

State Examinations Commission

Junior Certificate Examinations

2003

Materials and Technology

Metalwork

Higher Level

Marking Scheme

Question 1 - Section A **20 marks** **Only five parts to be counted**

- (a) Thomas Edison - invented light bulb / phonograph / gramophone
Charles Parsons - invented first practical steam turbine
John Logie Baird - invented television seeing by wireless **4 marks**
- (b) Spark plug - to ignite / light the fuel
Name and purpose (2 + 2) **4 marks**
- (c) (i) Petrol/alcohol/LPG/other gases
(ii) To connect / join the piston to the connecting rod (2 + 2) **4 marks**
- (d) Part C rotates when the piston moves up and down/ turns **4 marks**
- (e) (i) To help cool the engine / air moving past the fins -cools them
(ii) Lawnmower/ strimmer/ chainsaw / go kart / con saw etc **4 marks**
- (f) Thermosetting - a plastic that does not soften when heated
Pilot hole - a small hole drilled to guide a bigger drill (Diagram +label OK)
Ferrous metal - any metal or alloy that contains iron (*Any two*) (2 + 2) **4 marks**
- (g) Identify and name four components - 1=resistor,
2=Transistor, 3 =Lamp / bulb, 4= switch. (No identification - no marks)
4 marks

Question 1 - Section B **20 marks** **Only five parts to be counted**

- (a) Correct circuit diagram with correct symbols -
battery, switch, motor, - (3 symbols = 3 / circuit = 1) **4 marks**
- (b) Two stages described - how faced off, how tapered, how centre drilled,
how drilled (*terms only - 2marks*) (2 + 2) **4 marks**
- (c) Sketch of suitable design of undercarriage (*very good sketch - 2 marks*
average sketch - 1 mark)
Description of main components - 2 marks (*If named only 1 mark*) **4 marks**
- (d) Mark out, heat on strip heater / bender - bend to angle,
(3 steps = 4marks, 2 steps = 2 marks, 1step =1 mark) **4 marks**
- (e) (i) Sketch showing 3 surfaces/ general shape (*Rectangle 1 mark*) (2 marks)
(ii) drill holes **and** use screws and nuts (1+1=2) **4 marks**
- (f) Undercarriage - supports / allows aircraft to stand / move on ground
/take off/ land
or
Tail Fin - Helps aircraft to maintain stability/ keeps in a straight path
4 marks

Question 2 - 20 marks

- (a) Any *two* important points / strength - weight / corrosion properties/cost
(One point - 2 marks) **3 marks**
- (b) Any *two* important points / information for making, dimensions, different views
(One point - 2 marks) **3 marks**
- (c) (i) Elevation: correct shape of body, wheels in correct position,
draw bar shown, proportion good
(4 correct - 6 marks, 3 correct - 4 marks, 2 correct - 3 marks, 1 correct - 2 marks) **6 marks**
- (ii) Two improvements: handle for end of draw bar, sides on body,
bigger wheels, brakes etc (2 x 2) **4 marks**
- (iii) Mechanism described: fulcrum for steering / may be text **4 marks**

Question 3 20 marks

- (a) So that different sizes of holes /different processes may be drilled at correct cutting speeds. So that different materials may be drilled eg soft and hard (2 + 2) **4 marks**
- (b) (i) Two good appropriate steps (2+2) **4 marks**
(ii) Secure workpiece in machine vice on drill table, position
for first hole - lock vice to table -Use pilot hole/ Jig,
Drill 18mm hole - Morse taper drill (Any four) **4 marks**
- (c) Correct substitution in formula, correct answer (2+2)
Answer 1000RPM - (If correct answer only - 4 marks) **4 marks**
- (d) Sketch with description - Depth gauge and taper tap
(1 for description / 1 for sketch: for each one) (2+2) **4 marks**

Question 4 20 marks

- (a) Blast furnace **1 mark**
- (b) Pig iron **1 mark**
- (c) Iron ore, coke and limestone **3 marks**
- (d) Purpose of Part A is to supply air **2 marks**
- (e) (i) Molten pig iron is removed at B **2 marks**
(i) Slag is removed at C (If A and B mixed up - 2 marks only) **2 marks**
- (f) The charge is heated by the burning of the coke with air blasts **2 marks**
- (g) (i) Aluminium, copper, tin, lead, zinc etc **3 marks**
(ii) Any two defined (2 x 2) **4 marks**

Question 5 20 marks

- (a) Suitable material named with reason (*1+1 = 2 for material + reason*)
Part A - handlebars; steel, stainless steel, aluminium alloy
Part B - tyre; rubber Part C - mudguard - sheet metal / plastic **6 marks**
- (b) (i) Gear ratio is 2:1 (If 1:2 award 1 mark) **2 marks**
(ii) Rear wheels turn at 1200 RPM (If 4800 RPM - award 1 mark) **2 marks**
- (c) Sketch showing method of locking - expect labels
Good sketch with locking system well explained / shown
Poor sketch - details not clear - *award up to 3 marks* **6 marks**
- (d) Any **two** reasonable advantages: easy access to land, feeding animals
inspecting fences, fencing, moving small loads etc (*2 x 2*) **4 marks**

Question 6 20 marks

- (a) (i) Two steps: cleaning, fluxing, heating /protect component,
clamping / holding / applying solder (*2 x 2*) **4 marks**
(ii) Tin and lead (*1+1*) **2 marks**
(iii) Purpose of flux: to prevent oxidation / keep joint clean **(3 marks)**
(iv) Any **three** - Wear goggles, gloves, protective clothing,
care with hot bit, care with lit torch, use air extractor,
care in lighting torch, not to spill flux, use low voltage bit (*3x1*) **3 marks**
- (b) **Two** properties: good conductor, reasonable strength, low melting point,
solidifies quickly, does not corrode, durable (*2 x 2*) **4 marks**
- (c) Any **two**: Alloy - combination / mixture of metals,
Clearance angle -angle on cutting tool, allows cutting edge to cut
Engraving - decorating metal using sharp tool / engraving machine **4 marks**

Question 7 20 marks

- (a) Input: mouse, digital camera, modem, scanner
Output: CNC machine, printer, modem (*6 x 1*) **6 marks**
- (b) Function of any **four**: Mouse- digital input pointer, camera - inputs
digital images, modem - email / Internet, scanner- images,
CNC machine - manufacture, printer - prints data,
modem - receives information email etc **4 marks**
- (c) CD Writer - allows data to be written to CD, ROM - Read only memory,
DOS - disk operating system, Computer virus - bug that damages corrupts **4 marks**
- (d) Any **two** correct advantages (*2 x 2*) **4 marks**
- (f) Any **two**: Test run - simulated on screen, define a profile -inputting X and Z data,
Canned cycle - part cycle already stored, program - list of commands **2 marks**