

Year 11 Physics Revision Checklist – Electrical Circuits

NB: There will be no questions in the topic test relating to Electrical Safety.

Science as a Human Endeavour

The supply of electricity to homes has had an enormous impact on society and the environment. An understanding of electrical circuits informs the design of effective safety devices for the safe operation of:

- lighting
 - power points
 - stoves
 - other household electrical devices.
- WACE Study Guide pp. 77-78*
Pearson Physics 11 Section 5.6
Exploring Physics pp. 132-133

Science Understanding

- there are two types of charge that exert forces on each other

Pearson Physics 11 Section 5.1
WACE Study Guide pp. 63-65
Exploring Physics p. 90 Set 9: 9.1, 9.3, 9.5, 9.9

- electrostatically charged objects exert a force upon one another; the magnitude of this force can be calculated using Coulomb's Law
[NB: from Year 12 syllabus – additional worksheets will be provided; formula & constant will be provided in any assessment]

This includes applying the relationship

$$F = \frac{kq_1q_2}{r^2}$$

Exploring Physics p. 90, Set 9: 9.3, 9.10

- electric current is carried by discrete charge carriers; charge is conserved at all points in an electrical circuit

This includes applying the relationship

$$I = \frac{q}{t}$$

Pearson Physics 11 pp. 128-129
WACE Study Guide p. 66-67
Exploring Physics pp. 91 Set 9: 9.7, 9.13

- energy is conserved in the energy transfers and transformations that occur in an electrical circuit

Pearson Physics 11 Section 5.5

- the energy available to charges moving in an electrical circuit is measured using electric potential difference, which is defined as the change in potential energy per unit charge between two defined points in the circuit

This includes applying the relationship

$$V = \frac{W}{q}$$

WACE Study Guide pp. 65-66
Pearson Physics 11 Section 5.2
Exploring Physics pp. 91

- energy is required to separate positive and negative charge carriers; charge separation produces an electrical potential difference that drives current in circuits

WACE Study Guide p. 65-66
Pearson Physics 11 Section 5.2

- power is the rate at which energy is transformed by a circuit component; power enables quantitative analysis of energy transformations in the circuit

This includes applying the relationship

$$P = \frac{W}{t} = VI$$

Pearson Physics 11 p. 129
WACE Study Guide p. 67-68

Exploring Physics pp. 97 Set 10: 10.1, 10.3, 10.5, 10.7, 10.9, 10.11, 10.13

- resistance depends upon the nature and dimensions of a conductor

Pearson Physics 11 Section 5.4

WACE Study Guide pp. 71

- resistance for ohmic and non-ohmic components is defined as the ratio of potential difference across the component to the current in the component

This includes applying the relationship

$$R = \frac{V}{I}$$

Pearson Physics 11 Section 5.4

WACE Study Guide pp. 70, 76-79

Exploring Physics pp. 105; Set 11: 11.1, 11.3, 11.5, 11.7, 11.9

- circuit analysis and design involve calculation of the potential difference across the current in, and the power supplied to, components in series, parallel, and series/parallel circuits

This includes applying the relationships

$$\begin{aligned} \text{series components, } I &= \text{constant,} & V_t &= V_1 + V_2 + V_3 \dots \\ R_t &= R_1 + R_2 + R_3 \dots \end{aligned}$$

$$\begin{aligned} \text{parallel components, } V &= \text{constant,} & I_t &= I_1 + I_2 + I_3 \dots \\ \frac{1}{R_t} &= \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \dots \end{aligned}$$

WACE Study Guide pp. 73-76

Pearson Physics 11 Section 5.5

Exploring Physics pp. 115; Set 12: 12.1, 12.3, 12.5, 12.7, 12.9, 12.11, 12.13

- ~~there is an inherent danger involved with the use of electricity that can be reduced by using various safety devices, including fuses, residual current devices (RCD), circuit breakers, earth wires and double insulation~~

~~Pearson Physics 11 Section 5.6~~

~~WACE Study Guide pp. 76-78~~

~~Exploring Physics pp. 125-126, 132-133 Set 13: 13.1, 13.3, 13.5, 13.7, 13.9, 13.10, 13.12, 13.14~~

- electrical circuits enable electrical energy to be transferred and transformed into a range of other useful forms of energy, including thermal and kinetic energy, and light

WACE Study Guide p. 69

Pearson Physics 11 pp. 119-121

Exploring Physics pp. 125-126

WACE Study Guide – Chapter 3 Review Questions pp. 79-81

WACE Study Guide – Trial Test 3 pp. 169-174

Pearson Physics 11 Chapter 5 Review questions pp. 164-166

Past Stage 2 Physics WACE Exam Questions:

Year	Questions
2010	1,3,5,7,12,17,20
2011	9,12,17,22
2012	6,8,15,16,18,20
2013	2,5,12,21,23
2014	3,7,9,15,18,19,22

Note: Coulomb's Law is not officially in the Year 11 ATAR syllabus, but we do teach it in Year 11 at Perth Modern. You can expect that it will be included in at least one of the assessment items on the topic of Electrical Circuits. Since the formula and constant for Coulomb's Law are not on your Year 11 data sheet – these will be supplied to you in any assessment where they are required. You do not have to commit them to memory.