Transformers and the turns ratio

Physics calculations (separate Physics only) | AQA GCSE Physics 8463 only (not Combined Science) | 12 questions, 38 marks

GCSE science calculations

Scan for the solutions

Equations for this topic (cover this box to practise recalling them)

- $\frac{\text{potential difference across primary coil}}{\text{potential difference across secondary coil}} = \frac{\text{number of turns on primary coil}}{\text{number of turns on secondary coil}}$ on the physics equation sheet
- potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil on the physics equation sheet
- power = potential difference × current learn this one

Name: _____ **Date:** _____ **Score:** _____ **/ 38**

1 **Higher tier**

A step-down transformer has 2000 turns on its primary coil and 100 turns on its secondary coil. The potential difference across the primary coil is 230 V.

Calculate the potential difference across the secondary coil.

(2 marks)

Answer _____

2 **Higher tier**

In a lab, a step-up transformer is connected to a 12 V alternating supply. The primary coil has 50 turns and the secondary coil has 1000 turns.

Calculate the potential difference across the secondary coil.

(2 marks)

Answer _____

3 **Higher tier**

A transformer for a set of garden lights has a primary p.d. of 240 V and a primary current of 0.5 A. The p.d. across the secondary coil is 6 V. Assume the transformer is 100% efficient.

Calculate the current in the secondary coil.

(2 marks)

Answer _____

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4 **Higher tier**

A generator at a power station produces a potential difference of 25 kV. A step-up transformer has 1000 turns on its primary coil and 16 000 turns on its secondary coil.

Calculate the potential difference across the secondary coil in volts.

(3 marks)

Answer _____

5 **Higher tier**

A phone charger contains a transformer. The primary coil is connected to the 230 V mains. The secondary coil gives 5.0 V and a current of 2.0 A to the phone. Assume the transformer is 100% efficient.

Calculate the current in the primary coil in milliamps.

Give your answer to 2 significant figures.

(3 marks)

Answer _____

6 **Higher tier**

A transformer at an electricity substation near Swindon steps the potential difference down from 132 kV to 11 kV. The current in the primary coil is 50 A. Assume the transformer is 100% efficient.

Calculate the current in the secondary coil.

(3 marks)

Answer _____

7 **Higher tier**

A doorbell runs from a small transformer. The transformer changes 230 V from the mains to 8.0 V for the bell. The primary coil has 1150 turns.

Calculate the number of turns on the secondary coil.

(3 marks)

Answer _____

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8 **Higher tier**

A neon sign above a café in Brighton needs 9200 V. A step-up transformer connected to the 230 V mains supplies this. The secondary coil has 24 000 turns. The current in the primary coil is 0.40 A.

Calculate the number of turns on the primary coil.

(3 marks)

Answer _____

9 **Higher tier**

Rhys finds an old transformer in the school prep room. The coil that connects to the supply has 3000 turns. The coil that connects to a lamp has 250 turns. The lamp is working at 20 V and takes a current of 3.0 A.

Calculate the potential difference of the supply.

(3 marks)

Answer _____

10 **Higher tier**

Ms Kowalski builds a model of the National Grid on a lab bench. Her step-up transformer has 100 turns on the primary coil and 2500 turns on the secondary coil. The primary coil is connected to a 12 V supply and the current in it is 2.5 A. Assume the transformer is 100% efficient.

a. Calculate the potential difference across the secondary coil.

b. Calculate the current in the secondary coil. Show your working.

(4 marks)

Answer _____

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11 **Higher tier**

A 60 W, 12 V lamp in a fish tank is powered from the 230 V mains through a step-down transformer. The lamp works at its normal power. The primary coil has 1150 turns. Assume the transformer is 100% efficient.

a. Calculate the current in the lamp.

b. Calculate the current in the primary coil. Give your answer to 2 significant figures.

c. Calculate the number of turns on the secondary coil. Show your working.

(5 marks)

Answer _____

12 **Higher tier**

At a substation, a step-down transformer takes electricity from 400 kV transmission cables and supplies a town at 11 kV. The primary coil has 8000 turns. The current supplied to the town by the secondary coil is 1200 A. Assume the transformer is 100% efficient.

a. Calculate the number of turns on the secondary coil.

b. Calculate the current in the transmission cables connected to the primary coil. Show your working.

(5 marks)

Answer _____

End of questions | Total 38 marks

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