

**GCSE Physics B (Twenty First Century Science)**  
**J259/02** Depth in physics (Foundation Tier)

**Question Set 3**

1 The generator in a power station is connected to the National Grid through a transformer.

Near a town, other transformers are used to transfer power into homes.

Fig. 1.1 is a simplified diagram showing just one transformer near the homes

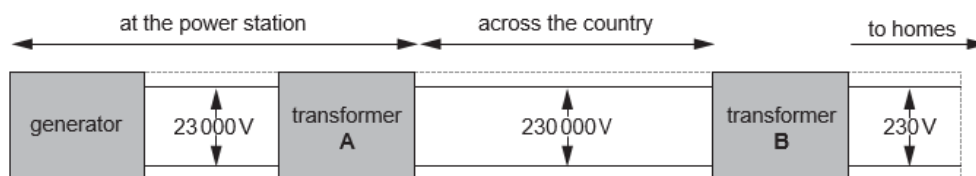


Fig. 1.1

(a) The generator produces an alternating voltage, not a direct voltage.

Explain the difference between these two types of voltage.

[2]

(b) (i) Using Table 1.1 calculate the output current for transformer B.

Use the equation:

Input potential difference  $\times$  Input current = Output potential difference  $\times$  Output current

Transformer A has already been completed.

Transformer	Input potential difference (V)	Input current (A)	Output potential difference (V)	Output current (A)
A	23 000	3 000	230 000	300
B	230 000	300	230	

Table 1.1

[3]

(ii) Use the input data for transformer A to show that the output power of the generator is more than 60 megawatts (MW).

1 MW = 1 000 000 W

Output power = ..... MW [3]

(iii) A typical home needs a power of 10 kilowatts (kW).

1 kW = 1000 W.

Calculate the number of homes that this power station could supply.

Use your answer to **(b)(ii)**.

Number of homes = ..... [2]

(c) All power stations use step-up transformers like transformer **A** between the generator and the National Grid power cables.

Explain how using 230 000 V instead of 23 000 V for the cables across the country makes energy transfer more efficient. [2]

**Total Marks for Question Set 3: 12**

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