



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination, 2019

Technology

Higher Level

Tuesday, 11 June
Afternoon, 2:00 - 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 **Section C**.

Centre Number

Examination Number

*Write your examination number
in the box provided on this page.*

SECTION A		For the Examiner	
No. of Questions	Mark	Total	
	x	4	
	x	3	
	x	2	
	x	1	
	x	0	
	x	/	
Total (32)		Total 1:	
Disallowed		Mark	Total
	x	4	
	x	3	
	x	2	
	x	1	
Total (max 7)		Total 2:	
Section A Total (1-2):			

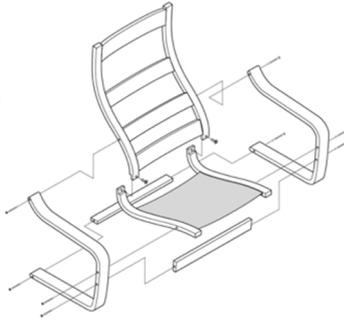
Section A Answer **any 25** questions from this section - all questions carry equal marks. **100 marks**

1. A view of a chair is shown.

Name the type of view shown

and

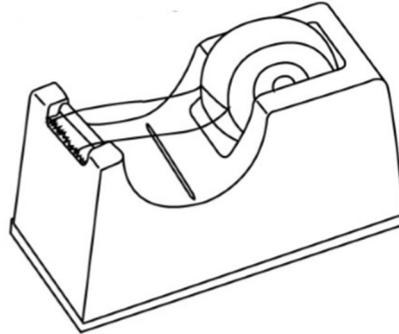
state **one** advantage of this type of view.



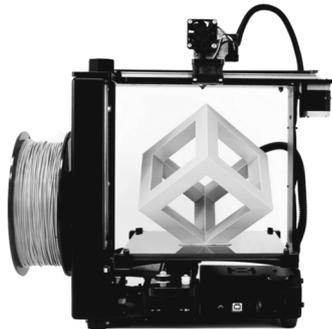
View: _____

Advantage: _____

2. Use **two** rendering techniques to enhance the view of the tape dispenser shown.



3. State **one** advantage and **one** disadvantage of using a 3D printer in school.



Advantage: _____

Disadvantage: _____

4. State **two** reasons why DVD drives are no longer built into modern laptop computers.



(i): _____

(ii): _____

5. State the meaning of **each** of the graphics shown.



(i)



(ii)

(i): _____

(ii): _____

6. Explain **each** of the following terms:

Thermoplastic,

and

Thermosetting plastic.



Thermoplastic: _____

Thermosetting plastic: _____

7. State the purpose of **each** type of nut shown.



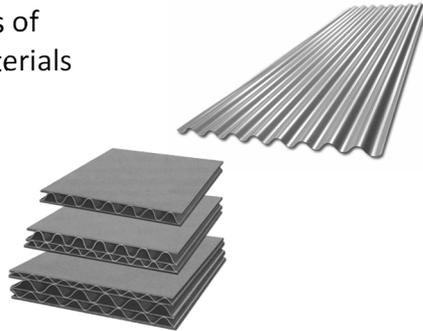
(i)

(ii)

(i): _____

(ii): _____

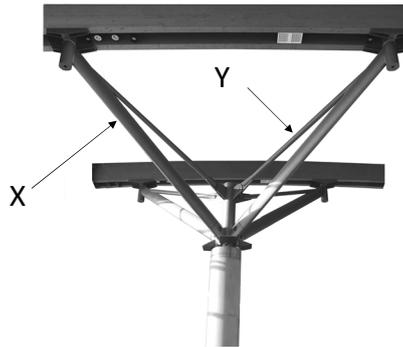
8. State **two** advantages of using corrugated materials in manufacturing.



Advantage 1: _____

Advantage 2: _____

9. Name the forces operating on member X and on member Y in the roof support structure shown.



X: _____

Y: _____

10. Name **each** of the tools shown

and

name a **material** which should be cut with each tool.

(i)



Tool (i): _____

Material: _____

(ii)



Tool (ii): _____

Material: _____

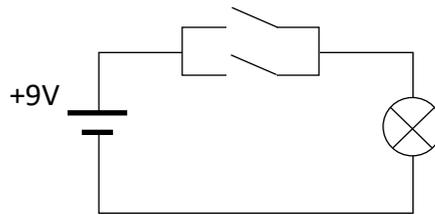
11. State the property of an LDR which changes with varying light levels.



LDR

Property: _____

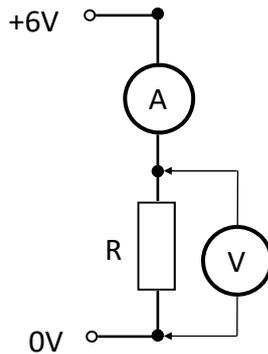
12. Name the logic gate represented by the circuit shown.



Logic Gate: _____

13. Calculate the resistance R in the circuit shown.

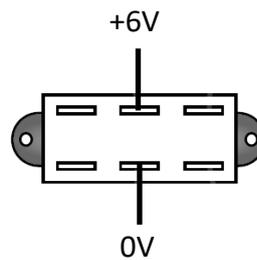
$V = 6\text{ V}$, $A = 20\text{ mA}$.



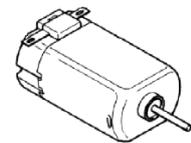
Calculation:

Resistance: _____

14. Indicate clearly, on the sketch shown, how to connect the switch and motor in order to allow the motor turn clockwise or anticlockwise.

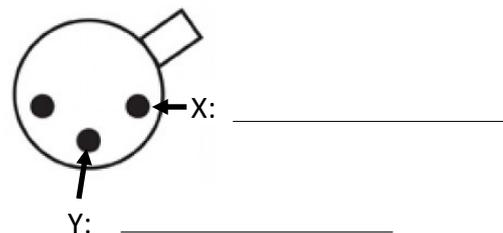
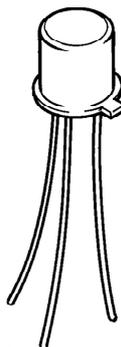


DPDT switch



DC motor

15. Name the legs of the transistor labelled X and Y on the pin view shown.



16. State **two** advantages of using a toothed belt over a chain drive in an inkjet printer mechanism.



Advantage 1: _____

Advantage 2: _____

17. The location of the effort **E** is shown on the cross trainer. Show clearly the location of:

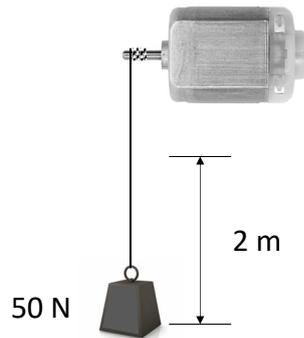
the load (**L**),

and

the fulcrum (**F**).



18. Calculate the work done to lift the 50 N load a distance of 2 m, by the system shown.

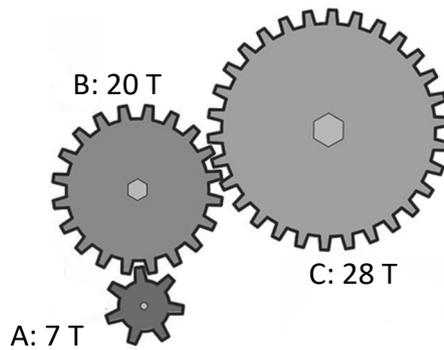


Calculation:

Work: _____

19. In a gear train, gear A rotates at 160 RPM.

Calculate the speed of rotation of gear **C**.



Calculation:

Gear C: _____

20. Name **two** safety features on the pillar drill shown.



(i): _____

(ii): _____

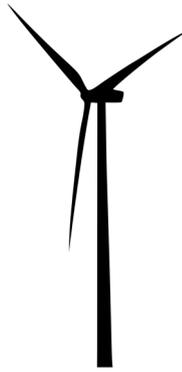
21. State **two** reasons why additives are used in processed foods.



Reason 1: _____

 Reason 2: _____

22. Name **two** energy conversions taking place in a working wind turbine.



Energy Conversion 1

Energy Conversion 2

From: _____

 To: _____

 From: _____

 To: _____

23. Smart watches are an example of wearable technology.



State **two** benefits of this type of technology.

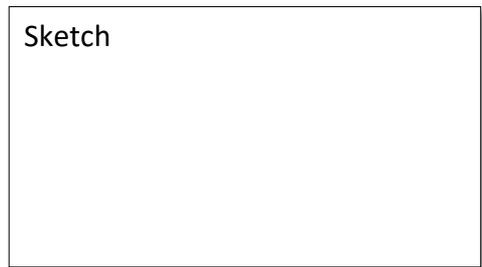
Benefit 1: _____

 Benefit 2: _____

24. Name **and** sketch a structural feature which makes a Ferris wheel both strong and lightweight.



Name: _____



25. Smart phones contain a number of sensors, including: gyroscopes, accelerometers and biometric sensors.



State the purpose of any **one** of these sensors in a smart phone.

Sensor: _____

 Purpose: _____

26. State **two** reasons why a power adaptor is required for portable electronic devices.



(i): _____

(ii): _____

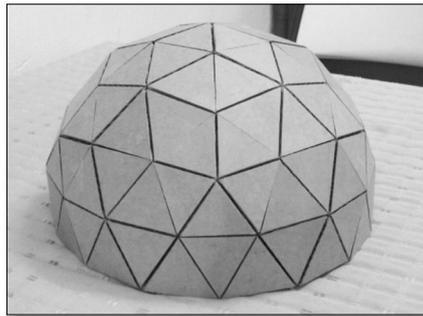
27. State **two** important features which should be considered when designing a running shoe.



(i): _____

(ii): _____

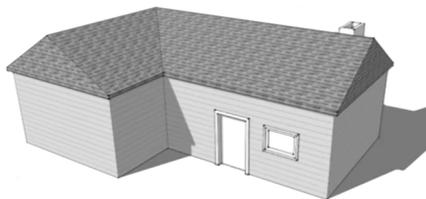
28. State **two** reasons for making a model as part of a design process.



(i): _____

(ii): _____

29. State **two** ways in which a home could be made more energy efficient.



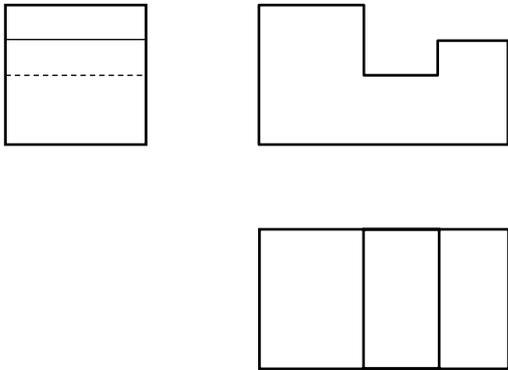
(i): _____

(ii): _____

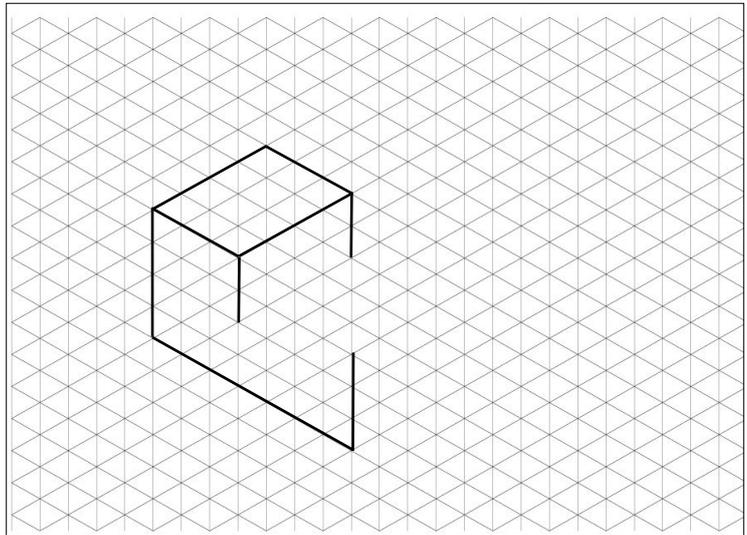
30. Indicate clearly on the sketch shown, how the four 1.5 V cells should be connected to produce 6 V.



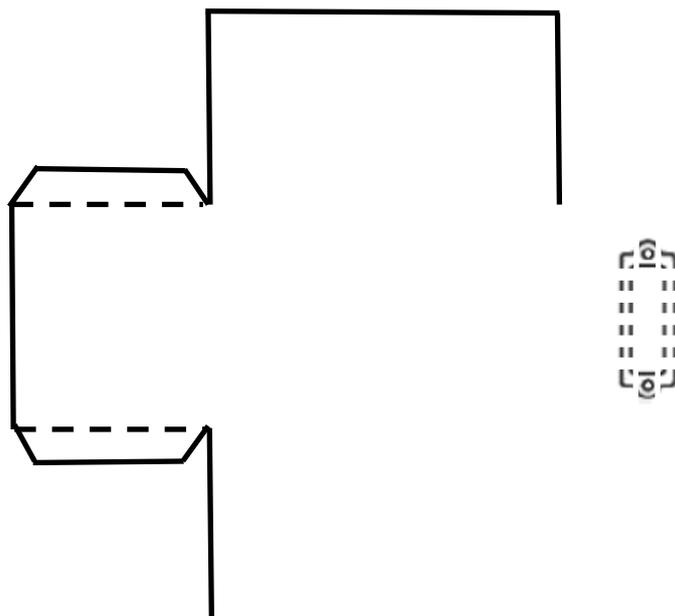
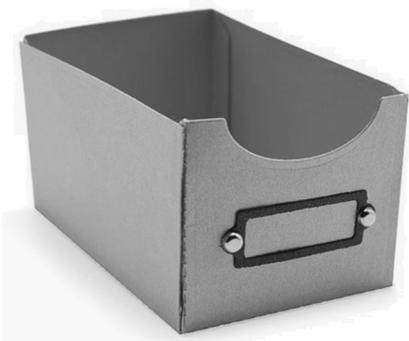
31. An orthographic projection of a component is shown.
On the grid provided, complete the isometric view of the component.



Orthographic projection



32. Complete the development of the polypropylene storage box shown.





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Section B and Section C

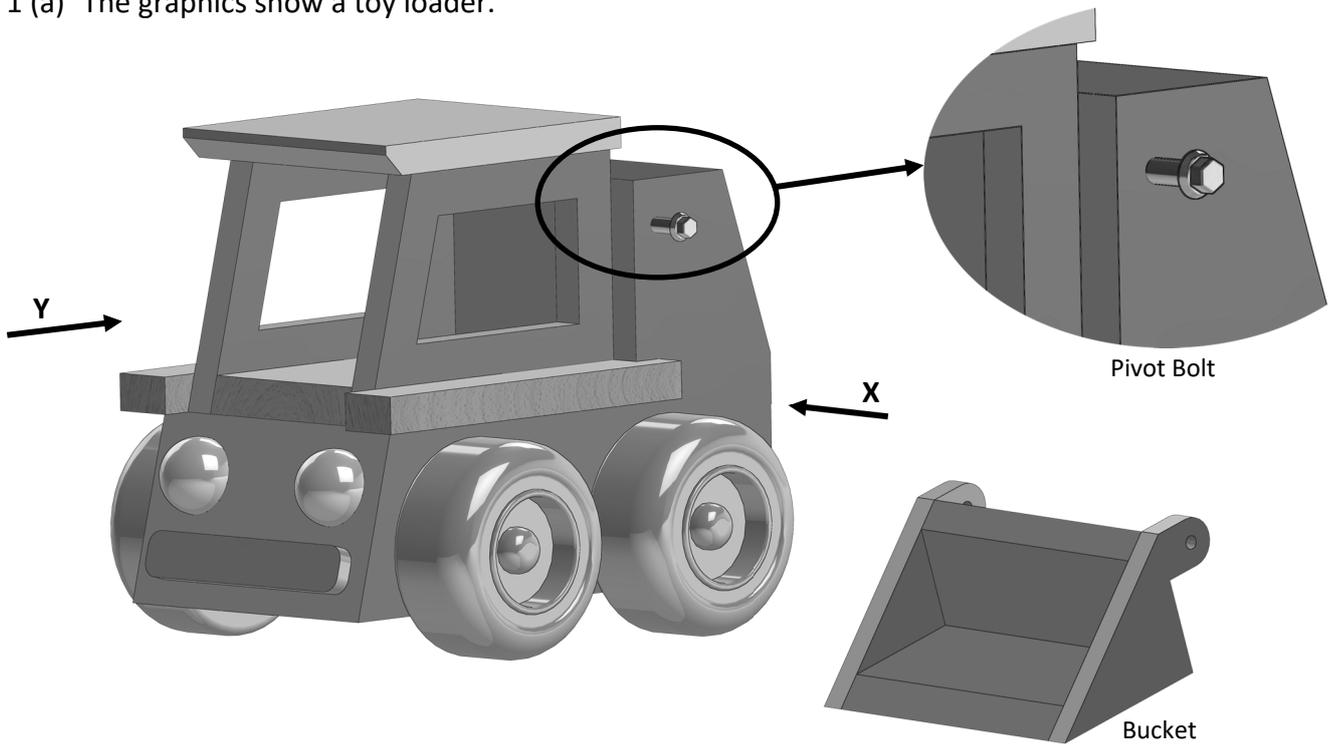
Section B - 50 marks

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. Hand up **Section A** with your answer sheets to this paper.

1 (a) The graphics show a toy loader.



(i) Make well-proportioned sketches of the following views:

1. An **elevation** in the direction of arrow **X**.
2. An **end view** in the direction of arrow **Y**.

(10 marks)

(ii) A bucket for the loader, similar to that shown, is required.

1. Suggest a suitable **material** from which to manufacture the bucket and give **one** reason for your choice.
2. Describe, using notes and sketches, how to manufacture the bucket.

(10 marks)

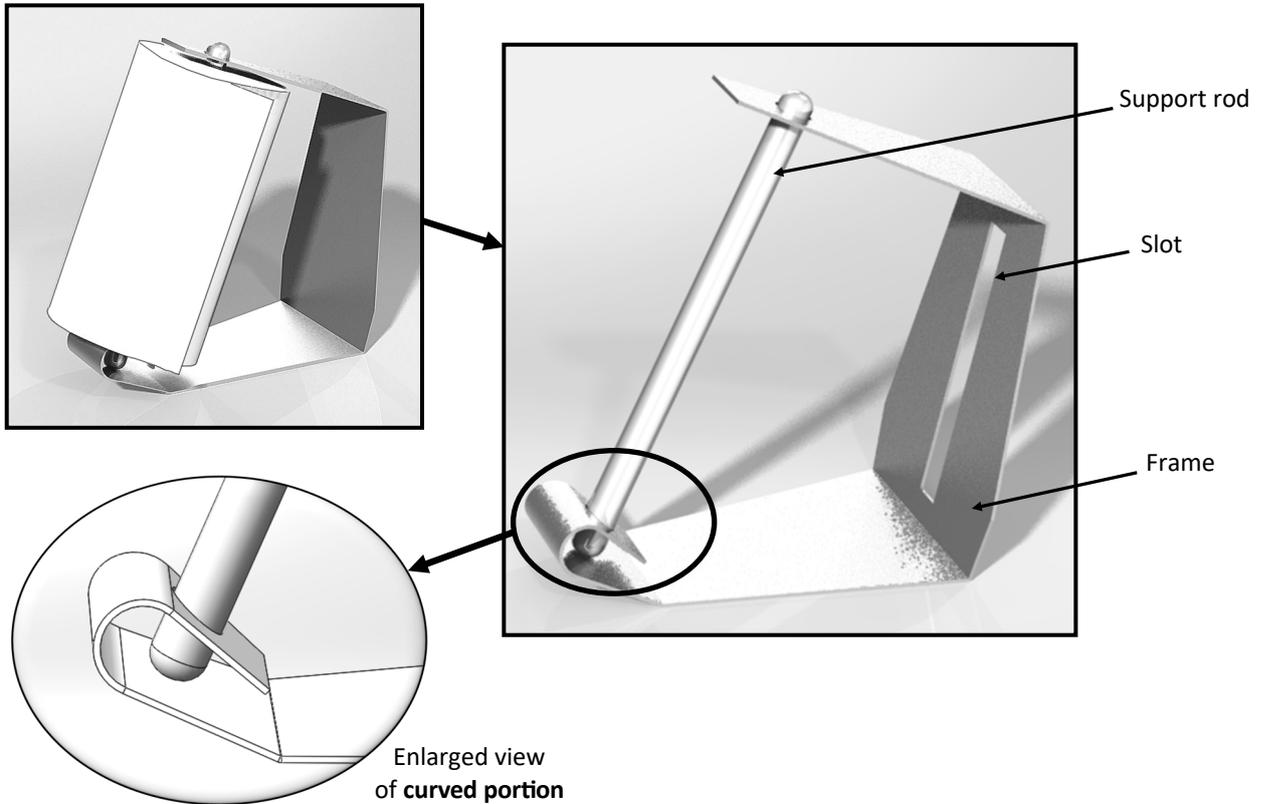
(iii) A connecting arm is required to attach the bucket to the body of the toy at the pivot bolt shown. The arm must allow the bucket to be raised and lowered using a suitable mechanism.

Sketch a design for a suitable connecting arm and mechanism.

(5 marks)

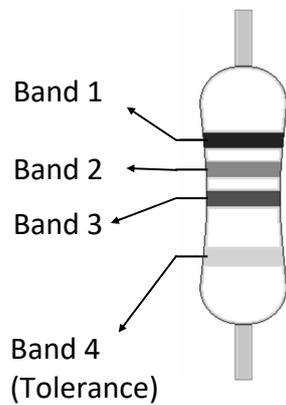
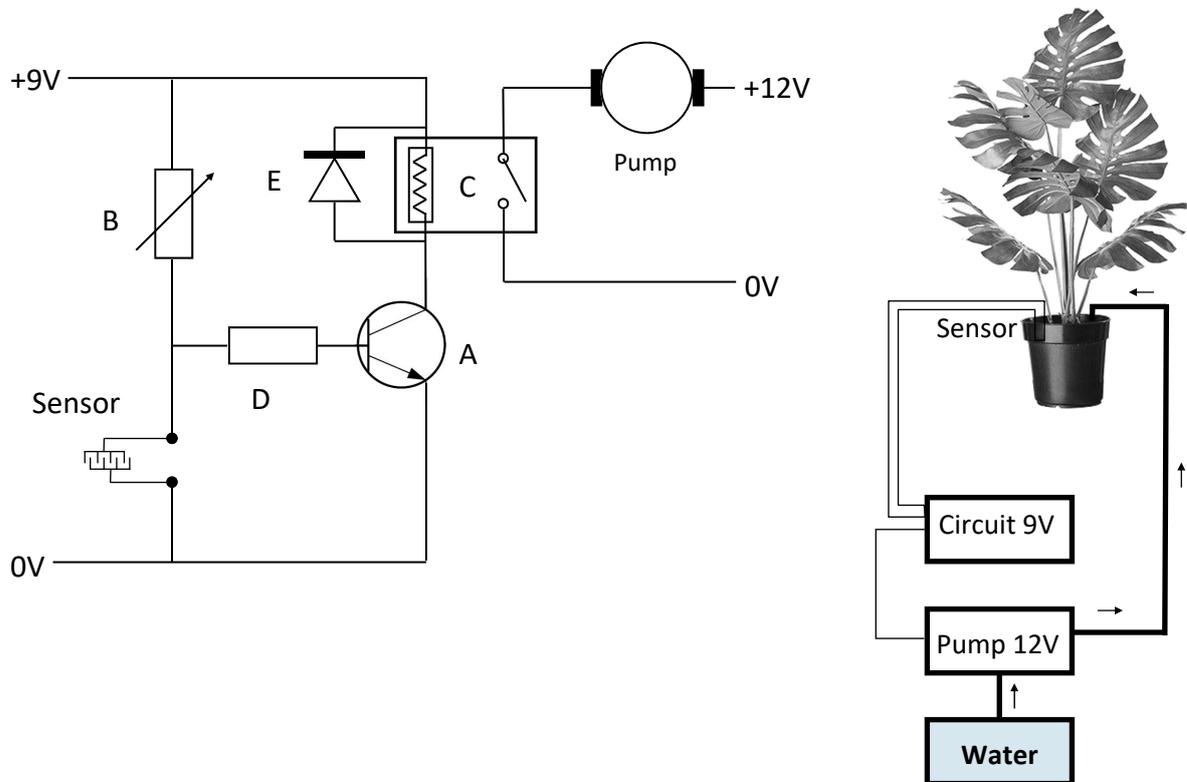
- OR -

- 1 (b) The graphics show a design for a free-standing paper roll holder. The frame is manufactured from a single material. The slot was added to allow the paper to exit the holder and be easily cut.



- (i) Make a well-proportioned sketch of the **development** of the holder to include the slot and holes. Indicate clearly on your sketch the position of all cutting and bend lines. (10 marks)
- (ii) 1. Explain, using sketches, the steps required to manufacture the **holder** from a suitable **named** material.
2. Describe, using sketches, how to produce the **curved portion** shown above. (10 marks)
- (iii) When testing the holder, it was found that it was difficult to remove and cut the paper through the slot shown. Describe, using sketches, a suitable modification to solve this problem. (5 marks)

2 (a) The circuit shown will be used to automatically water a plant when dry soil is detected.



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

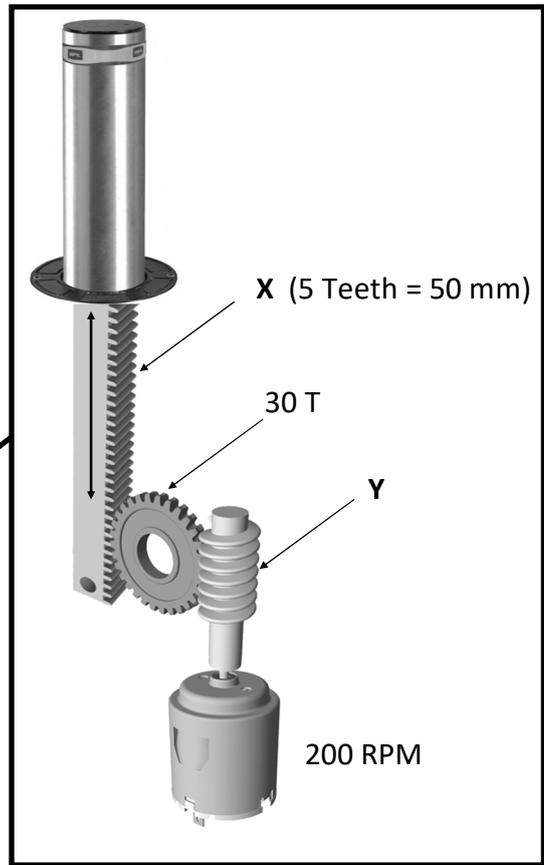
- (i) Name the components labelled **B** and **C** in the circuit. (6 marks)
- (ii) State the functions of components **A** and **B** in the circuit. (6 marks)
- (iii) Resistor **D** has a value of $2200\ \Omega$ and a tolerance of $\pm 5\%$. Using the table provided, state the colours of the four bands on resistor **D**. (8 marks)
- (iv) Name component **E** and explain why it is required in this circuit. (5 marks)

- OR -

2 (b) The graphic shows a mechanism to control a working model of a street bollard.



Street bollards



- (i) Name the parts of the mechanism labelled **X** and **Y**.
State **one** advantage of using this type of mechanism to control the bollard. (9 marks)
- (ii) The mechanism shown changes the direction of motion by 90° .
Name and sketch another mechanism which could achieve this change of direction. (6 marks)
- (iii) Explain why limit switches should be used as part of the control circuit for this mechanism.
Name a suitable type of switch to act as a limit switch. (6 marks)
- (iv) If the motor attached to gear **Y** rotates at 200 RPM, calculate the time for which the motor must run to raise the bollard through 1 metre. (4 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 & Society



- (a) *'To lead the transition to a low carbon future, we need creative and innovative problem solvers.'*

#GenerationTomorrow

- (i) Outline **two** reasons why we must transition to a low carbon future.
- (ii) Outline **two** technologies which will assist with this transition.

(20 marks)

- (b) Technology impacts on the environment, people and society as a whole.

- (i) Outline, using suitable examples, **two** positive impacts of technologies on elderly people in society.
- (ii) Outline, using suitable examples, **two** negative impacts of the use of plastic technologies on the environment.
- (iii) Outline, using suitable examples, **two** ways in which developments in communications technology have changed society.

(30 marks)

4. Control Systems and Technology & Society



- (a) Commercial drones use a range of technologies to operate correctly. These include **GPS, remote control** and **live video feed**.

Explain the function of any **two** of these technologies in operating a drone.

(10 marks)

- (b) Modern fire alarms, security and heating services in schools are examples of advanced control systems.

(i) Outline the role of **sensors, feed back** and **control panels** in any **one** of these systems.

(ii) Outline **two** advantages in using a control system for these services.

(20 marks)

- (c) Modern factory production lines are now commonly operated by robotic machines. In the workforce, robotic machines are now replacing people.

(i) Outline **two** advantages of using robotic machines on production lines in place of people.

(ii) Outline **two** new skills required of the human workforce in such factories.

(20 marks)

5. Design & Manufacture



'Iasc' are an import and distribution company, for fishing equipment, to shops around the country. The company requires an animated, electro-mechanical, display sign based on the name and the company logo shown.

(i) Describe, with the aid of sketches, the steps required to manufacture a suitable display from a **named** material. *Name any tools required and state the processes used.*

(20 marks)

(ii) Describe the steps you would take to ensure that the final display is safe for use and is finished to a high standard.

(15 marks)

(iii) Describe, with the aid of sketches, how the display could be animated. *Name any additional components required.*

(15 marks)

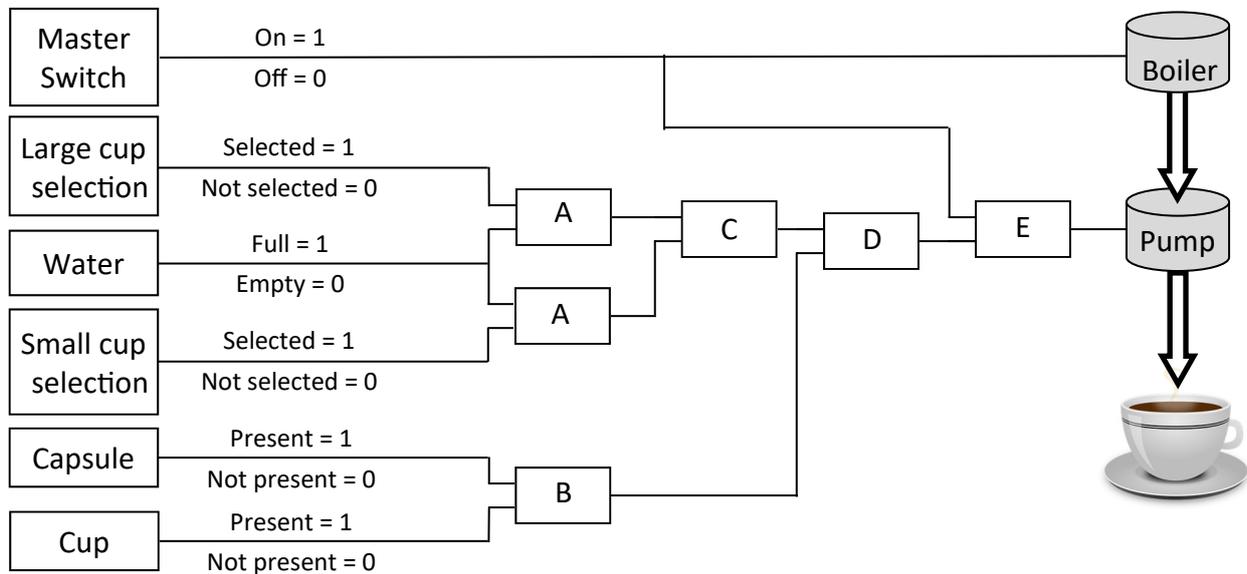
6. Control Systems



- (a) A system diagram, to control the operation of a home coffee machine is shown. Coffee will be delivered if the machine is switched on, a cup, water and a coffee capsule are all present. The system has the following features:

A master on/off switch and two coffee selection buttons (large or small coffee).

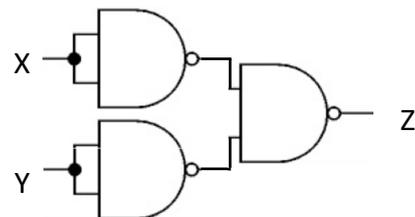
A low water level, coffee capsule and cup detection sensors.



- Name the logic gates required at **A**, **B**, **C**, **D** and **E**.
- Sketch a truth table for gate **E**.
- Design a modification to the system to display a warning message if a coffee cup or a coffee capsule is not present.

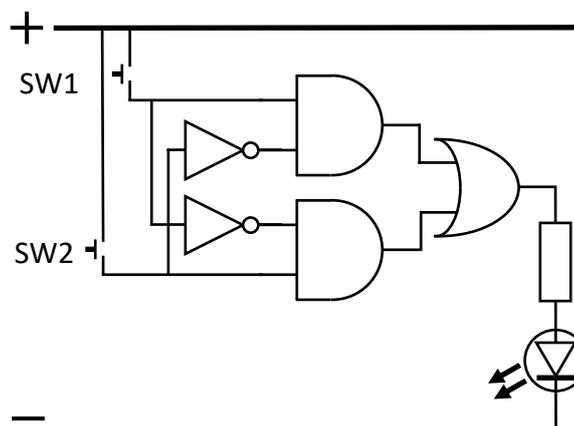
(30 marks)

- (b) A NAND gate is a combination of an AND gate followed by a NOT gate. NAND gates can be combined to construct other gates. Use a truth table to determine which gate is represented by the NAND gate combination shown.



(10 marks)

- (c) Draw a truth table to determine the conditions for switches SW1 and SW2 (on or off) in order to light the LED in the circuit shown.



(10 marks)