



HOMework BOOKLET

P2 Foundation

Electricity Components and Symbols Match and Draw

Draw **one** line from the name of each component to the correct symbol.

ammeter

battery

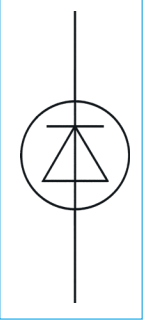
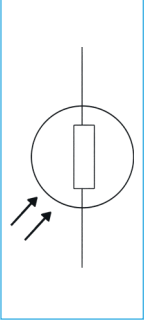
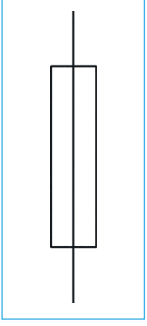
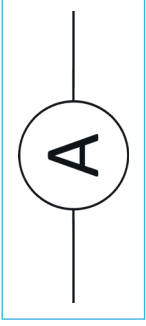
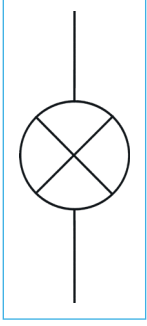
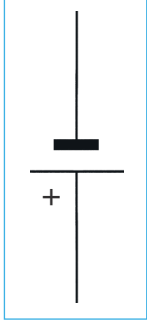
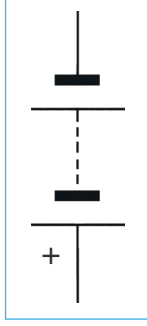
cell

diode

fuse

lamp

light-dependent resistor (LDR)



light-emitting diode (LED)

resistor

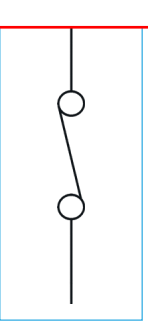
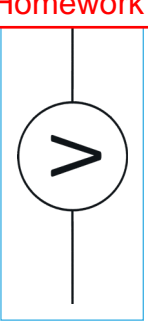
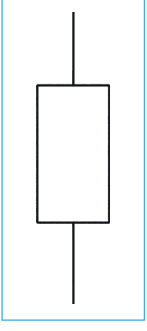
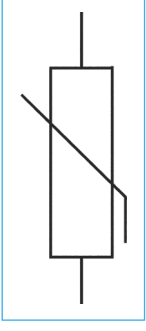
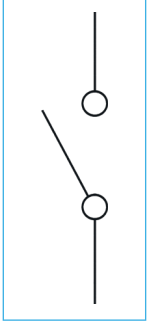
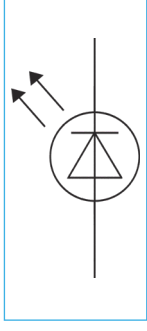
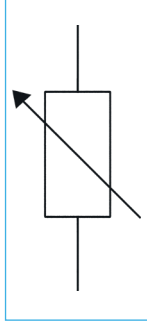
switch (open)

switch (closed)

thermistor

variable resistor

voltmeter



Homework 1

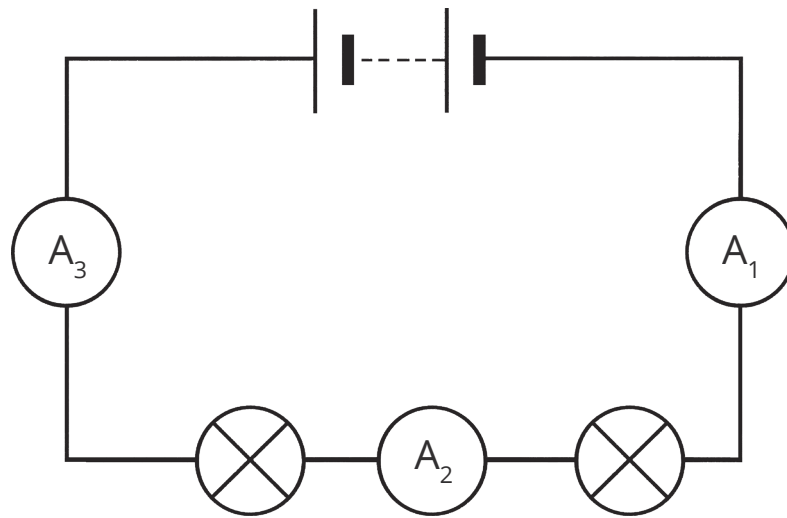
Electrical Charge and Current

1. What is electric current?

Tick **one** box.

- a flow of electrical charge
- a source of potential difference
- the energy transferred in a circuit
- the particle that moves around a circuit

2. The circuit below contains two bulbs and three ammeters.



The current shown on ammeter A_1 is 6A.

Write down the current shown on the other two ammeters.

ammeter A_2 _____ A

ammeter A_3 _____ A

3. Charge flow, current and time are linked by the equation:

$$\text{charge flow} = \text{current} \times \text{time}$$

Draw **one** line from each variable to the correct unit.

charge flow

current

time

amp

coulomb

second

volt

watt



4. The current in a circuit is 4A.

Calculate the charge that flows through the circuit in 300 seconds.

charge = _____ C

5. The current in a circuit is 6A.

Calculate the charge that flows through the circuit in 2 minutes.

charge = _____ C

6. The current in a circuit containing a buzzer is 200mA.

Calculate the charge that flows through the buzzer in 120 seconds.

charge = _____ C

7. A fuse is a safety feature of a circuit. The fuse wire melts when 1.5C of charge flows through the fuse in 0.6 seconds.

Calculate the current at which the fuse wire melts.

current = _____ A

8. The current in a circuit containing a bulb is 3A.

Calculate the time taken for 135C of charge to pass through the bulb.

time = _____ s



Current, Resistance and Potential Difference

Potential difference can be calculated using the equation:

$$\text{potential difference} = \text{current} \times \text{resistance}$$

1. What is the potential difference if a current of 3A flows through a resistance of 20Ω ?

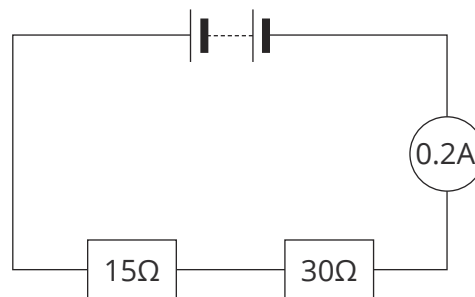
potential difference = _____ V

2. A current of 150mA passes through a 10Ω resistor.
Calculate the potential difference across the resistor.

potential difference = _____ V

3. **Figure 1** shows a series circuit.

Figure 1



Calculate the potential difference across the battery.

potential difference = _____ V

4. A 6V battery is connected across a filament lamp with a resistance of 40Ω .

Calculate the current through the lamp.

current = _____A

5. A 1.5V battery is connected across a 50Ω resistor.

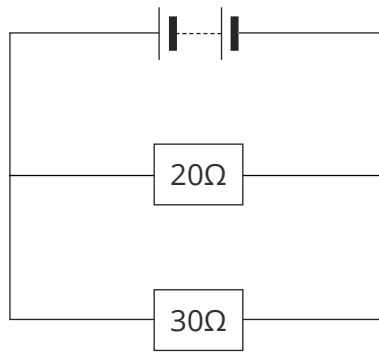
Calculate the current through the resistor.

Give your answer in mA.

current = _____mA

6. **Figure 2** shows a parallel circuit.

Figure 2



The potential difference across the battery is 6V.

Calculate the current through the 20Ω resistor.

current = _____A

7. A 12V battery causes a current of 3A to flow through a circuit.

Calculate the resistance of the circuit.

resistance = _____ Ω

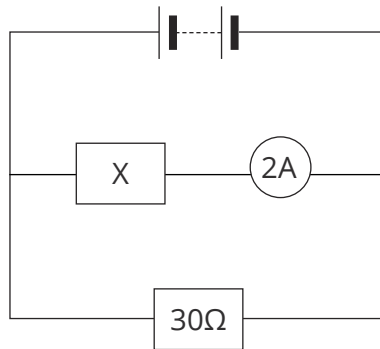
8. A potential difference of 6V causes a current of 200mA to flow through a circuit.

Calculate the resistance of the circuit.

resistance = _____ Ω

9. **Figure 3** shows a parallel circuit.

Figure 3



The potential difference across the battery is 9V.

Calculate the resistance of resistor **X**.

resistance = _____ Ω

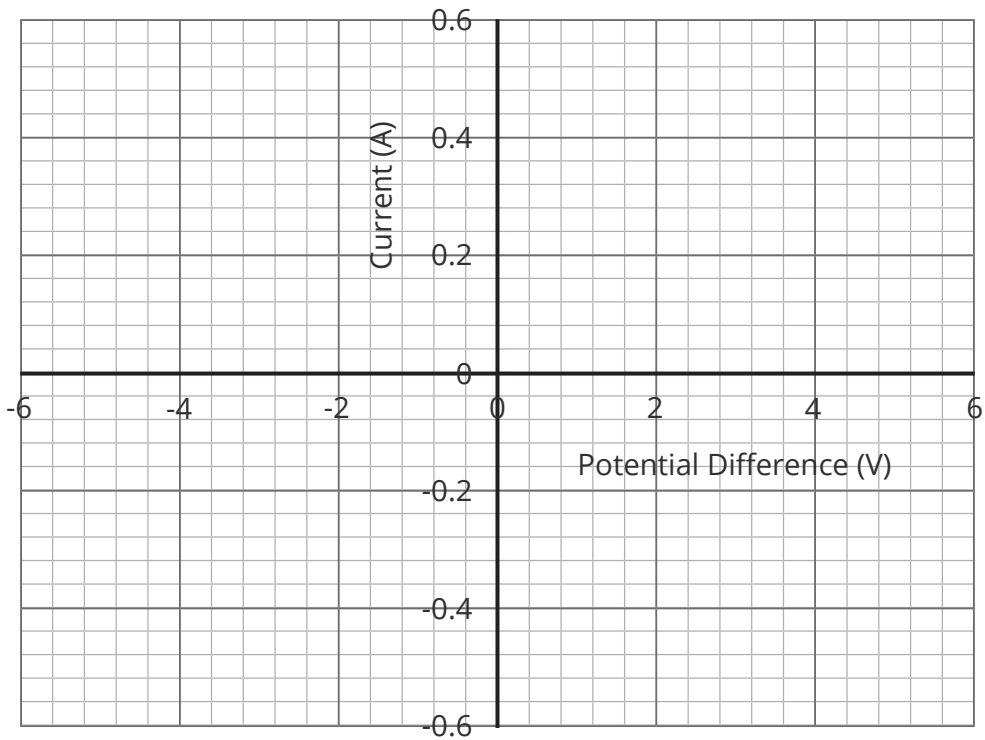


Current-Potential Difference Graphs

Resistor

Use the data in the table below to plot a graph of current against potential difference for a fixed resistor.

Potential Difference (V)	Current (A)
-5	-0.5
-4	-0.4
-3	-0.3
-2	-0.2
-1	-0.1
0	0
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5



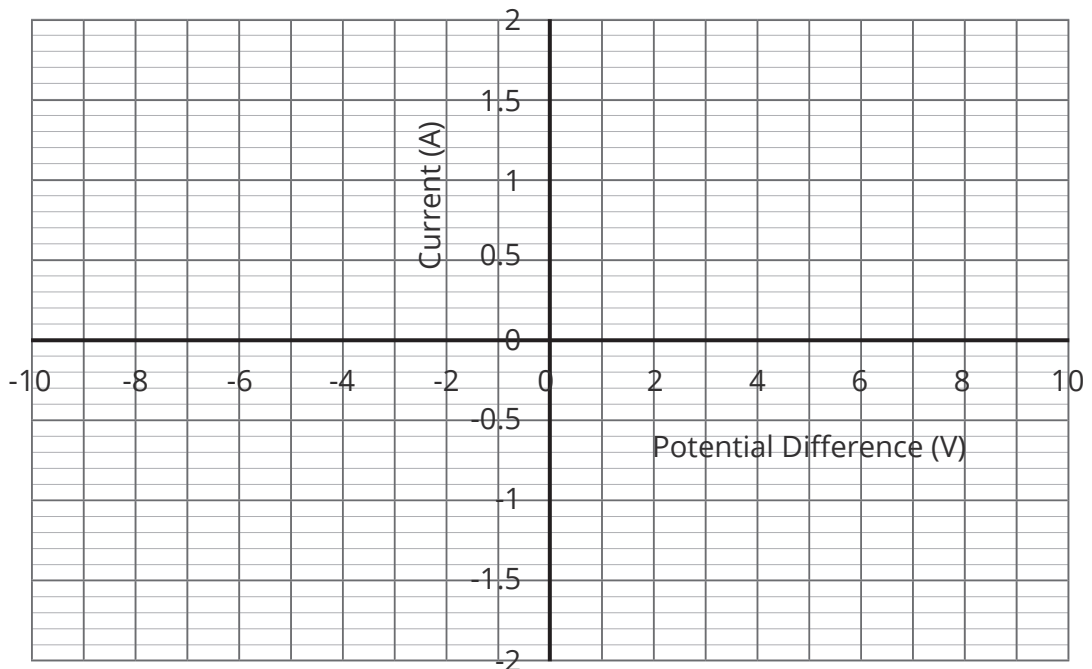
Describe the relationship between the current through the resistor and the potential difference across it.



Filament Lamp

Use the data in the table below to plot a graph of current against potential difference for a filament lamp.

Potential Difference (V)	Current (A)
-9	-1.46
-8	-1.41
-7	-1.36
-6	-1.25
-5	-1.15
-4	-1
-3	-0.78
-2	-0.5
-1	-0.25
0	0
1	0.25
2	0.5
3	0.78
4	1
5	1.15
6	1.25
7	1.36
8	1.41
9	1.46



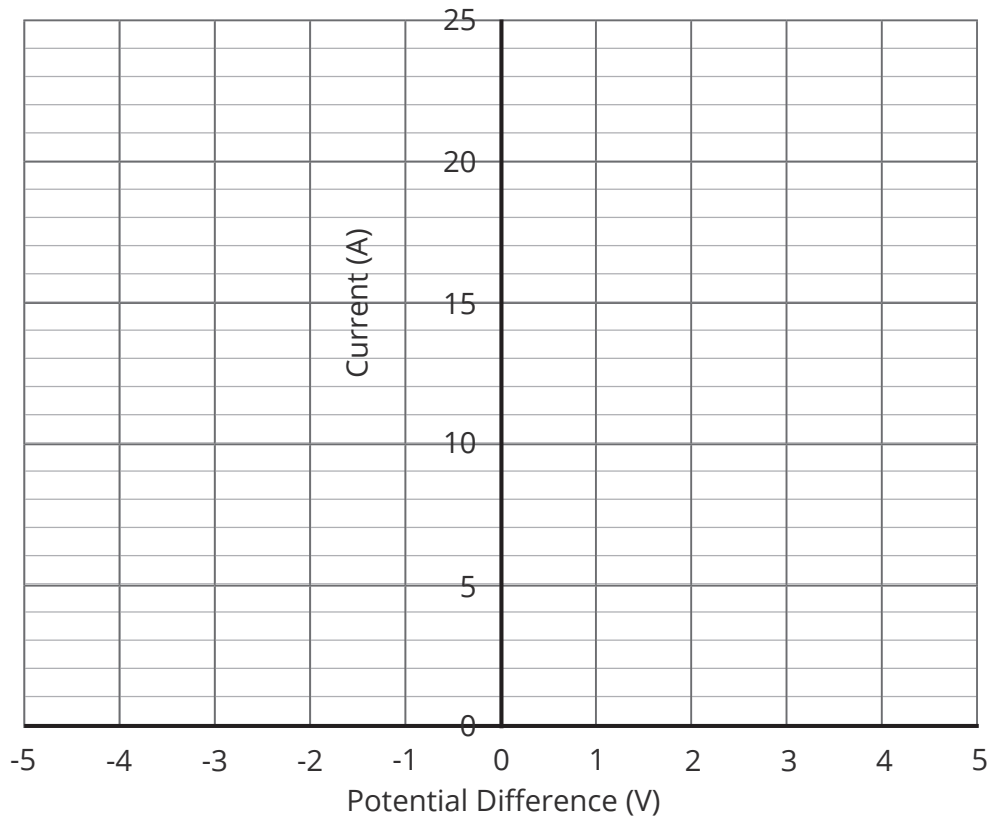
Explain the relationship between the current through the filament lamp and the potential difference across it.



Diode

Use the data in the table below to plot a graph of current against potential difference for a diode.

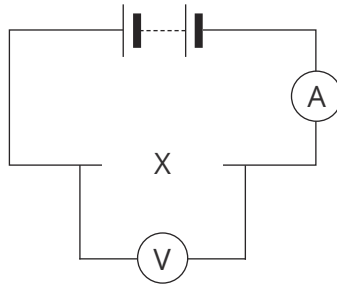
Potential Difference (V)	Current (A)
-5	0
-4	0
-3	0
-2	0
-1	0
0	0
1	0
2	1
3	3
4	8
5	20



Explain the relationship between the current through the diode and the potential difference across it.

Thermistors

The circuit below has a thermistor in position X

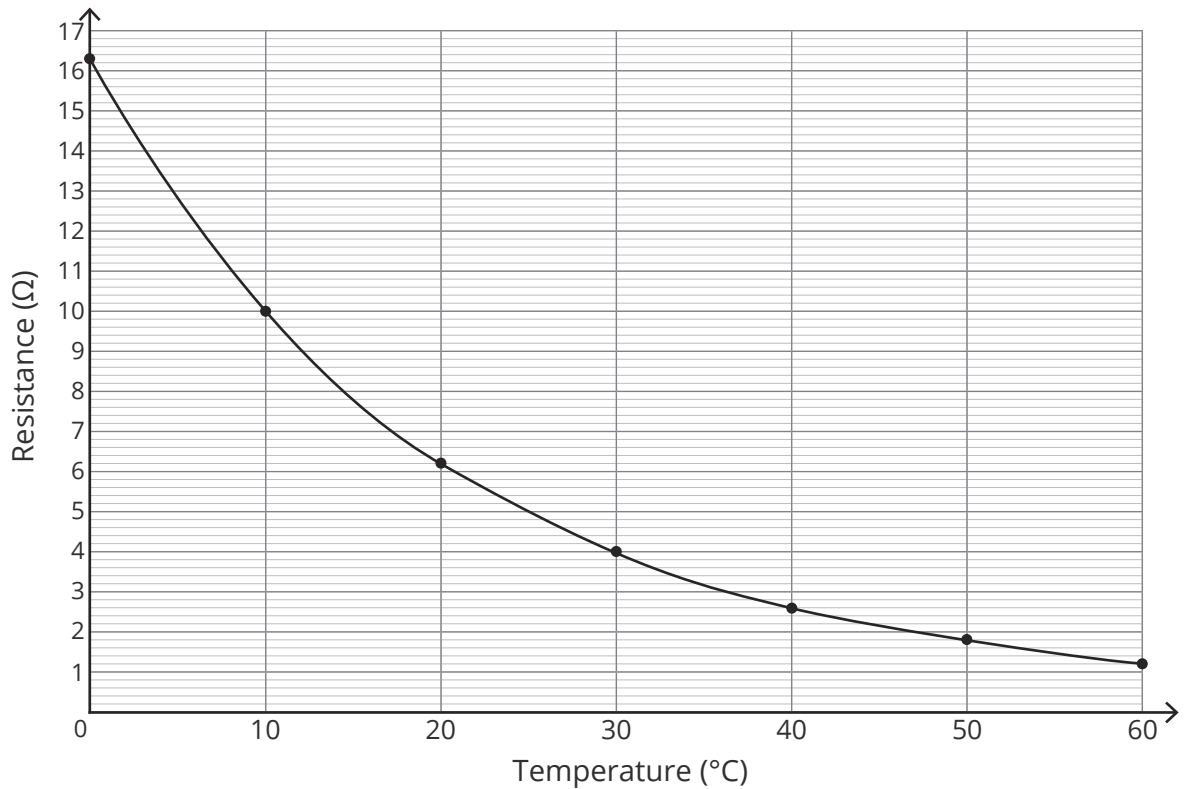


1. What is the circuit symbol for a thermistor?

Tick **one** box.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The graph shows how the resistance of the thermistor changes with temperature.



2. What is the resistance of the thermistor at 30°C?

resistance = _____ Ω

3. Write down the equation that links current, potential difference and resistance.

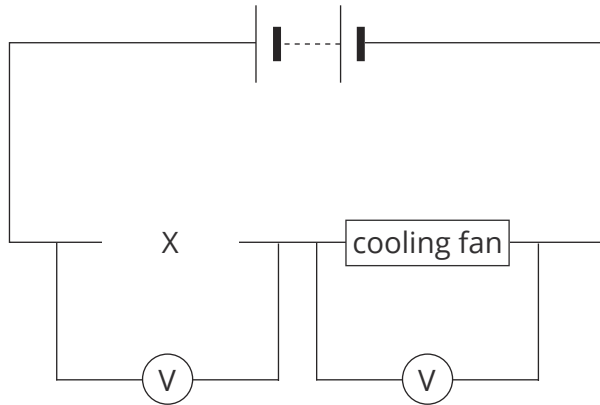
The current flowing through the thermistor at 30°C is 2.25A.

4. Calculate the potential difference across the thermistor. You should use your answer from question 2.

potential difference = _____V

5. Describe, in as much detail as you can, the effect of temperature on the resistance of the thermistor. You should include data from the graph in your answer.

The thermistor (X) is used in a thermostat to control the temperature of a fridge.



6. Circle **one** word in each sentence to explain how the thermostat works to keep the fridge cold.

If the temperature of the fridge increases, the resistance across the thermistor **increases/decreases**.

This means the potential difference across the thermistor is **high/low**.

The potential difference across the fan is **high/low**.

This makes the fan move **faster/slower** to cool the fridge down.



Power Calculations

Power can be calculated using the equation: $\text{power (W)} = \frac{\text{energy transferred (J)}}{\text{time (s)}}$

Use the equation to answer the questions below.

1. A kettle takes 300 seconds to boil some water. During this time, the kettle transfers 825 000 J of energy.

Calculate the power of the kettle.

power = _____ W

2. A microwave transfers 900 000 J of energy in 600 seconds.

Calculate the power of the microwave.

power = _____ W

3. A small motor runs for 60 minutes. The energy transferred during this time is 18 000 J.

Calculate the power of the motor.

power = _____ W

4. A person spends 8 minutes in an electric shower. The energy transferred during the shower is 4 320 000 J.

Calculate the power of the shower.

power = _____ W



5. Write down the equation that links time, power and work done.

6. A person sprints for 2 minutes. They do 84 960 J of work during the sprint.

Calculate the power output of the person during the sprint.

power = _____ W

7. A person used 908 W to lift a 100 kg mass in 50 seconds.

Calculate the work done during the lift.

work done = _____ J

8. A 1100 W toaster transfers 198 kJ of energy toasting some bread.

Calculate the time it takes.

time = _____ s

9. A 70 kg person ran to the top of some stairs with a power of 882 W. They did 1234.8 J of work during the run.

Calculate the time it took the person to reach the top of the stairs.

time = _____ s