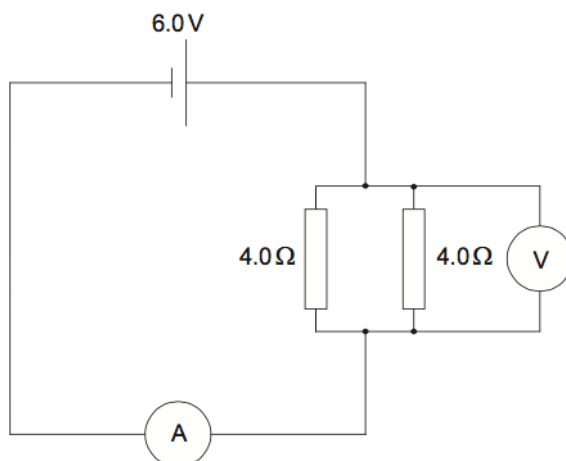# emf and Ir topic questions
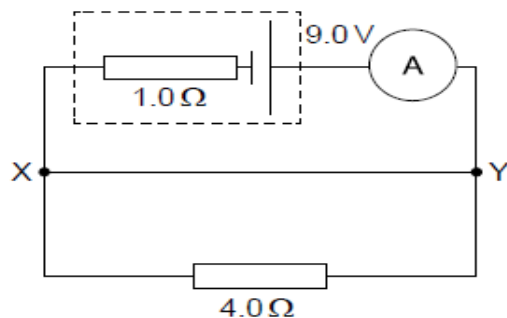
1. A circuit consists of a cell of electromotive force (emf) 6.0V and negligible internal resistance connected to two resistors of 4.0Ω.

The ammeter has resistance equal to 1.0Ω and the voltmeter is ideal. What are the readings of the ammeter and the voltmeter?

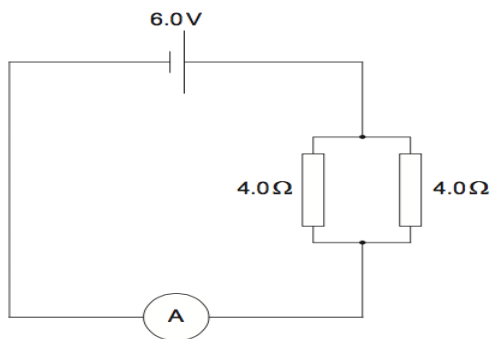|	Ammeter	Voltmeter
A.	2.0A	3.0V
B.	3.0A	3.0V
C.	2.0A	4.0V
D.	3.0A	4.0V

2. A circuit contains a cell of electromotive force (emf) 9.0 V and internal resistance 1.0 Ω together with a resistor of resistance 4.0 Ω as shown. The ammeter is ideal. XY is a connecting wire.

What is the reading of the ammeter?

A. 0 A

B. 1.8 A

C. 9.0 A

D. 11 A

**3.** A circuit consists of a cell of electromotive force (emf) 6.0V and negligible internal resistance connected to two resistors of 4.0Ω.

The resistance of the ammeter is 1.0 Ω. What is the reading of the ammeter?

A. 2.0A

B. 3.0A

C. 4.5A

D. 6.0A

4. A battery of emf 12 V and negligible internal resistance is connected to a resistor of constant resistance 6 Ω, an ideal ammeter and an ideal voltmeter.
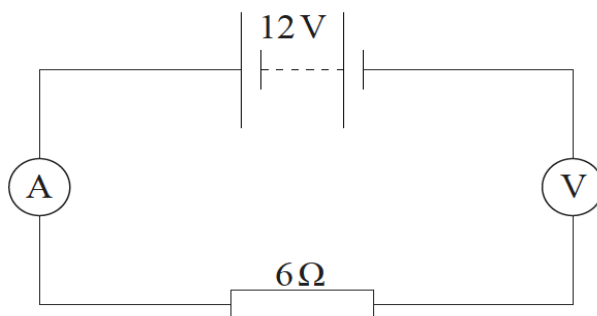
What is the reading on the ammeter and on the voltmeter?

|	Ammeter reading / A	Voltmeter reading / V
A.	2.0	0
B.	2.0	12
C.	0	0
D.	0	12

5. A battery of internal resistance 2 Ω is connected to an external resistance of 10 Ω. The current is 0.5 A.
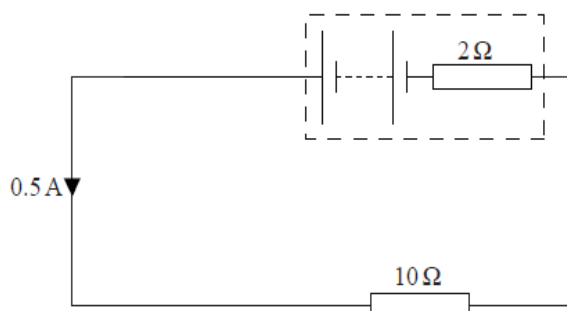
What is the emf of the battery?

A. 1.0 V

B. 5.0 V

C. 6.0 V

D. 24.0 V

6. The circuit shows a resistor R connected in series with a battery and a resistor of resistance $10\ \Omega$. The emf of the battery is 20 V and it has negligible internal resistance. The current in the circuit is 1.0 A.
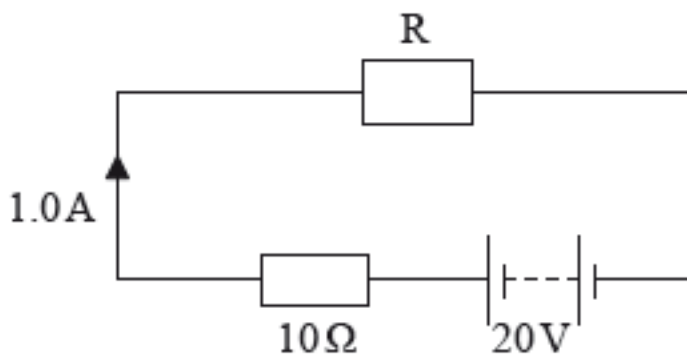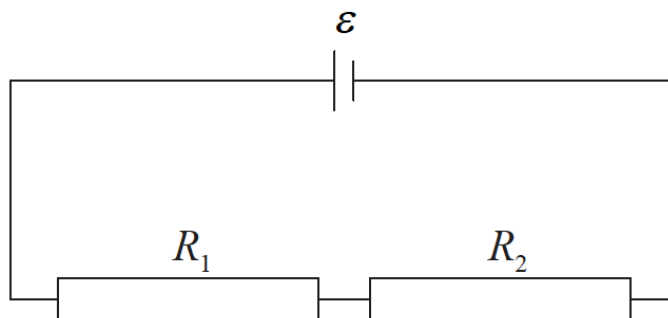

Which of the following is the resistance of R?

A. $1.0\ \Omega$

B. $2.0\ \Omega$

C. $10\ \Omega$

D. $20\ \Omega$

7. A battery of emf 6.0V is connected to a 2.0Ω resistor. The current in the circuit is 2.0A. The internal resistance of the battery is

A. zero.

B. $1.0\ \Omega$.

C. $3.0\ \Omega$.

D. $4.0\ \Omega$.

8. Two resistors, of resistance R_1 and R_2, are connected in series with a cell of emf ε and negligible internal resistance.

Which expression gives the potential difference across the resistor of resistance R_1?

A. $\left(\dfrac{R_1}{R_1+R_2}\right)\varepsilon$

B. $\left(\dfrac{R_1+R_2}{R_1}\right)\varepsilon$

C. $\left(\dfrac{R_2}{R_1+R_2}\right)\varepsilon$

D. $\left(\dfrac{R_1+R_2}{R_2}\right)\varepsilon$

9. The electromotive force (emf) of a cell is defined as

A. the power supplied by the cell per unit current from the cell.

B. the force that the cell provides to drive electrons round a circuit.

C. the energy supplied by the cell per unit current from the cell.

D. the potential difference across the terminals of the cell.

10a. In an experiment a student constructs the circuit shown in the diagram. The ammeter and the voltmeter are assumed to be ideal.
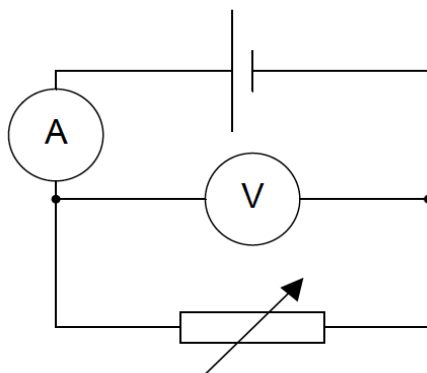
State what is meant by an ideal voltmeter.

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10b. The student adjusts the variable resistor and takes readings from the ammeter and voltmeter. The graph shows the variation of the voltmeter reading V with the ammeter reading I.
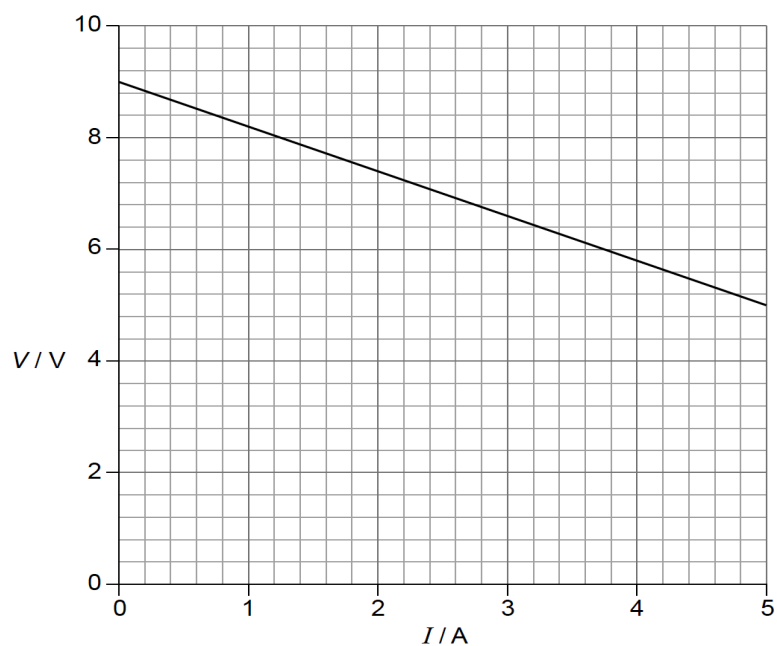
Use the graph to determine

(i) the electromotive force (emf) of the cell.

(ii) the internal resistance of the cell.