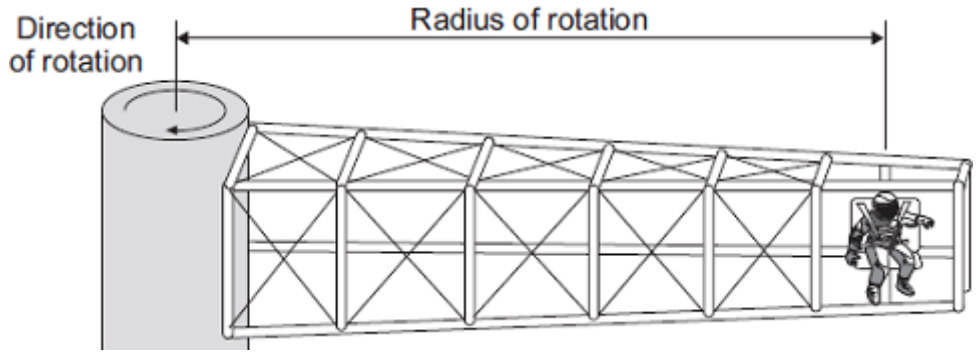
Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Q1.

The diagram shows a 'G-machine'. The G-machine is used in astronaut training.

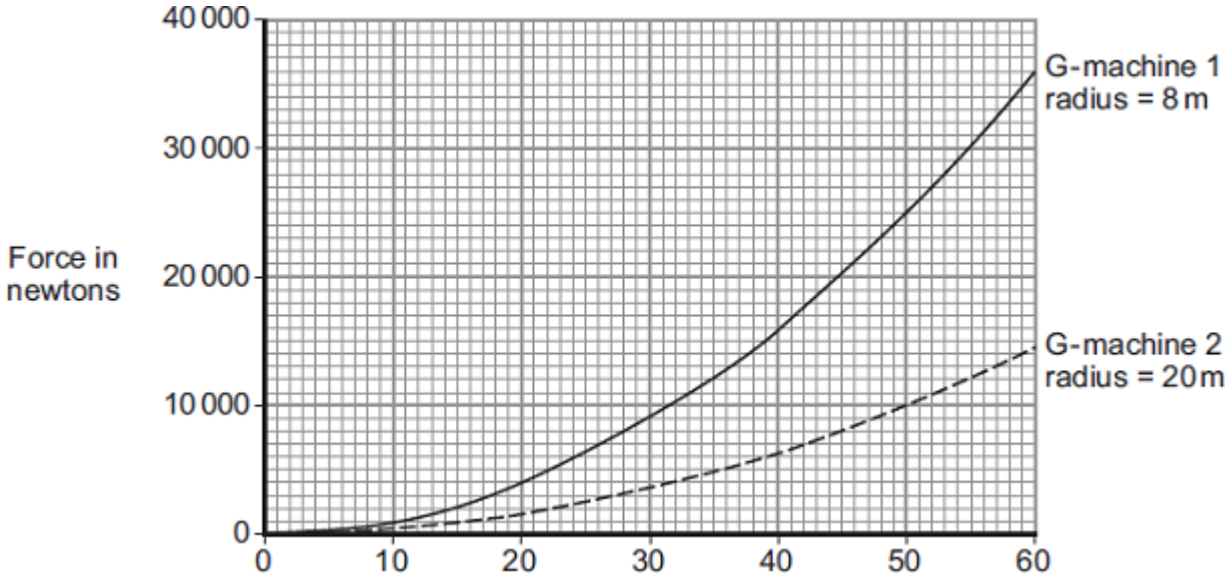


The G-machine moves the astronaut in a horizontal circle.

(a) The force causing the astronaut to move in a circle is measured.

The graph shows how the speed of the astronaut affects the force causing the astronaut to move in a circle for two different G-machines.

The radius of rotation of the astronaut is different for each G-machine.



(i) State **three** conclusions that can be made from the graph.

1. _____

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2. _____

_____

3. _____

_____

(3)

(ii) The speed of rotation of G-machine 1 is increased from 20 m/s to 40 m/s.

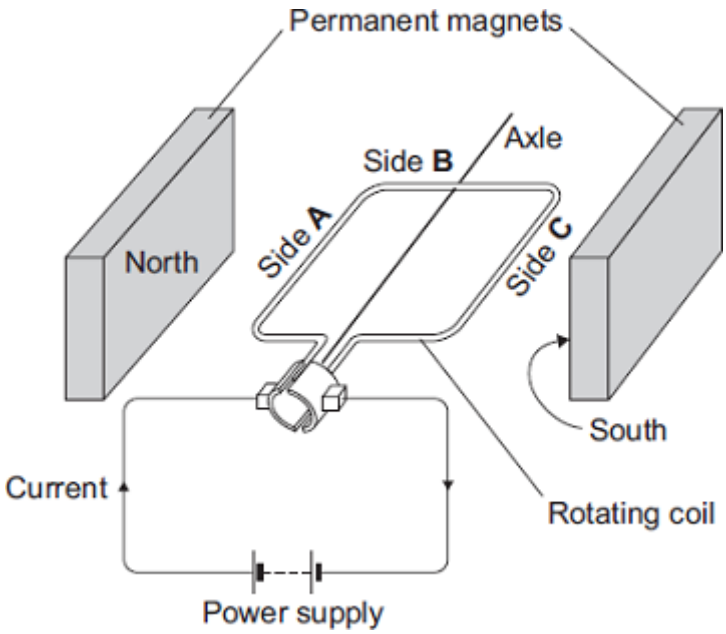
Determine the change in force on the astronaut.

_____

Change in force = _____ N

(1)

(b) Each G-machine is rotated by an electric motor. The diagram shows a simple electric motor.



(i) A current flows through the coil of the motor.

Explain why side **A** of the coil experiences a force.

_____

_____

_____

_____

(2)

(ii) Draw arrows on the diagram to show the direction of the forces acting on side **A** of the coil and side **C** of the coil.

(1)

(iii) When horizontal, side **B** experiences no force.

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Give the reason why.

_____

_____

(1)

(c) While a G-machine is rotating, the operators want to increase its speed.

What can the operators do to make the G-machine rotate faster?

_____

_____

(1)

(d) The exploration of space has cost a lot of money.

Do you think spending lots of money on space exploration has been a good thing?

Draw a ring around your answer.

Yes **No**

Give a reason for your answer.

_____

_____

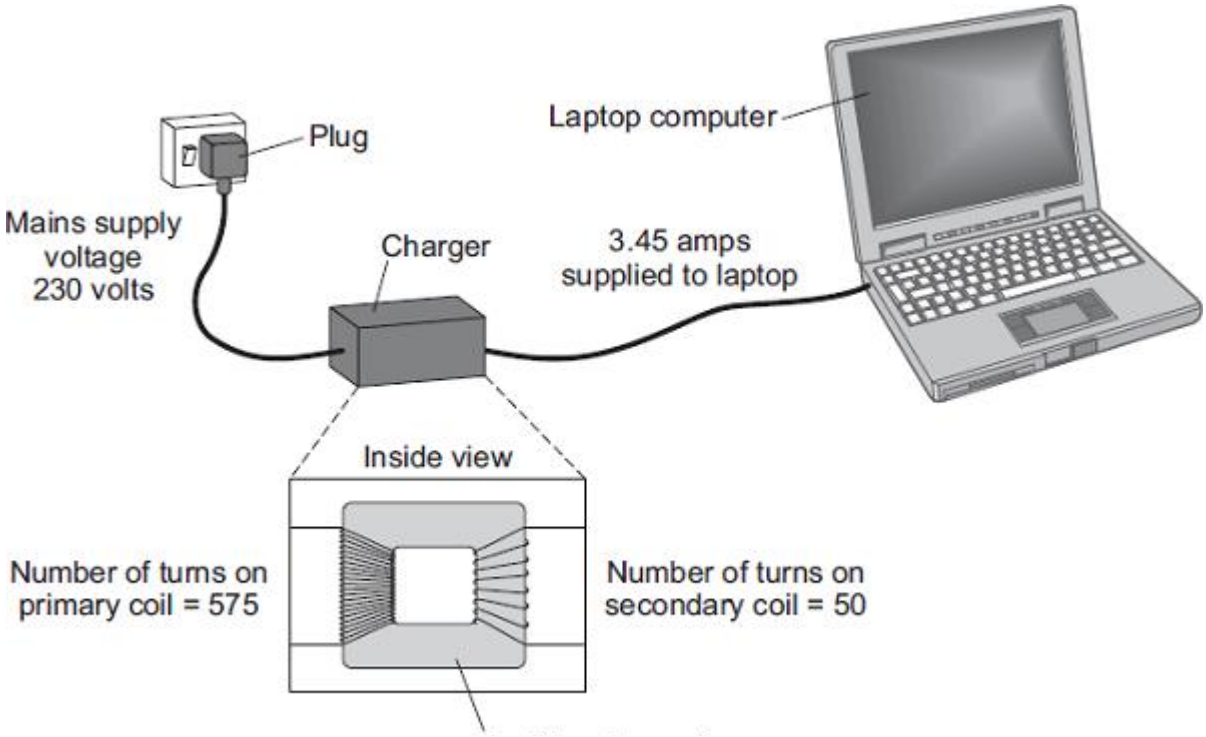
(1)

(Total 10 marks)

Q2.

Batteries inside laptop computers are charged using laptop chargers. The laptop charger contains a traditional transformer.

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(a) The alternating current flowing through the primary coil of the transformer creates an alternating current in the secondary coil.

Explain how.

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(b) (i) Use information from the diagram to calculate the potential difference the charger supplies to the laptop.

_____

_____

_____

_____

Potential difference = _____ V

(2)

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(ii) Calculate the current in the primary coil of the transformer when the laptop is being charged.

Assume the transformer is 100% efficient.

_____

_____

_____

_____

Current = _____ A

(2)

(c) Laptop batteries and mobile phone batteries can only be recharged a limited number of times. After this, the batteries cannot store enough charge to be useful. Scientists are developing new batteries that can be recharged many more times than existing batteries.

Suggest **one** other advantage of developing these new batteries.

_____

_____

_____

(1)

(Total 8 marks)

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