

GCSE Physics (9 – 1)

Series Circuits

Name:

Group:

Instructions

- Read each question carefully before you begin to answer it.
- Use black ink or black ball-point pen for your answers.
- Fill in the boxes at the top of this page with your name and group.
- Attempt to answer every question in the booklet.
- Answer the questions in the spaces provided – there may be more space than you need in some answer spaces.
- Calculators may be used for this booklet.
- For any calculations, you **must** show all your working.
- Any and all drawings or graphs should be completed in pencil.



For markers use	
Question	Mark
1	/6
2	/7
3	/14
4	/6
5	/6
6	/11
Total	/50
%	
Grade	

Information

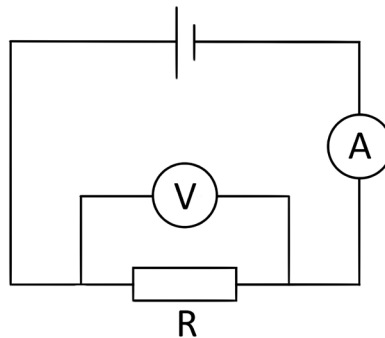
- The maximum mark for this paper is 50 marks.
- The marks for each question are shown in brackets.
- Please be aware that good English and clear presentation are required in your answers.



1. A series circuit is a single, continuous loop where the electrical current must flow through every component one after the other.

For each of the following questions **circle** the letter of the correct answer.

- a) A student set up a series circuit to determine the resistance of a resistor R. The figure below shows the circuit the student set up. The meter readings are 2.5 A and 10 V.



- | A | B | C | D |
|---------------|---------------|----------------|----------------|
| 0.25 Ω | 4.00 Ω | 12.50 Ω | 25.00 Ω |

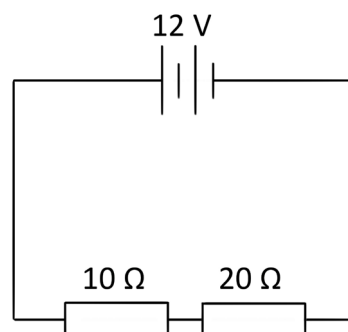
(1 mark)

- b) A student builds a series circuit using a cell and two identical lamps. The current flowing through the first lamp is 0.4 A. What is the current flowing through the second lamp?

- | A | B | C | D |
|-------|-------|-------|-------|
| 0.4 A | 0.2 A | 0.0 A | 0.8 A |

(1 mark)

- c) The circuit diagram shows a 10 Ω resistor and a 20 Ω resistor connected in series to a 12 V battery.



What is the current in the battery?

- | A | B | C | D |
|--------|--------|--------|--------|
| 0.40 A | 0.60 A | 1.20 A | 2.50 A |

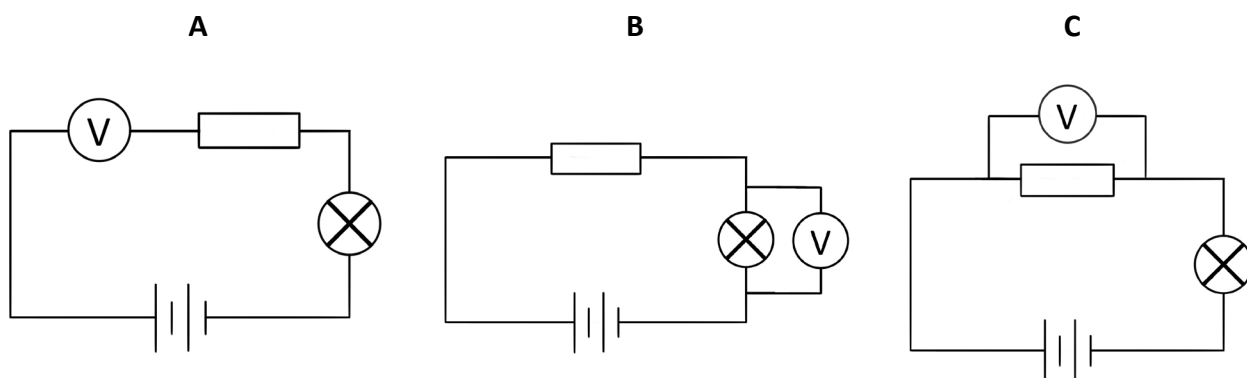
(1 mark)

- d) A series circuit contains a 12 V battery and two resistors.
The potential difference across the first resistor is 4 V.
What is the potential difference across the second resistor?

A	B	C	D
3.0 V	4.0 V	8.0 V	16.0 V

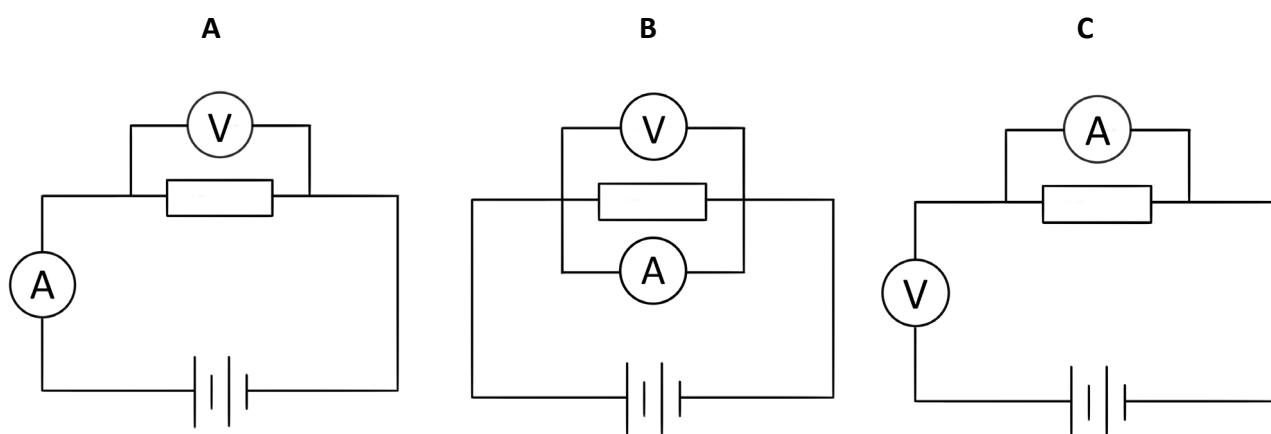
(1 mark)

- e) Which circuit shows a voltmeter measuring the potential difference across a resistor?



(1 mark)

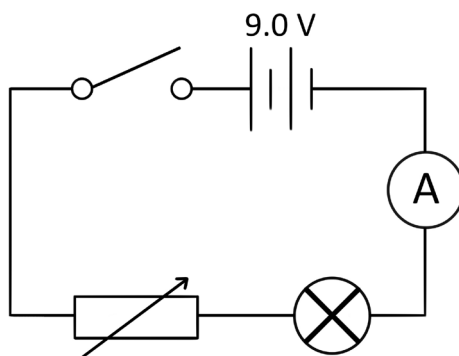
- f) A student is investigating the resistance of a fixed resistor.
Which diagram shows the correct way to connect the ammeter and the voltmeter?



(1 mark)

(Total for Question 1 is 6 marks)

2. A student investigates the electrical properties of a filament lamp.
The student sets up the circuit shown in the figure below.



- a) State the purpose of the variable resistor in this circuit.

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(1 mark)

- b) The student uses individual cells that each have a potential difference of 1.5 V.
Calculate the number of cells needed to make the 9.0 V battery shown in the circuit.

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(1 mark)

- c) The student needs to measure the potential difference across the filament lamp.
On the figure above, **draw** the correct electrical symbol and connections for this meter. (2 marks)

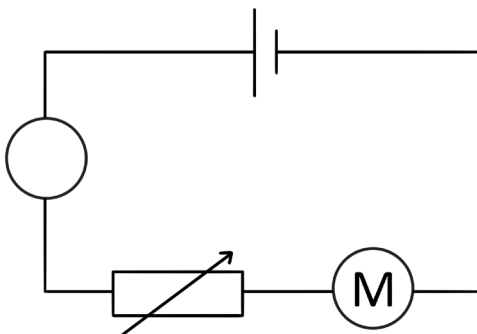
- d) The student closes the switch.
The potential difference across the filament lamp is 5.0 V and the current is 2.4 A.
Calculate the energy transferred by the filament lamp in 1 minute.

Energy transferred = ... J

(3 marks)

(Total for Question 2 is 7 marks)

3. A student uses the circuit in the figure below to investigate a small electric motor.



- a) The student has forgotten to add an ammeter and voltmeter to their circuit.

Draw the symbols for an ammeter and voltmeter on the circuit above and place them correctly to enable the student to use them.

(4 marks)

- b) The student turns on the circuit. The potential difference across the motor is 12.0 V and the current flowing through it is 2.5 A.

Calculate the resistance of the motor.

Resistance = ... Ω

(3 marks)

- c) Calculate the power of the electric motor.

Power = ... W

(2 marks)

d) The student leaves the motor running for **2 minutes**.

Use your answer from part (c) to calculate the electrical energy transferred by the motor in this time.

Energy transferred = ... J

(3 marks)

e) The student increases the resistance of the variable resistor.

Explain what happens to the reading on the voltmeter.

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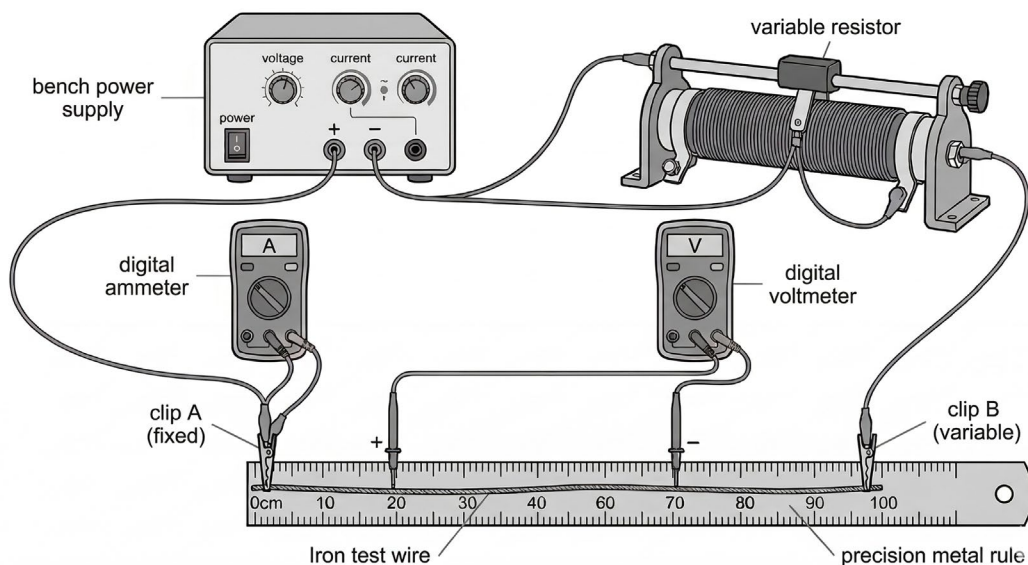
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(2 marks)

(Total for Question 3 is 14 marks)

4. A student wanted to determine the resistance of a length of nickel wire.
To do this the student set up a series circuit as shown in the figure below.



Using the correct electrical symbols, draw a circuit diagram of the student's circuit.

Use the following symbol to represent the iron wire in your circuit.

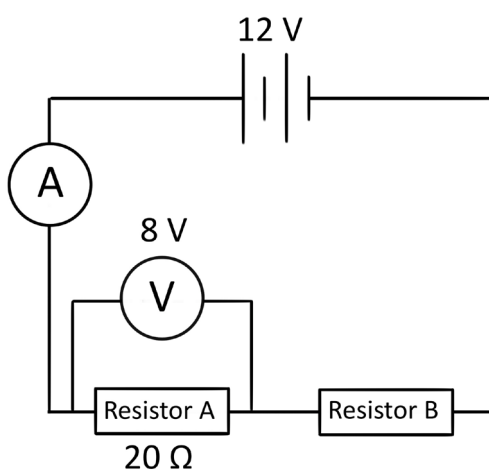


(6 marks)

(Total for Question 4 is 6 marks)

5. The circuit diagram shows two resistors, A and B, connected in series to a 12 V battery. The voltmeter across resistor A reads 8.0 V. The resistance of resistor A is $20\ \Omega$.

The figure below shows the circuit.

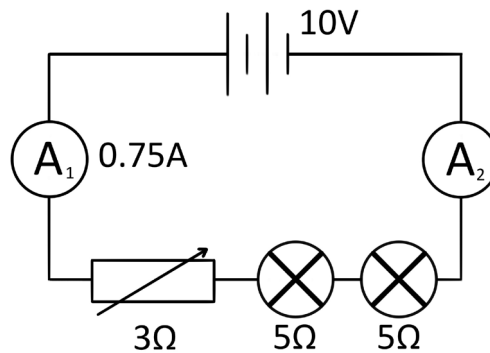


Calculate the total energy transferred by Resistor B when the circuit is switched on for **5 minutes**.

(6 marks)

(Total for Question 5 is 6 marks)

6. The figure below shows a two lamps and a variable resistor connected in series in a circuit.



a) Calculate the total resistance of the circuit.

Resistance = ... Ω
(1 mark)

b) The ammeter A1 reads 0.75 A.

What will be the reading on ammeter A2?

Ammeter A2 = ... A
(1 mark)

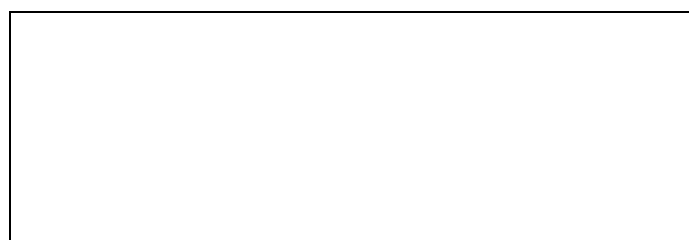
c) The resistance of the variable resistor is increased to 7 Ω .

Calculate the current in the circuit at this new resistance.

Current = ... A
(2 marks)

d) The circuit could be set up with a light dependent resistor (LRD) instead of a variable resistor.

In the box below draw the electrical symbol for a light dependent resistor.



(1 mark)

