Electricity – 2021/20 GCSE Gateway Physics Combined Science A

1. Nov/2021/Paper_J250/05/No.3

Which statement describes power?

A The rate of flow of charge.

B The rate of flow of current.

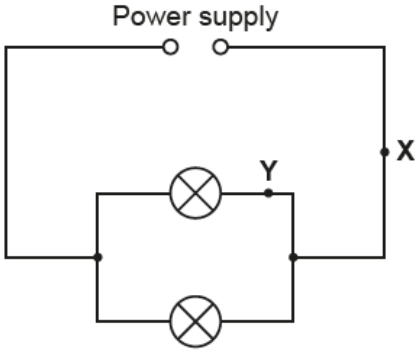
C The rate of stretching of a spring.

D The rate of transfer of energy.

Your answer ☐ **[1]**

2. Nov/2021/Paper_J250/05/No.5

Both lamps in this circuit are identical.



The current at point **X** is 0.2A.

What is the current at point **Y**?

A 0.1A

B 0.2A

C 0.4A

D 0.6A

Your answer ☐ **[1]**

3. Nov/2021/Paper_J250/05/No.6

In an electrical circuit, a current of 1.2 A flows for 25 seconds.

How much charge is transferred?

A 0.048 C

B 20.8 C

C 30 C

D 1800 C

Your answer ☐ **[1]**

4. Nov/2021/Paper_J250/05/No.7

A battery in a circuit has a potential difference of 6 V.

How much energy is transferred when 4 C of charge flows?

A 0.4 J

B 0.67 J

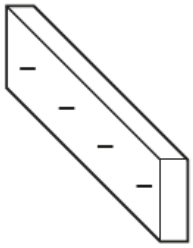
C 1.5 J

D 24 J

Your answer ☐ **[1]**

5. Nov/2021/Paper_J250/05/No.8

A student uses friction to charge a piece of plastic.



Which statement explains why the plastic becomes **negatively** charged?

A The plastic gains electrons.

B The plastic gains protons.

C The plastic loses electrons.

D The plastic loses protons.

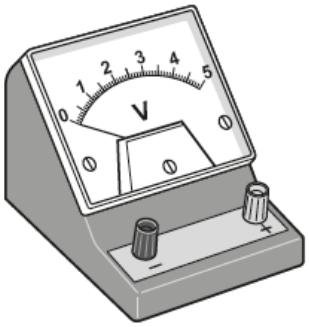
Your answer ☐ **[1]**

6. Nov/2021/Paper_J250/05/No.15

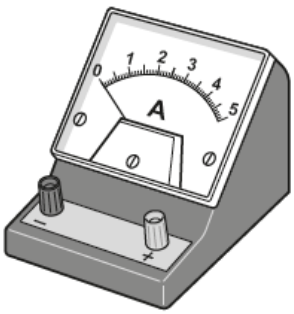
(a) A student investigates if resistance changes as current changes.

The student can use this equipment:

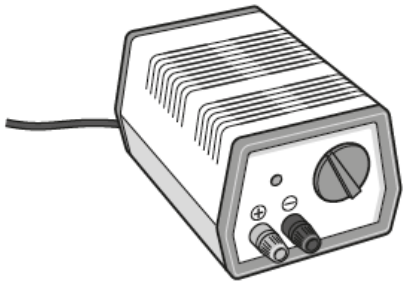
10 cm of resistance wire



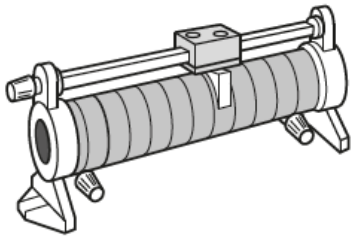
Voltmeter



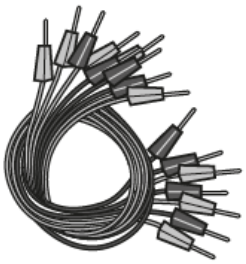
Ammeter



Power pack



Variable resistor



Connecting wires

Describe the method the student should follow to work out if the resistance of the 10 cm wire changes as current changes and describe how to use the results to calculate resistance.

You can include a diagram in your answer.

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..... **[6]**

(b) The student writes a risk assessment for the investigation.

(i) Suggest a possible hazard for this investigation.

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

(ii) How can the student reduce the risk from the hazard?

.....

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

7. Nov/2021/Paper_J250/06/No.2

Which sentence describes a feature of the **live** wire in a plug?

A It carries current to earth if there is a fault.

B It completes the circuit.

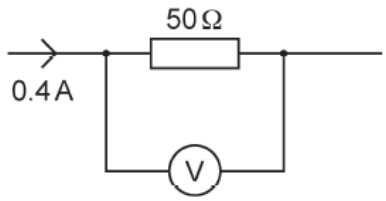
C It is at a potential difference of 230 V compared to earth.

D It melts if the current is too small.

Your answer ☐ **[1]**

8. Nov/2020/Paper_J250/05/No.2

Look at the circuit diagram.



What is the potential difference across the 50 Ω resistor?

Use the equation: potential difference = current × resistance

A 0.008 V

B 12.5 V

C 20 V

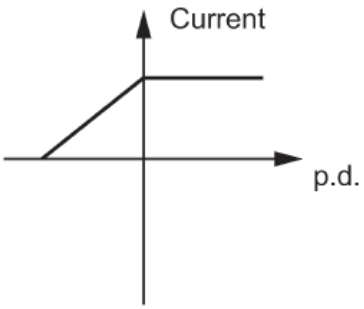
D 125 V

Your answer ☐ **[1]**

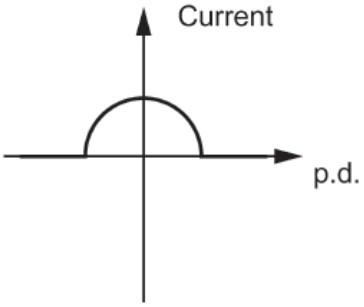
9. Nov/2020/Paper_J250/05/No.3

Which is the correct graph for a filament lamp?

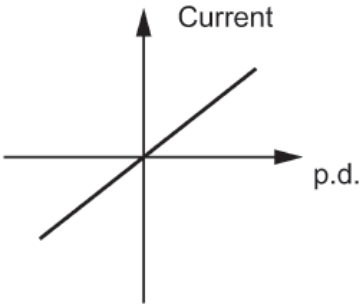
A



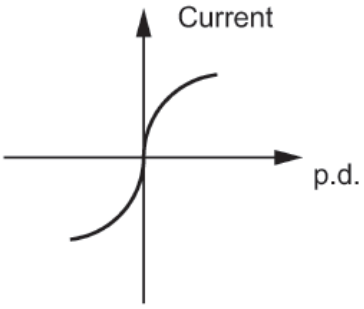
B



C



D



Your answer ☐ **[1]**

10. Nov/2020/Paper_J250/05/No.14

Plastic rods are used in static electricity experiments.

(a) Describe how a student could charge a plastic rod.

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

(b) **Fig. 14.1** is a diagram of a plastic rod before being charged.

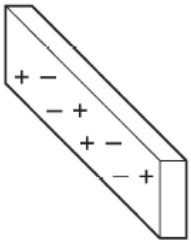

Fig. 14.1

Explain why the plastic rod becomes positively charged.

You may add to the diagram to explain your answer.

.....

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

(c) A teacher has two charged rods. One rod is positively charged.

She holds the positively charged rod near the other charged rod.

The rods move towards each other, as shown in **Fig. 14.2**.

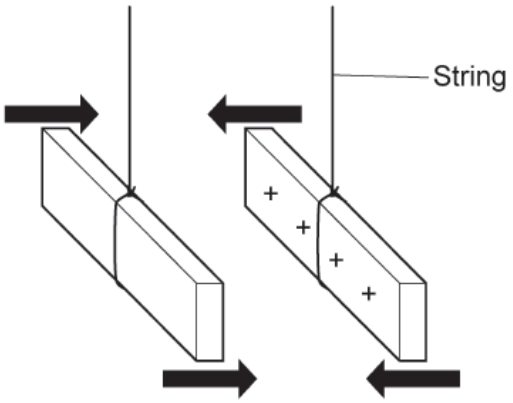

Fig. 14.2

Explain why the rods move towards each other.

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

11. Nov/2020/Paper_J250/05/No.15

Look at the circuit in **Fig. 15.3**. The lamps in the circuit are identical.

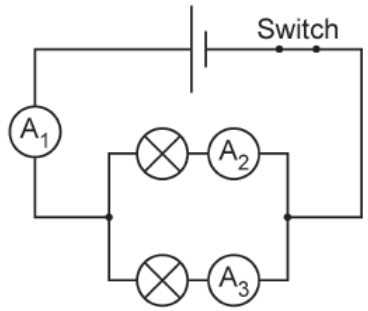


Fig. 15.3

(a) Ammeter A_2 reads 500 mA.

What is the reading on ammeter A_1 and ammeter A_3 in **amps (A)**?

Ammeter A_1 = ... A

Ammeter A_3 = ... A **[2]**

(b) Ammeter A_2 still reads 0.5 A.

How much charge flows through ammeter A_2 in 20 seconds?

Use the equation: charge flow = current × time

Charge flow = ... C **[2]**

12. Nov/2020/Paper_J250/06/No.11

A student wants to check the electrical power of a mains filament lamp.

He sets up the circuit in **Fig. 11.1**.

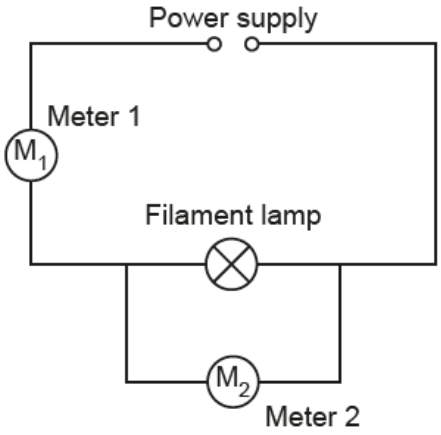


Fig. 11.1

(a) Complete the table to describe how he sets up the equipment in **Fig. 11.1**.

What is being measured?	Name of meter	Connected in
Potential difference	Meter 2 = ...	Parallel
.....	Meter 1 = Ammeter	.....

[2]

(b) **(i)** The student reads the meters in the circuit in **Fig. 11.1**.

- The value of the potential difference is 230 V.
- The value on the ammeter is 0.5 A.

Calculate the actual power of the mains filament lamp.

Use the equation: power = potential difference × current

Power = ...W **[2]**

13. Nov/2021/Paper_J250/11/No.3

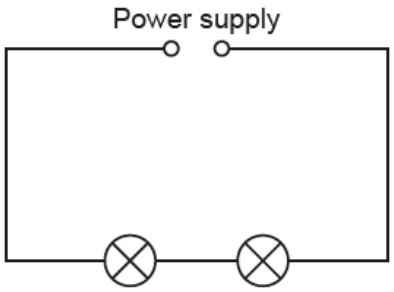
Which row of the table describes charge and current?

	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

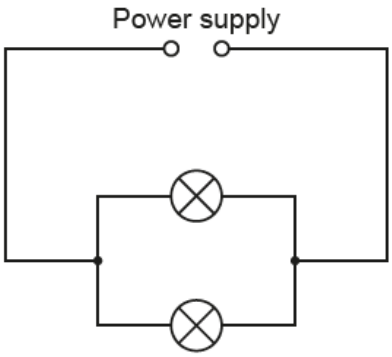
Your answer ☐ **[1]**

14. Nov/2021/Paper_J250/11/No.4

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]**

15. Nov/2021/Paper_J250/11/No.6

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]**

16. Nov/2021/Paper_J250/11/No.15

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:

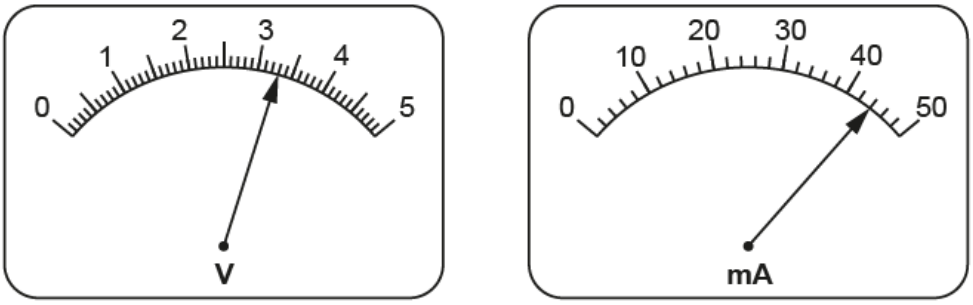


Fig. 15.1

(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]

(b) 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]

17. Nov/2021/Paper_J250/12/No.8

A 6 V battery transfers 1860 J of energy.

Calculate the charge transferred by the battery.

Use the equation: energy transferred = charge × potential difference

A 0.31 C

B 11.16 C

C 310 C

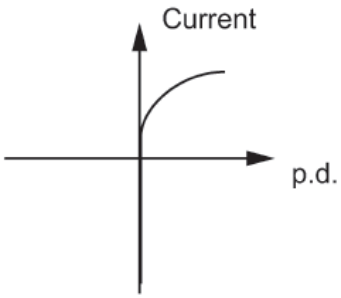
D 11 160 C

Your answer ☐ **[1]**

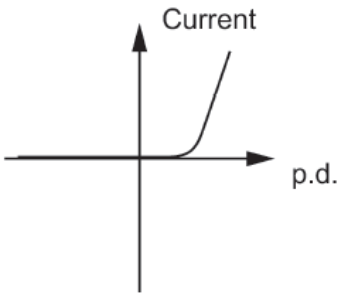
18. Nov/2020/Paper_J250/11/No.3

Which is the correct graph for a diode?

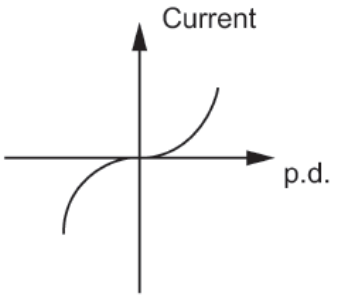
A



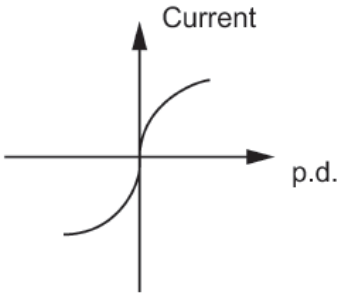
B



C



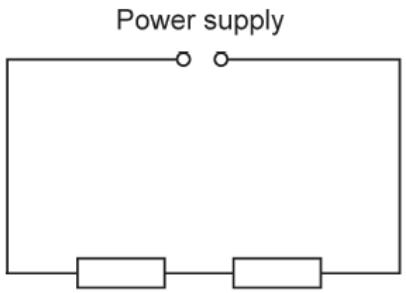
D



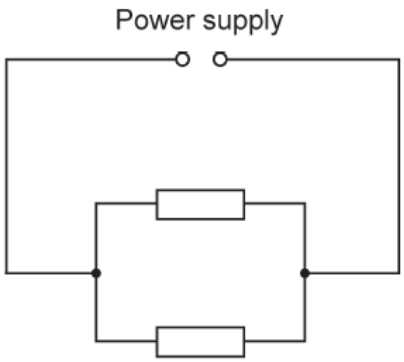
Your answer [ ] **[1]**

19. Nov/2020/Paper_J250/11/No.4

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**.

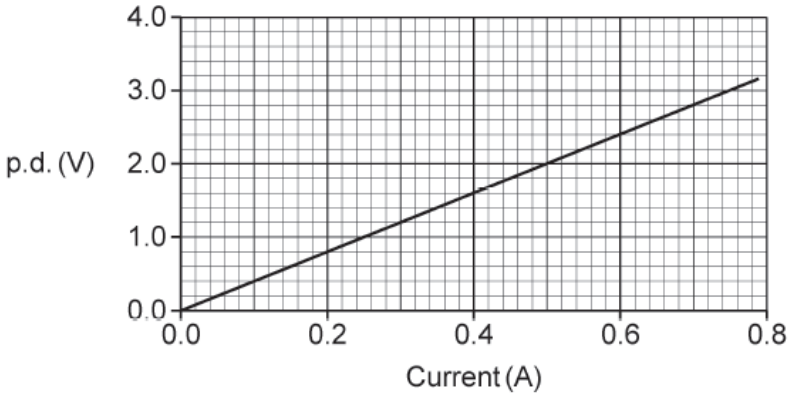
C Circuit **X** is a parallel circuit with a higher resistance than circuit **Y**.

D Circuit **Y** has a lower resistance than circuit **X**.

Your answer ☐ **[1]**

20. Nov/2020/Paper_J250/11/No.6

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 × resistance.

A 0.25 Ω

B 0.40 Ω

C 4.0 Ω

D 25 Ω

Your answer ☐ **[1]**

21. Nov/2020/Paper_J250/11/No.14

(a) **Fig. 14.1** is a diagram of a plastic rod.

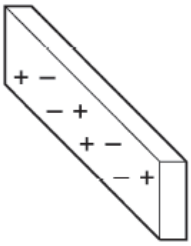


Fig. 14.1

(i) The plastic rod in **Fig. 14.1** is electrically neutral.

Explain how the diagram shows this.

.....

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

(ii) A student rubs the plastic rod with a cloth.

The plastic rod gains a positive charge.

She holds the positively charged plastic rod above her head, as shown in **Fig. 14.2**.

Fig. 14.2

Explain why the hairs on her head stand up.

You may add to the diagram in **Fig. 14.2** to explain your answer.

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

(iii) The student repeats the experiment with a metal rod.

Her hair does **not** stand on end. Suggest why.

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

(b) A Van de Graaff generator, as shown in **Fig. 14.3**, is often used to produce charges.

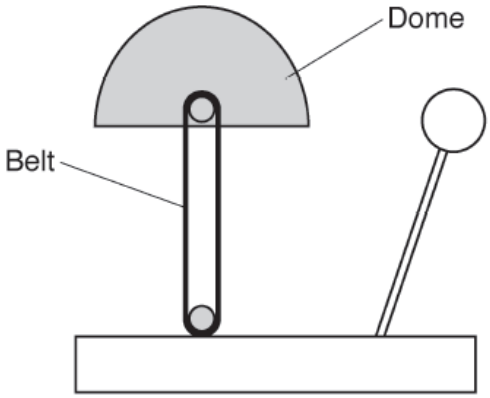

Fig. 14.3

A Van de Graaff generator has a charge of 1.2×10^{-5} C on its dome.

(i) The p.d. when the dome sparks is 30 kV.

How much energy is transferred when the dome sparks?

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

(ii) The dome takes 0.0005 s to discharge through a person.

Calculate the current in the person.

Use the equation: charge flow = current × time.

Current = ... A **[3]**

22. Nov/2020/Paper_J250/12/No.5

A student measures the energy transferred by an electrical heater.

Which row in the table shows the correct apparatus he used?

	To measure potential difference	To measure current	To measure time
A	Ammeter	Voltmeter	Thermometer
B	Joulemeter	Ammeter	Thermometer
C	Voltmeter	Ammeter	Stopwatch
D	Voltmeter	Joulemeter	Stopwatch

Your answer ☐ **[1]**