2026.S69

2026J125C1EL

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Cycle Final Examination 2026

Applied Technology

Common Level

Monday 15 June Morning 9:30 - 11:00

120 marks

Examination Number

Date of Birth

For example, 3rd February 2005 is entered as 03 02 05

Centre Stamp

Instructions

Write your Examination Number and your Date of Birth in the boxes on the front cover.

Answer all questions.
Write your answers in blue or black pen. You may use pencil for sketches only.
Write your answers in the spaces provided in this booklet. There is space for extra work at the end of the booklet. Label any such extra work clearly with the question number and part.

This examination booklet will be scanned and your work will be presented to an examiner on screen. Anything that you write outside of the answer areas may not be seen by the examiner.

Acknowledgements

Graphic Q1(a)(i) page 3.
https://www.theverge.com/2021/4/1/22358355/aptera-ev-three-wheeled-doe-atvm-loan-program

Graphic Q1(a)(iii) page 3.
https://sportscardigest.com/propeller-cars-odd-approach-to-earth-bound-propulsion/

Graphics Q2(a)(i) page 8.
https://i.pinimg.com/736x/b2/0f/ce/b20fce86d894e9c053790551bd3aae55.jpg
https://images.findagrave.com/photos/2010/38/6412592_126567150084.jpg

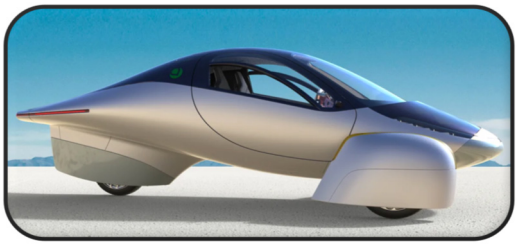
Graphic Q2(a)(iii) page 8.
https://www.indiamart.com/proddetail/high-quality-hotel-lift-19689057497.html

Graphic Q3(a)(i) page 13.
https://edition.cnn.com/travel/article/scariest-roller-coaster-drops-world/index.html

Graphic Q4(a)(i) page 16.
https://www.tomtech.co.uk/product/greenhouse-ventilation/

Question 1

(a) A solar-powered car is shown.



Solar-powered car

(i) State **one** advantage of solar technology.

Advantage:

(ii) Solar cell technology is in common use today.
Use a tick (✓) to show if **each** of the following statements is true or false.

Statement	True	False
Solar cells convert electrical energy to kinetic energy		
Solar cells convert light energy to electrical energy		
The energy captured by solar cells cannot be stored		

(iii) In the early twentieth century, engineers began to explore the design of propeller-driven vehicles.

In relation to the car shown opposite, describe a risk associated with this design.

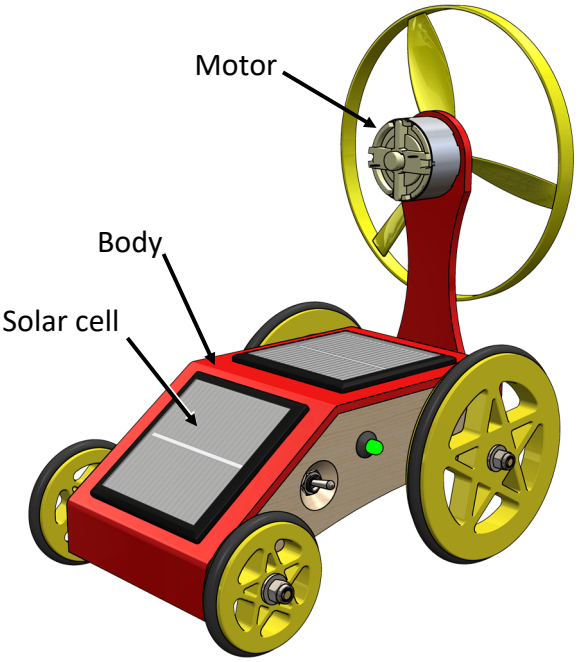
Propeller-driven car

Risk:

(iv) From what other technology, in your opinion, did designers get their inspiration for propeller-driven cars?

Answer:

(b) A student design for a propeller-driven solar-powered toy buggy is shown.

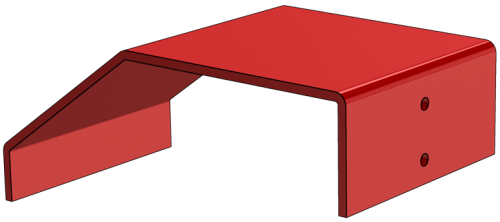


Solar powered buggy

(i) Name a suitable plastic for the body and give a reason for your choice.

Plastic:
Reason:

(ii) The body panel has three bends as shown.



In the space below, sketch the development (flat pattern) of this body panel showing all bend lines.
Include the location of the two holes.

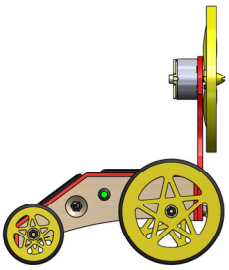
Development/flat pattern:

(iii) Name a suitable manufacturing process for making the plastic wheel rims and give a reason for selecting this process.

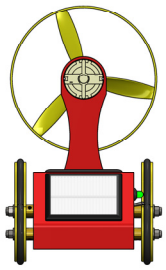
Name of process:
Reason:

(iv) Three orthographic views of the solar-powered buggy are shown.

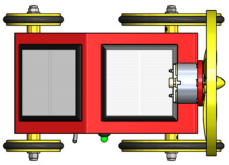
Name **each** of the views in the table below.



View **A**



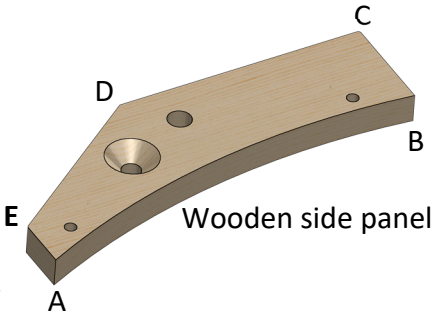
View **B**



View **C**

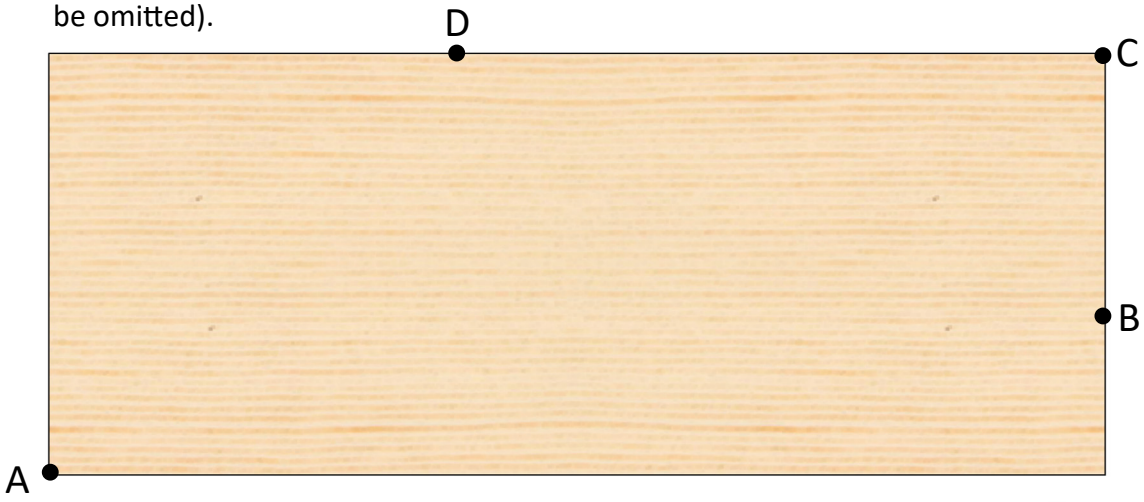
View	Name of the view
A	
B	
C	

(v) One of the side panels of the buggy is shown. This was marked out on a rectangular piece of wood as shown below (the wood is the exact length and height of the side panel). Note the positions of corners A, B, C, and D.

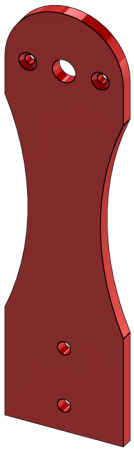


Wooden side panel

Estimate the position of corner **E** and sketch in the marking out necessary to make this panel (holes may be omitted).



(vi) The motor bracket is made from a plastic material. List **three** important stages in the manufacture of this bracket from a rectangular piece of plastic.



Motor bracket

1	
2	
3	

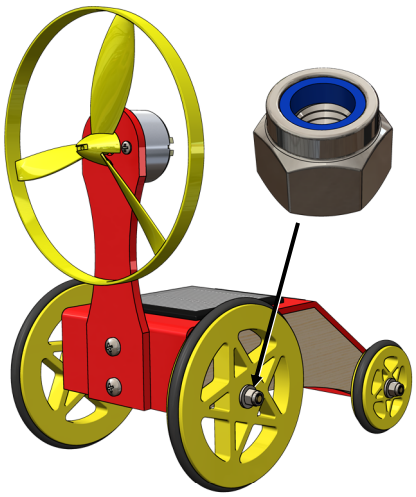
(c) **(i)** In the space opposite make a pictorial sketch of the side panel shown below.

Wooden side panel

(ii) Each wheel is attached to its axle using a special type of nut.

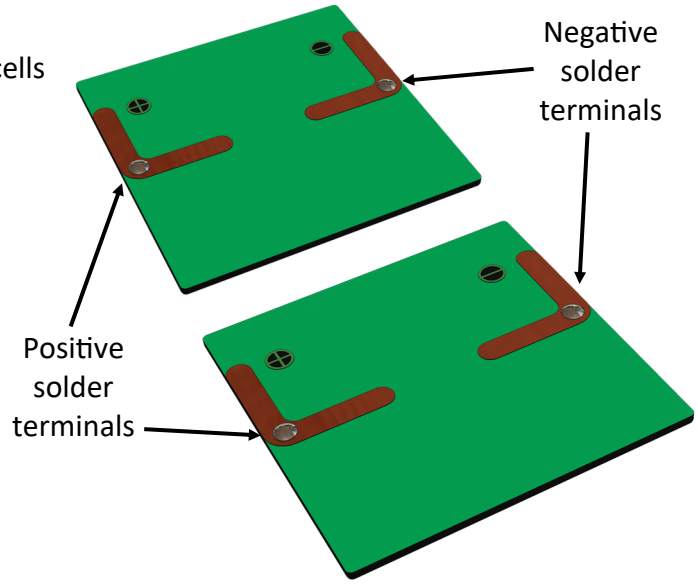
Name this nut and give a reason for its use.

Name:
Reason:



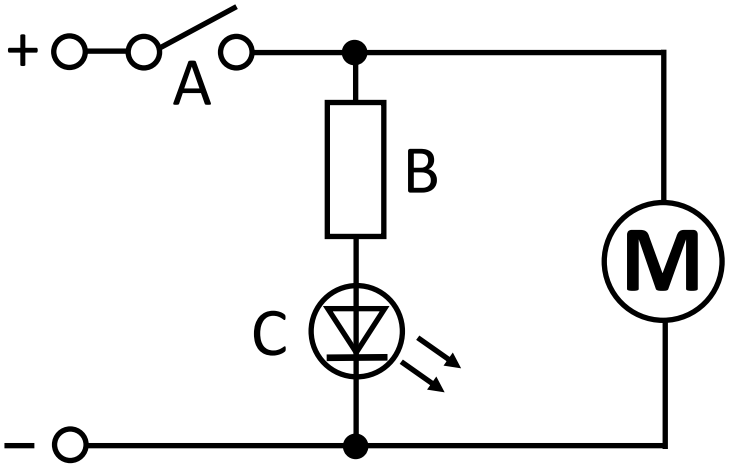
(iii) The undersides of the two solar cells that power the buggy are shown opposite.
These cells must be connected in parallel.

Draw in the **two** wire connections needed to connect these cells in parallel.



(d) The circuit diagram for the solar-powered buggy is shown below.

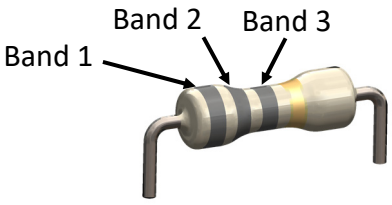
(i) Name the components **A**, **B**, and **C** represented by their symbols in the circuit diagram.



A	
B	
C	

(ii) Using the resistor colour code shown opposite, complete the table below by filling in each missing colour or value in the appropriate box.

Band 1	**Band 2**	**Band 3**	**Value Ω**
Red	Red		2200 Ω
	Black	Brown	100 Ω
Green	Blue	Orange	

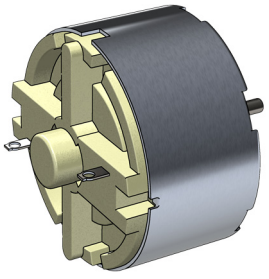


Position of bands

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

(iii) When the circuit was fully connected, it was found that the motor was driving the buggy in reverse, instead of forward.

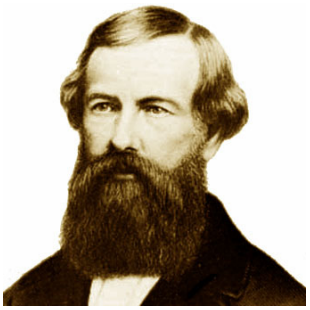
Suggest a solution to this problem.



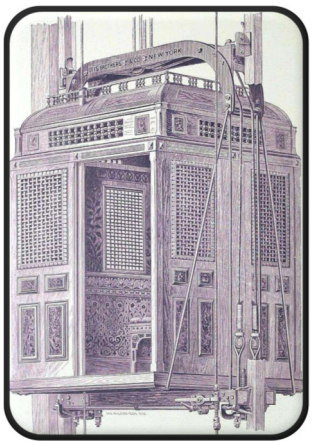
Solution:

Question 2

Elisha Graves Otis installed the first commercial lift in New York in 1857. The lift was powered by a steam engine.



Elisha Graves Otis



(a) **(i)** Describe **two** improvements to lift design/operation since the lift was first invented.

Improvement 1:
Improvement 2:

(ii) How has the invention of lifts influenced building design in recent decades?

Answer:

(iii) Suggest **two** features of lift design that make them suitable for wheelchair users.

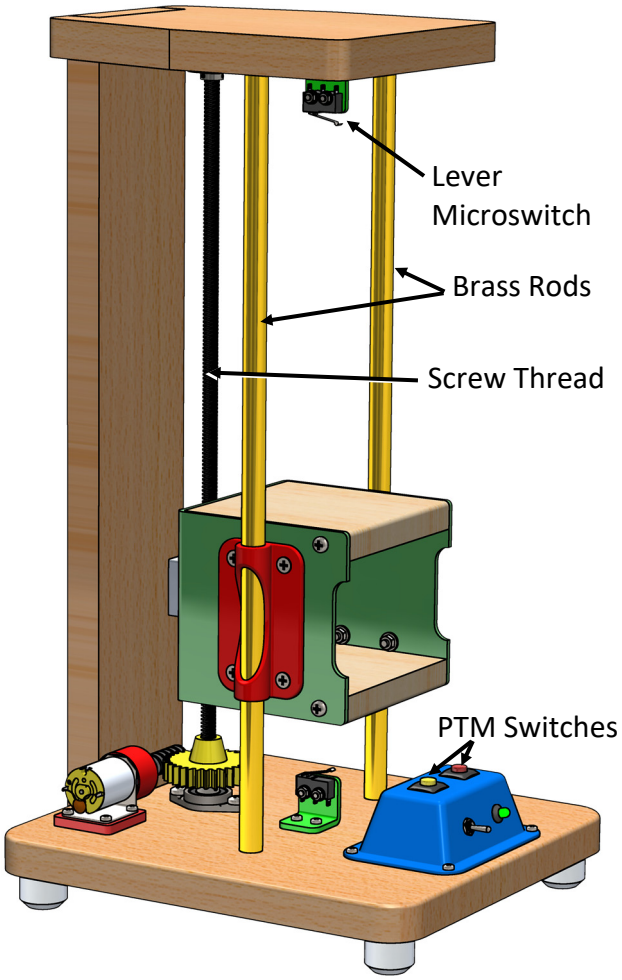
Feature 1:
Feature 2:

(iv) Describe **one** other technology that can be used in the home for persons with reduced mobility.

Answer:

(b) A student design for a working model of a lift is shown. The design involves the use of a motorised mechanism which turns a screw thread to raise and lower the lift. Two PTM switches are used to control the upward and downward movement of the lift.

Two lever microswitches are also used as part of the control system.



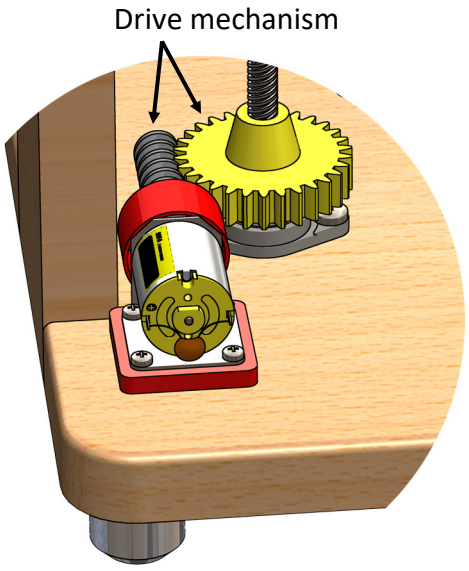
Working model of a lift

(i) Name a suitable hardwood for the main structure and give **two** reasons for your choice.

Hardwood:
Reason 1:
Reason 2:

(ii) The main drive mechanism is shown opposite.

Name this mechanism and state **two** reasons that make it a suitable choice in this design.

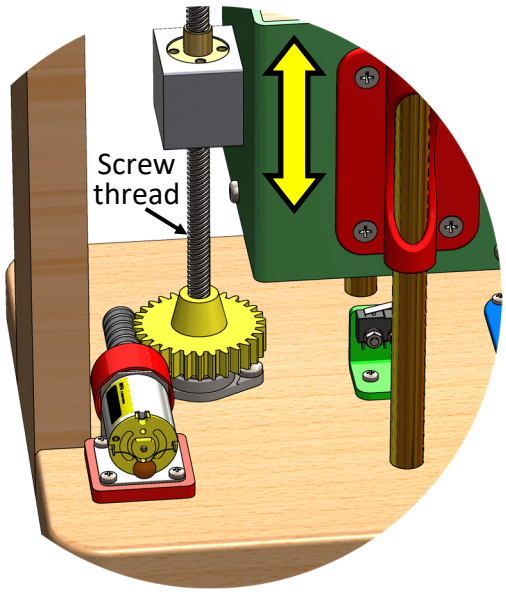


Name:
Reason 1:
Reason 2:

(iii) Each revolution of the screw thread raises or lowers the lift by 8 mm. Each revolution takes 2 seconds to complete.

Calculate how long it will take the lift to rise or fall by a distance of 80 mm.

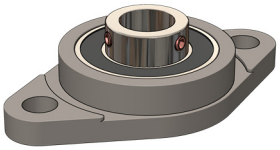
Calculation: Answer: _____



Detail view of the lifting mechanism

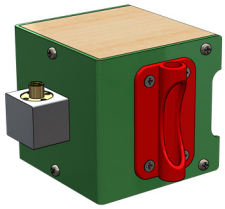
(iv) The bearing shown opposite is used at the top and bottom of the screw thread.

What is the function of this bearing?

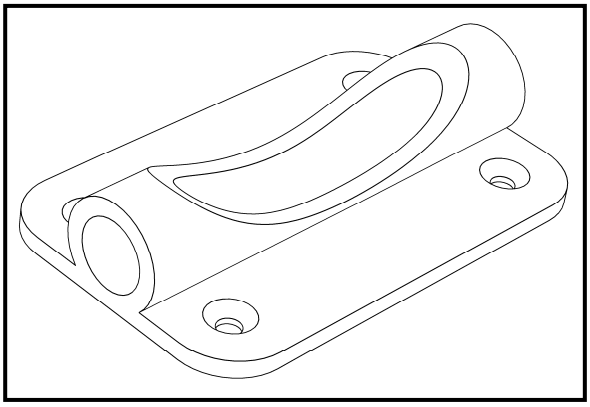


Answer:

(v) Plastic guide brackets are attached to the opposite sides of the lift box. This allows the lift box to slide up and down smoothly on the brass rods.

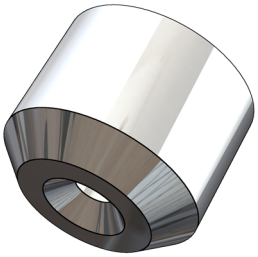


An outline drawing of a guide bracket is shown opposite. Apply shading to this drawing to enhance its appearance.



(vi) One of the four feet for the model is shown.

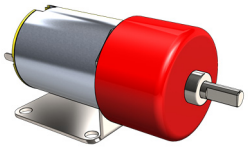
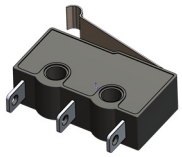
Name a suitable metal for the feet and indicate with a tick (✓) if it is a ferrous or a non-ferrous metal.



Name of metal	Ferrous	Non-ferrous

(c) **(i)** Control systems involve the use of either input or output components.

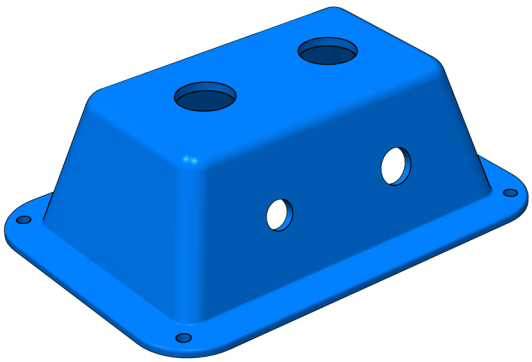
Using one tick (✓) per component, indicate whether each component shown is an input or an output.

Component	Input	Output
		
		
		

(ii) The control box was made using a thermoplastic.

Explain the term thermoplastic.

Answer:



Control box

(iii) Name a suitable thermoplastic from which to make the control box.

Name:

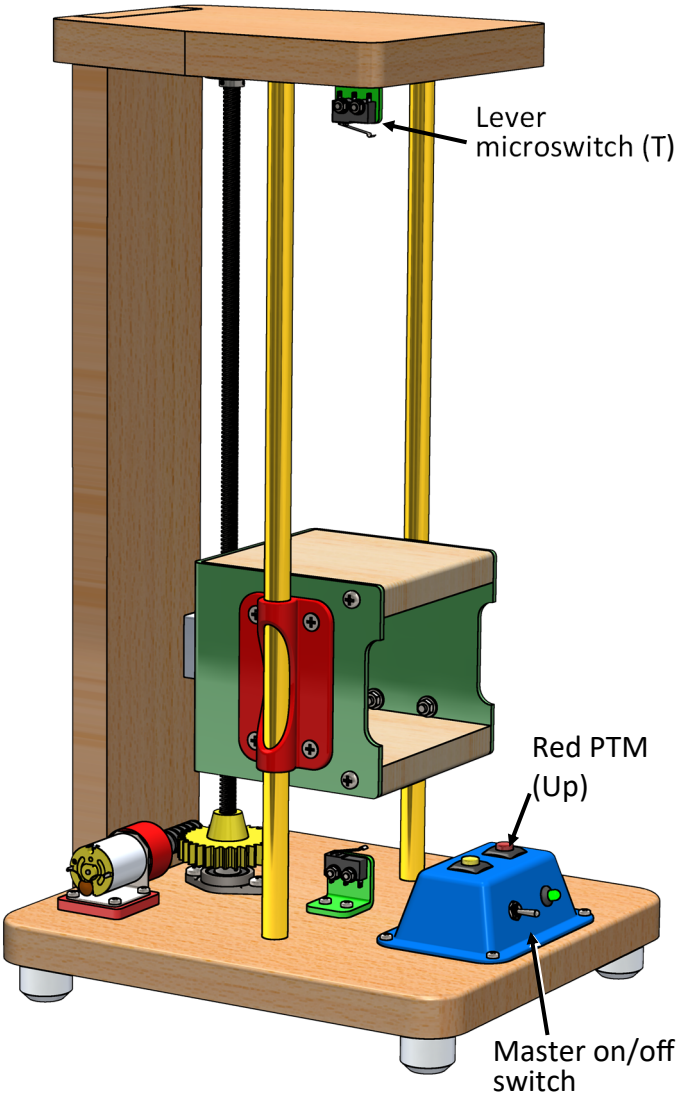
(iv) Each of the wooden parts of the lift model is to be finished using a spray lacquer.

Describe **two** important steps in preparing the wood for a spray finish.

Step 1:
Step 2:

(d) The control system components for raising the lift to its top position are shown.

When the master on/off switch is on and the red PTM switch is pressed, the motorised mechanism activates and the lift rises. It continues to rise until it makes contact, and presses the lever, of the top microswitch (T).



Summary of Logic Levels:

Master switch on = Logic 1
Master switch off = Logic 0

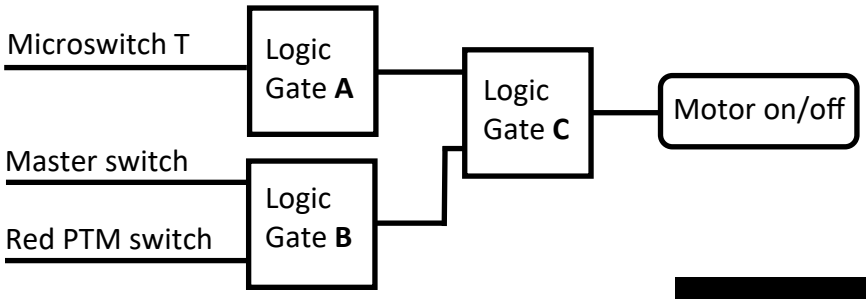
Red PTM pressed = Logic 1
Red PTM not pressed = Logic 0

Microswitch T pressed = Logic 1
Microswitch T not pressed = Logic 0

(i) What does PTM stand for?

P:	T:	M:

(ii) Name the logic gates at **A**, **B**, and **C** required to make this system work when raising the lift to its top position.



Logic Gate **A**	
Logic Gate **B**	
Logic Gate **C**	

(iii) The partly completed truth table for an OR gate is shown. Complete this truth table.

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

Question 3

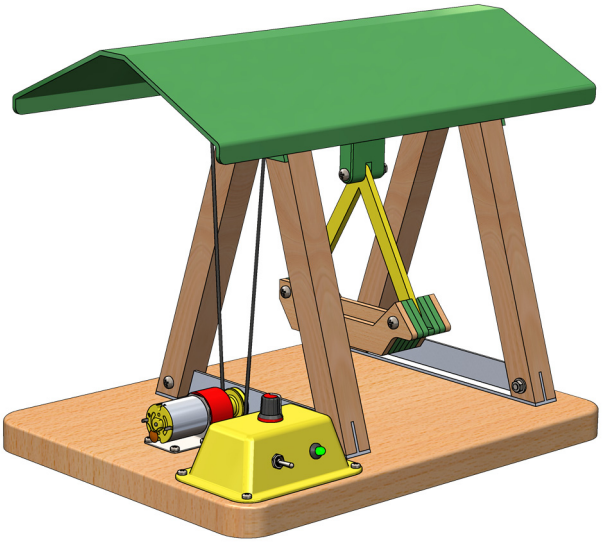
Theme parks play an important role in the tourism industry. Health and safety is an important consideration in theme parks.

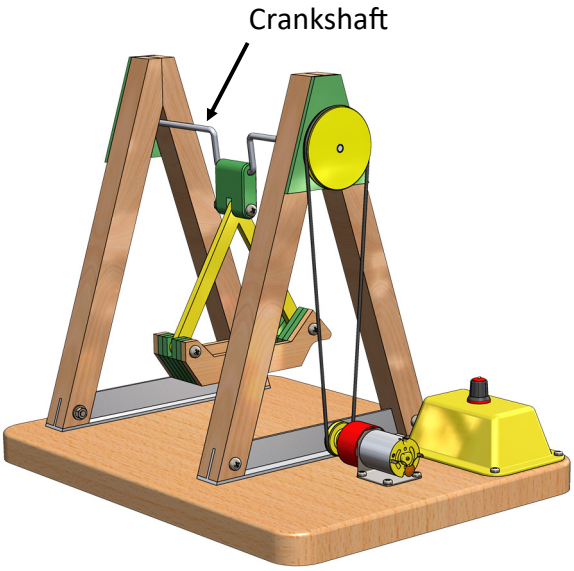
Theme park roller coaster

(a) **(i)** Describe a safety feature important for the safety of a person on a roller coaster.

Answer:

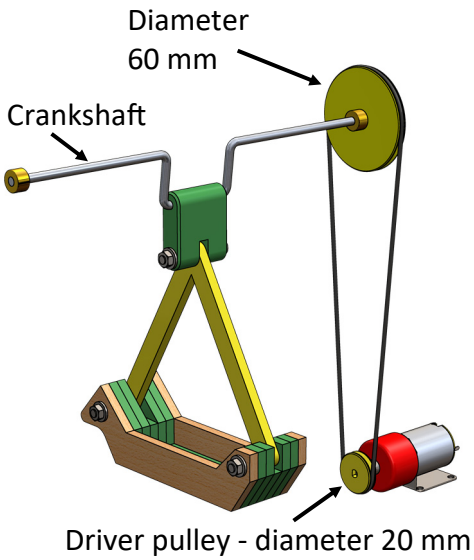
(ii) The images below show a student model of a swinging-boat attraction with the roof on and the roof off.





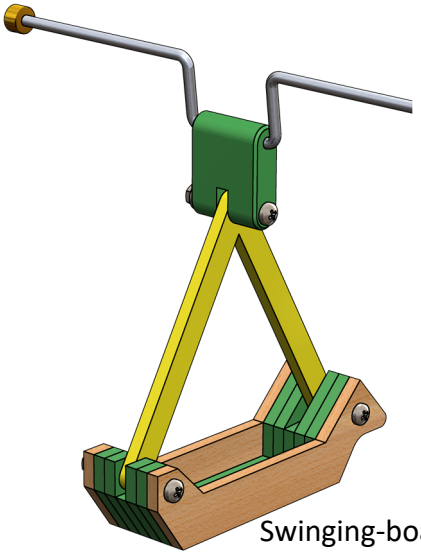
A pulley mechanism is used to rotate the crankshaft.
If the rotational speed of the driver pulley is 24 RPM, calculate the rotational speed of the crankshaft.

Answer: _____



(b) **(i)** Name the type of motion produced in the swinging-boat by the rotating crankshaft.

Motion type:



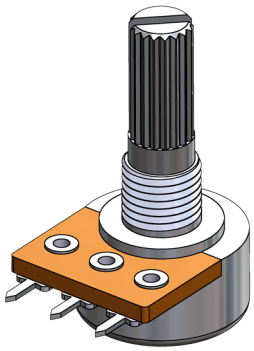
Swinging-boat

(ii) Name **one** other type of motion and give an example of it.

Answer:
Example:

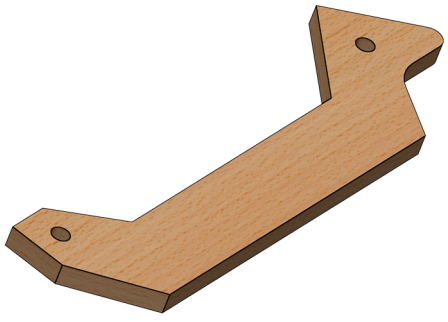
(iii) It was decided to modify the control circuit so that the speed of the motor could be varied. This required the use of the component shown opposite.

Name this component and draw its symbol.



Name of component	Symbol

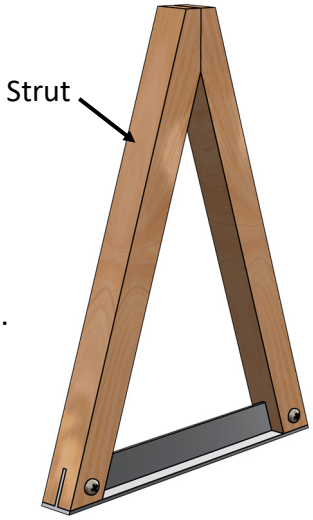
(iv) In the space opposite describe, with the aid of sketches, the processes required to make the wooden side panel shown below, from a rectangular piece of wood.



Swinging-boat side panel

(c) **(i)** The support frames of the structure are triangular in shape.

Give a reason for this design feature.



Answer:

(ii) Name **one** other structure that uses a triangulated framework.

Name:

(iii) Name the force acting on the strut of the support frame when the swinging boat is stationary.

Name of force:

(iv) Name the force acting in the pulley belt of the drive mechanism and give **one** other example in everyday life where this force is present.

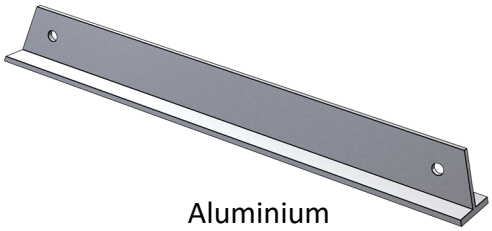
Name of force:
Example:

(v) The shaped aluminium T-section at the base of each frame is shown. This section has holes drilled at both ends.

Name a hand tool you could use to cut the ends of the aluminium.
State **two** safety precautions you would take when drilling the holes.

Hand tool:

Safety precaution 1:
Safety precaution 2:



Aluminium
T-section

Question 4

The image opposite shows a mechanical ventilation system in the roof of a greenhouse.

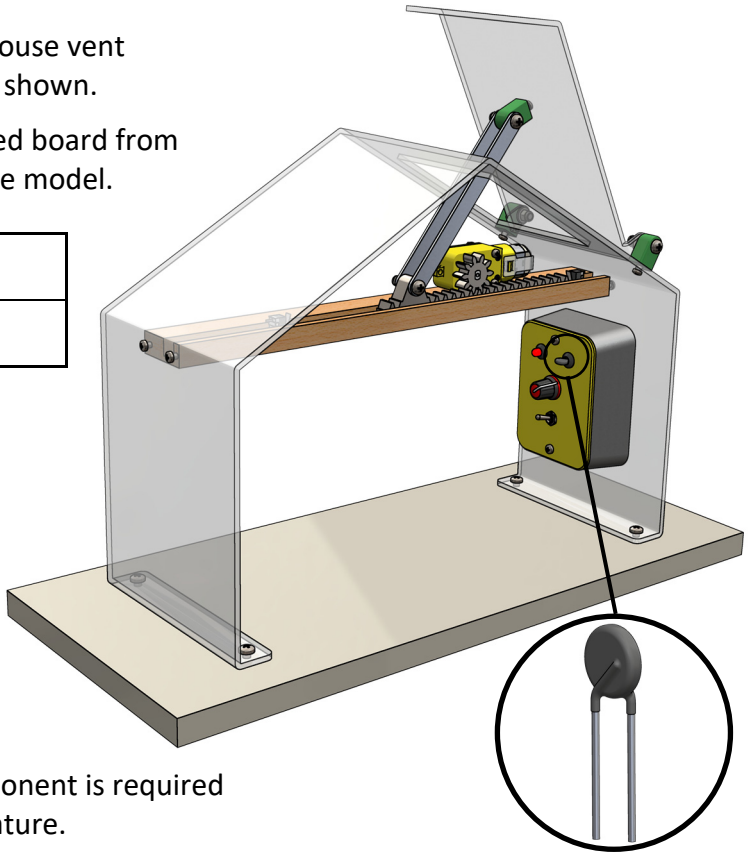
(a) **(i)** Why is ventilation required in a greenhouse?

Answer:

(ii) A working model of a greenhouse vent which opens automatically is shown.

Name a suitable manufactured board from which to make the base of the model.

Manufactured board:



Temperature-sensing component

(iii) A temperature-sensing component is required to detect changes in temperature.

Name this component.

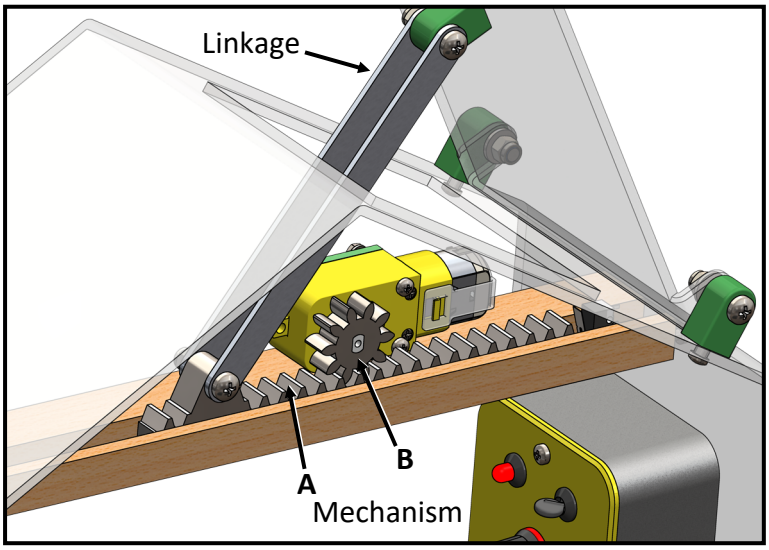
Name:

(iv) Name **two** appliances in the home that have temperature control.

Appliance 1:
Appliance 2:

(b) **(i)** A closeup of the opening system is shown.

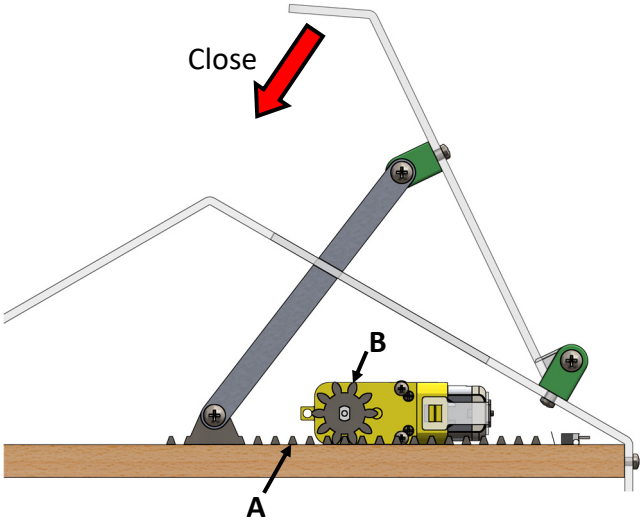
Name the parts **A** and **B**, of the mechanism shown.



Mechanism parts
A:
B:

(ii) Gear **B** of the mechanism has ten teeth. It must move ten of the teeth on part **A** to **fully close** the vent from the open position shown.

The rotational speed of Gear **B** is 5 RPM. Calculate how long it will take for the vent to fully close from the open position shown.



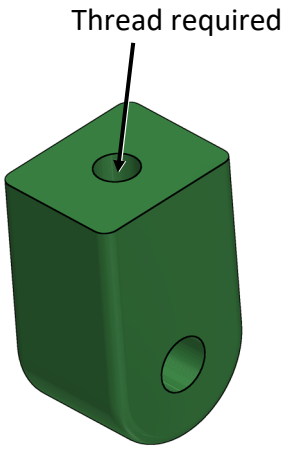
Front view of the mechanism

Calculation:

Answer: _____

(iii) The vent hinges on two green mounting blocks, one of which is shown opposite. The hole on the underside must be threaded so that it can receive a machine screw.

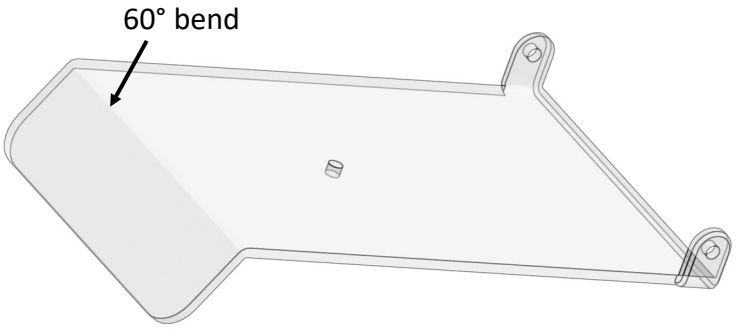
Name the tool required to thread the hole and briefly describe the process.



Name of tool:
Threading Process:

(c) **(i)** The vent window has a 60° bend as shown.

Name the machine used to make this bend. In the correct order, list **two** steps in the bending process.



Machine Name:
Step 1:
Step 2:

(ii) In the space opposite describe, with the aid of sketches, the processes required to round the ends of the aluminium linkage to produce a smooth safe finish.

Aluminium linkage

Additional writing space.
Label all work clearly with the question number and part.

Do not write on this page

Junior Cycle Final Examination – Common Level

Applied Technology

Monday 15 June

Morning 9:30 - 11:00