

N4 Electricity and Energy

Homework One

1. Draw the circuit symbols for the following components:

- a) ammeter
- b) voltmeter
- c) resistor
- d) switch
- e) lamp
- f) battery

(6)

2. Copy and complete the following sentences using words from the following list:

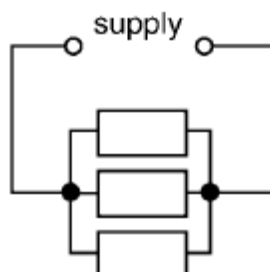
negatively positively electrons protons parallel series

- a) Current is the rate of flow of _____ charged particles called _____.
- b) When measuring the current in a component, the ammeter must be placed in _____ with the component.
- d) When measuring the voltage across a component, the voltmeter must be placed in _____ with the component.

(4)

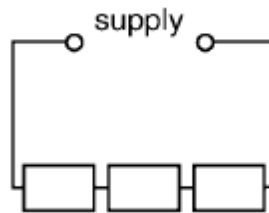
Homework Two

1. In the following circuit, are the resistors connected in series or parallel?



(1)

2. In the following circuit, are the resistors connected in series or parallel?



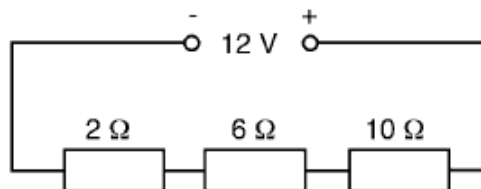
(1)

3. Which of the following circuit rules are for series circuits and which are for parallel circuits?

- A the current is the same at all points in the circuit
- B the sum of the branch currents is equal to the current drawn from the supply
- C the voltage across components in this circuit is the same for all components
- D the sum of the voltages across the components in this circuit is equal to the supply voltage

(4)

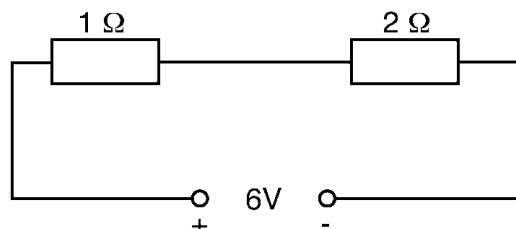
4. The circuit shows a 12 V supply connected to three resistors.



The voltage across the 2 Ω resistor is 1.3 V. The voltage across the 10 Ω resistor is 6.7 V.
State the voltage across the 6 Ω resistor.

(1)

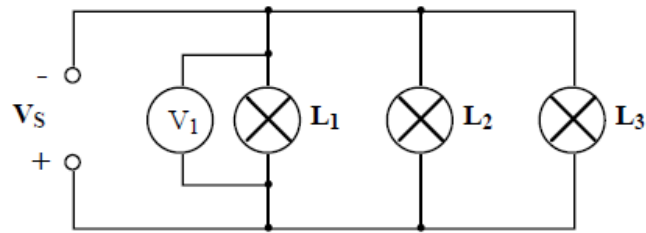
5. Two resistors are connected to a 6 V supply as shown.



The current flowing through the 1 Ω resistor is 2 Amperes.
State the current flowing through the 2 Ω resistor.

(1)

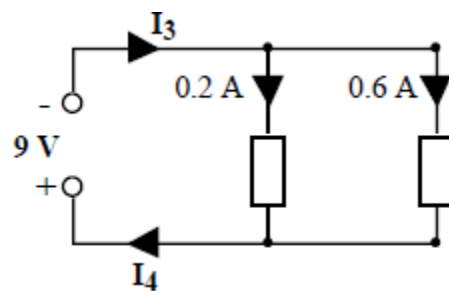
6. In the following circuit the value of V_s is 12 V.



State the reading on voltmeter V_1 .

(1)

7. Look at the circuit shown below.



Which one of the following statements is true?

- A I_3 is greater than I_4
- B I_3 is less than I_4
- C I_3 is the same as I_4

(1)

Homework Three

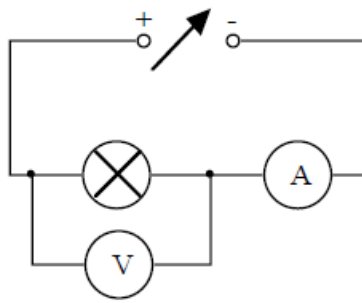
1. Copy and complete the following:

Resistance is the _____ to the flow of current.

Resistance is measured in units called _____.

(2)

2. The following circuit diagram is used to carry out an Ohm's Law experiment.



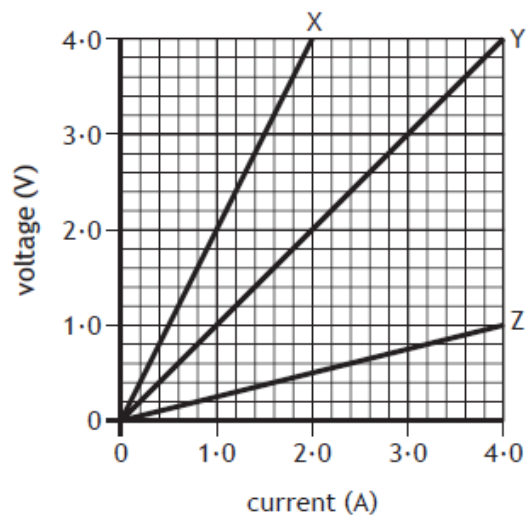
a) Explain how you would use the meter readings to find the resistance of the lamp.

(1)

b) The voltmeter reading is 12 V. The ammeter reading is 10 A. Calculate the resistance of the lamp.

(3)

3. The graph shows how the voltage varies with current for three resistors X, Y, and Z.



a) State the current for resistor X when the voltage is 4.0 V.

(1)

b) Calculate the resistance of resistor Z when the voltage is 1.0 V.

(3)

Homework Four

1. Copy and complete the sentences by inserting one of the following words.


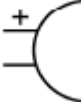

analogue *digital*

a) _____ components **switch directly** from one value to the next value e.g. from on to off.

b) _____ components will operate over a **continuous range** of values.


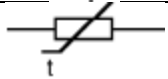

(2)

2. Copy and complete the following table for output components.

Device	Symbol	Energy Change	Analogue or Digital?
		Electrical to Sound	Analogue
Buzzer		Electrical to Sound	
Lamp		Electrical to Light	
L.E.D		Electrical to Light	Digital

(4)

3. Copy and complete the following table for input components.

Device	Symbol	Energy Change	Analogue or Digital?
		Sound to Electrical	Analogue (Responds to a range of sounds)
Thermistor		Heat to Electrical	
LDR		Light to Electrical	Analogue (Responds to a range of light levels)
Switch		Kinetic to Electrical	

(4)

Homework Five

1. Draw the circuit symbol for the following logic gates,

a) AND-gate

b) OR-gate

c) NOT-gate

(3)

2. Which logic gate has the following truth table?

Input A	Input B	Output C
0	0	0
0	1	1
1	0	1
1	1	1

(1)

3. Which logic gate “combines the input signals so that the output is only 1 when both inputs are 1”?

(1)

4. Draw an electronic circuit diagram that could be used for a system that turns on a cooling fan during the day when it becomes too hot.

The components that are available are listed below:

LDR Thermistor AND-gate Motor

(5)

Homework Six

1. Name the Physics quantity which is defined as “the energy transferred every second”.

(1)

2. A pair of straighteners is connected to an energy meter. After 300 seconds the energy meter reads 450000 Joules.



Calculate the power rating of the straighteners.

(3)

3. An electric toothbrush has a power rating of 16 W.



a) Calculate how much electrical energy is supplied to the toothbrush when it is used for 120 seconds.

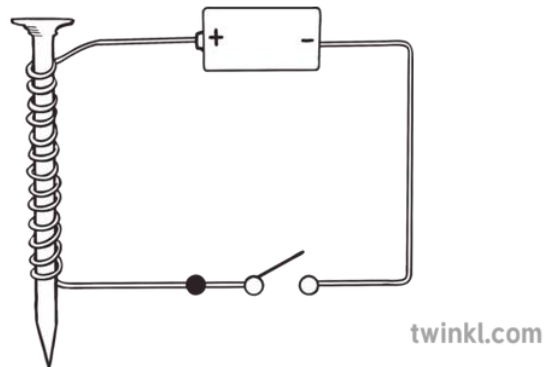
(3)

b) The output energy from the toothbrush in this time is 1152 J. Calculate the percentage efficiency of the toothbrush.

(3)

Homework Seven

1. A diagram of a simple electromagnet is shown below.



Copy this diagram and add the following labels:

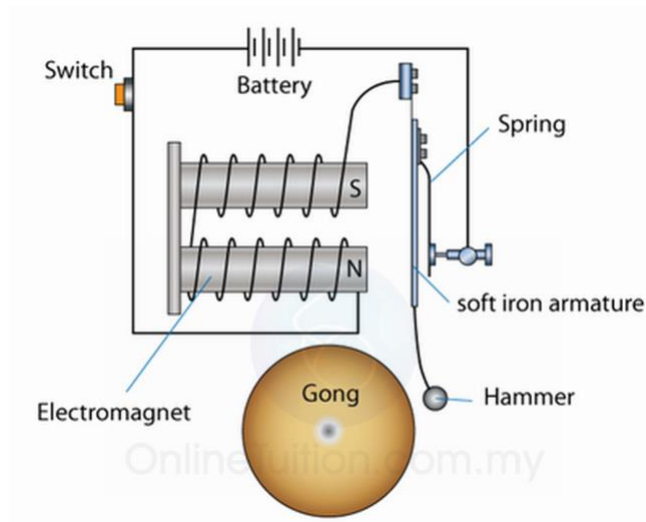
coil of wire

battery

switch

(3)

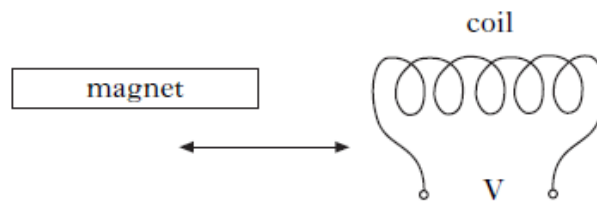
2. Electromagnets are often used in electric bells.



Explain why an electromagnet is used in the bell rather than a permanent magnet.

(2)

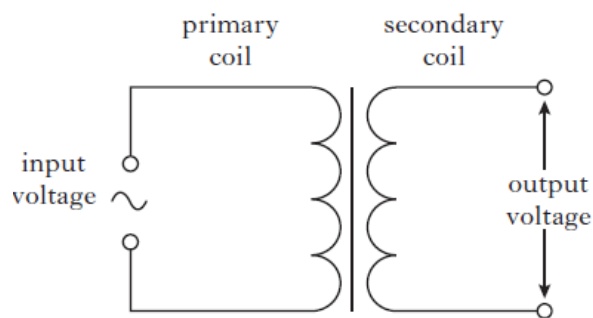
3. When a permanent magnet is pushed into or pulled out of a coil of wire, a voltage is induced across the ends of the wire.



Name two ways to make the voltage induced as large as possible.

(2)

4. A student investigates the operation of a transformer. The circuit used is shown below.



The data from the investigation is shown below.

Input voltage = 8 V

Number of coils on primary coil = 400

Number of coils on secondary coil = 2000

Use this data to calculate the output voltage.

(3)

Homework Eight

1. Wind is an energy source that can be used many times without running out.



a) State two other energy sources that can be used many times without running out.

(2)

b) State the group name that is used for all energy sources that can be used many times without running out.

(1)

c) State an advantage of using this group of energy sources.

(1)

d) State a disadvantage of using this group of energy sources.

(1)

2. Coal is an energy source that is used in many power stations.



a) Coal is an example of a fossil fuel. State the names of two other fossil fuels.

(2)

b) Why are fossil fuels described as non-renewable energy sources?

(1)

c) State an advantage of using non-renewable energy sources.

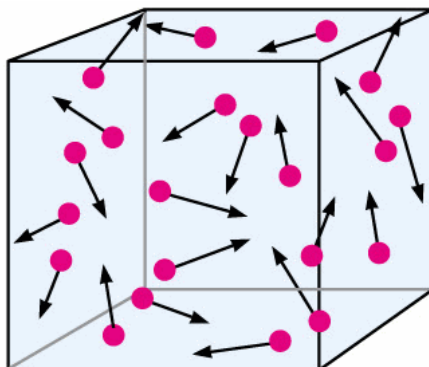
(1)

d) State a disadvantage of using non-renewable energy sources.

(1)

Homework Nine

1. The Kinetic Theory of Gases can be shown by the following diagram.



Use some of the words below to copy and complete the statements about the Kinetic Theory of Gases.

close together far apart fast large
organised random slow small

- a) Gases are made up of lots of very _____ particles.
- b) The particles in a gas are very _____.
- c) Gas particles always move in a very _____ fashion.
- d) The particles in a gas are always moving at very _____ speeds.

(4)

2. State the value of absolute zero on the degrees Celsius scale.

(1)

3. Copy and complete this table about the Gas Laws, by correctly matching the law to its explanation.

Name of Law	Explanation
Boyle's Law	Volume occupied by a gas will increase when the temperature increases
Charles' Law	The pressure of a gas will increase when the temperature of the gas increases
Gay-Lussac's	The pressure of a gas will increase when the volume of the gas decreases

(3)

4. A balloon is placed in a fridge for several hours.



State what will happen to the volume of the balloon. Explain your answer.

(2)