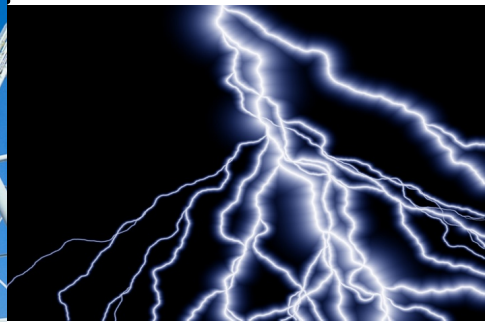
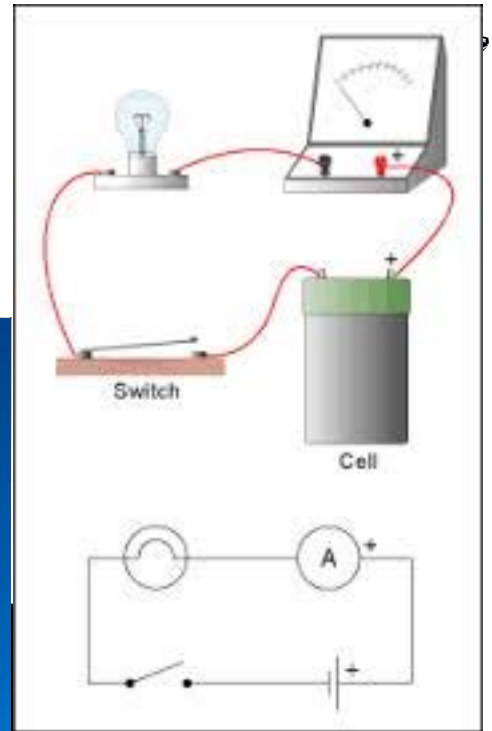


# Physics

Name:

*Dcttj gcf 'J kij 'Uej qqn*  
*Physics Department*

## Electricity



Quick Homeworks



## Homework tips

- Start homework as soon as possible. Do not leave it until the night before the due date.
- Refer to summary notes, jotter notes and example problems when completing homework.
- If after doing above there are any issues ask your teacher for help. This must be done at least 1 full day before due date. This will then give you the opportunity to complete the homework by due date.

Sign below to state that you have read this.

Pupil \_\_\_\_\_

Parent \_\_\_\_\_

# ELECTRICITY

## *Homework Exercises*

### Homework 2.1 – Electric Charge and Current (pupil pack p 8, 9)

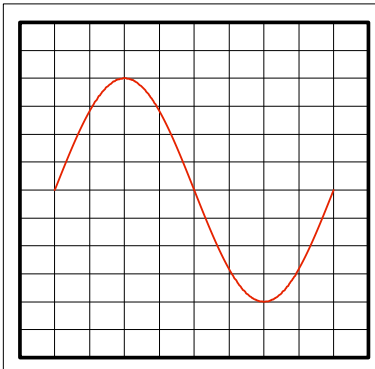
1. Explain what alternating current and direct current mean, and state the type of supply (mains or battery) that produces each. (3)

2. (a) What are the two types of electric charge? (½)

(b) Copy and complete:  
Like charges \_\_\_\_\_, Unlike charges \_\_\_\_\_ (½)

3. Construct a table showing the following components with their correct symbol:  
*cell; bulb; resistor; diode* (2)

4. Look at this oscilloscope pattern:



(a) Is this trace representing ac or dc input? (1)

(b) If the gain is set at 2 V per division, what is the peak voltage of the trace? (1)

(c) Describe what would happen to the trace on the screen if a 3 V source was used instead. Use the words frequency and amplitude in your answer. (1)

5. How does the *peak* value of an alternating voltage compare to its quoted value? (1)

**Total 10 marks**



# ELECTRICITY

## *Homework Exercises*

### Homework 2.2 - Electric Charge and Current (pupil pack p 9)

1. State the symbol, the correct unit and the shortened form of the unit in the appropriate columns for each of the quantities listed. The first one has been done for you. (2)

QUANTITY	SYMBOL	UNIT	UNIT SYMBOL
time	t	second	s
current			
voltage			

2. What is an electric current? (1)
3. (a) Calculate the charge that passes along a wire if a current of 10 A flows for 30 seconds. (2)  
(b) Calculate the charge that passes through a bulb if it draws a current of 500 mA for 8 seconds. (2)  
(c) 12 Coulombs pass through a lamp in 6 seconds. What is the current flowing through the lamp? (2)
4. What is the definition of the voltage of a supply? (1)

**Total 10 marks**

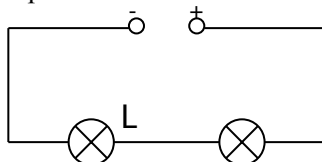


# ELECTRICITY

## Homework Exercises

### Homework 2.3 – Circuits (pupil pack p9,10)

1. Draw this circuit diagram carefully in your homework jotter, adding the circuit symbol for an **ammeter** in position to measure the current through lamp L. Then add the circuit symbol for a **voltmeter** in position to measure the voltage across lamp L. (2)

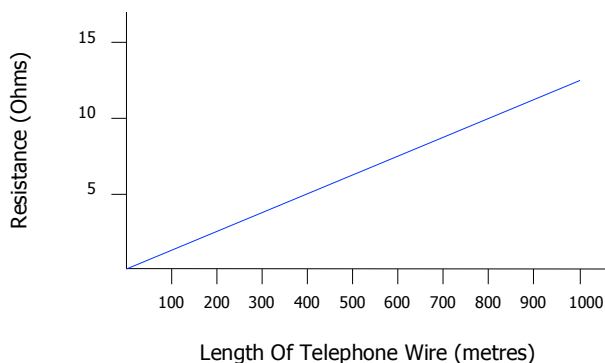


2. What happens to the current in a circuit when the resistance is increased? (1)

3. A lamp has a resistance of  $960 \Omega$ . It needs to draw a current of  $0.25 \text{ A}$  to operate at its correct brightness. What size of voltage does it need? Use Ohm's law to calculate the answer. (2)



4. The graph below shows how the resistance of telephone wire varies with length.



- (a) From the graph, what will be the resistance of a length of wire 400 metres long? (1)  
(b) Use this answer to calculate the resistance of a piece of wire 20 000 m long. (1)  
(c) The electrical signals must be boosted at regular intervals in order for the signal to remain strong enough. One amplifier is required for every  $50 \Omega$  of resistance.

Calculate the number of amplifiers needed for the 20 000 m long piece of wire in part (b). (1)

**Total 10 marks**





# ELECTRICITY

## *Homework Exercises*

### Homework 2.4 –Circuits II (pupil pack p 10,11)

1. Give one example from your home where two switches are used in series to switch on an appliance. (1)
  
2. (a) Draw a circuit diagram for a circuit that has three lamps in series attached to a battery pack, and add a switch that controls all three lamps. (1)  
(b) If the three lamps are rated as "6 V, 0.06 A", calculate the **supply voltage** needed to allow them to operate properly. (2)  
(c) What size of current will be drawn from the battery? Explain why it is this value. (2)
  
3. (a) Draw a circuit diagram for a circuit that has three lamps in parallel attached to a battery pack, and add a switch that controls all three lamps. (1)  
(b) If the three lamps are rated "6 V, 0.06 A", calculate the current drawn from the battery pack. (1)  
(c) What size voltage must the battery be to allow them to operate properly? Explain why it is this value. (2)

*Total 10 marks*

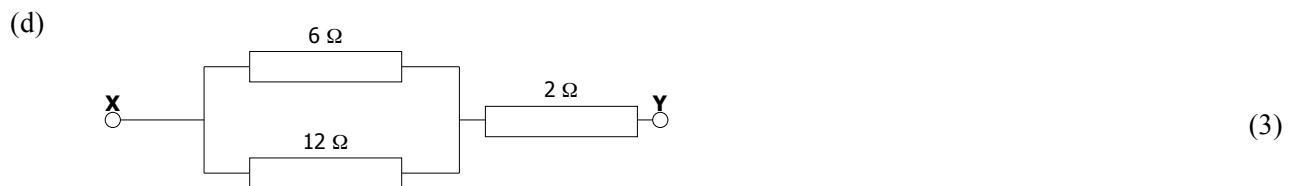
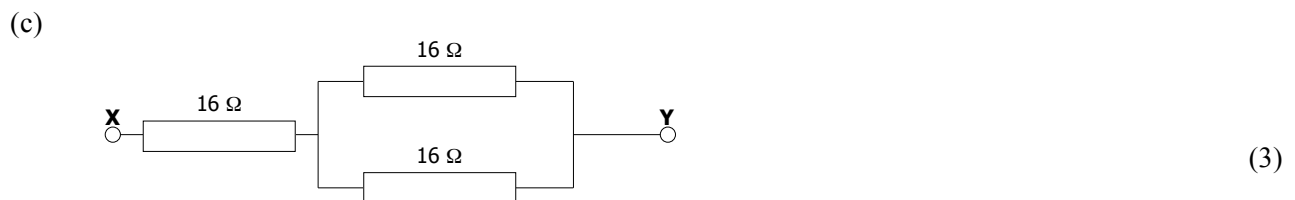
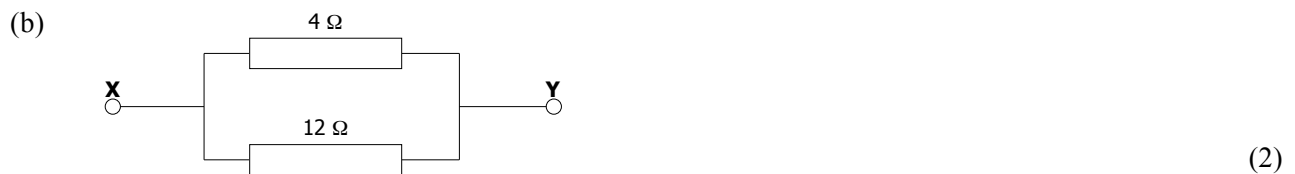


# ELECTRICITY

## *Homework Exercises*

### Homework 2.5 –Circuits III (pupil pack p 10,11)

1. Calculate the equivalent resistance between **X** and **Y** in each of the following networks, showing all the working for each one:



*Total 10 marks*



# ELECTRICITY

## *Homework Exercises*

### Homework 2.6 – Circuits (pupil pack p 12,13)

1. Copy and complete the following table:

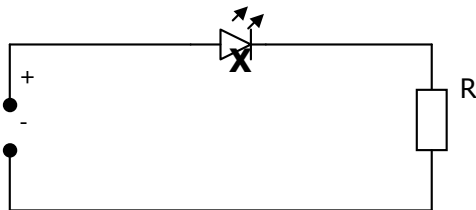
(5)

OUTPUT DEVICE	ENERGY CHANGE	SYMBOL
	Electrical →	⊗
Motor	Electrical →	
	Electrical →	🔊
Solenoid	Electrical →	
	Electrical →	🔌

2. For each of the devices mentioned in the table above, state whether it is an analogue output or a digital output.

(2)

3.



(a) What would happen in the circuit if the LED was connected the opposite way around?

The LED is attached to a 6 V supply. An excerpt from its data sheet is given below:

Working voltage: 2.7 V

Working current: 110 mA

(b) Calculate the value of the resistor R needed.

(3)



# ELECTRONICS

## *Homework Exercises*

### Homework 2.7 – Circuits (pupil pack p12,13)

1. Copy and complete the following table:

(2)

INPUT DEVICE	ENERGY CHANGE
solar cell	→
	heat → electrical
microphone	→

2. Sketch a graph to show how the resistance of an LDR might vary with light intensity.

(2)

3. A thermistor is placed in a beaker of water and its resistance measured with an ohmmeter at various temperatures. The following results are obtained:

TEMPERATURE(°C)	RESISTANCE (Ω)
0	980
10	600
20	375
30	300
40	240
50	160
60	108
70	75
80	53

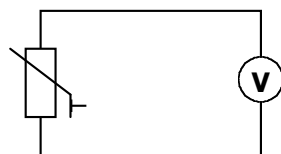
(a) What is the resistance of the thermistor at 30 °C?

(1)

(b) If the thermistor was connected to a 6V battery, how much current would flow through it at 30 °C?

(2)

4. A girl decides to find out how a thermistor could be used to investigate temperature changes. She sets up the following circuit:



(a) Suggest why this circuit is not suitable for her purpose.

(1)

(b) Explain how she could change the circuit, and redraw the amended version.

(2)

**Total 10 marks**






# ELECTRICITY

## *Homework Exercises*

### Homework 2.8 – Electrical Power (pupil pack p14,15)

1. Name 3 electrical devices from the home that use resistors to convert electrical energy into heat. You should only list devices that do this on purpose – for instance, televisions heat up, but you don't switch on the TV to heat the room! (3)
  
  2. (a) A 1200 W hair dryer is connected to the mains (230 V). Calculate the current drawn. (2)  
(b) The dryer is used for 5 minutes. How much electrical energy is used in this time? (2)
- 
- 
3. A 100 W light bulb is found to draw a current of 0.43 A when it is operating correctly. Use this information to calculate the resistance of its filament. (3)

**Total 10 marks**



# ELECTRICITY

## *Homework Exercises*

### Homework 2.9 – Behind the Wall (pupil pack p 15)

Answer the following questions about household wiring:

1. How are appliances connected in household wiring – in series or in parallel? (1)
2. (a) Give two reasons why the ring circuit is the preferred method for wiring sockets in parallel. (2)  
(b) Sketch a circuit diagram of a ring circuit with three sockets connected to it. Label each wire drawn. (2)
3. For each appliance, fill in the correct energy change. (3)

APPLIANCE	MAIN ENERGY TRANSFORMATIONS
Lamp	Electrical →
Vacuum Cleaner	Electrical →
Iron	Electrical →
Fan Heater	Electrical →
Television	Electrical →
Hi-fi	Electrical →

4. Copy and complete the table below: (2)

APPLIANCE	POWER RATING	FUSE
Clock	10 W	
Table lamp	60 W	
Iron	1200 W	
Kettle	2000 W	

*Total 10 marks*

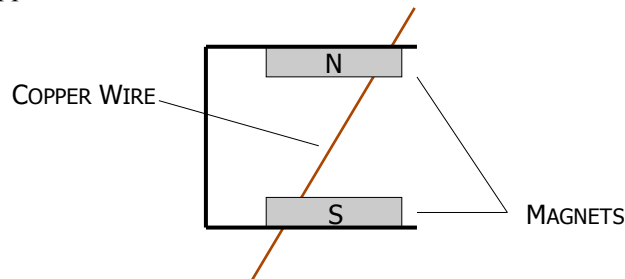


# ELECTRICITY

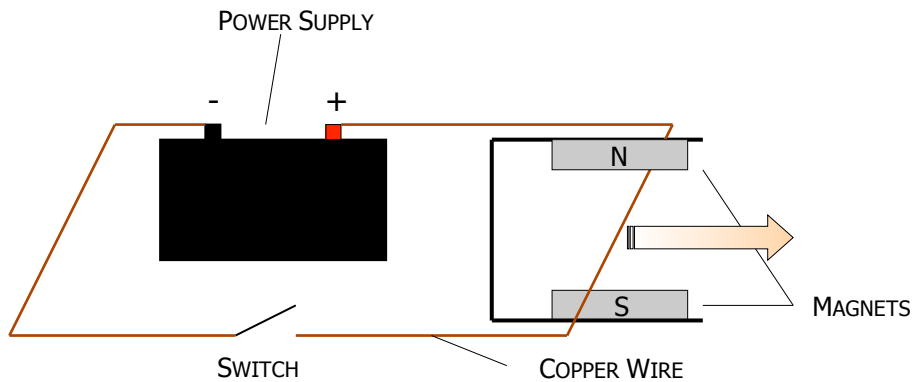
## *Homework Exercises*

### Homework 2.10 – Magnetism and Electromagnetism (pupil pack p 16)

1. (a) What exists around a wire when an electric current flows through it? (1)  
(b) If the wire is wrapped into a coil, what does the coil become when a current flows through it? (1)  
(c) List two practical applications that make use of this effect. (2)
  
2. A wire is placed in a magnetic field as shown. When a current flows through the wire, what happens to it? Why does this happen? (2)



3. In the diagram below, the copper wire moves to the right when the switch is closed. Describe **two** ways of getting the wire to move to the left when the switch is closed. (2)



4. Draw the field lines around a permanent magnet. (2)

*Total 10 marks*



# ELECTRONICS

## *Homework Exercises*

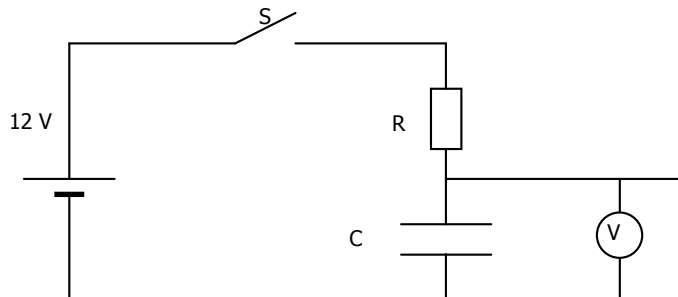
### Homework 2.11 – Input Devices P13/14 Summary Notes

1. Copy and complete the following table:

(4)

INPUT DEVICE	ENERGY CHANGE
solar cell	→
	heat → electrical
microphone	→

2. Look at the following circuit. Capacitor C is initially discharged. Switch S is now closed



(a) What will the voltmeter read before the switch is closed?

(1)

(b) What happens to the voltage as time goes on after the switch is closed?

(1)

3. Use the following list of input devices to choose the most appropriate input for the following systems:

(2)

microphone; thermocouple; solar cell; LDR; switch; voltage divider; capacitor; thermistor.

(a) Karaoke machine

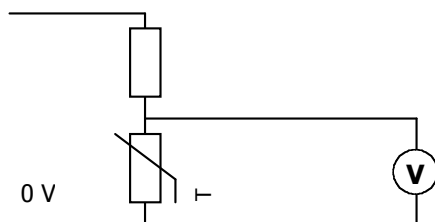
(b) Automatic camera flash

(c) Temperature control in a fish tank

(d) Time delay switch on a burglar alarm

3. The circuit shown below was set up. The thermistor used has its resistance vary with temperature as show in the table. The fixed resistor has a value of  $1000\ \Omega$ .

+5 V



TEMPERATURE ( $^{\circ}\text{C}$ )	RESISTANCE ( $\Omega$ )
20	1000
50	700
100	100

(a) What is the reading on the voltmeter at room temperature ( $20\ ^{\circ}\text{C}$ )?

\*6+

**Total 10 marks**



