



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Applied 2016

Marking Scheme

Technology

Common Level

Note to teachers and students on the use of published marking schemes

Marking schemes published by the State Examinations Commission are not intended to be standalone documents. They are an essential resource for examiners who receive training in the correct interpretation and application of the scheme. This training involves, among other things, marking samples of student work and discussing the marks awarded, so as to clarify the correct application of the scheme. The work of examiners is subsequently monitored by Advising Examiners to ensure consistent and accurate application of the marking scheme. This process is overseen by the Chief Examiner, usually assisted by a Chief Advising Examiner. The Chief Examiner is the final authority regarding whether or not the marking scheme has been correctly applied to any piece of candidate work.

Marking schemes are working documents. While a draft marking scheme is prepared in advance of the examination, the scheme is not finalised until examiners have applied it to candidates' work and the feedback from all examiners has been collated and considered in light of the full range of responses of candidates, the overall level of difficulty of the examination and the need to maintain consistency in standards from year to year. This published document contains the finalised scheme, as it was applied to all candidates' work.

In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with their Advising Examiners when in doubt.

Future Marking Schemes

Assumptions about future marking schemes on the basis of past schemes should be avoided. While the underlying assessment principles remain the same, the details of the marking of a particular type of question may change in the context of the contribution of that question to the overall examination in a given year. The Chief Examiner in any given year has the responsibility to determine how best to ensure the fair and accurate assessment of candidates' work and to ensure consistency in the standard of the assessment from year to year. Accordingly, aspects of the structure, detail and application of the marking scheme for a particular examination are subject to change from one year to the next without notice.



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Applied, 2016

Vocational Specialism - Technology
(240 Marks)

Wednesday 15 June, Afternoon 2:00 to 4:00

General Directions:

1. Write your examination number in this box:

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2. There are two sections in this paper.
 Section 1– Answer **all three** questions. - 90 marks

Q1. - Short answer questions
Q2. - Graphical Communication
Q3. - Health and Safety

Section 2– Five questions, answer **any three** - 150 marks

Q1. - Introducing Technology
Q2. - Design and Manufacture
Q3. - Water Technology
Q4. - Electrical Understanding and Basic Electronics
Q5. - Tools and Equipment

3. Write your answers in the spaces provided and include sketches (in pencil) where appropriate.

Centre Stamp

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 plus 4)	
	Note: The mark in row 3 (or row 5 if Irish bonus is awarded) must equal the mark in the Total mark box on the script.	

Section	No.	Mark
Section 1	1	
	2	
	3	
Section 2	1	
	2	
	3	
	4	
	5	
Total		

Compulsory

1. Answer **any Ten** of the following fifteen short questions.

2 + 2

- (a) Plywood is a very versatile material and can be used in the manufacture of products such as children's bikes. Give a reason for using plywood and explain the term plywood.

Reason It can be laminated, it is strong and flexible or any valid response.

Plywood Plywood is a manufactured board where thin layers of wood are glued one on top of the other to maximise strength. Each layer may have the grain running alternately.



Child's Bike

2 + 2

- (b) The 'goobag' is a recently developed travel bag that can be collapsed as shown in the image. Suggest **two** good design features of this travel bag.

Feature 1 Very portable.

Feature 2 Compact for storage.



Collapsible Travel Bag

2 + 2

- (c) Bluetooth devices such as the 'Beats' Bluetooth speaker, shown opposite, are becoming popular. Briefly describe what is meant by Bluetooth and suggest one other use for Bluetooth.

Bluetooth A means of wirelessly transmitting signals from one electronic device to another.

Use Wireless connection of a mobile phone to a car radio or any other valid response.



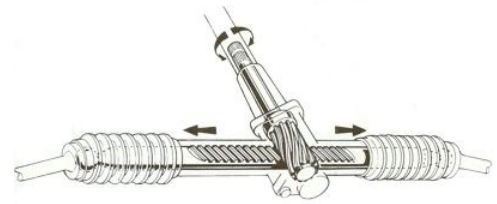
'Beats' Bluetooth speaker

2 + 2

- (d) An image of a car steering mechanism is shown. Name this mechanism and suggest **one** other use for this type of mechanism.

Name Rack and pinion

Other use Automatic Sliding Gate or other valid response.



Car steering mechanism

2 + 2

- (e) Car bodies typically include many curved panels. Suggest **two** reasons for this.

Reason 1 For high strength to weight ratio and to reduce vibration in the panel.

Reason 2 For aesthetics making the car more attractive to look at or any other valid response.



Car Body

4 x 1

- (f) Complete the table by naming a unit of measurement in each case.

Quantity	Computer Memory	Tyre Pressure	Area	Mass
Unit	Gigabytes	PSI, Pascals	Square Metres	Kilograms

4 x 1

- (g) A kit which can be used to build a variety of bikes and trikes has been developed by 'Infento'. Suggest a suitable material for each of the following parts:

Frame Aluminium, or other valid material.

Wheel hubs Plastic (e.g. ABS), aluminium.

Handlebar grips Plastic or rubber.

Chain Steel



Infento Constructible Trike

2 + 2

- (h) Advances in computer software and printing technology has made it possible to produce toys and even car components using 3D printers.
Suggest **two** advantages of 3D printing.

- 1 Possible to make complex parts easily. Or other valid response.
- 2 Products are easily customised so giving the consumer more choice.



3D Printed Car

4

- (i) Describe the function of a corrosion inhibitor in a central heating system.

Function When added to the heating system it prevents corrosion in the pipes, radiators and fittings. It keeps the system clean and makes it more efficient.



Corrosion inhibitor

2 + 2

- (j) The device shown opposite is often fitted in the plumbing system of a house. Name the device and state where it is located in the plumbing system.

Name Immersion heater

Location Located in the hot water cylinder.



2 + 2

- (k) Tablet computers have become popular. Name **two** design features of these tablets which make them user friendly.

- 1 Touch screens. Any other valid response.
- 2 Easy connection to Wifi networks. Applications are easily accessed and downloaded. Any other valid response.



Tablet computer

4

- (l) Calculate the cost of running a 0.1 kW backlit LCD display for 10 hours if a unit of electricity costs 22 cent.

Calculation

Cost = Power x Time in hours x Unit cost

= 0.1 x 10 x 22

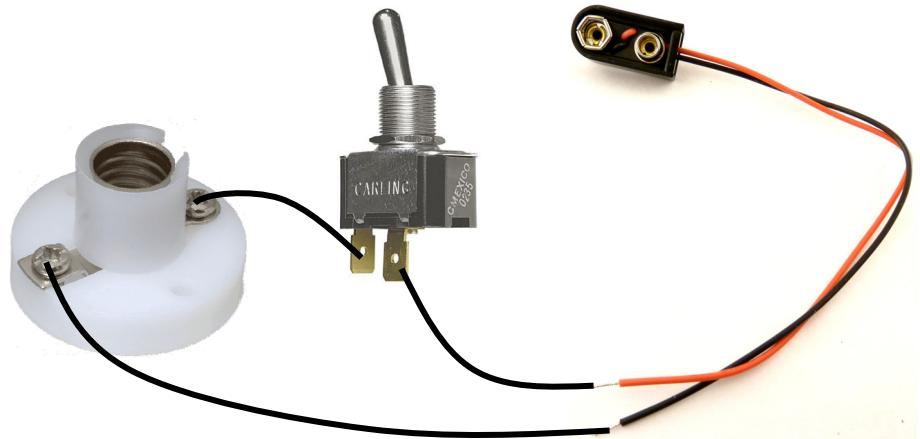
= 22 cent



Backlit LCD display

2 + 1 + 1

- (m) Draw the electrical wire connections so that a bulb, when placed in the bulb holder, can be switched on/off using the switch when the battery snap is connected to a power supply.



2 + 2

- (n) Give **two** reasons why old mobile phones should not be disposed of in a landfill site.

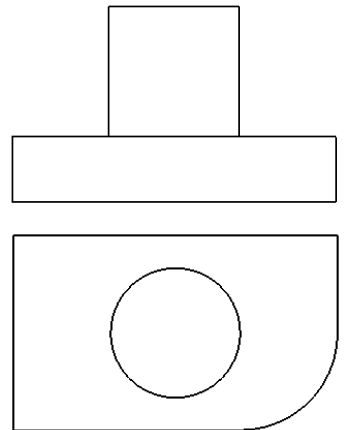
- 1 The lithium ion batteries can leak and pollute underground waters.
- 2 Many of the parts can be reused or recycled.



- (o) The Elevation and Plan of a machine part are shown. In the space provided, make a 3D sketch of the part.

3D Sketch

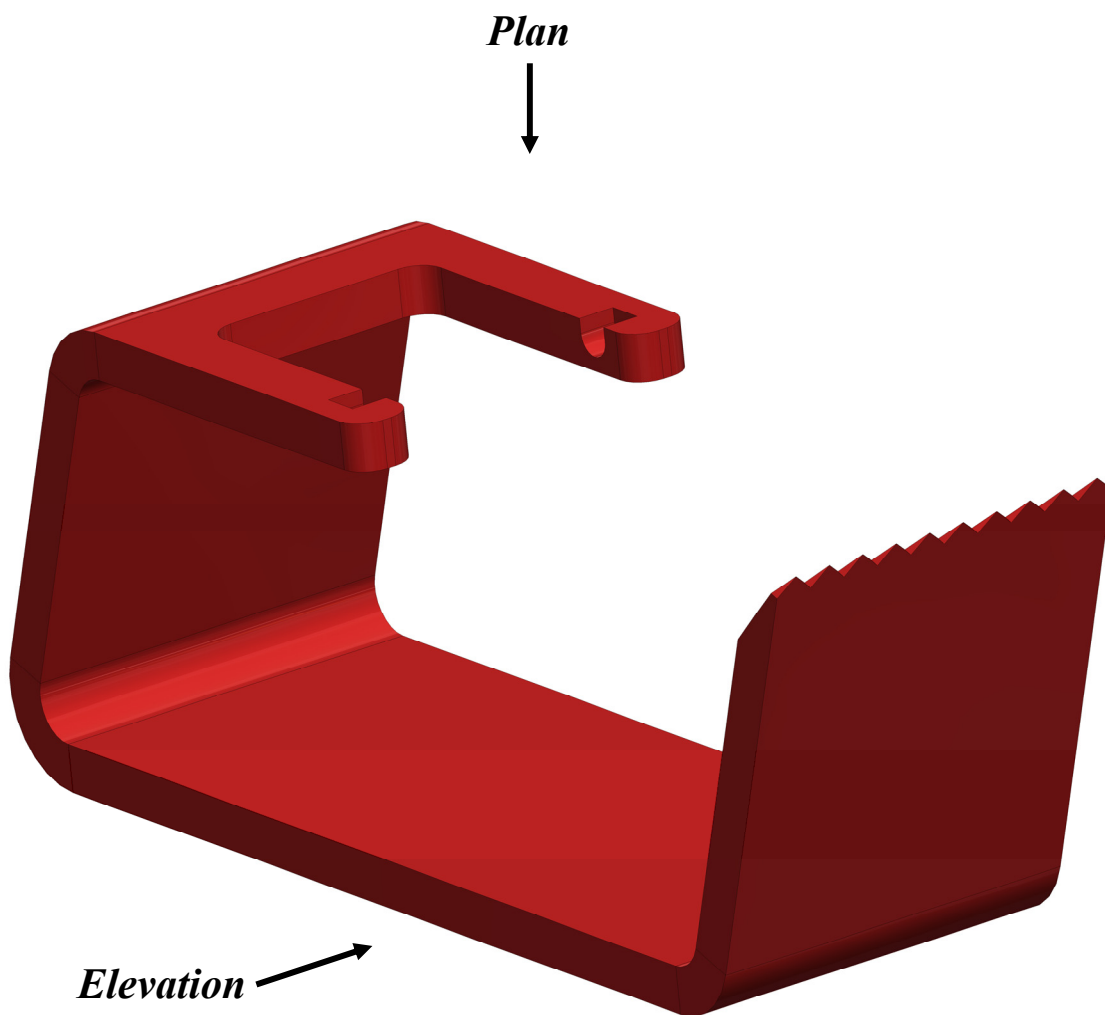
Good = 4
 Fair = 3
 Poor = 2
 Very Poor = 1



Compulsory

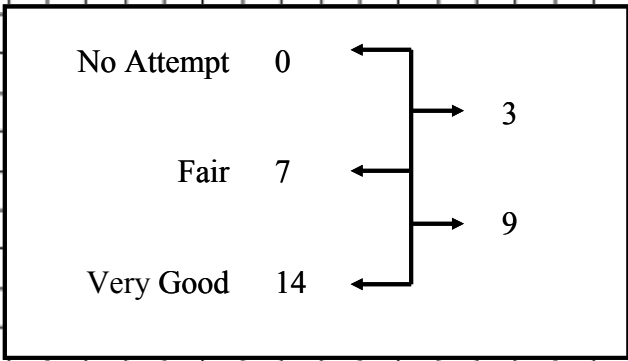
2. Graphical Communication

- (a) A CAD solid model of the body of a sellotape dispenser is shown below. In the space opposite draw a well proportioned Elevation and Plan of the tape dispenser.
- (b) Estimate 4 dimensions and include them on your completed drawing.



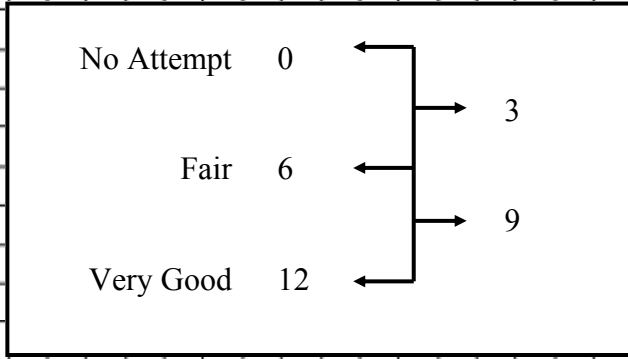
Sellotape Dispenser Body

14



ELEVATION

12



PLAN

4 x 1

Estimate 4 dimensions and include them on your completed drawing.

Compulsory

3. Health and Safety

(a) (i) A safety device to be used in a school workshop is shown below. Name this device and give **two** examples of where it could be used to help prevent injury.

Name Push Stick

Use 1 Pushing wood through a circular saw when ripping.

Use 2 Pushing wood or plastic through a band saw for straight cuts.



Safety Device

(ii) An image of a chop saw is shown. Describe **one** significant safety feature of this saw.

Answer The safety guard will rise as you cut the material and close again as the arm of the saw is raised, thereby preventing the risk of cuts.



Chop Saw

2 + 2 + 2

4

2 + 2

(b) The picture opposite shows a person ripping a length of wood in an unsafe manner.

(i) What safety precaution is **not** being observed here?

Answer _____

(ii) State the purpose of the riving knife.

Purpose _____

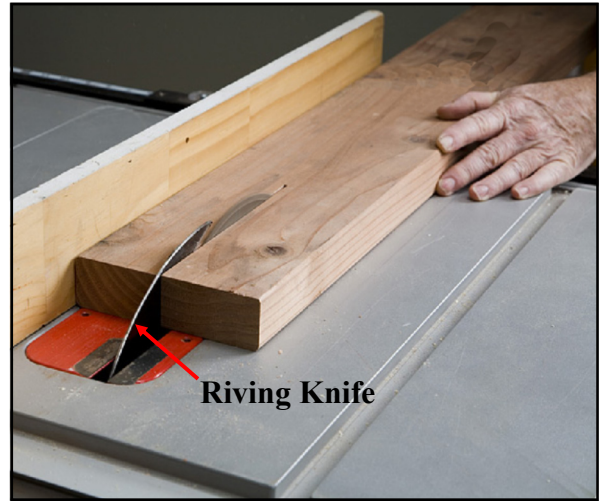
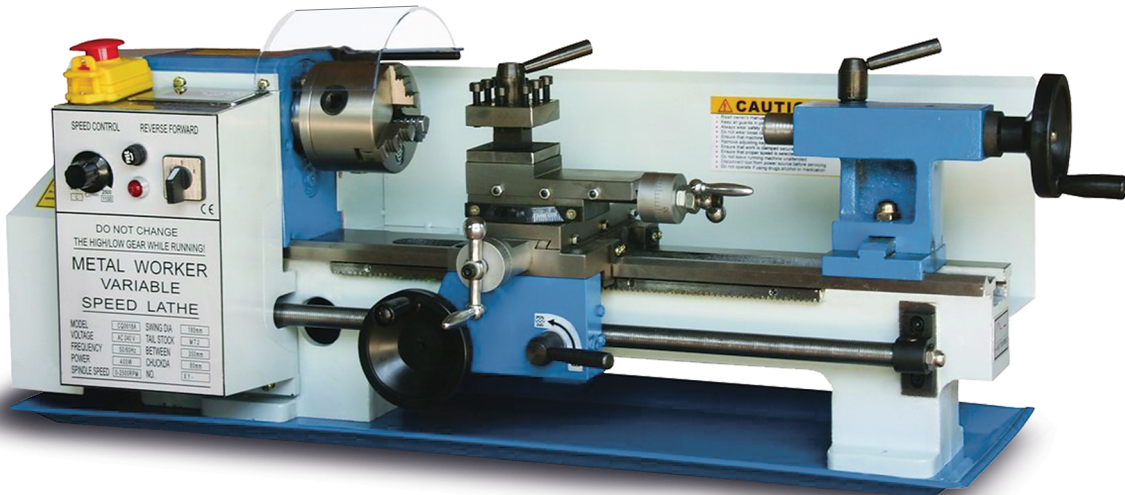


Table Saw



(c) A bench-mounted lathe is shown above.

(i) Describe **two** safety features of this lathe.

Safety Feature 1 The safety guard over the chuck prevents injury from flying pieces of material.

Safety Feature 2 Emergency stop button kills the power in an instant.

(ii) Describe **one** significant safety precaution that should be observed by a person using a lathe such as this.

Answer Use safety goggles, no loose clothing, long hair tied back or any other valid response.

2 + 2 + 2

Section 2 (150 marks)

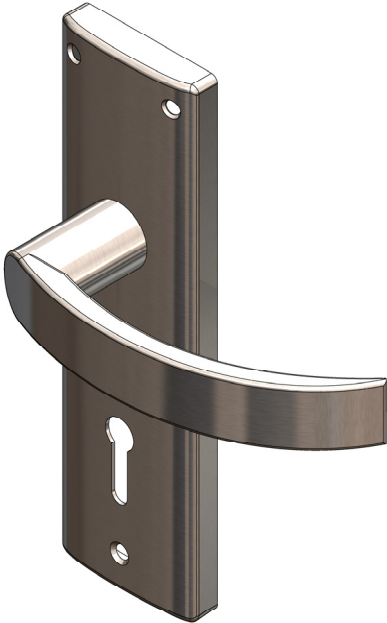
Answer **ANY THREE** Questions from this section.

1. Introducing Technology

(50 marks)

- (a) An image of a steel door handle is shown. In the space below make a 3D sketch of the door handle and apply appropriate shading.

3D Sketch



Steel Door handle

12

No Attempt	0	←	→	3
Fair	6	←	→	9
Very Good	12	←	→	

- (b) A tinted photograph holder made in the Technology workshop is shown.

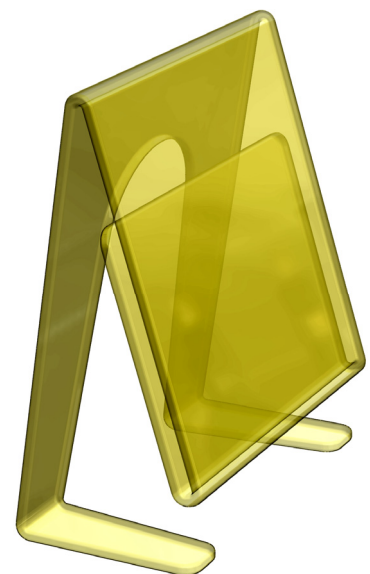
- (i) Suggest a suitable material for the photograph holder and give a reason for your choice.

Material Acrylic plastic

Reason Available in a range of colours, easily bent and shaped.

- (ii) Describe how to bend the material.

Answer Place the bend line on a hot wire strip heater and when it is soft enough bend the plastic around an angle block (or a drawing of the angle) to achieve the correct angle.



Tinted Photograph Holder

6 + 3 + 3

3 + 3 + 3 + 3

(c) A design for a child's wooden toy plane is shown. The plane is made from hardwood.

(i) Name a suitable hardwood for the plane.

Hardwood Any hardwood (ash, oak, cherry etc.).

(ii) Name a machine that could be used to make the wooden fuselage.

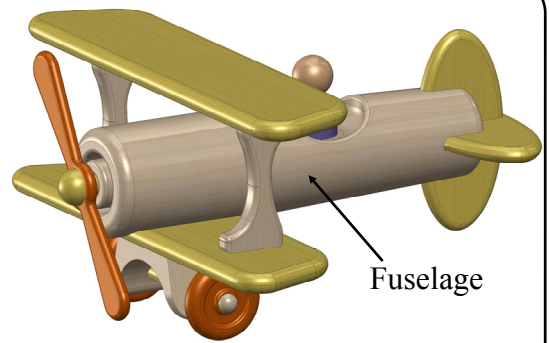
Machine A wood lathe.

(iii) The exploded view shows the jointing method used to join the wing to the support. Name this method as shown circled in red.

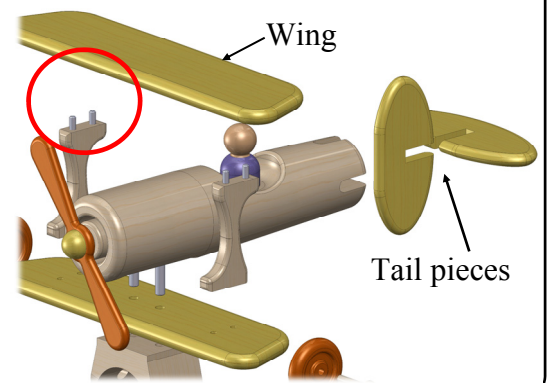
Method Dowel Joint.

(iv) Name the joint used to join the tail pieces to each other.

Joint name Halving Joint



Wooden Toy Plane



2 + 2

(d) Robotics play a key role in car manufacturing and in industry generally.

(i) Suggest **two** processes performed by robots in the manufacture of a car.

- 1 Welding, bolting, spray painting.
- 2 Panel assembly, mechanical handling of the car chassis.

(ii) In a factory where all manufacturing is done using robotic devices, suggest **two** roles for human workers in the factory.

- 1 Maintenance of the machines.
- 2 Programming of the robots.

(iii) Outline **two** advantages of using robots in manufacture.

- 1 Fast, reliable, work 24-7
- 2 Don't take sick days, very accurate and excellent for repetitive tasks.

2 + 2

3 + 3

2. Design and Manufacture

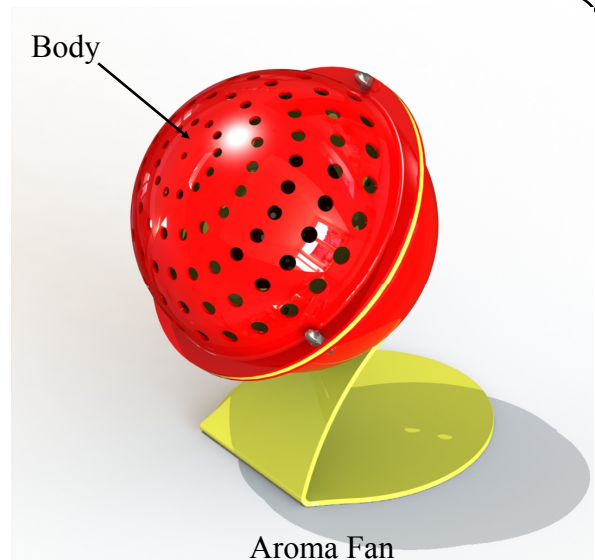
(50 marks)

(a) An Aroma fan, into which pot-pourri is placed, uses an internal fan to radiate the fragrance of the pot-pourri. High Impact Polystyrene (HIPS) is used to make the spherical body of the product.

(i) Name a suitable machine that could be used to form the hemispherical parts of the product.

Answer Vacuum former

(ii) Explain the main steps in the process of forming the plastic into hemispheres.



Process Pre-heat the vacuum former elements.

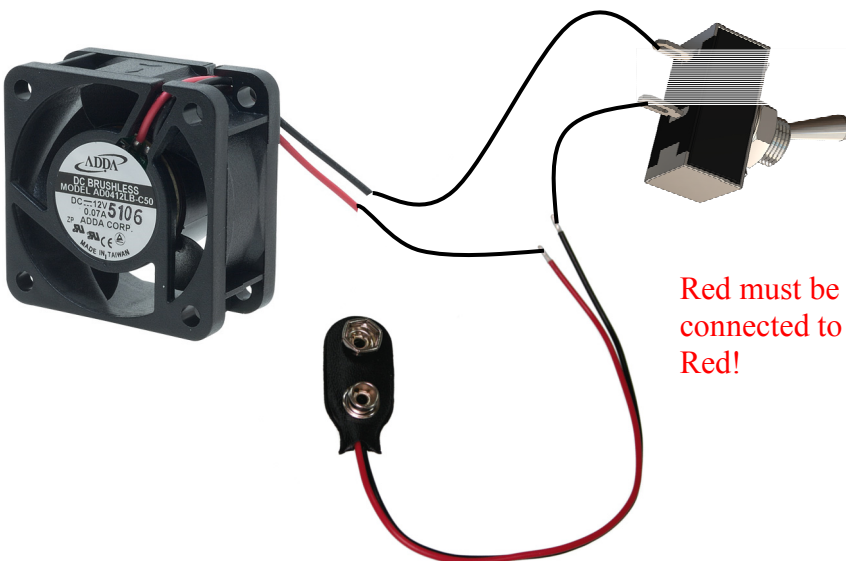
Place the hemispherical mould (plug) in the vacuum former and drop the table.

Clamp the plastic into position and pull across the hood.

When the plastic has softened sufficiently, push back the hood and raise the mould with the vacuum pump on.

When the plastic has cooled sufficiently, use the Vac-Blow button to release the plastic from the mould/plug.

(b) The components needed for the fan circuit are: an axial fan, a battery snap and a toggle switch. Draw the wire connections so that the fan can be controlled by the switch.



Toggle switch at rear of the unit

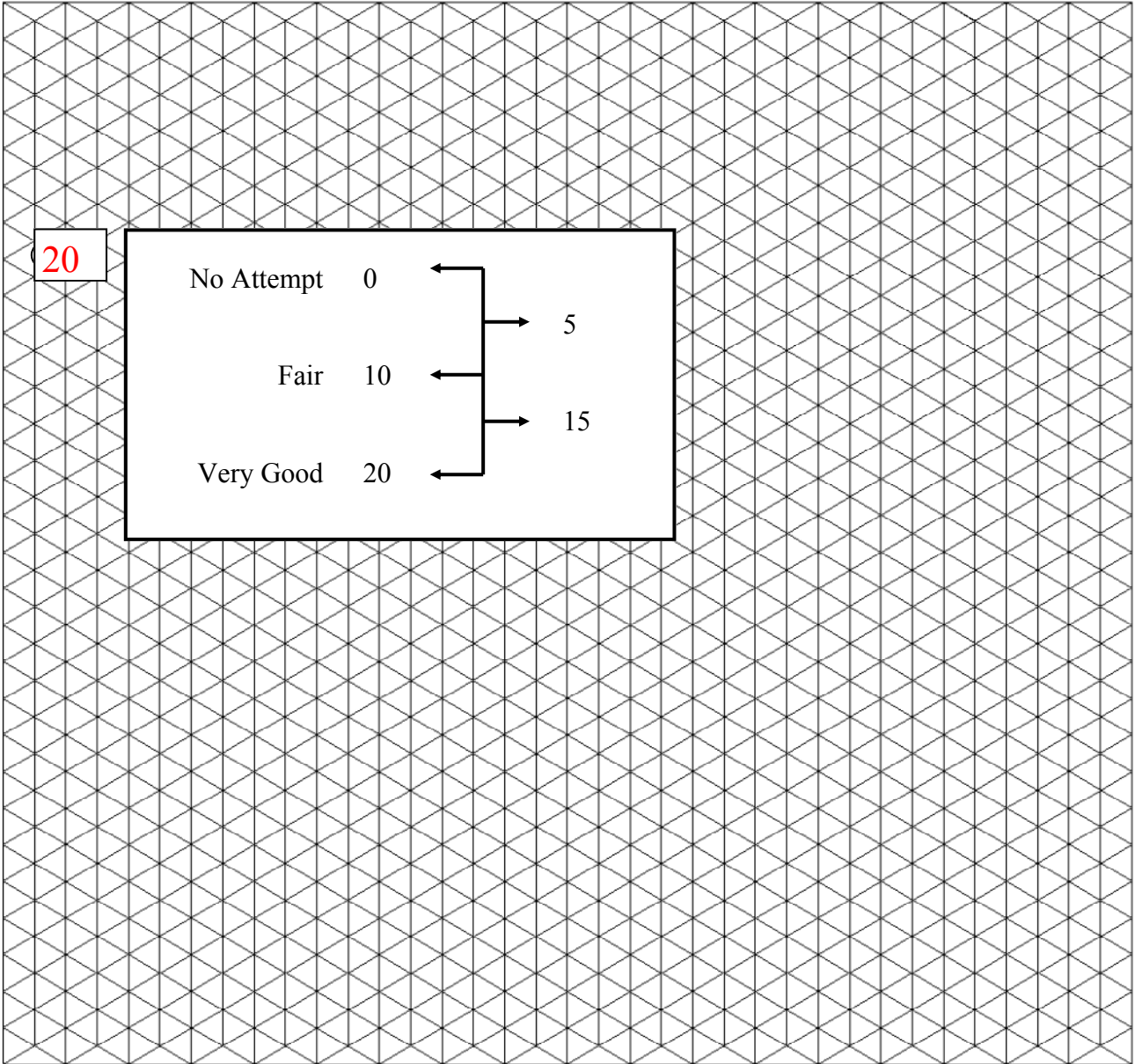
2

4 steps x 3 marks each

4 marks x 3 wires

- (c) (i) In the *Design and Manufacture* module you designed and manufactured a product. Name the product you made and make an isometric sketch of it on the grid below.


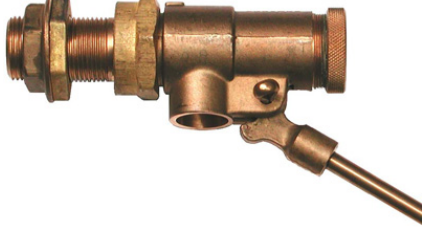


Product Name _____



- (ii) State in what way your product is **OR** is not environmentally friendly.

4 + 4 + 4 + 4

(b) Describe the function of **each** of the fittings shown in the space provided.

1 Stop cock valve to switch off or on a water supply.	
2 Ball cock/valve water cistern fitting.	
3 Straight joiner compression fitting for water piping.	
4 Insert for reinforcing the wall of plastic piping in a plumbing system so that a compression fitting can be attached to it.	

0 to 10

(c) Describe the basic operation of a water tower in the water supply system of a town or city.

Answer: At regular intervals such as during the night (during low demand and cheaper electricity) water is pumped into these water towers. The height of the tanks in the towers provides sufficient pressure for the water supply of a town or area. This way, gravity is used to provide the pressure to consumers.



Typical Water Towers

4. Electrical Understanding and Electronics

(50 marks)

(a) Pictures of a domestic electric shower and of a pumped electric shower are shown.

(i) How does an 'electric shower' differ from a 'pumped electric shower'?

Answer Electric showers heat the water whereas the pumped shower pumps it from the hot water cylinder.

(ii) Which of these shower units consumes the most electricity? Give a reason for your answer.

Answer The Electric Shower

Reason It heats the water as well as pumping it. Heating elements consume a lot of power.



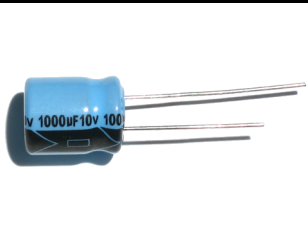
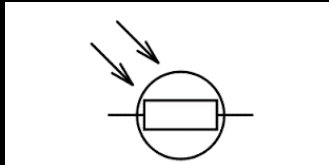
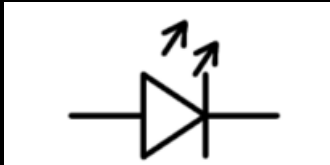



Electric Shower



Pumped Electric Shower

(b) Name the electronic components shown in the table below and draw the corresponding symbol for each.

Component			
Name	LDR	LED	Capacitor
Symbol			

5+5+4

(c) A domestic electricity meter reading was recorded as 30924 units (kWh) at the end of a particular billing period. Two months later the reading was 31480 units.



(i) How many units were consumed in the two month period?

Answer $31480 - 30924 = 556$ units

(ii) Calculate the bill (in Euro) if the unit cost was 16 cent.

Calculation:

$$\text{Bill} = 556 \times 0.16 = \text{€}88.96$$

(iii) If the VAT rate is 10%, calculate the electricity bill to the nearest Euro when the VAT is added to the bill?

Calculation:

$$\text{Total Electricity bill} = \text{€}88.96 + \text{€}8.896 = \text{€}98.00 \text{ to the nearest Euro}$$

6+6

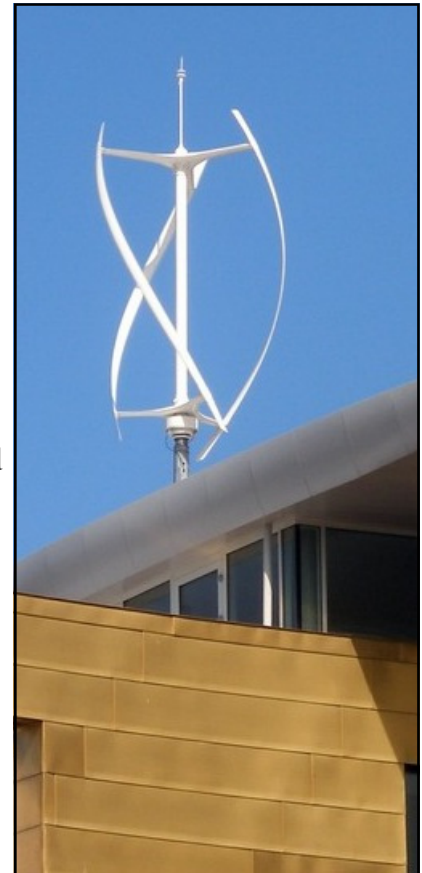
(d) Domestic and small business type wind turbines are becoming popular for electricity generation.

A 'Gorlov' type vertical axis wind turbine is shown.

(i) Outline an advantage of using this type of turbine compared to a typical three blade propeller type turbine.

Advantage This is a compact design and as such does not take up much space. It is also quite attractive in design.

(ii) When spinning on a given day, the power generated by this turbine was 2100W (2.1kW). If the voltage produced was transformed to 240 Volts, calculate the current available.



Vertical axis wind turbine

Calculation

Note: $\text{Power} = \text{Voltage} \times \text{Current} \quad (P = V \times I)$

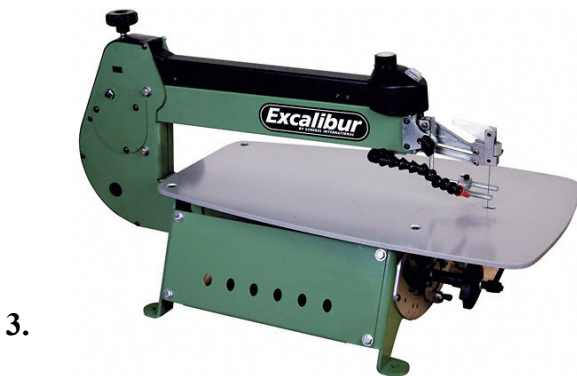
Answer: $2100 = 240 \times \text{Current}$

$$2100/240 = \text{Current} = 8.75 \text{ Amps}$$

5. Tools & Equipment

(50 marks)

(a) A range of equipment found in workshops is shown.



Name **each** piece of equipment and give its use.

No.	Name	Use
1	Bench polisher	For polishing materials such as metals
2	Portable Gas torch	For heating light metals for bending and shaping purposes or other valid use.
3	Scroll saw	For cutting curves in wood, non ferrous metals and plastics etc.
4	Sheet metal folder/brake	For bending sheet metal.

4 x (3 + 3)

6 x 2

(b) Building electronic circuits requires the use of specialist tools. Name **each** of the tools shown and state its purpose in circuit building.

Tool A

Name Soldering Iron

Purpose For joining electronic components to circuit boards.

A



Tool B

Name Side Cutter

Purpose For snipping the ends off soldered wire and leads after soldering.

B



Tool C

Name Wire Stripper

Purpose For stripping the plastic insulation off electrical/electronic cable.

C



(c) Make a sketch of **any 3** of the following tools in the spaces provided.

Try Square	Scriber	Countersink Bit	Mallet

5 + 5 + 4

Blank Page

