height of the Cab?**

(ii) **What is the size of radius 'R'?**

(iii) **Describe how you would form this curve?**

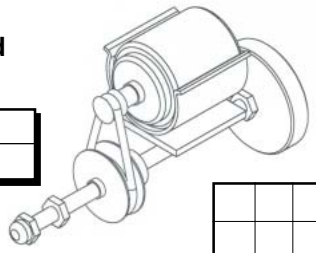
(iv) **Describe how you would bend the Cab.**

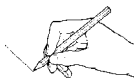
(v) **List the tools used to make the axle.**



(vi) **What does 'M4' refer to on the axle drawing?**

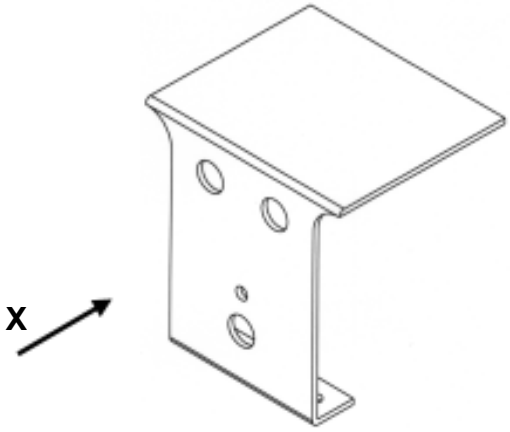
(vii) **Name the mechanism used to turn the axle.**





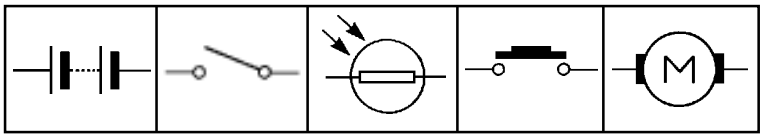
USE A PENCIL ONLY

(viii) **Draw an elevation of the cab looking in the direction of arrow 'X'.**

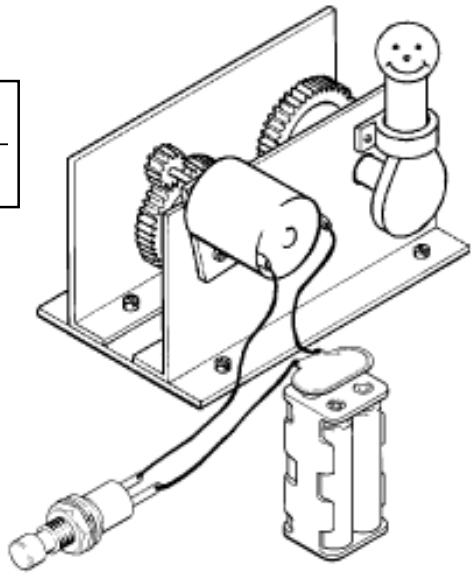


5. **20 Marks**

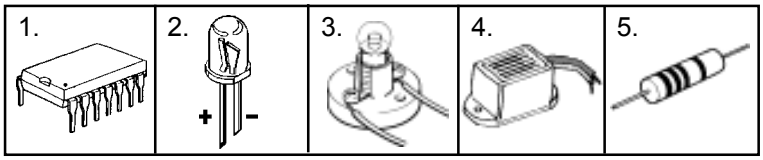
(a) **(i)** **Select the correct symbols from the chart and complete the electrical circuit diagram for this project.**



Draw the circuit in this box

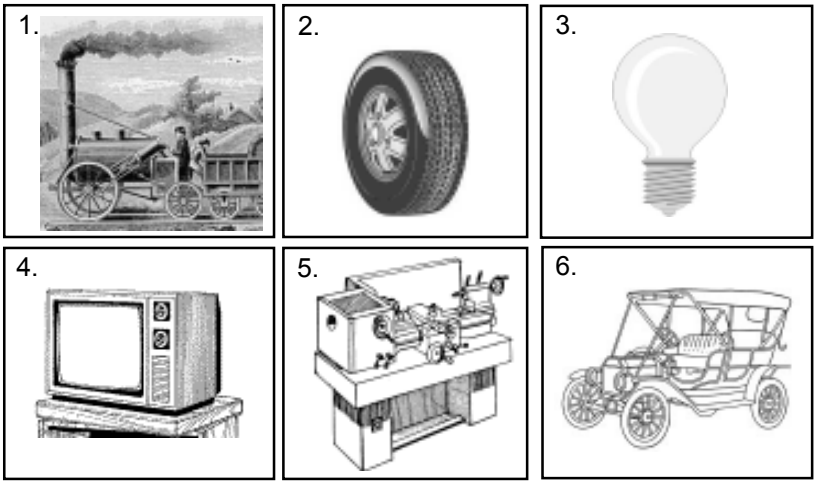


(ii) **Match the number to the component.**



Component	No.
Bulb	
Buzzer	
Integrated Circuit	
LED	
Resistor	

(b) **Match the achievement to the inventor.**



Inventor	No.
John Logie Baird	
Henry Maudslay	
Thomas Edison	
Henry Ford	
John Dunlop	
George Stephenson	

(c) **(i)** **Which of these devices can store more data?**

CD - ROM	
Floppy Disk	

(ii) **Name two computer input devices.**

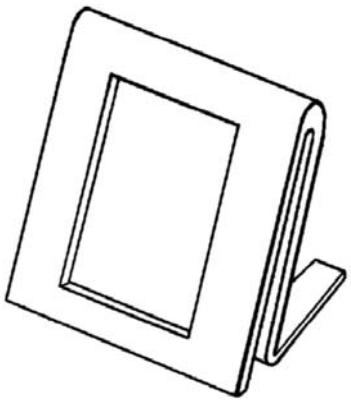
1.	
2.	

(iii) **List two uses for a computer in the engineering industry.**

1.	
2.	

6. **20 Marks**

(i) **The design shows a photograph frame. Name one plastic material and one sheet metal material suitable for making this project. Give reasons for your choice.**



Plastic:
Reason:

Metal:
Reason:

(ii) **The rectangle below shows the blank piece of material to be used to make the project. Complete the marking out and show where the bend lines should be located.**

(iii) **Using the chart below describe the cutting and shaping processes to be used to make the photograph frame. Also list the tools used at each stage.**

Cutting:	**Tools used:**
Shaping:	**Tools used:**

(iv) **How would you finish the edge of the photograph frame?**

(v) **Before designing a photograph frame what information would you need to know?**
