Simple Circuits (F)

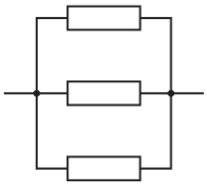
1. Which voltage is the maximum voltage made when **four** 1.5 V cells are connected in **series**?

A 0 V
B 1.5 V
C 3.0 V
D 6.0 V

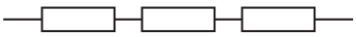
Your answer ☐ **[1]**

2. A student has 3 identical resistors. She arranges them in four different ways.

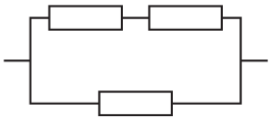
A



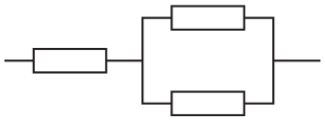
B



C



D



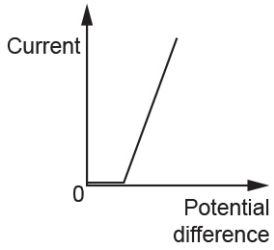
Which arrangement has the **most** resistance?

Your answer ☐ **[1]**

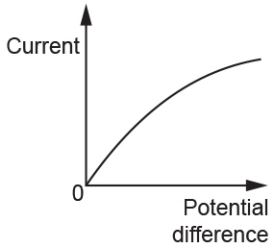
3. A student investigates how current and potential difference vary in different components.

Look at the graphs of her results.

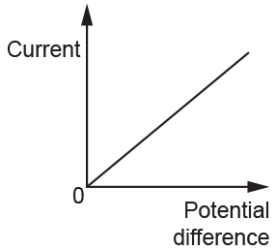
A



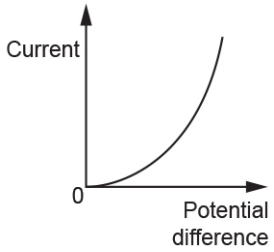
B



C



D



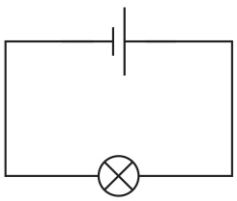
Which graph shows a filament lamp?

Your answer ☐ **[1]**

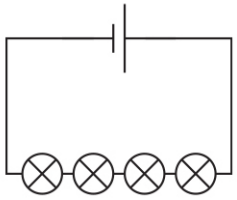
4. A student sets up four different circuits. He uses identical lamps and the same cell.

Look at the diagrams of his circuits.

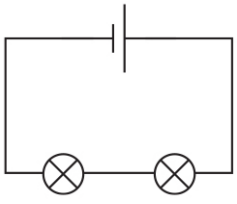
A



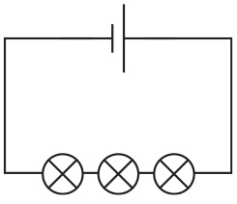
B



C



D



Which circuit has the brightest lamp(s)?

Your answer ☐ **[1]**

5. The table shows the current and potential difference for four different lamps.

Which lamp has the highest **power**?

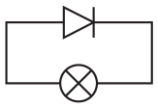
Use the equation: power = potential difference × current

	Current (A)	Potential difference (V)
A	2	5
B	3	4
C	4	2
D	5	1

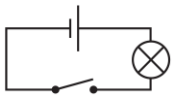
Your answer ☐ **[1]**

6. A student sets up four electrical circuits.

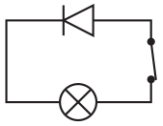
A



B



C



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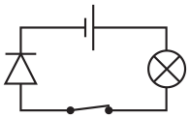
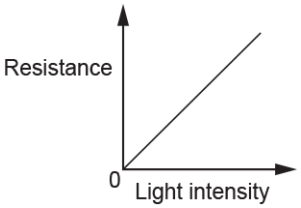


Identify in which circuit the lamp will light up.

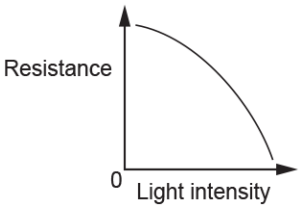
Your answer ☐ **[1]**

7. A student investigates how the resistance of a light dependent resistor (LDR) changes with light intensity.

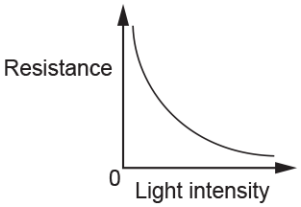
A



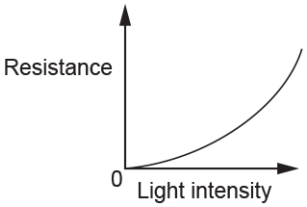
B



C



D



Which graph shows the correct relationship between the resistance of an LDR and light intensity?

Your answer ☐ **[1]**

8. Which item uses the most power?

Use the equation: power = potential difference × current

	Item	**Current (A)**	**Potential difference (V)**
A	Calculator	0.1	3
B	Mobile Phone	1.0	5
C	Radio	0.5	12
D	Torch	1.2	6

Your answer ☐ **[1]**

9 (a). A student uses four electrical appliances for different lengths of time.

Look at the table.

Appliance	Power (W)	Time used (hours)
Hair dryer	1500	0.3
TV	100	5
Toaster	2000	0.2
Light bulb	10	12

i. Which appliance uses the **most** energy?

_____ **[1]**

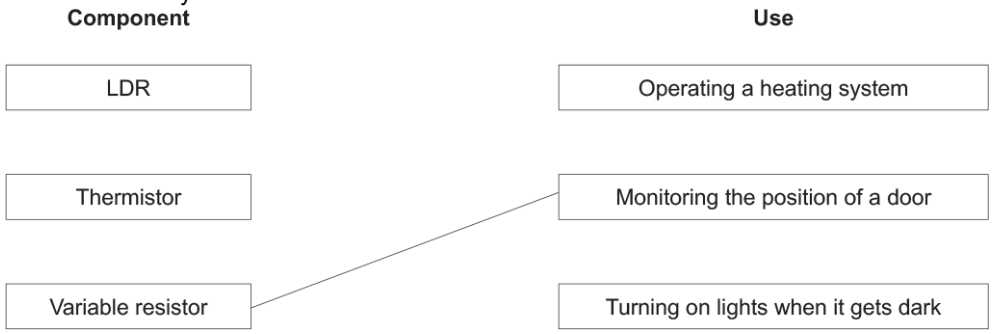
ii. Which appliance uses the **least** energy?

_____ **[1]**

(b). Here are three different components and their use in the home.

Match the component to its correct use.

One has been done for you.



[2]

(c). A charge of 44 000 C flows through a light bulb. The potential difference is 230 V.

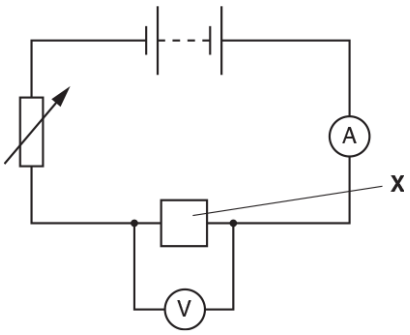
Calculate the energy transferred.

Use the equation: Charge = Energy ÷ Potential difference

Record your answer to **2** significant figures.

Answer = ... J **[4]**

10 (a). A student builds a circuit to investigate the resistance of component **X**.



i. What is the name of this component?

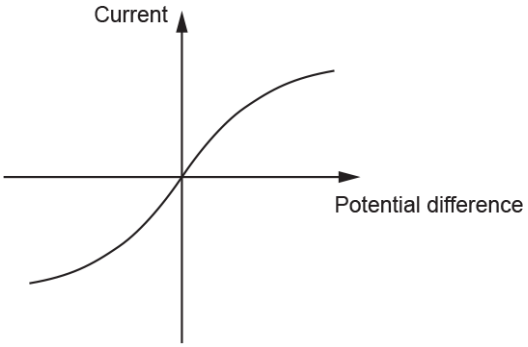
_____ **[1]**

ii. Why is this component needed in this circuit?

_____ **[1]**

(b). The student uses the circuit to take current and potential difference readings.

The student plots a graph of her results.



i. Look at the graph.

What is component **X** in the circuit?

_____ **[1]**

ii. The resistance of component **X** varies as the potential difference changes.

Describe **how** the graph shows this and explain **why** this happens.

_____

_____

_____

_____ **[3]**

(c). Component **X** has a resistance of 16 Ω when a current of 0.25 A flows.

i. Calculate the potential difference across component **X**.

Use the equation: Potential difference = Current × Resistance

Answer = ... V **[2]**

ii. Calculate the power of component **X** when a current of 0.25 A flows.

Answer = ... W **[3]**

11. A domestic wind turbine has a power rating which varies from 1.0 kW to 3.0 kW.

i. The domestic wind turbine has an electrical resistance of 23 Ω.

It generates a current of 11 A on a windy day.

Calculate the **power** output in kW of the turbine on this day.

Answer = _____ kW **[4]**

ii. Suggest why the manufacturer gives a range for the power rating of the wind turbine.

_____

_____ **[1]**

iii. Using just **one** domestic wind turbine may be an unreliable source of power for a house.

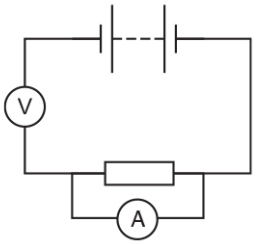
State a reason why.

_____

_____ **[1]**

12 (a). A student sets up a circuit to find out the resistance of an unknown resistor. The student makes **three** mistakes in their circuit.

Look at the circuit diagram of their experiment.



i. Write down the **three** mistakes the student makes.

1 _____

_____

2 _____

_____

3 _____

_____ **[3]**

i. For **one** of the mistakes identified in **(i)** describe how the student can fix the error.

_____

_____ **[1]**

(b). The student finds that the current is 20 mA when the potential difference is 4.0 V.

Calculate the **resistance** of the unknown resistor.

Include the **unit** for resistance in your answer.

Use the equation: resistance = potential difference ÷ current.

Resistance = ... Unit = ... **[4]**

13 (a). A TV has the label below on it.

OCR TV

Voltage: 230 V
Power: 65 W
Frequency: 50 Hz

Calculate the **current** in the TV when it is turned on.

Use the equation: power = potential difference × current

Give your answer to **2** significant figures.

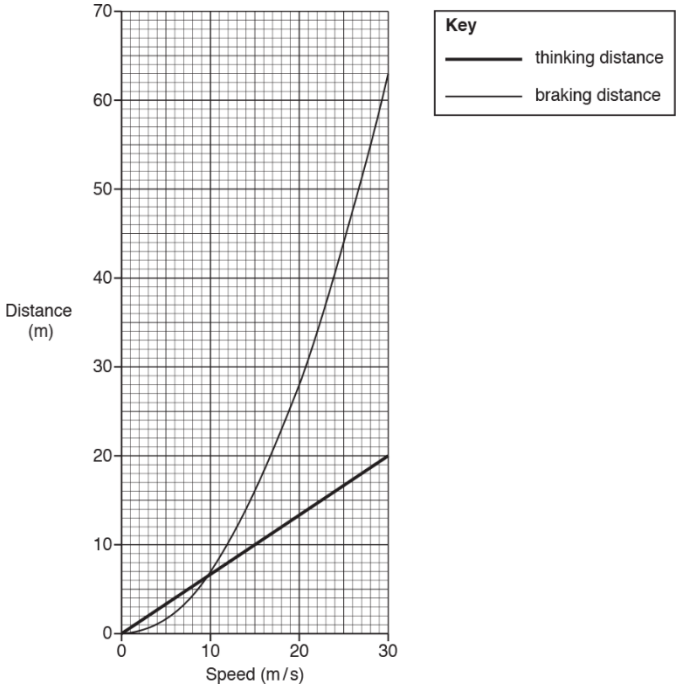
Current = ... A **[4]**

(b). The TV is turned on for 30 minutes.

Calculate the energy transferred by the TV.

Energy used = ... J **[4]**

14. The graph shows thinking and braking distances for a car at different speeds.



Describe how **thinking distance** varies with increasing speed.

Use data from the graph in your answer.

_____

_____

_____

_____ **[2]**

15(a). A student sets up the circuit in **Fig. 17.1** to investigate the resistance of a lamp.

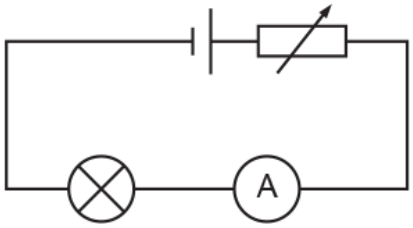


Fig. 17.1

i. The student also needs to add a voltmeter to the circuit.

On **Fig. 17.1 draw** where the voltmeter should be connected.

[2]

ii. The student takes readings of potential difference and current and records them in **Table 17.1**.

Potential difference (V)	Current
1.0	1.000
2.0	1.9
3.0	2.7
4.0	3.2
5.0	3.5

Table 17.1

There are **two** mistakes in the results table.

Write down the **two** mistakes and suggest how they could be corrected.

Mistake 1: _____

Correction 1: _____

Mistake 2: _____

Correction 2: _____

[4]

iii. Calculate the resistance of the lamp when the potential difference is 4.0 V in **Table 17.1**.

Use the equation: potential difference = current × resistance

Resistance = ... Ω **[3]**

(b). The student plots the results from **Table 17.1** on the graph in **Fig. 17.2**.

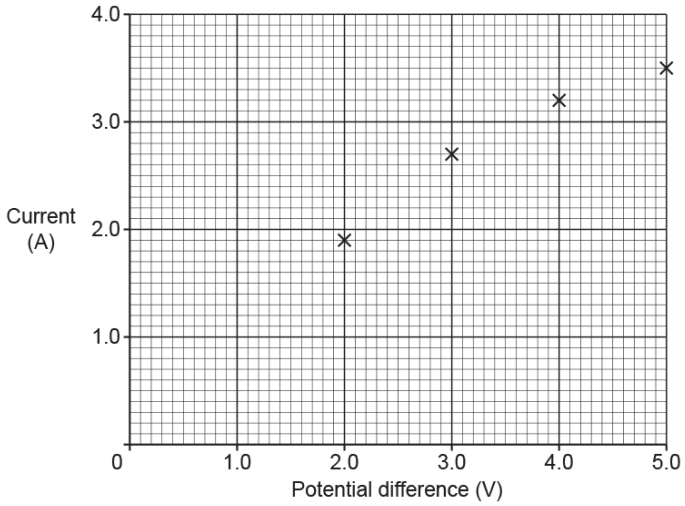


Fig. 17.2

i. Plot the missing point at 1.0 V on the graph **and** draw a line of best fit.

[2]

ii. Describe the relationship between potential difference and current.

Use data from the graph to support your answer.

---**[2]**

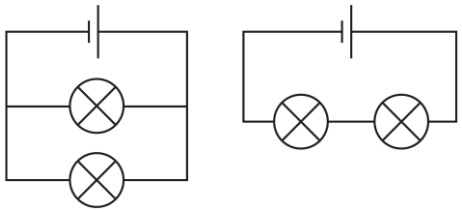
iii. Explain how you could use the circuit in **Fig. 17.1** to investigate the resistance of a fixed resistor instead of a lamp.

---**[2]**

iv. Explain how and why the graph in **Fig. 17.2** would look different for a fixed resistor at a constant temperature.

---**[2]**

16. A student investigates if lamps are brighter in a series circuit or a parallel circuit. He sets up two different circuits, **A** and **B**.



A B

State which circuit will have the brightest lamps and explain why.

In your answer, include the variables that the student will need to control in this experiment.

---

[6]

17. Calculate the charge when 200 J of energy is transferred with a potential difference of 40 V.

Use the equation: energy transferred = charge × potential difference

Charge = ... C **[3]**

END OF QUESTION PAPER