Revision Sheet

A-Level Physics · Unit 10 D.C. circuits

9 vocabulary items · 25 marks of exam questions (5 questions)

Part 1 · Vocabulary review (9 items). The terms this unit is examined on most. Mark it yourself from the answer key.

Section A · Chinese to English

Write the English word.

1. _____ [1]

2. _____ [1]

3. _____ [1]

4. _____ [1]

5. _____ [1]

6. _____ [1]

7. _____ [1]

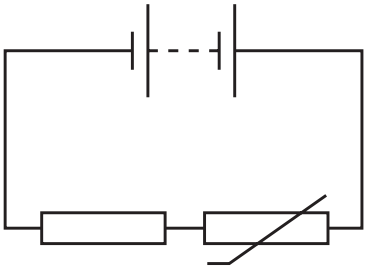
8. _____ [1]

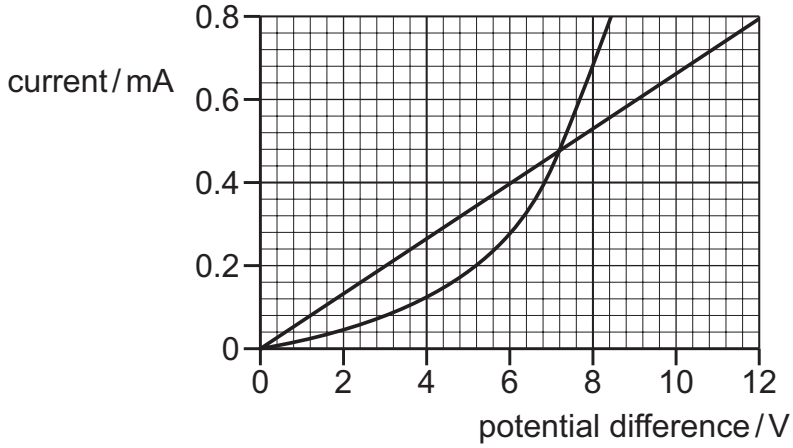
9. _____ [1]

Part 2 · Exam questions (25 marks, 5 questions) begins on the next page. They are ordered easy to difficult and none of them has been set before.

10 The diagram shows a circuit containing a thermistor, a fixed resistor and a battery.

The graph shows the $I-V$ characteristics of both components.





The battery has an e.m.f. of 12 V and negligible internal resistance.

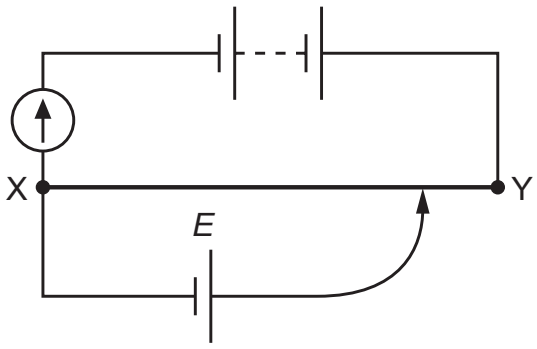
What is the current in the fixed resistor?

A 0.36 mA **B** 0.40 mA **C** 0.48 mA **D** 0.80 mA

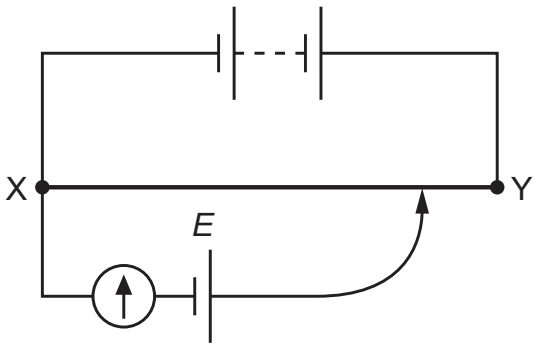
11 A potentiometer circuit may be used to determine the unknown electromotive force (e.m.f.) *E* of a cell. The circuit diagrams shown include a battery of known e.m.f. and negligible internal resistance, a uniform resistance wire XY and a galvanometer.

Which circuit diagram shows a suitable arrangement for determining *E*?

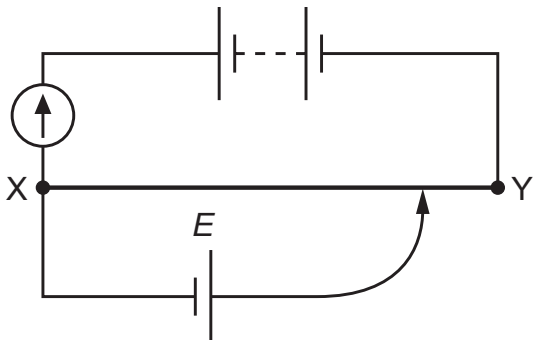
A



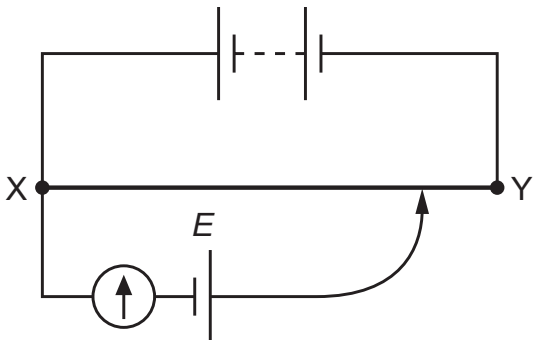
B



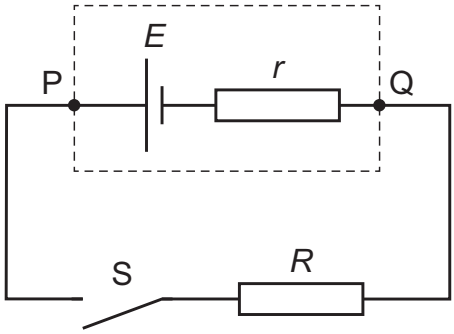
C



D



12 A cell of electromotive force (e.m.f.) *E* and internal resistance *r* is connected in series with a switch S and an external resistor of resistance *R*.



The potential difference (p.d.) between P and Q is *V*.

Which statement is correct when S is changed from open to closed?

A *V* increases because there is a p.d. across *R*.

B *V* decreases because there is a p.d. across *r*.

C *V* remains the same because the decrease of p.d. across *r* is balanced by the increase of p.d. across *R*.

D *V* remains the same because the sum of the p.d.s across *r* and *R* is still equal to *E*.

13 **(a)** State Kirchhoff's first law.

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..... [1]

(b) A battery is connected to two resistors X and Y, as shown in Fig. 6.1.

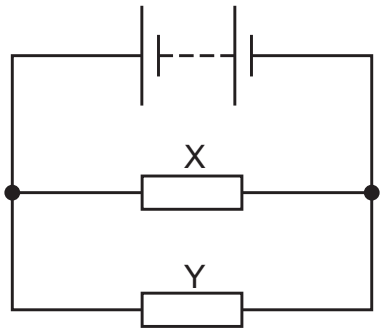

Fig. 6.1

The resistance of resistor X is greater than the resistance of resistor Y.

(i) State and explain which resistor dissipates more power.

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..... [3]

(ii) The two resistors are made of wires that have the same length. Both wires are made from metal of the same resistivity.

State and explain which resistor is made of wire with the larger cross-sectional area.

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..... [2]

(c) A battery of electromotive force (e.m.f.) 9.0 V and negligible internal resistance is connected in series with a light-dependent resistor (LDR) and a fixed resistor of resistance 1800 Ω, as shown in Fig. 6.2.

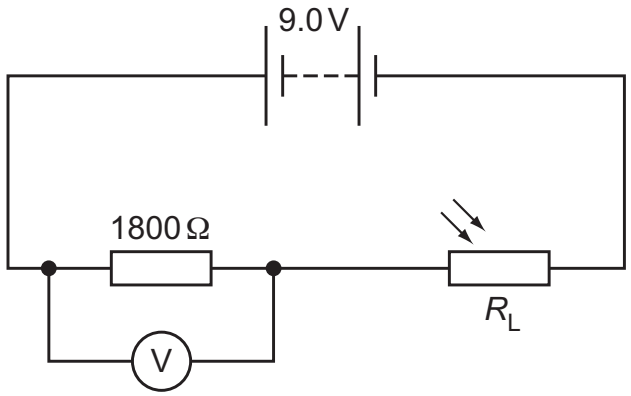

Fig. 6.2

A voltmeter is connected across the fixed resistor. The reading on the voltmeter is 5.4 V.

(i) Calculate the current in the circuit.

current = ... A [1]

(ii) Calculate the resistance R_L of the LDR.

R_L = ... Ω [2]

(iii) The intensity of the light illuminating the LDR increases.

By reference to the current in the circuit, state and explain the change, if any, to the voltmeter reading.

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..... [2]

[Total: 11]

14 **(a)** Define the *electromotive force* (*e.m.f.*) of a source.

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..... [2]

(b) The circuit shown in Fig. 5.1 contains a battery of e.m.f. *E* that has internal resistance *r*, a variable resistor, a voltmeter and an ammeter.

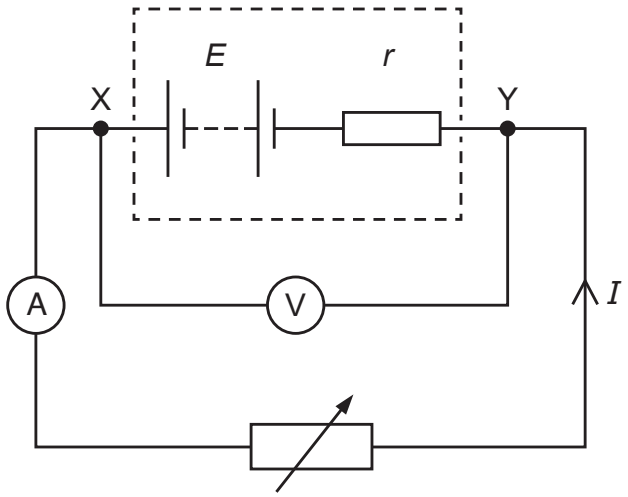

Fig. 5.1

Readings from the two meters are taken for different settings of the variable resistor. The variation with current *I* of the potential difference (p.d.) *V* across the terminals XY of the battery is shown in Fig. 5.2.

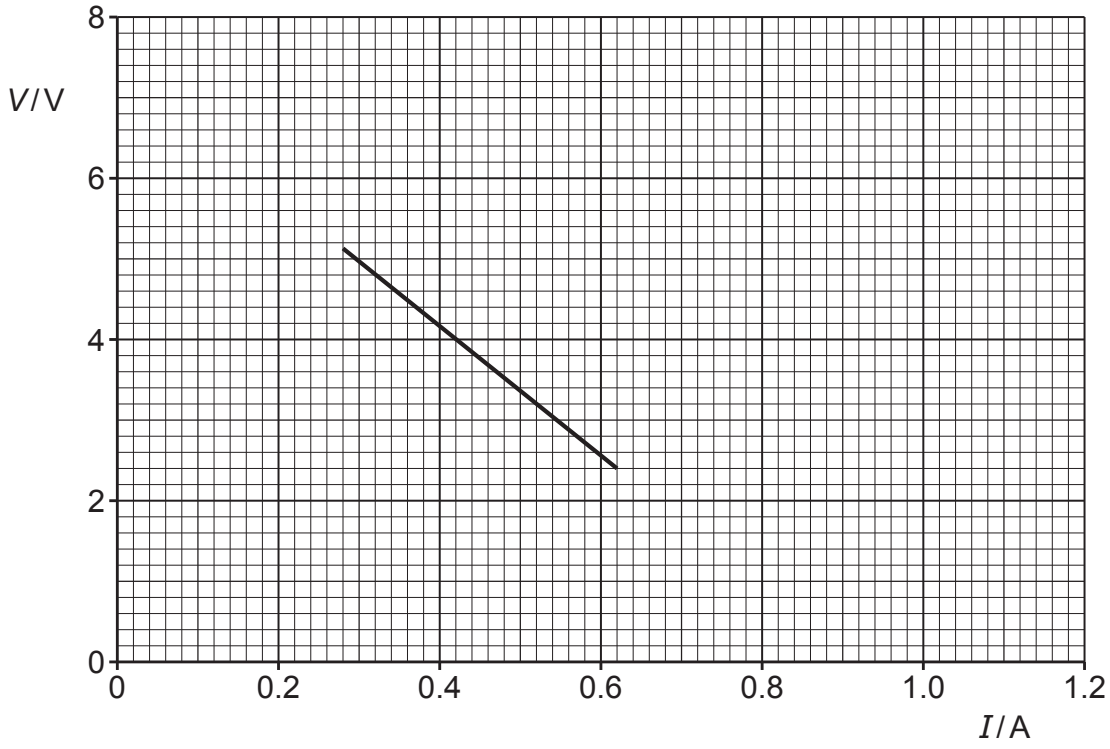

Fig. 5.2

Explain why V is not constant.

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.....

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..... [3]

(c) For the battery in **(b)**, use Fig. 5.2 to determine:

(i) the e.m.f. E

E = ... V [1]

(ii) the maximum current that the battery can supply

maximum current = ... A [1]

(iii) the internal resistance r.

r = ... Ω [2]

(d) On Fig. 5.2, sketch a line to show a possible variation with I of V for a battery with a lower e.m.f. and a lower internal resistance than the battery in **(b)**. Your line should extend over at least the same range of currents as the original line. [2]

[Total: 11]