S68. 2019

2019J065G1EL

Coimisiún na Scrúduithe Stáit

State Examinations Commission

Junior Certificate Examination, 2019

Technology

Ordinary Level

Tuesday, 11 June
Afternoon, 2:00 - 4:00

Instructions:

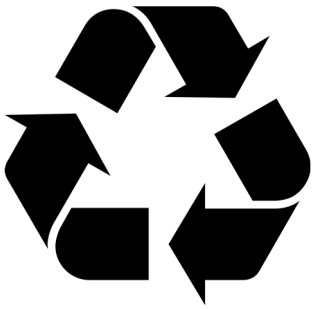
1. Answer **Section A** (short answer questions). 80 marks
2. Answer **two** questions from **Section B**. 80 marks
3. Hand up this paper at the end of the examination.
4. Write your examination number in the box below.

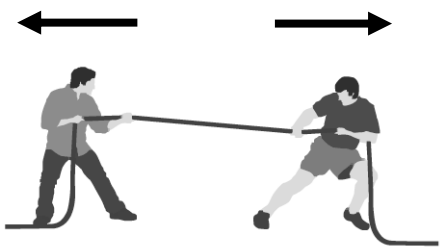
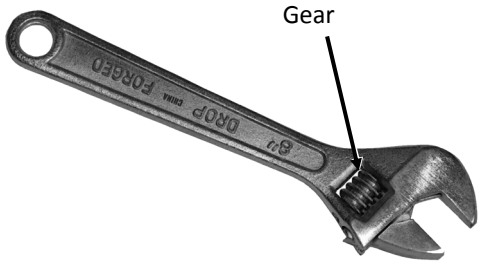
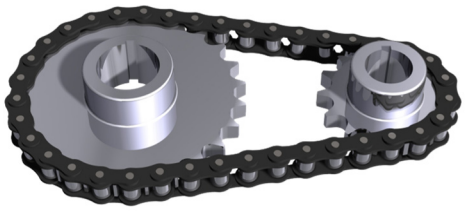
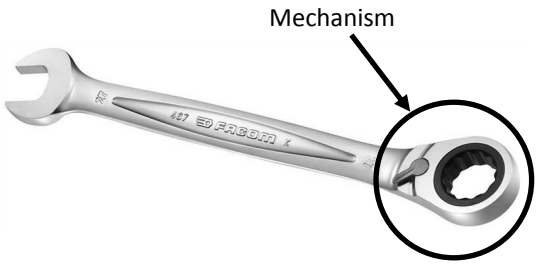
Centre Number	**Examination Number**

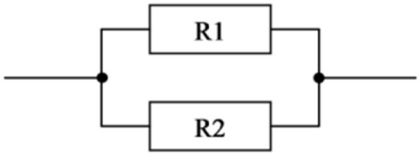
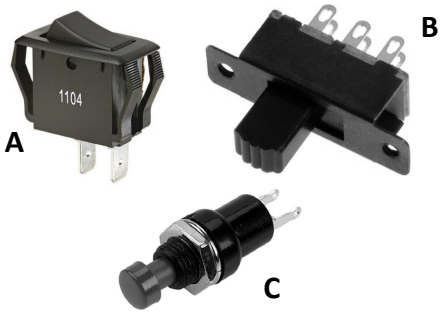
1.	Total of end of page totals	
2.	Aggregate total of all disallowed question(s)	
3.	Total mark awarded (1 minus 2)	
4.	Bonus mark for answers through Irish (if applicable)	
5.	Total mark awarded if Irish Bonus (3+4)	
	Note: The mark in row 3 (or row 5 if an Irish bonus is awarded) must equal the mark in the Mór-iomlán box on the script	

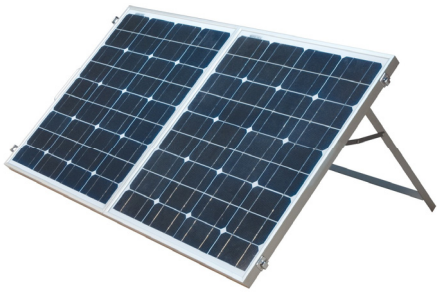
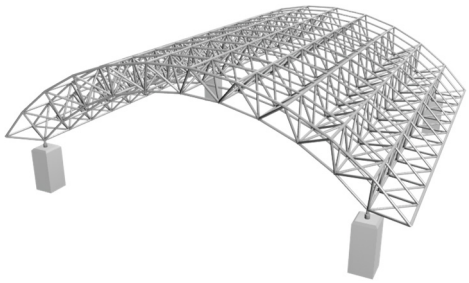
Total Mark		
Question		Mark
Section A		
Section B	Q 1	
	Q 2	
	Q 3	
	Q 4	
Total		
Grade		

Section A – 80 marks. Answer **any sixteen** questions in this section.

1. 	These tubes are:	Conical	
		Cylindrical	
		Prismatic	
2. 	This is the logo for:	Facebook	
		WhatsApp	
		Twitter	
3. 	This is a\an:	Digital Watch	
		Analog Watch	
		Digital and analog watch	
4. 	Taps are usually made from:	Aluminium	
		Lead	
		Stainless Steel	
5. 	This waste symbol means that we should:	Reuse	
		Recycle	
		Reduce	

6. 	The force exerted on the rope by the men is:	Tension	
		Torsion	
		Bending	
7. 	The round gear used to adjust this wrench is a:	Bevel Gear	
		Rack Gear	
		Worm Gear	
8. 	The smaller sprocket in this mechanism rotates:	Faster than the large sprocket	
		Slower than the large sprocket	
		At the same speed as the large sprocket	
9. 	The mechanism in this reversible wrench is:	A rack	
		A ratchet	
		A rocker	
10. 	To create lifting force this hydraulic jack makes use of:	Water pressure	
		Oil pressure	
		Air pressure	

11. 	LED stands for:	Laser Emitting Diode	
		Light Emitting Display	
		Light Emitting Diode	
12. 	These resistors are in:	Series	
		Parallel	
		Series and parallel	
13. 	Which of these switches can be used to control a motor in forward and reverse motion?	Switch A	
		Switch B	
		Switch C	
14. 	This symbol represents the unit of:	Electrical Resistance	
		Electrical Current	
		Voltage	
15. 	Plastic is used to cover electrical wires because it is a/an:	Electrical conductor	
		Electrical insulator	
		Semiconductor	

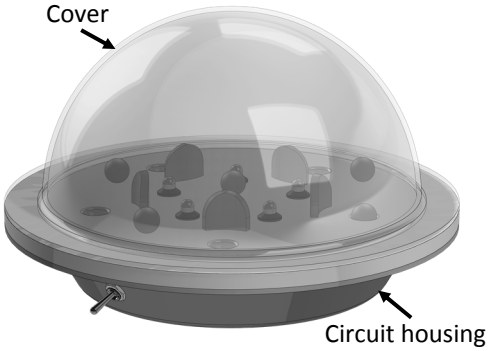
16. 	When in motion this swing seat will:	Vibrate	
		Reciprocate	
		Oscillate	
17. 	Photovoltaic panels convert:	Electrical energy to Light energy	
		Light energy to Electrical energy	
		Light Energy to Kinetic energy	
18. 	Coal is an example of a:	Bio-fuel	
		Fossil Fuel	
		Nuclear fuel	
19. 	This is an example of a:	Frame structure	
		Shell structure	
		Tensile structure	
20. 	The bagless vacuum cleaner was invented by:	James Watt	
		Thomas Edison	
		James Dyson	

Section B – 80 Marks.
Answer **any two** questions from this section.

Question 1 — 40 Marks

(a) *10 marks*

An image of a child's handheld game is shown.
Also shown is an image of the game without the cover.
There are five balls to be positioned in the five holes.

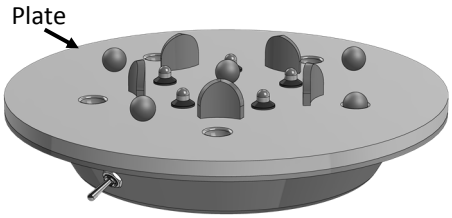


(i) Suggest a suitable material from which to make the transparent cover and give a reason for your choice.

Material:_____

Reason:_____

_____



Game with cover removed

(ii) Name a suitable plastic for the circuit housing.
You may not choose the material used in part (i) above.

Name:_____

(iii) Describe briefly a method of forming the transparent cover of the game.

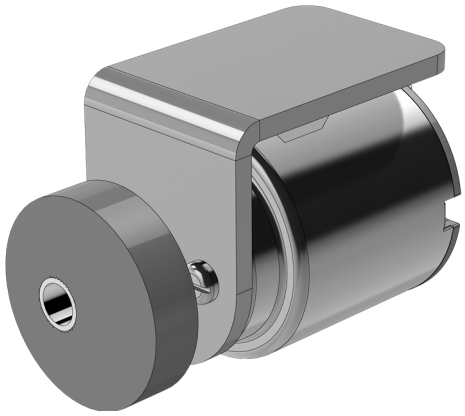
Answer: _____

_____

_____

(b) *10 marks*

It is proposed to place a motor with an off-centre disc in the circuit housing and attach it to the underside of the plate.



Motor with off-centre disc

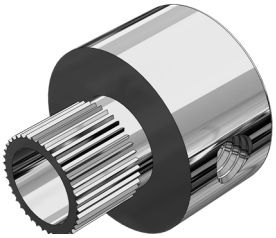
(i) Describe the effect this motor and disc will have when it is rotating at high speed.

Effect: _____

_____

_____

(ii) The brass hub shown is used to attach the disc to the motor shaft. Explain why it is best to use this hub rather than simply pushing the disc onto the shaft.



Enlarged view of brass hub

Answer: _____

_____

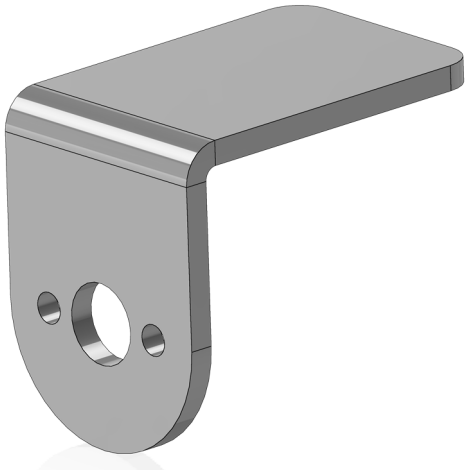
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Question 1

8 marks

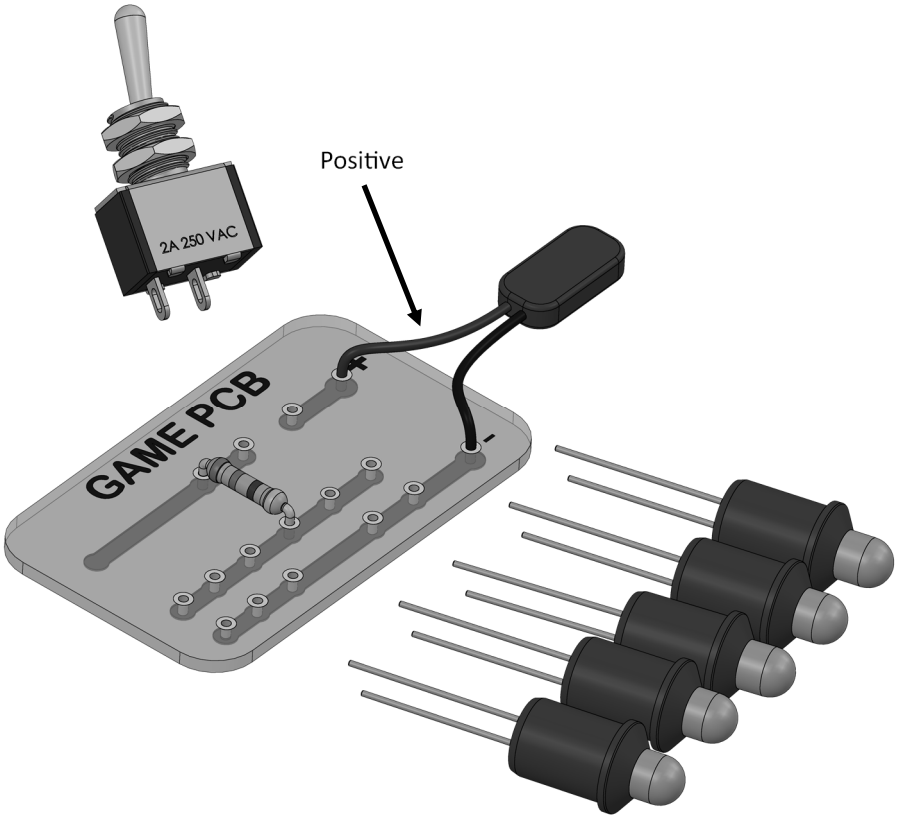
(c) The bracket to attach the motor to the underside of the plate is shown below. In the space below, using your own dimensions, draw the flat pattern (development) of the bracket.

Motor Bracket



12 marks

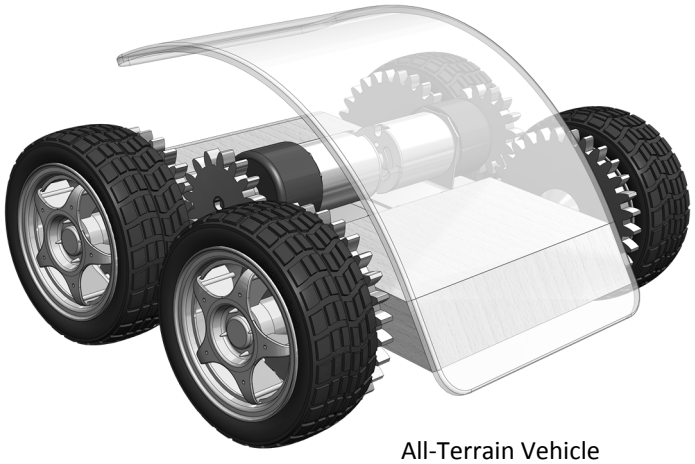
(d) A switch and five LEDs must be connected to the Printed Circuit Board shown below. Sketch in the wire connections from each component to the PCB so that the switch activates all five LEDs.



Question 2 — 40 Marks

9 marks

(a) A model of a four-wheel drive all-terrain vehicle is shown. The vehicle is driven using a separate gearbox motor on each side.



All-Terrain Vehicle

(i) What is the purpose of using a separate gearbox to drive each side of the vehicle?

Answer: _____

_____

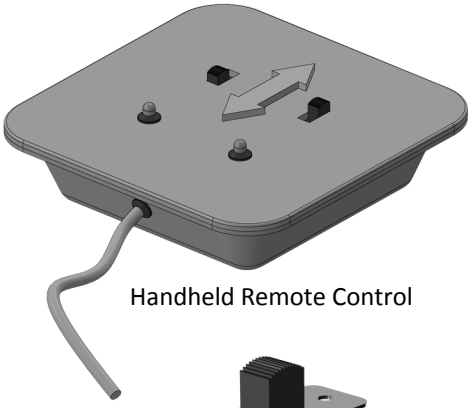
_____

_____

(ii) A handheld remote control with a cable is used to control the vehicle. A DPDT switch with a 'Centre Off' position is used to control each motor. Explain DPDT.

DPDT: _____

_____

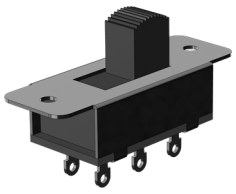


Handheld Remote Control

(iii) Suggest an advantage of using a DPDT switch.

Advantage: _____

_____

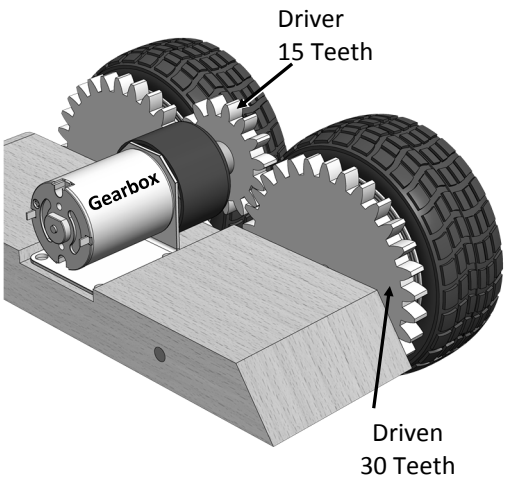


DPDT slide switch

9 marks

(b) (i) The driver gear attached to the gearbox has 15 teeth and the driven gears attached to the wheels have 30 teeth. If the driver gear rotates at a speed of 120 RPM, calculate the speed of rotation of the driven gears.

Calculation



Vehicle Gear Train

(ii) Why does the driver gear have to be positioned **between** the two driven gears?

Answer: _____

_____

Question 2

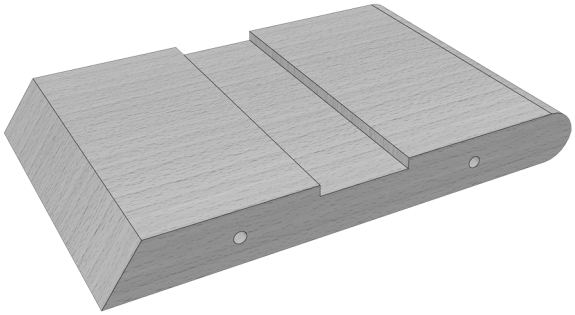
10 marks

(c) A perspective view of the chassis of the vehicle is shown below.

(i) Name a suitable hardwood from which to make the chassis.

Hardwood: _____

(ii) In the space opposite draw a plan view (top view) of the chassis.



Plan view of the chassis

6 marks

(d) The gears for the vehicle were modelled using CAD software.

(i) Explain the term CAD.

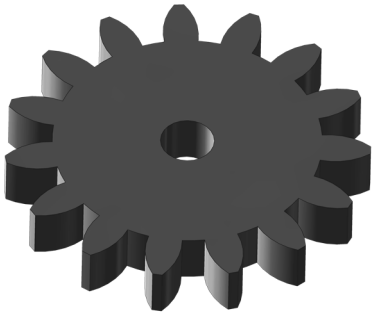
CAD: _____

(ii) Name a type of 3D modelling software that could be used to model the gear.

Name: _____

(iii) Name a machine that could be used to cut out the gears.

Name: _____



Driver Gear

6 marks

(e) Suggest **one** advantage and **one** disadvantage of the introduction of 'self-driving' cars.

Advantage: _____

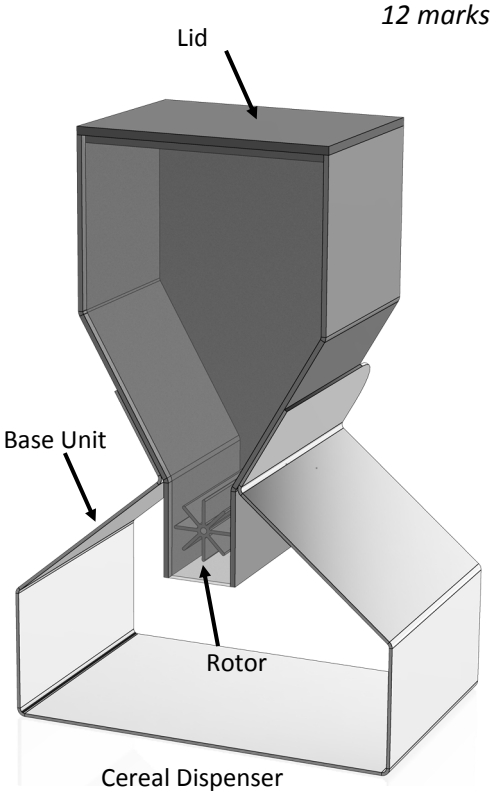
_____

Disadvantage: _____

_____

Question 3 — 40 Marks

(a) A student's design for a cereal dispenser is shown. *12 marks*



Cereal Dispenser

(i) The base unit is made from stainless steel.
Suggest **two** reasons why this material was selected.

Reason 1: _____

_____

Reason 2: _____

_____

(ii) A gearbox motor is used to drive the rotor. The label on the gearbox motor is shown below.

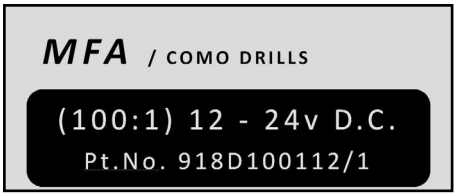
Explain the terms '100:1' and 'D.C.'

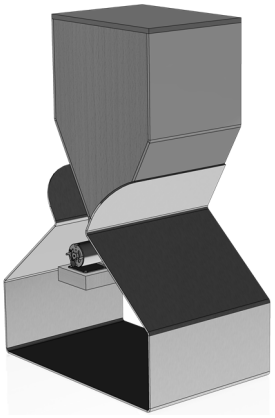
100:1 _____

_____

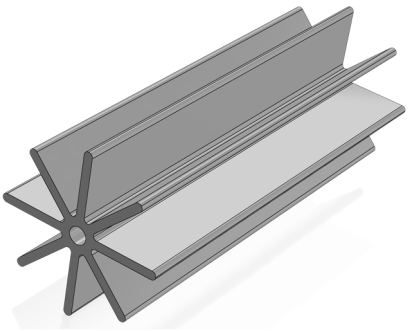
_____

D.C. _____




Rear view of dispenser with gearbox motor visible

(b) The rotor used to dispense the cereal is shown opposite. *6 marks*
It was decided to 3D print the rotor.


3D Printed rotor

(i) Suggest **one** reason why 3D printing is a good choice for manufacturing this part.

Answer: _____

_____

(ii) Suggest **one** advantage of 3D printing from an environmental point of view.

Answer: _____

_____

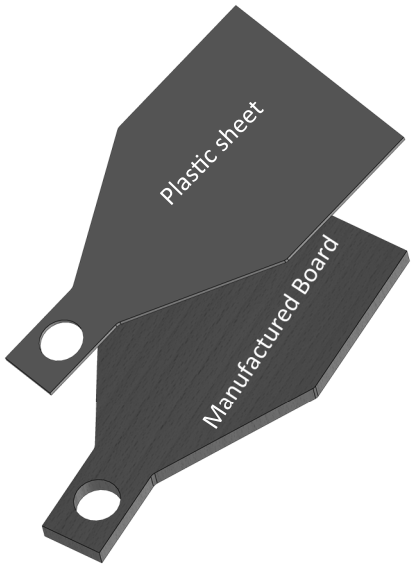
Question 3

12 marks

(c) (i) The back panel of the cereal dispenser is made from a manufactured board covered with a sheet of plastic.

Name a suitable manufactured board.

Name: _____



(ii) Describe a method, other than gluing, of joining the plastic sheet to the manufactured board.

Answer: _____

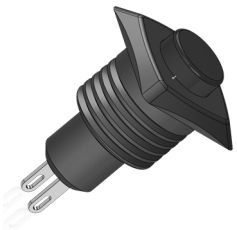
_____

_____

(iii) In the space opposite make a 3D sketch of a suitable handle for the lid of the cereal dispenser.

10 marks

(d) A decision needs to be made as to the type of switch to use to activate the motor when dispensing cereal. The switches available are a PTM switch and a Toggle switch as shown.



PTM Switch

(i) Select the most suitable switch and give a reason for your choice.

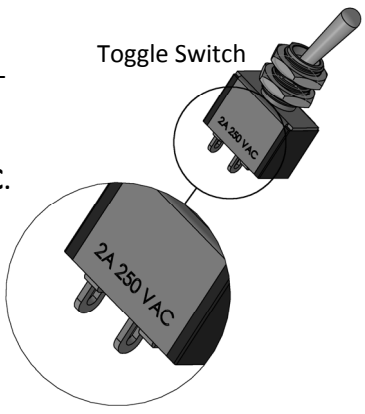
Choice of switch: _____

Reason for choosing: _____

_____

_____

Toggle Switch



Enlarged view of switch

(ii) An enlarged view of the toggle switch reveals the text **2A 250 VAC**.

What do the underlined letters **A** and **V** represent?

Letter **A**: _____

Letter **V**: _____

Question 4 — 40 Marks

(a) *16 marks*

(i) Give **two** reasons why supermarkets use barcodes on their products.

Reason 1: _____

_____

Reason 2: _____

_____



Barcode

(ii) Self-service checkouts are now commonplace in supermarkets.
Suggest **two** advantages of these checkouts.

Advantage 1: _____

Advantage 2: _____



(b) *8 marks*

Fast food restaurants are changing from using polystyrene packaging for their burgers to using cardboard packaging.

(i) In what way does this benefit our environment?

Answer: _____

_____


Burger packaging

(ii) 'Coffee to go' is now very popular in fuel stations. However the cups are not environmentally friendly. Suggest a solution to this problem.

Possible Solution: _____

_____

_____



(c) *16 marks*

Fruit producers, such as those producing strawberries, have begun to use robotic machines to pick the fruit.



(i) Identify **two** key problems that the robotic machine would need to overcome to successfully pick the fruit.

Problem 1: _____

Problem 2: _____

(ii) The Dutch company 'Greenbot' placed the first totally robotic tractor on the market in 2015. It is unmanned and uses GPS navigation.

Explain the terms 'unmanned' and 'GPS'.

Unmanned: _____

_____

GPS: _____


Greenbot robotic tractor