Signature: Name: Marks:

Charge, Current, Voltage, Energy and Power Worksheet

Q1.

A charge of 30 C flows through an electrical circuit in 20 seconds. What is the current flowing in the circuit?

Q2.

2.25×10^{20} electronics flows through a bulb in 2 minutes. Calculate the electric current that flows through the bulb. (Charge on one electron is $1.6 \times 10^{-19} C$)

Q3.

Calculate the number of electrons that flow through a wire if a steady current of 1.5 A flows through the wire for 2 minutes. (Charge on an electron is 1.6×10^{-19})

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Q4.

How many electronics are there in 0.8 C of charge? (Charge on one electron is 1.6×10^{-19} C)

Q5.

When lightning strikes, 500 C of charge is transferred and 1.6×10^{9} J of energy is dissipated. What is the potential difference between the cloud and the earth?

Q6.

The potential difference across two metal plates is 400 V. How much energy is required to transfer 50 C of charge across the two plates?

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Q7.

What is the number of electrons transferred across two metal plates of potential difference 420 V if 1.26×10^4 J of energy is dissipated during the process? (Charge of an electron = 1.6×10^{-19} C)

Q8.

A current of 0.2 A flows in a conductor when a potential different of 3 V is applied across it. Calculate the resistance of the conductor.

Q9.

Calculate the current flowing across a conductor with resistance of 50 Ω when a potential difference of 12 V is applied across the conductor.

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Q10.

A constantan wire of length 3x and diameter 2d has the resistance R. What is the resistance, in terms of R, for another constantan wire of length x and diameter d?

Q11.

State four factors that affect the resistance of a conductor.

Q12.

When a resistor is connected to a 6 V supply, 6.25×10^{19} electrons flow across the resistor in every 2 seconds. Calculate the energy dissipated and electrical power. (Charge of electron = 1.6×10^{-19} *C*)

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Q13.

A 48 Ω resistor was connected to a 240 V power supply. Calculate the amount of energy dissipated in the resistor after 2 minutes.

Q14.

A 48 Ω resistor was connected to a 240 V power supply. Calculate the amount of energy dissipated in the resistor after 2 minutes.

Q15.

When a bulb is connected to a power supply of 12 V for 3 minutes, 1080 J of energy is dissipated. Calculate

a) the resistance of the bulb

b) the amount of energy dissipated when the same bulb is connected to a power supply of 20 V for 5 minutes.

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Q16.

A water heater is rated 240 V, 1500 W. Calculate the resistance of the heating element and the current when the water heater is connected to a 240 V power supply.

Q17.

When an electrical kettle is connected to a 240 V power supply, 216 KJ of energy is dissipated in 5 minutes. Calculate

a) the power of the electrical kettle

b) the resistance of the heating element

c) the current that flows when the 240 V supply is connected.

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Q18.

A water heater is rated 240 V, 400 W heats up 120 g of water from 25 ^{0}C to 38 ^{o}C in 8 seconds. Calculate the efficiency of the water heater. (Specific heat capacity of water = 4200 J kg^{-1} $^{o}C^{-1}$)

Q19.

The diagram shows a light bulb which glows brightly when electrical current flows through it.

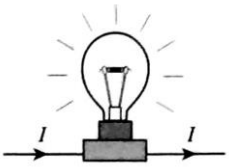

Diagram 1

a) What is the meaning of current?

b) Name one instrument that can be used to measure the magnitude of current flow.

c) A constant current of 3.0 A flows through the light bulb for 0.5 minute. Calculate the amount of charge that flows through the bulb.

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Q20.

Diagram 2 shows an electric iron with power rating 240 V, 1800 W,

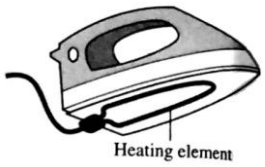

Diagram 2

a) State one suitable material that can be used as the heating element in the electric iron.

b) The electric iron in Diagram 2 is connected to a 240 V power supply. Calculate

I. The current that flows through the heating element
II. The resistance of the heating element

c) A student carried out an investigation to compare the heating effect of the heating elements P, Q and R. The electric iron is switched on until it reaches a certain fixed temperature. The table below shows the results of the investigation.

Heating element	**Potential Difference /V**	**Current /A**	**Time required to reach a fixed temperature / minutes**
P	240	8.0	2.0
Q	240	5.0	5.0
R	240	3.0	3.0

I. State the energy change the occurs when the electric iron is switched on.
II. Calculate the energy supplied by each of the heating elements P, Q and R to reach the temperature required.
III. Based on your answers in (c)II., suggest the most suitable heating element to be used in the electric iron. Give one reason for your answer.