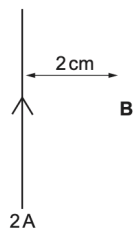
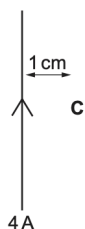
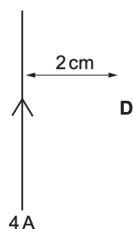


Simple Circuits

Q1.(2018)

Four compasses are each placed near to a wire at points **A**, **B**, **C** and **D**. Each wire has a current flowing through it. The distance of each compass from its wire is shown.



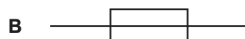
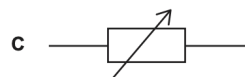
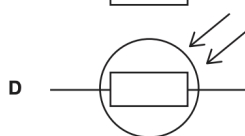
Which compass experiences the **greatest** magnetic field strength?

Your answer

[1]

Q2.(2018)

A student wishes to draw a diagram of a circuit she has created.



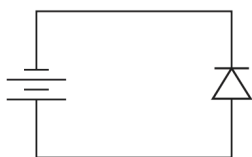
Which diagram **A**, **B**, **C** or **D** shows the circuit symbol for a variable resistor?

Your answer

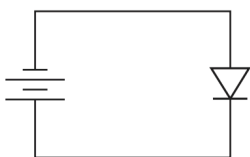
[1]

Q3.(2018)

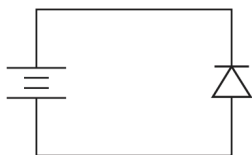
In which circuit would a current flow?



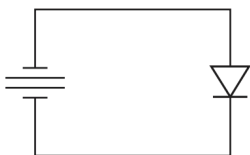
A



B



C



D

Your answer

[1]

Q4.(2018)

An object travelling in a circle at a constant speed has a changing velocity.

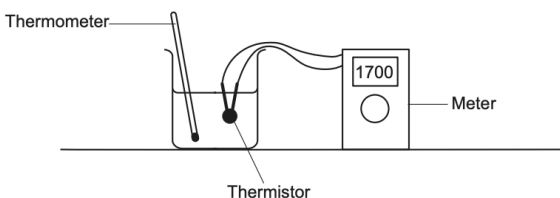
State why.

.....
..... [1]

Q5.a(2018)

Two students investigate how the resistance of a thermistor varies with temperature.

The students place the thermistor in a beaker of water and measure the resistance of the thermistor for 5 different temperatures. They repeat the experiment three times at each temperature in order to calculate a mean.



Temperature (°C)	Resistance (Ω)			
	1	2	3	Mean
10	1900	1870	1930	1900
15	980	1000	990	990
20	770	760	760	763.3
25	610	720	610	647
30	540	540	530	536

(a) (i) Describe the pattern shown by these results.

.....
.....
..... [2]

Q5.b(2018)

The students have made mistakes when recording their results.

Identify **two** mistakes **and** explain what they should have done.

.....
.....
.....
..... [2]

Q5.c(2018)

Suggest **one** way the experiment could be improved.

.....
..... [1]

Q5.d(2018)

At 10°C the thermistor had a resistance of 1900Ω . The thermistor has a power rating of $75 \times 10^{-3}\text{W}$.

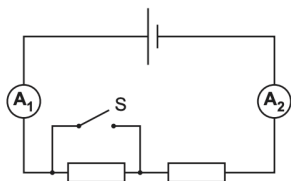
Calculate the maximum current in this thermistor at 10°C .

Use the equation: $\text{Power} = \text{Current}^2 \times \text{Resistance}$

Answer = A [3]

Q6.(2019)

A student connects this electrical circuit. The resistors are identical.



Ammeter **A₁** reads 1.6A when the switch S is open.

What does ammeter **A₂** read when switch S is closed?

- A 0.0A
- B 0.8A
- C 1.6A
- D 3.2A

Your answer

[1]

Q7.(2019)

An electron is accelerated through a potential difference of 12000V. The charge on an electron is $1.60 \times 10^{-19} \text{C}$.

Calculate the energy transferred to the electron.

Use the equation: energy transferred = charge $\times$ potential difference

- A $1.33 \times 10^{-23} \text{J}$
- B $1.92 \times 10^{-15} \text{J}$
- C $1.20 \times 10^4 \text{J}$
- D $7.50 \times 10^{22} \text{J}$

Your answer

[1]

Q8.(2019)

A current of 2.5A flows for 1 minute through a circuit.

Calculate the charge flowing.

Use the equation: charge flow = current $\times$ time

- A 0.04 C
- B 2.5 C
- C 24 C
- D 150 C

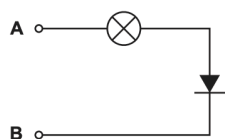
Your answer

[1]

Q9.a(2019)

A student makes a 'component tester'. He connects a diode to a small filament lamp.

This is a diagram of the component tester.

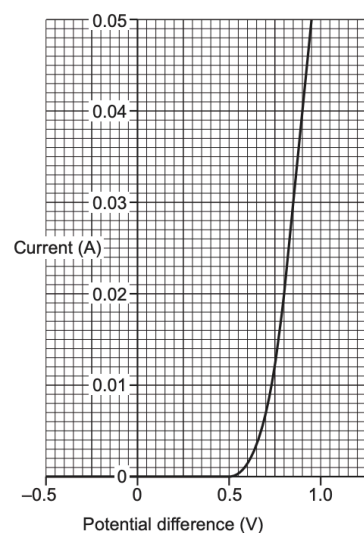


- (a) Describe how the student could use the component tester to find the positive (+) terminal of a cell.

.....
.....
.....
.....
.....
..... [3]

Q9.b(2019)

Here is a graph of current against potential difference for a diode.



(i) The diode is **not** a fixed resistor.

Describe **two** ways the graph shows this.

- 1
- 2

[2]

Q9.c(2019)

Calculate the resistance of the diode at +0.8 V.

Use the graph **and** the equation: potential difference = current $\times$ resistance

Resistance = Ω [4]

Q9.d(2019)

The manufacturer of the diode gives the following warning:

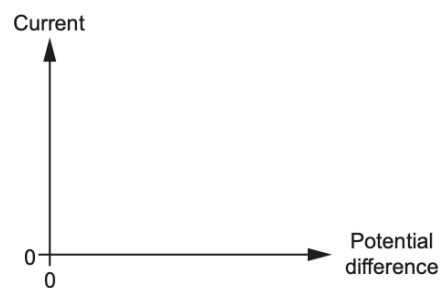
The supply voltage must not exceed 1 V.

Use the graph in 11(b) to explain why.

.....
.....
..... [2]

Q9.e(2019)

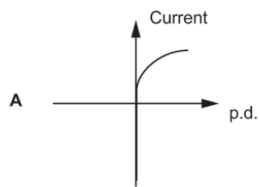
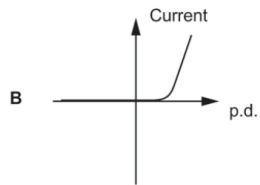
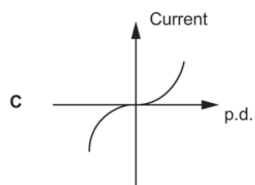
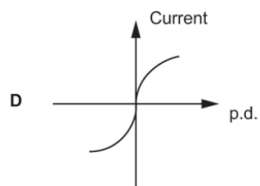
Sketch a graph of current against potential difference for a filament lamp.
Use the axes below.



[1]

Q10.(2020)

Which is the correct graph for a diode?



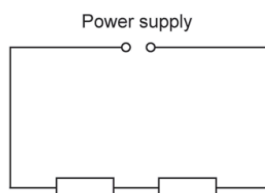
Your answer

☐

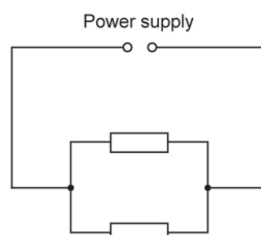
[1]

Q11.(2020)

Look at circuits **X** and **Y**. The resistors are all identical.



Circuit **X**



Circuit **Y**

Which statement about circuit **X** or circuit **Y** is correct?

- A Circuit **Y** has a higher resistance than circuit **X**.
- B Circuit **Y** is a series circuit with a lower resistance than circuit **X**.
- C Circuit **X** is a parallel circuit with a higher resistance than circuit **Y**.
- D Circuit **Y** has a lower resistance than circuit **X**.

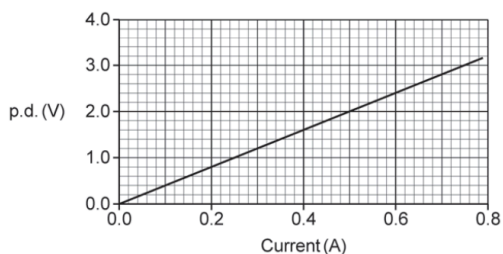
Your answer

☐

[1]

Q12.(2020)

Look at the graph of potential difference (p.d.) against current for a component.



Calculate the resistance of the component at 1.6 V.

Use the equation: potential difference = current $\times$ resistance.

- A 0.25 Ω
- B 0.40 Ω
- C 4.0 Ω
- D 25 Ω

Your answer

[1]

Q13.(2021)

Which row of the table describes charge and current?

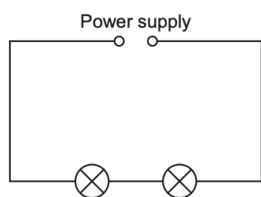
	Charge	Current
A	A property of all matter	The energy supplied per coulomb
B	A property of all matter	The rate of flow of charge
C	Resistance to current flow	The energy supplied per coulomb
D	Resistance to current flow	The rate of flow of charge

Your answer

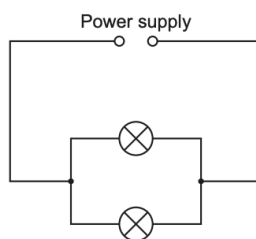
[1]

Q14.(2021)

Circuits **X** and **Y** contain identical lamps.



Circuit **X**



Circuit **Y**

Which statement explains why circuit **X** has a higher resistance than circuit **Y**?

- A** In circuit **X** each lamp has the full potential difference across it.
- B** In circuit **X** the current is the same at all points.
- C** In circuit **Y** the current is the same at all points.
- D** In circuit **Y** there are two pathways for current.

Your answer ☐

[1]

Q15.(2021)

Electrical circuits can be used to transfer energy.

Which row of the table correctly shows the information needed to calculate the amount of energy transferred?

	Current	Potential difference	Time the circuit is used for
A	✓	✓	✗
B	✓	✗	✗
C	✓	✓	✓
D	✗	✓	✓

Your answer ☐

[1]

Q16.a(2021)

A student does an experiment to measure the resistance of a coil of wire.

The diagrams in **Fig. 15.1** show the meters used in this experiment:

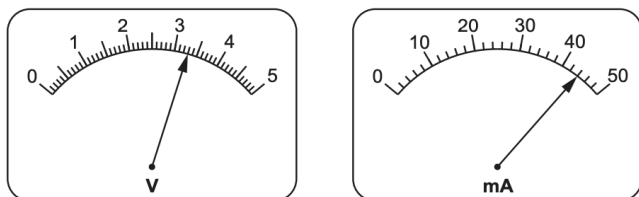


Fig. 15.1

(a) Meter **V** measures potential difference.

Complete the table to describe meter **V**.

Name of meter V	
Smallest change in potential difference that can be measured on meter V	

[1]

Q16.b(2021)

Draw a circuit diagram for the experiment.

Use the symbol for a fixed resistor to represent the coil of wire that the student is testing.

[3]

Q16.c(2021)

Write down the values of potential difference and current shown by the meters in **Fig. 15.1**.

Potential difference = V

Current = mA

[2]

Q16.d(2021)

Calculate the resistance of the coil of wire.

Resistance = Ω [3]

Q16.e(2021)

To improve the experiment, the student places the coil of wire in a beaker of water, as shown in Fig. 15.2.

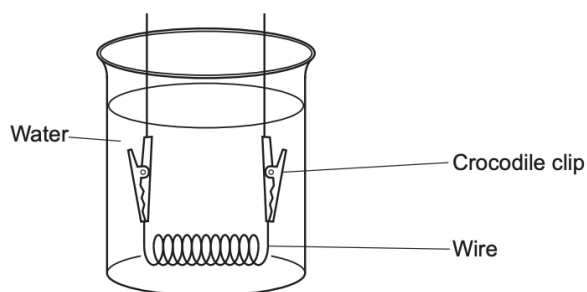


Fig. 15.2

Suggest **two** reasons why this improves the experiment.

- 1
-
- 2
-
- [2]

Q16.f(2021)

The student adds a variable resistor in series with the wire.

Suggest **two** reasons why this improves the method.

- 1
-
- 2
-
- [2]

Q17.(2022)

A 1.5V cell transfers 18mC of charge in a circuit.

What is the amount of energy transferred by the cell?
Use the Data Sheet.

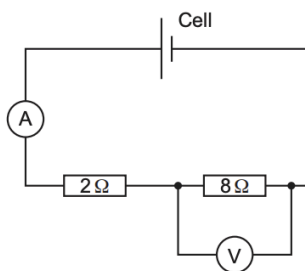
- A 0.027 mJ
- B 0.27 J
- C 27 mJ
- D 27 J

Your answer

[1]

Q18.a(2022)

A teacher builds the circuit shown in the diagram.



(a) Give the **total** resistance of the circuit.

Total resistance = Ω [1]

Q18.b(2022)

The voltmeter reads 4 V.

Calculate the ammeter reading.
Use the Data Sheet.

Ammeter reading = A [3]

Q18.c(2022)

Calculate the potential difference across the cell.

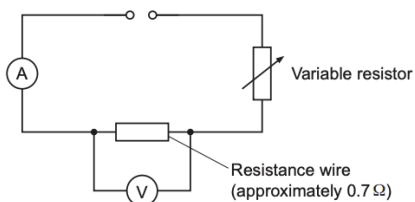
Potential difference = V [1]

Q19.(2022)

A student investigates if a length of resistance wire has linear or non-linear behaviour.

They use the circuit shown in Fig. 14.1.

Fig. 14.1

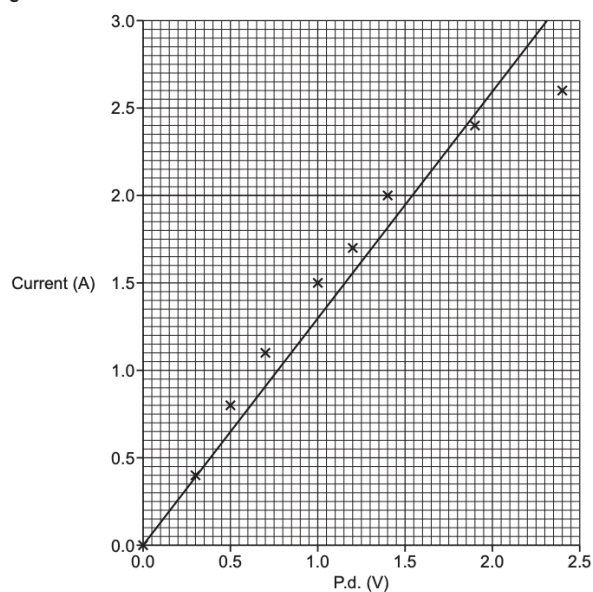


This is their method:

- Turn on the power supply.
- Measure the p.d. and current.
- Move slider on variable resistor.
- Take repeat measurements of p.d. and current.

Fig. 14.2 shows the student's results.

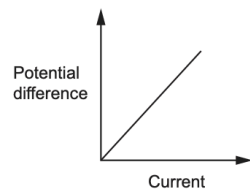
Fig. 14.2



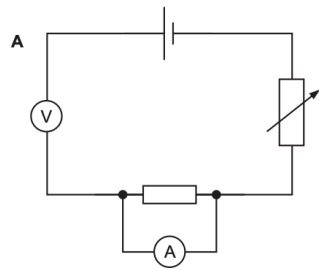
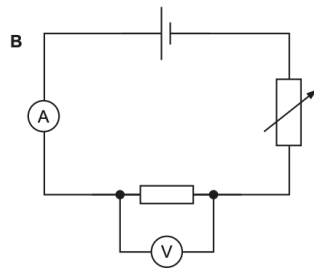
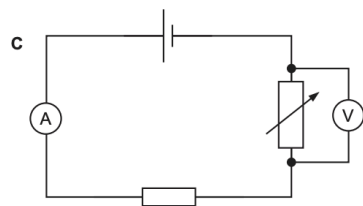
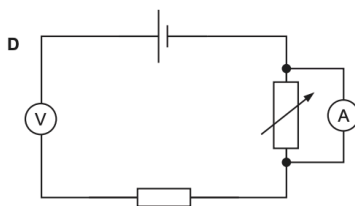
Suggest how their method could be improved.

[6]

The graph shows how potential difference varies with current for a fixed resistor.



Which circuit could be used to produce the graph?

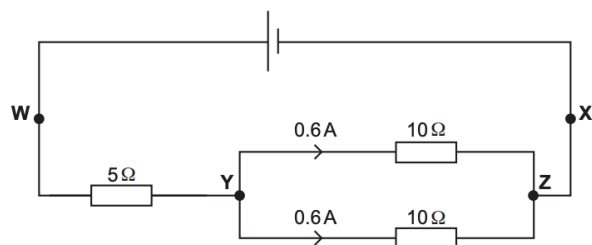


Your answer

[1]

Q21.a(2023)

A student builds the circuit shown in the diagram.
W, **X**, **Y** and **Z** are points in the circuit.



(a) Calculate the potential difference between **Y** and **Z**.

Use the Equation Sheet.

Potential difference between **Y** and **Z** = V [3]

Q21.b(2023)

The resistance of the circuit between **Y** and **Z** must be less than 10Ω .

Explain why.

.....

 [2]

Q21.c(2023)

Calculate the current at **W**.

Current at **W** = A [1]

Q21.d(2023)

Which statement describes the values of the current at **W** and **X**?

Tick (✓) **one** box.

The current at **W** is equal to the current at **X**.

☐

The current at **W** is more than the current at **X** as the current at **X** equals 0A.

☐

The current at **X** is more than the current at **W**.

☐

The current at **X** is more than 0A but less than the current at **W**.

☐

[1]

Q21.e(2023)

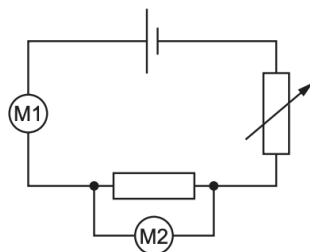
Calculate the power dissipated by one of the 10Ω resistors.

Use the Equation Sheet.

Power dissipated = W [3]

Q22.a(2024)

A student uses the circuit shown in the diagram to measure the resistance of a resistor.
M1 and M2 are meters.



Explain the purpose of the variable resistor in the diagram.

.....
..... [1]

Q22.b(2024)

Explain why meter M1 in the diagram must be an ammeter.

.....
..... [1]

Q22.c(2024)

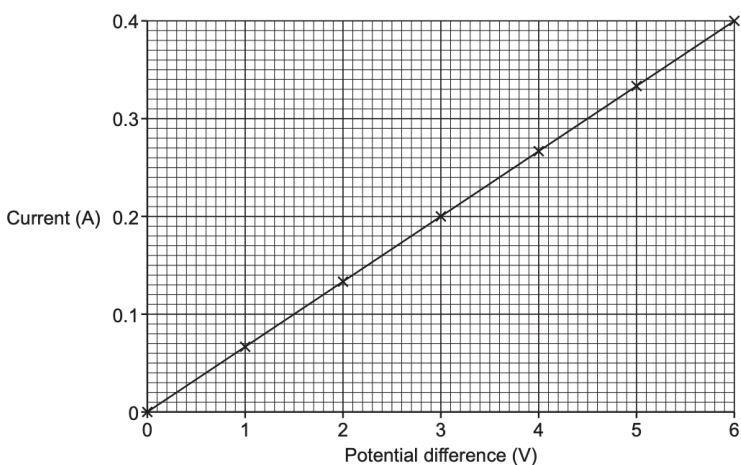
When meter M1 in the diagram is replaced by a voltmeter, no current flows.

Suggest why.

.....
..... [1]

Q22.d(2024)

The graph shows the student's results from using the circuit.



Calculate the resistance of the resistor. Use the graph.

Resistance = Ω [4]

Q22.e(2024)

Complete the sentence about the graph to explain the relationship between potential difference and resistance.

Use words from the list.

decreases **increases** **stays the same**

As the potential difference increases, the resistance [1]

