T10pt2 Electricity and Circuits MIXED

Section A

1) The voltage and frequency of UK mains electricity is
- ☐ **A:** 110 V and 60 Hz
- ☐ **B:** 230 V and 50 Hz
- ☐ **C:** 50 V and 230 Hz
- ☐ **D:** 60 V and 110 Hz

2) What is described as 'the movement of charge in one direction only'?
- ☐ **A:** potential difference
- ☐ **B:** resistance
- ☐ **C:** direct current
- ☐ **D:** alternating current

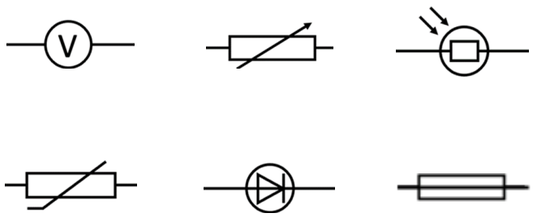
3) Which of these is **not** an electrical safety feature
- ☐ **A:** fuse
- ☐ **B:** circuit breaker
- ☐ **C:** Earth wire
- ☐ **D:** thermistor

4) Name the quantity that has been measured if the measurement is 110 W
- ☐ **A:** power
- ☐ **B:** energy
- ☐ **C:** potential difference
- ☐ **D:** charge

5) What should you do to an LDR to lower its resistance?
- ☐ **A:** make it warmer
- ☐ **B:** make it colder
- ☐ **C:** increase the light intensity shining on it
- ☐ **D:** decrease the light intensity shining on it

6) Which of the following supplies alternating current (AC)?
- ☐ **A:** batteries
- ☐ **B:** mains plug sockets
- ☐ **C:** cells
- ☐ **D:** solar panels

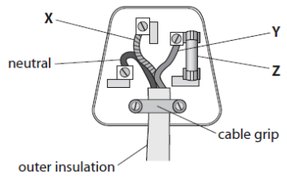
Name each of the components represented by these symbols.



Draw a circuit diagram for a circuit that could be used to calculate how the resistance of a fixed resistor changes as the current flowing through it changes.

Many devices are connected to mains electricity using a cable that contains three different wires. Draw lines to match the wires to their features and function

Potential difference	Wire	Colour	Function
230 V	Neutral	Blue	Connects to the output of a power station.
0 V	Live	green/ yellow	Completes the circuit back to the power station.
0 V	Earth	Brown or Red	Provides a route for current to flow down instead of flowing through a human if there is a fault.



Name the parts of the plug shown in the diagram.

X .....

Y .....

Z .....

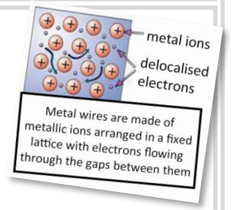
Section B

State the energy transfers happening in a filament lamp

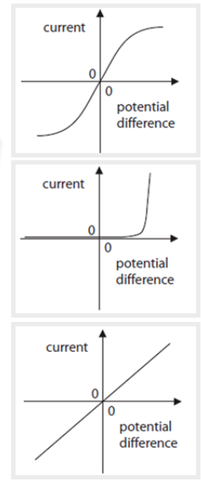
..... → ..... and .....

Explain why as the current flowing through a filament lamp increases, so does the resistance of the filament lamp.

Include the words: Electrons, ions, vibration, collisions.



Match the components with the graphs that show how current through them varies with potential difference across them.



Suggest changes that could be made to the wires in a circuit to reduce energy lost to the surroundings due to the heating effect.

- .....
- .....

The image shows a thirteen amp fuse. Describe in detail how a thirteen amp fuse protects devices from getting damaged if they become faulty.

Suggest the names of at least three devices that make **use** of the heating effect of an electric current.

Tick all the boxes that apply

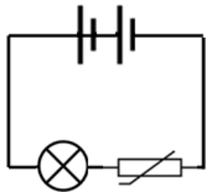
Safety feature	Disconnects the live wire if there is a fault	Acts quickly enough to prevent electrocution	Protects devices and wiring from damage
Fuse			
Circuit breaker			
Earth wire			

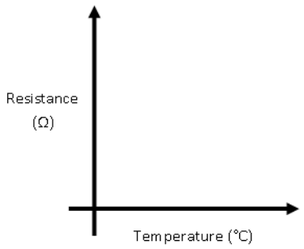
combined sciences text book pages 388-400

Link to BBC Bitesize

Section C

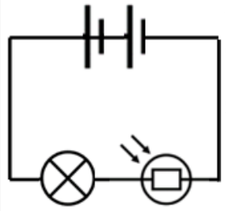
The circuit to the right shows a thermistor connected in series with a light bulb.
State and explain what happens to the brightness of the bulb as the temperature of the thermistor is increased.



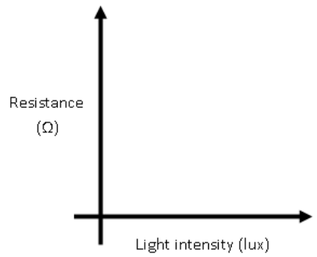


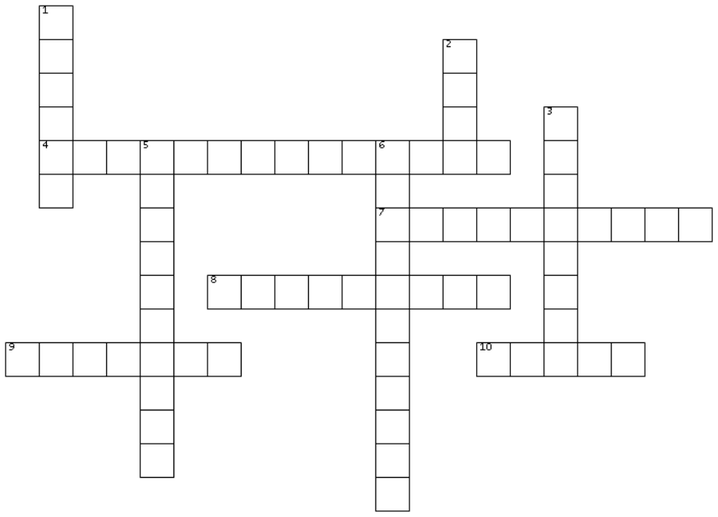
Sketch the shape of the graph you would expect if the resistance of a thermistor at different temperatures was investigated.

The circuit to the left shows a light-dependent resistor (LDR) connected in series with a light bulb.
State and explain what happens to the brightness of the bulb as the intensity of light shining on the LDR is increased.



Sketch the shape of the graph you would expect if the resistance of an LDR at different light intensities was investigated.





ACROSS
4. a device that can disconnect a live wire from a circuit very quickly if current becomes too larger (7,7)
7. a component designed so that its re-sistance decreases as its temperature increas-es (10)
8. name of the charged particles that move through a wire when a current flows (9)
9. word used to describe the regular arrange-ment of ions inside a metal (7)
10. the name for the wire coloured green/ yellow inside UK mains plugs (5)

DOWN
1. type of current supplied by cells and batteries (6)
2. electrical component designed to break circuits if current becomes too larger (4)
3. electrical component represented by a hollow rectangle in circuit diagrams (8)
5. what occurs between electrons and ions inside an electrical component that results in the component heating up (10)
6. type of current supplied by the national grid (11)

Section D

power = energy transferred ÷ time taken $P = \frac{E}{t}$

electrical power = current × potential difference $P = I \times V$

electrical power = (current)^2 × resistance $P = I^2 \times R$

What is the power of a device that transfers 50 J of electrical energy into other forms of energy every 25 seconds?	Calculate the power of a device that needs to be connected to a 12 V power supply for a current of 3 A to flow through it.	What is the electrical power if a component has a total resistance of 120 Ω and 0.5 A is flowing through it?
Calculate the potential difference across a component if its power rating is 2 W and the current flowing through it is 0.5 A.	How long would it take for a guitar amplifier with a power rating of 15 W to transfer 300 J of electrical energy in to other forms?	What is the total resistance of a device if 2.5 A of current is flowing through it and it has a power rating of 40 W?
An electric motor with a power rating of 50 W has a total resistance of 250 Ω. What is the maximum current that can flow through the motor? Give your answer to two decimal places.	25 kJ of energy is transferred by a device in 5 minutes. State the power of this device? Give your answer to one significant figure.	600 mA flows through a device with a power of 12 W. Calculate the total resistance of the device, giving your answer to two significant figures.

ANSWERS	33	4	80	5
36	6.4	2	20	0.45