3 Mobile phone charger X contains a transformer and is used to charge the phone's battery.

Diagram 1 shows the information on charger X.

Input voltage = 230 V
Output voltage = 5.0 V
Output current = 1.2 A

Diagram 1

(a) (i) The power of the charger can be calculated using the formula

power = current × voltage

Calculate the output power of charger X.

(2)

output power = ... W

(ii) Calculate the input current to charger X.

Assume that charger X is 100% efficient.

(3)

input current = ... A

(b) Charger X transfers a charge of 10 500 C to the mobile phone battery.

(i) State the formula linking charge, current and time.

(1)

(ii) Calculate the time in minutes to transfer a charge of 10 500 C to the battery.

(3)

time = ... minutes

(iii) Charger Y can also be used to charge the mobile phone battery.

Diagram 2 shows the information label for charger Y.

Input voltage = 230 V
Output voltage = 5.0 V
Output current = 2.1 A

Diagram 2

Explain how the time taken to transfer the same amount of charge to the mobile phone battery will be affected when charger Y is used instead of charger X.

(2)

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.....

(c) Both chargers contain step-down transformers.

Explain how a step-down transformer works.

You may include a diagram to support your answer.

(4)

(Total for Question 3 = 15 marks)