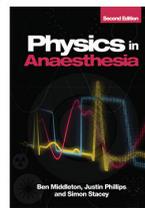


Chapter 18

Basics of electricity



Self-assessment questions

These questions and answers, in both MTF and SBA formats, accompany *Physics in Anaesthesia 2e* and link back to the book for guidance.

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Multiple true / false questions

For each of the following questions, mark all answers as either true or false

1. At room temperature good conductors of electricity include:

- a. Distilled water
- b. Silicon
- c. ECG electrodes
- d. Theatre clogs
- e. Saline spilt on the floor

Did you know?

- Common semiconducting materials are crystalline solids, such as silicon (Si), germanium (Ge) and gallium arsenide (GaAs).

Reminder

- A semiconductor's resistivity can reduce at temperatures higher than room temperature to allow the conduction of electricity.

2. Which of these options will increase the resistance of a conducting wire?

- a. Heating it up
- b. Increasing the length
- c. Reducing the cross-sectional area
- d. Cooling it down
- e. Increasing the surface area

Reminder

- Conducting metal wires have a positive temperature coefficient of resistance.
- A positive temperature coefficient of resistance: temperature rises, resistance rises.
- A negative temperature coefficient of resistance: temperature rises, resistance falls.

3. Regarding the Wheatstone resistor bridge network in a blood pressure transducer:

- a. It allows for extremely large voltage differences to be measured
- b. There are four resistors
- c. Two pairs of resistors are in series and set up as potential dividers
- d. If there is no difference in output voltages from the potential dividers the transducer resistance can be calculated
- e. The variable resistor changes to maintain the voltmeter output at 100 V

Pointer

- See Section 6.8 and Figures 18.6 and 18.7.

Single best answer questions

For each of the following questions, select the single best answer – note that more than one answer may be true but only one option represents the best answer

1. What is the current flowing through a circuit with resistance of 90 Ohm connected to a 12 V power supply?

- a. 0.13 mA
- b. 13 A
- c. 7.5 mA
- d. 7.5 A
- e. 133 mA

Pointer

- See Figure 18.2.

Reminder

- The Ohm, abbreviation Ω , is the SI unit of electrical resistance.

2. If there are three resistors in series in a closed circuit that each lead to a 2 V voltage drop, what must the power supply voltage into the circuit be?

- a. -6 V
- b. 6 V
- c. 8 V
- d. 12 V
- e. 16 V

Pointer

- Think Kirchhoff's voltage law – see Equation 18.3.

3. What would be the total resistance of two resistors of 100 and 200 Ohms if they were (a) in series and (b) in parallel?

- a. (a) = 300 Ohm; (b) = 67 Ohm
- b. (a) = 200 Ohm; (b) = 100 Ohm
- c. (a) = 150 Ohm; (b) = 75 Ohm
- d. (a) = 67 Ohm; (b) = 300 Ohm
- e. (a) = 300 Ohm; (b) = 75 Ohm

Reminder

- Total resistance will always be greater than the value of the largest resistor when resistors are placed in series.
- Total resistance will always be smaller than the value of the smallest resistor when resistors are placed in parallel.

Answers to questions for Chapter 18 – Basics of electricity

Multiple true / false questions

The following answers are true:

1. c and e
2. a, b and c
3. b, c and d

Single best answer questions

The options below represent the single best answer, although other options may also be true:

1. e
2. b
3. a