Coimisiún na Scrúduithe Stáit
State Examinations Commission

TECHNOLOGY

Junior Certificate Examination, 2005
HIGHER LEVEL
200 Marks
Wednesday, 22nd June, Afternoon, 2:00 to 4:00

SECTION A

INSTRUCTIONS

1. Answer Section A (short answer questions). 100 marks
2. Answer either (a) or (b) from each question in Section B. 50 marks
3. Answer one question from Section C. 50 marks
4. Hand up this paper at the end of the examination along with answer sheets for Section B and C.

Centre Number

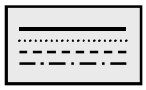
Examination Number

For Examiner	
Total Mark	
Question	**Mark**
Section A	
Section B Q1 (a)	
(b)	
Q2 (a)	
(b)	
Section C Q3	
Q4	
Q5	
Q6	
Total	
Grade	

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

Section A Answer 25 questions from this section - all questions carry equal marks. 100 marks

1. Explain the function of both of these computer drawing programme icons.

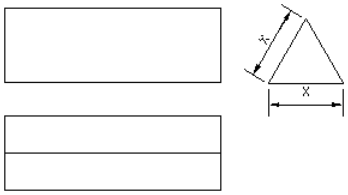
(i) 

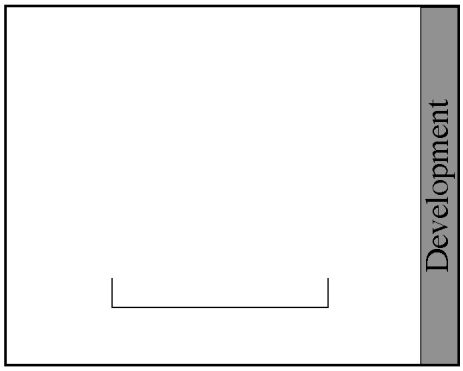
(i): _____

(ii) 

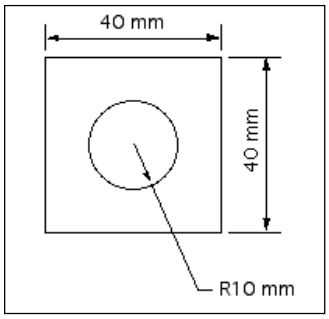
(ii): _____

2. Complete the development of the chocolate bar wrapper shown.





3. State **two** advantages of using CAD to produce drawings?



CAD Drawing

(i): _____

(ii): _____

4. In relation to computers state the meaning of the following abbreviations:

(i) ROM

(ii) CPU

ROM: _____

CPU: _____

5. State **two** reasons why some manufacturers no longer supply floppy disk drives with new computers?

(i): _____

(ii): _____

6. Indicate if the timbers listed are a softwood or a hardwood.

Beech: _____

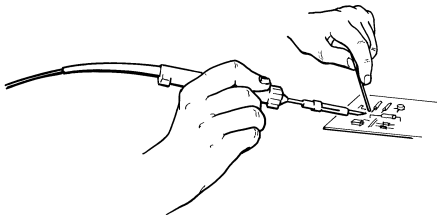
Teak: _____

Pine: _____

Oak: _____

7. Solder is an alloy.
Explain the underlined word.

Name **one** other alloy.



Alloy: _____

_____

_____

_____

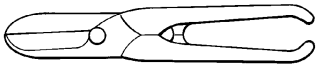
Name: _____

_____

8. Name the tool shown

and

name a material which can be shaped using this tool.



Tool: _____

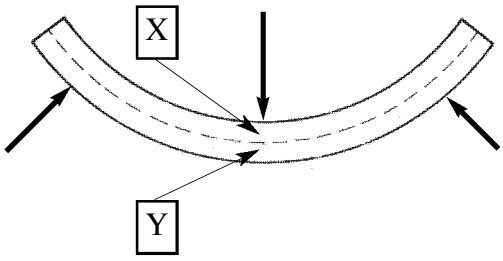
_____

Material: _____

_____

_____

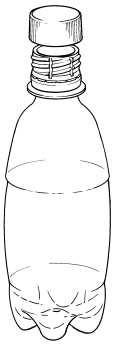
9. Name the forces at X and at Y in the beam shown.



Force X: _____

Force Y: _____

10. State **two** advantages of plastic containers over glass containers for soft drinks.



(i): _____

_____

_____

_____

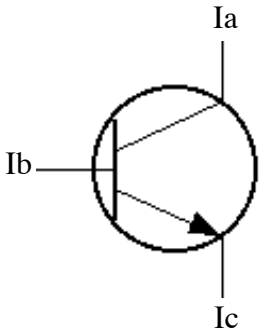
(ii): _____

_____

_____

_____

11. Which statement concerning the current flow in the transistor shown is correct?



Statement A: Ic = Ia - Ib
Statement B: Ic = Ia + Ib
Statement C: Ic = Ia ÷ Ib
Statement D: Ic = Ia x Ib

Answer: _____

12. Name and sketch the symbol for the logic gate which will produce the truth table shown.

Input1	Input 2	Output
1	1	1
1	0	1
0	1	1
0	0	0

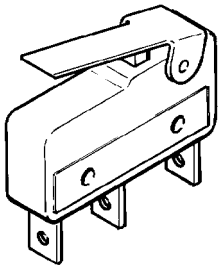
Gate: _____

Symbol:

13. In relation to a switch state the meaning of the following abbreviations:

(i) COM

(ii) NC

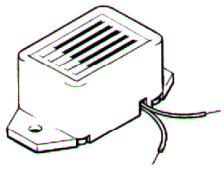


COM: _____

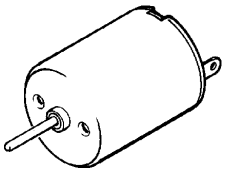
NC: _____

14. Sketch the circuit symbols for the components shown.

(i) Buzzer



(ii) Motor



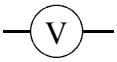
(i):

(ii):

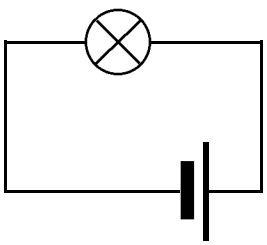
15. Indicate clearly on the circuit shown the correct location of:

an ammeter 

and

a voltameter, 

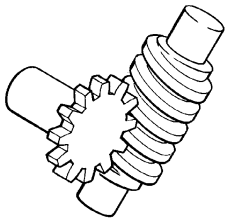
to measure the resistance of the bulb when lighting.



16. Name the mechanism shown

and

state **one** advantage in using this mechanism to lift a load.



Name: _____

_____

Advantage: _____

_____

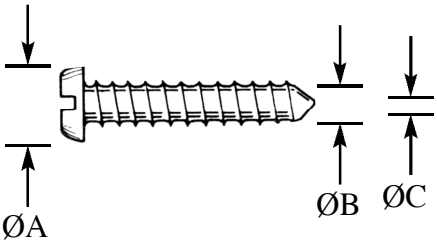
_____

_____

17. Name the type of screw shown

and

state which diameter drill bit A, B or C, should be used to make a pilot hole for the screw.

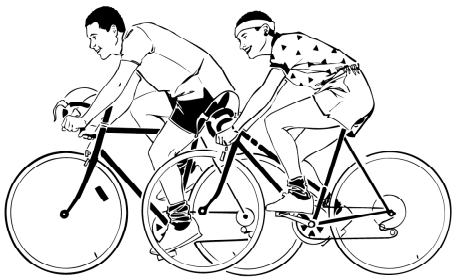


Name: _____

_____

Drill bit: _____

18. Identify **two** mechanisms on a bicycle where friction is essential to the cyclist.



(i): _____

_____

_____

_____

(ii): _____

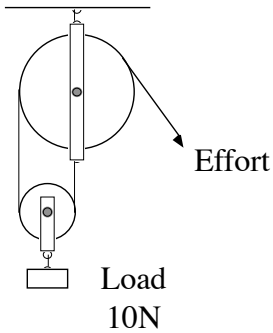
_____

_____

_____

19. Calculate the effort required to lift the load.

Why is the measured effort greater than the calculated effort?



Effort: _____

_____

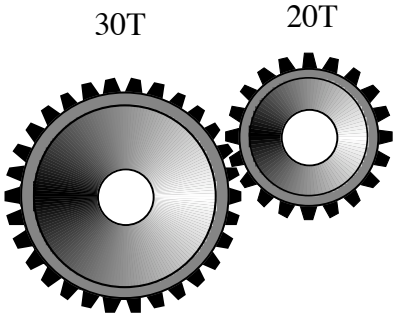
Reason: _____

_____

_____

_____

20. Calculate the output speed in the gear train shown.

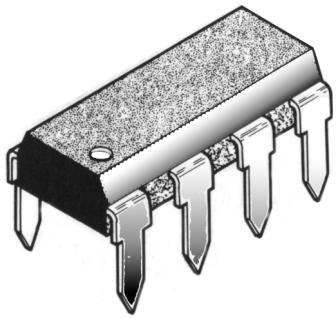


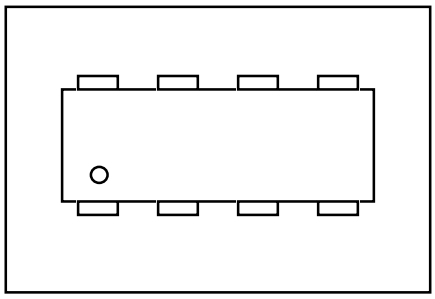
Output speed: _____

21. Indicate clearly the locations of pin 1

and

pin 8 on the chip shown.

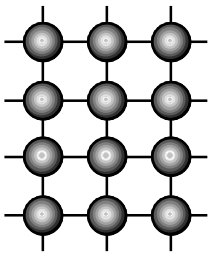




22. Identify the thermosetting plastic in the following list:
Polythene, PVC, Bakelite

and

state **one** use for a thermosetting plastic.



Thermoset: _____

_____

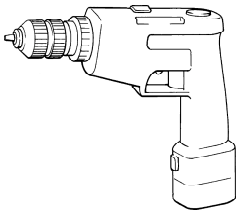
Use: _____

_____

_____

_____

23. State **two** safety precautions which must be observed when using an electric hand drill.



(i): _____

_____

_____

_____

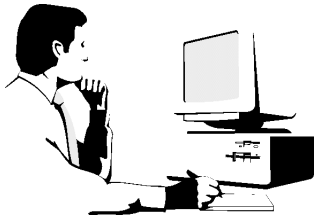
(ii): _____

_____

_____

_____

24. Explain the term 'computer virus'.



Computer virus: _____

_____

_____

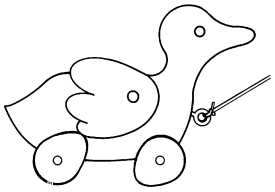
_____

_____

_____

_____

25. State **two** reasons for making a model as part of the design process.



(i): _____

_____

_____

_____

(ii): _____

_____

_____

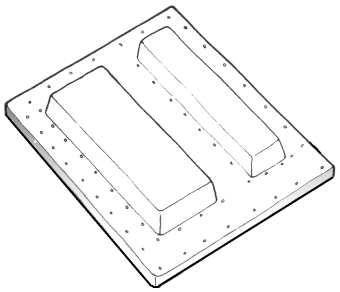
_____

26. In the vacuum forming mould shown, explain why

(i) the sides of the mould are sloped

and

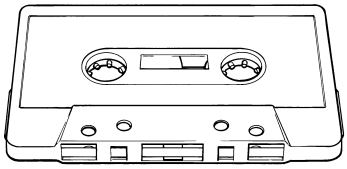
(ii) holes are drilled in the base.



(i): _____

(ii): _____

27. Name **two** audio recording technologies which have replaced cassette tapes.



Cassette tape

(i): _____

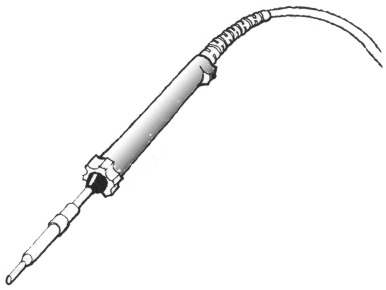
(ii): _____

28. State **two** reasons why a plastic bag levy was introduced by the government.

(i): _____

(ii): _____

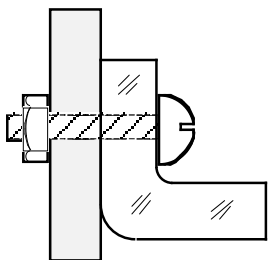
29. When soldering a component to copper stripboard, name **two** procedures which will ensure a good joint.



(i): _____

(ii): _____

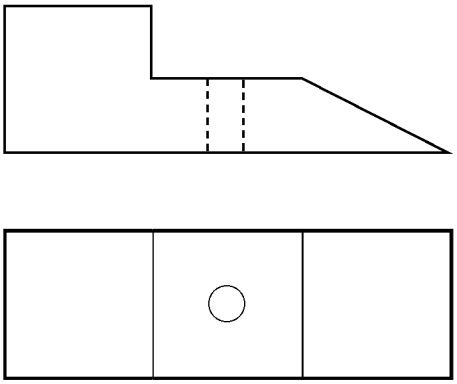
30. State **two** items of information communicated by the sketch.



(i): _____

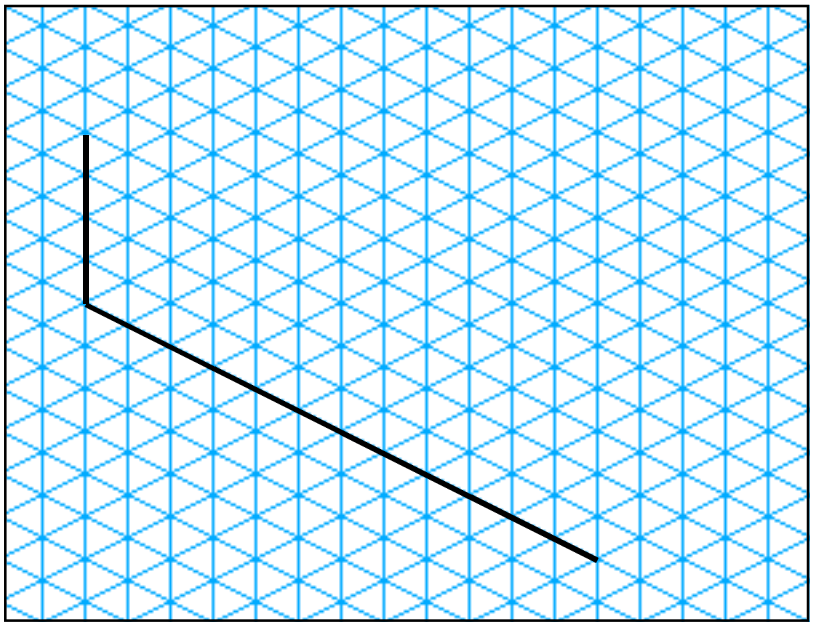
(ii): _____

31. Complete the isometric sketch of the component shown.

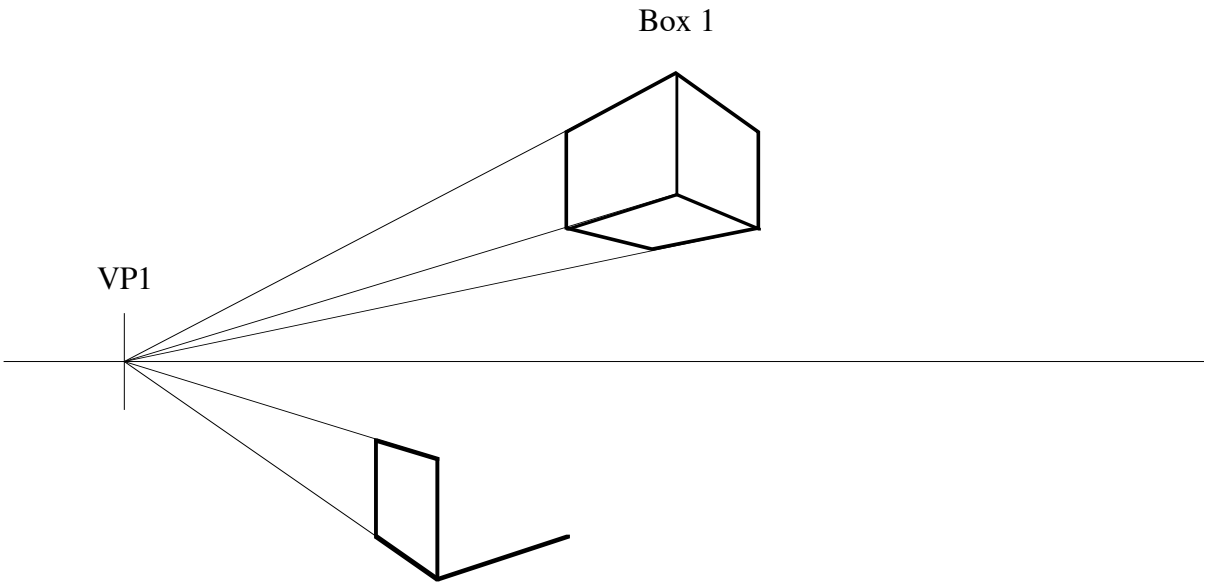


Orthographic view

Isometric view



32. Locate the second vanishing point (VP2) and complete the perspective view of box 2.



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TECHNOLOGY

Junior Certificate Examination, 2005

HIGHER LEVEL

200 Marks

Wednesday, 22nd June, Afternoon, 2:00 to 4:00

SECTION B and SECTION C

SECTION B - 50 Marks

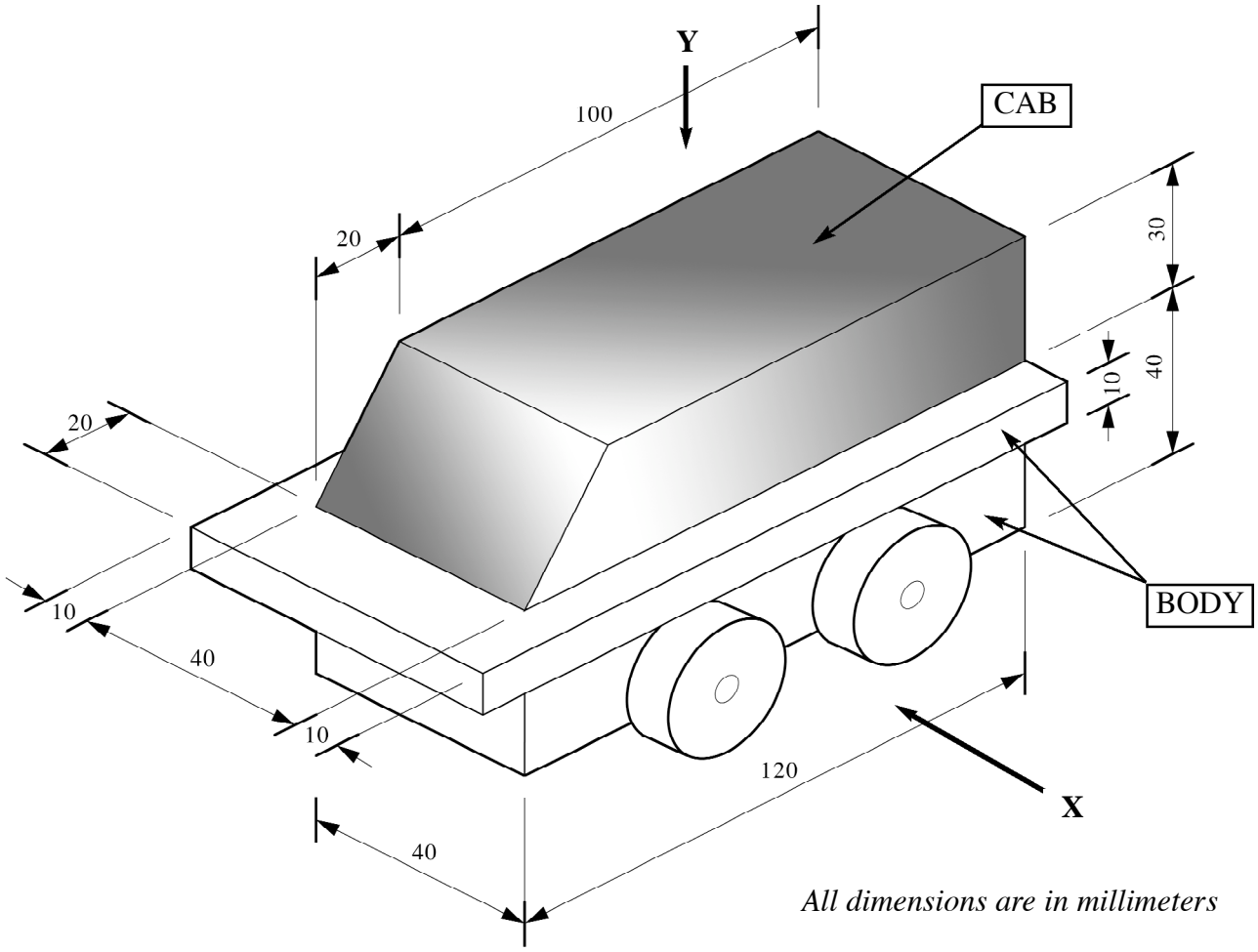
SECTION C - 50 Marks

INSTRUCTIONS

1. Answer either (a) or (b) from each question in Section B.
2. Answer one question from Section C.
3. Make sure to hand up Section A with your answer sheets to this paper.

SECTION B - 50 Marks **Question 1, answer either (a) or (b) from this question.**

1 (a) The sketch shows a design for a motorised vehicle.
The vehicle will be manufactured from acrylic (cab) and wood (body).



All dimensions are in millimeters

(i) Using a suitable scale sketch:

1. An elevation looking in the direction of arrow 'X', indicate the approximate positions of the wheels.

2. A plan view looking in the direction of arrow 'Y'.

Include all dimension lines in your sketch.

10 marks

(ii) Identify **two** areas of the design which present a safety concern and sketch an alternative design.

5 marks

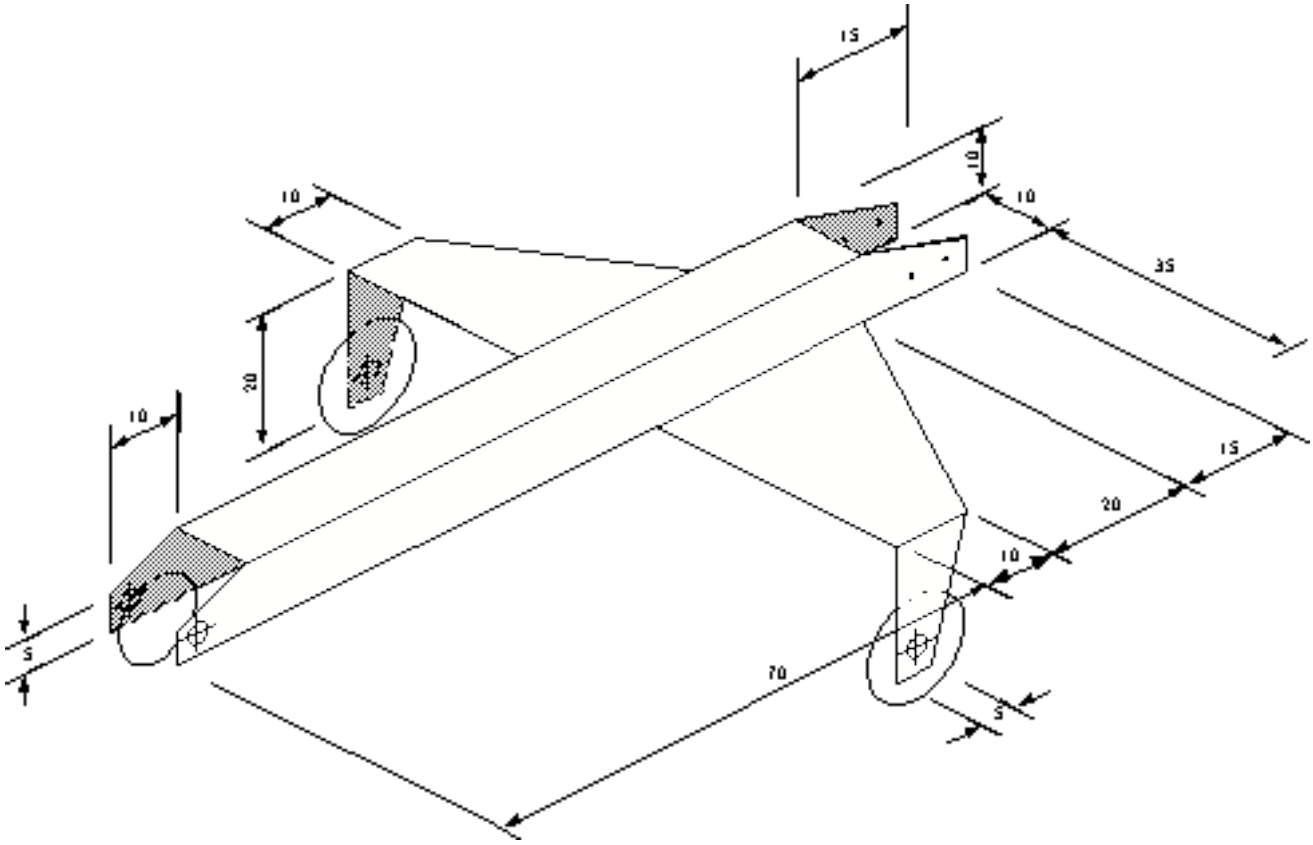
(iii) 1. Sketch a design for a means to open and close the acrylic cab to allow access to the motors and batteries.

2. Sketch and label a suitable mechanism which will allow a 'driver' to bob up and down as the vehicle moves.

10 marks

- OR -

1 (b) The sketch shows a design for an acrylic undercarriage for a model plane.
The wings, tail plane, rudder and electric motor are omitted.



All dimensions are in millimeters

(i) Using a suitable scale, draw a development of the undercarriage.
Indicate the approximate positions of the drill holes.
Indicate clearly all bend lines and show the overall dimensions.

10 marks

(ii) 1. Indicate clearly the correct steps required to drill the acrylic, for the wheels and engine mount, at the points indicated.

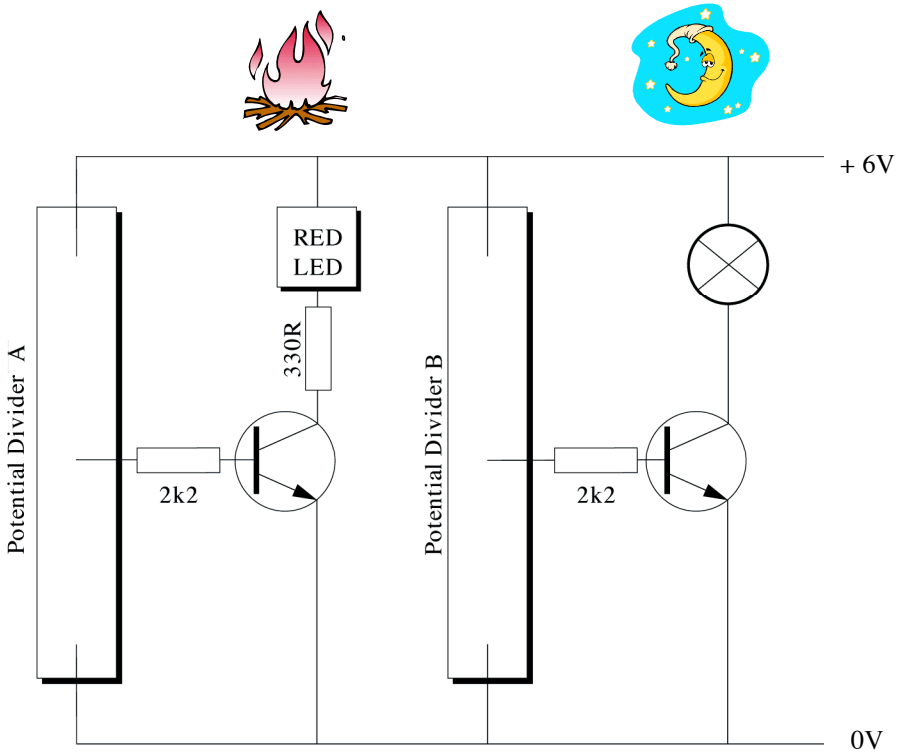
2. Indicate clearly the steps you would take to manufacture and finish the undercarriage from a sheet of acrylic.
Name all equipment required.

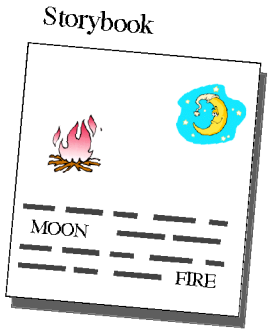
10 marks

(iii) Sketch a suitable design modification which will reduce the weight of this undercarriage without reducing the strength.

5 marks

2 (a) A circuit is required for a child's electronic storybook, as shown, which will:
- show a red glow in the fire icon when the child's hand warms the word 'FIRE' in the story OR
- light up the moon icon when the child covers the word 'MOON' in the story.





Resistor Colour Codes

Colour	Value
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Grey	8
White	9

The following components are also required for the circuit: thermistor, light dependant resistor and variable resistors.

(i) 1. Indicate clearly the colour codes for the 330R and 2k2 resistors in the circuit.

2. Sketch the symbol for the LED and indicate clearly how to identify the negative leg on the LED. 10 marks

(ii) 1. Using the appropriate component symbols, sketch the circuit diagram for potential divider A.

2. Using the appropriate component symbols, sketch the circuit diagram for potential divider B.

3. State **one** advantage of constructing this circuit on printed circuit board in place of copper strip board.

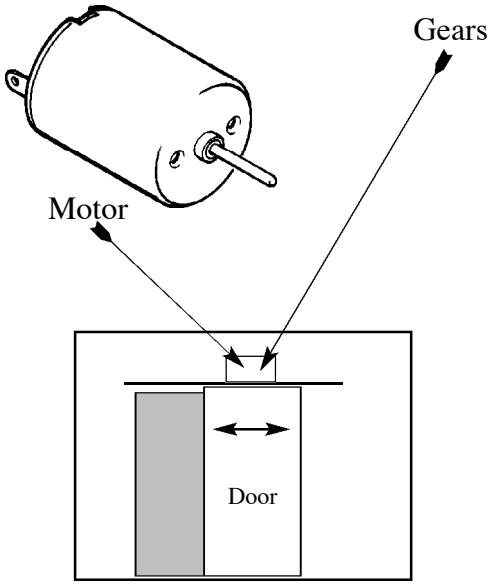
10 marks

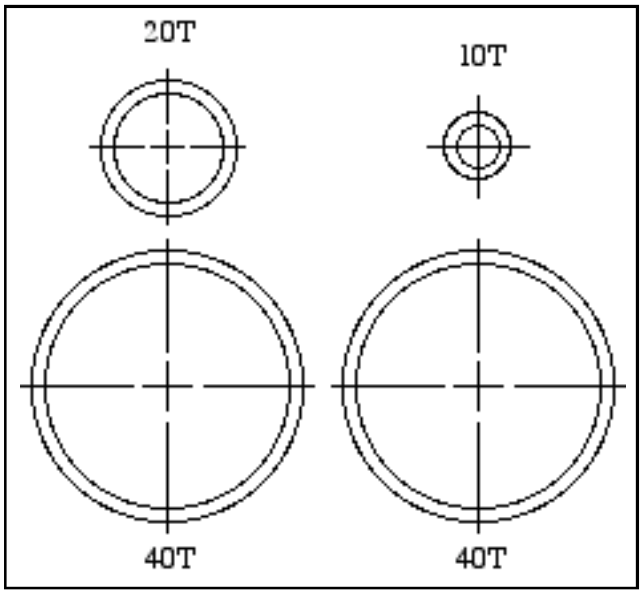
(iii) The maximum current for the red LED used is 20mA.
If a 9V power supply was used in place of the 6V supply, show how you would calculate the value of the required protective resistor.

5 marks

- OR -

2 (b) The sketch shows the components required to control the movement of a sliding door. A DPDT relay and limit switches are also required.





(i) 1. Explain the abbreviation DPDT.

2. Explain why a DPDT relay is used in this situation.

3. Explain why limit switches are required.

10 marks

(ii) 1. Arrange the gears shown to produce the maximum possible speed reduction when connected to the motor.

2. If the motor turns at 16 RPM, calculate the output speed of this gear arrangement.

10 marks

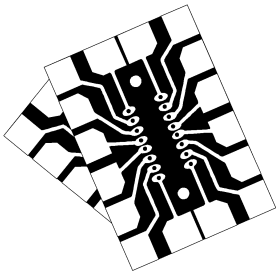
(iii) Sketch and name **two** alternative mechanisms which will allow the motor and gear system to move the sliding door.

5 marks

Section C - 50 Marks

Answer **one** question from this section - all questions carry equal marks.

This section relates to **Technology & Society, Control Systems** and **Design & Manufacture**.



3. Technology and Society

Microelectronics are now widely used in society.

(a) (i) Using appropriate examples, name **two** areas where microelectronics are found in the home and outline their use.

(ii) Explain, giving **two** reasons, why many devices containing microelectronics are regarded as disposable.

(iii) Outline a means of managing the appropriate disposal of microelectronic devices.

20 marks

Alternative energy sources, such as solar, wind and tide, are commonly used to supplement traditional energy sources in providing energy for the national electricity grid.

(b) (i) Outline **two** concerns regarding traditional energy sources.

(ii) State **one** impact which the construction of <u>each</u> of these alternative energy sources will have on the environment.

(iii) Outline **one** disadvantage associated with the operation of <u>each</u> of these alternative energy sources.

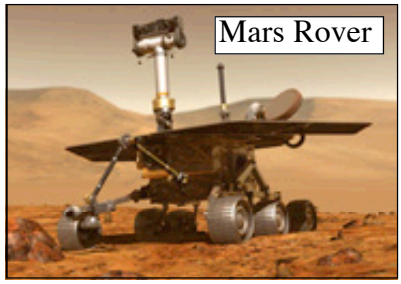
20 marks

Digital technologies are commonly found in consumer goods from digital images to digital music.

(c) Using appropriate examples, outline **two** advantages of digital technology over older technologies.

10 marks

4. Control Systems & Technology and Society



Robotic devices are commonly preferred in space exploration as shown.

(i) Explain, giving **two** reasons, why robots are preferred in this situation.

(ii) Explain the function of a **computer programme,** a **computer interface** and **sensor feedback** in the operation of the Mars Rover.

(iii) Explain why an on-board computer and an earth based computer are required to control the Mars Rover missions.

35 marks

Manufacturing industry commonly use robotic arms on production lines.

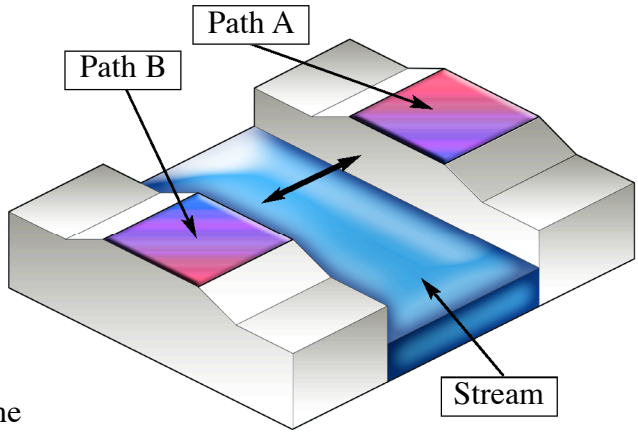
(iv) Explain why robotic arms are designed with up to 'six degrees of freedom'.

(v) Explain why robotic arms are an essential part of a 'flexible manufacturing system'.

(vi) Explain why robotic arms will never completely replace a human workforce.

15 marks

5. Design and Manufacture



A model of a retractable bridge is required to span the stream between the paths A and B shown. One person must be capable of extending and retracting the lightweight bridge.

(a) (i) Name **two** materials from which the bridge could be manufactured.
State **one** advantage and **one** disadvantage to each material.

(ii) Outline **one** manufacturing and **one** finishing process required for each material named.

20 marks

(b) (i) Sketch a suitable lightweight structure for the bridge.

(ii) Indicate **two** different structural features which will prevent distortion of the bridge.

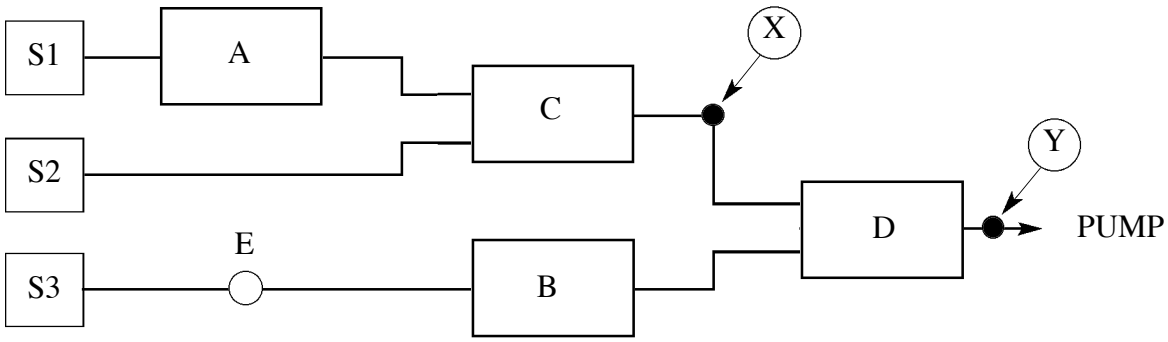
(iii) Sketch a suitable mechanism which will allow one person to easily extend and retract the bridge.

30 marks

6. Control Systems

A block diagram for a system to control the water levels in a tank is shown.
The system will turn on a water pump if low water levels are detected at sensor S1 or an override switch S2 is activated.
The pump will not operate if high levels are detected at sensor S3.

Sensor S1 produces a logic state of 0 at low water levels.
Sensor S3 produces a logic state of 1 at high water levels.
A latched alarm is required at E.



(a) (i) Identify the logic gates required at A, B, C and D.

(ii) Copy and complete the partial truth table for this gate arrangement.

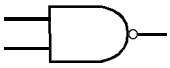
S1	S2	S3	X	Y
0	0	1		
1	0	1		

(iii) Explain the term 'Latch'.

(iv) Outline the gate arrangement required to produce the latch.

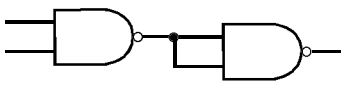
30 marks

NAND gates can be combined to produce other logic gates
(a NAND gate is an AND gate followed by a NOT gate).

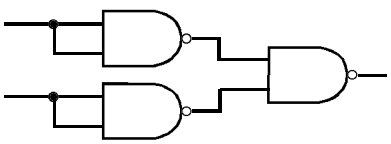


(b) Use truth tables to determine which logic gate is equivalent to the NAND gate arrangements shown below?

(i)



(ii)



20 marks