

Practice Question Set For A-Level  
**Subject : Physics**  
**Paper-1 Topic : 2 (Mechanics)**

**Name of the Student:** \_\_\_\_\_

**Max. Marks : 21 Marks**

**Time : 21 Minutes**

**Q1.**

Electrical power is transmitted from Norway to Britain using a cable laid under the North Sea.  
The following information is published on a website.

The cable has a diameter of 15 cm and a length of 720 km.

It is made of copper of resistivity  $1.7 \times 10^{-8} \Omega \text{ m}$ .

The electrical power transmitted from Norway is 1400 MW and the transmission potential difference is 1100 kV.

The efficiency of this process is almost 100%.

Deduce, by calculation, whether the claim for efficiency is correct.

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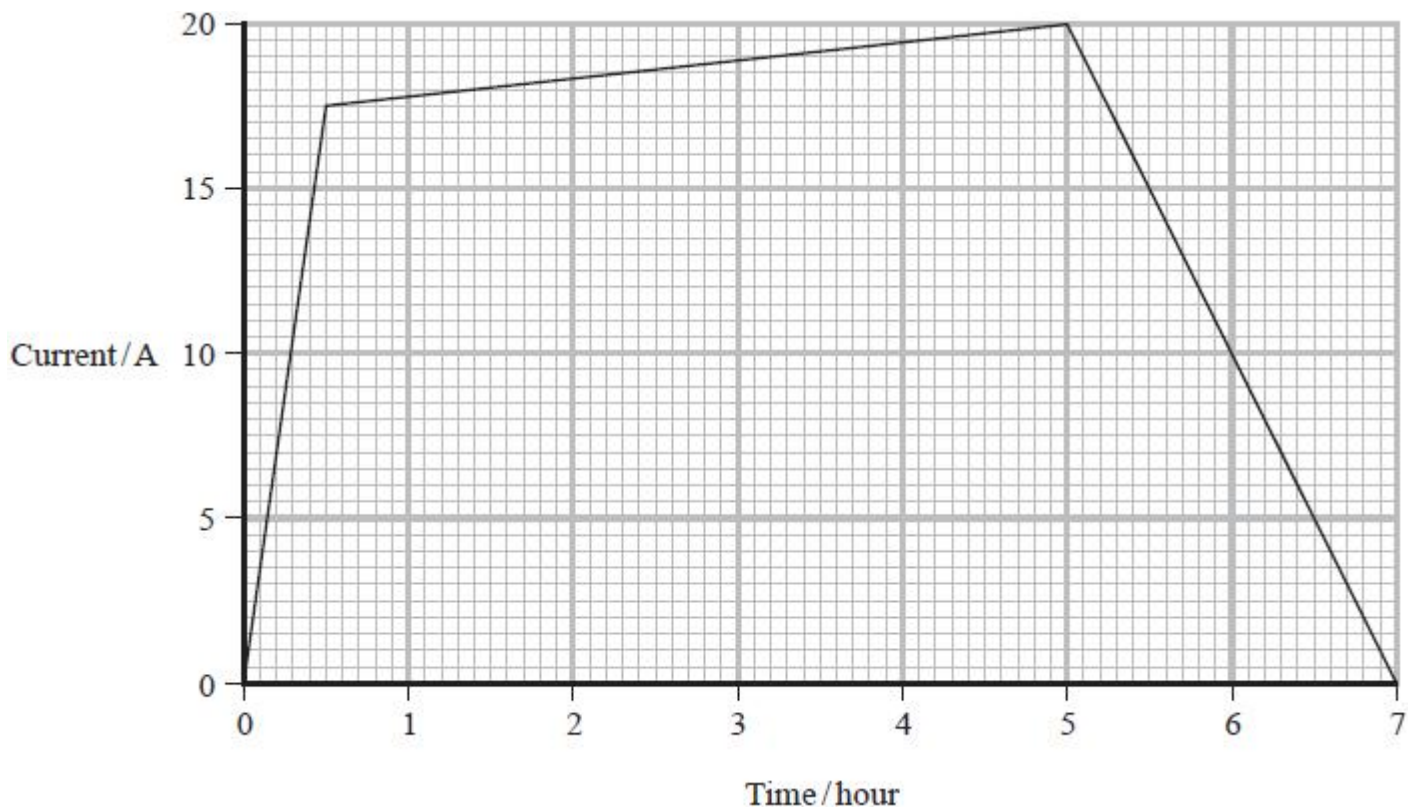
**(Total for question = 6 marks)**

**Q2.**

Electric cars are powered by a large battery within the car.

(a) The manufacturer of an electric car states that the battery stores a maximum charge of 110 Ah.

The graph shows how the current through the battery varies with time as the battery is charged.



The manufacturer claims that it takes 5 hours to reach 90% of the maximum charge. Criticise this statement.

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(b) The manufacturer tested the car by driving it at constant speed along a horizontal track. The manufacturer determined that the maximum range of the car was 160 km.

- (i) Show that the average value for the resistive forces on the car was about 800 N.  
 efficiency of car = 85%  
 energy stored when battery has maximum charge = 42 kW h

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- (ii) The manufacturer repeated the test on a sloping track, as shown. This reduced the maximum range of the car. At the new maximum range, the car had moved upwards through a vertical height of 3.0 km.



Calculate the reduction in the maximum range of the car.  
mass of car = 1300 kg

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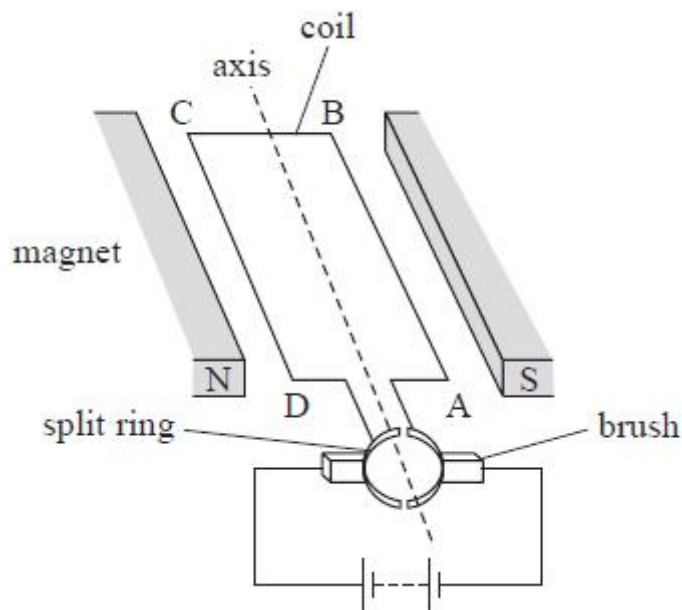
Reduction in maximum range = .....

(Total for question = 9 marks)

**Q3.**

Electric vehicles use a direct current (d.c.) electric motor powered by a battery for propulsion. A simplified diagram of a d.c. electric motor is shown.

A split ring consists of two semi-circular sections that are attached to a coil. The coil is labelled ABCD. Two brushes, made of carbon, rub against and make electrical contact with the split ring.



\* Describe how this arrangement can lead to the coil rotating.

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**(Total for question = 6 marks)**