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|  | Australian Curriculum Year 9 Science sample assessment ׀ Task-specific standards — continua  Electric kettles | Name |

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**Sections 1 and 2 purpose of assessment:** To demonstrate understanding of energy transfer in electric circuits and to investigate factors that affect the transfer of energy in an electric kettle.

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| Understanding dimension | | Skills dimension | |  |
| Science Understanding | Planning and conducting | Processing and analysing data and information | Communicating |  |
| **Section 1: Questions 1–7**  Description of energy transfer in electric circuits and heating appliances and explanation of the factors that affect energy transfer using the particle model | **Section 2: Questions 8 and 9a**   * Measurement of voltage and current for various lengths and thickness of wire * Identification and description of safety considerations | **Section 2: Questions 9b, 10 and 11**  Analysis of trends in data to draw conclusions consistent with evidence about how current, resistance and voltage relate to the wire’s dimensions | **Sections 1 and 2**  Communication of findings and ideas about factors that affect energy transfer in electric circuits |  |
| * Manipulation of formulas to derive the formula, with units, for calculating power from resistance and voltage (Q6). Thorough explanation of how electrical energy is transformed into heat integrated with an appropriate labelled diagram (Q7) | * Accurate and precise measurement of reliable voltage and current data for various lengths and thickness of wire (Q9a)   Description of how to manage identified safety risks (Q8) | * Accurate calculation of resistance (Q9b) and analysis of trends in data to identify relationships (Q10) to inform the thorough explanation of how current, resistance and voltage relate to the wire’s dimensions, using the particle model (Q11) | * Concise and coherent use of appropriate language and representations when communicating findings and ideas | A |
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|  |  |  |  | B |
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| * Description of energy transformations (Q1), definitions (Q2), relationships using formula (Q3, 4, 5a), units for resistance and voltage (Q6), how electrons move through a resistor (Q7) | * Accurate measurement of voltage and current for various lengths and thickness of wire (Q9a)   Description of identified safety risks (Q8) | * Calculation of resistance (Q9b) and analysis of trends in data to identify how current, resistance and voltage relate to the wire’s dimensions (Q10) | * Use of appropriate language and representations when communicating findings and ideas | C |
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|  |  |  |  | D |
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| * Restatement of science facts | * Collection of voltage and current data (Q9a) | * Restatement of given information and data about current, resistance and voltage | * Fragmented use of language and representations | E |
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**Section 3 purpose of assessment:** To plan an investigation to investigate the question: *Is the stated power rating of my kettle accurate*?

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| Understanding dimension | | Skills dimension | |  |
| Science Understanding | Planning and conducting | Processing & analysing data & information  Evaluating | Communicating |  |
| **Section 3: Introduction**  Background information about factors affecting energy transfer | **Section 3: Materials and Method**  Design of an appropriate investigation to determine the resistance of the heating element of a kettle | **Section 3: Results, Analysis of results, Discussion, Conclusion**  Analysis of trends in data to draw conclusions consistent with evidence about the power of a kettle element  Analysis of the method to propose effective modifications | **Section 3**  Communication of findings and ideas using appropriate language, symbols, units and conventions |  |
| * Explanation of the factors affecting energy transfer integrated with the findings in Section 2 and the particle model | * Design and refinement of a method that controls, and accurately measures variables to ensure the systematic collection of reliable data   Description of how to manage safety considerations | * Calculation of resistance and analysis of trends in data to identify and explain relationships between variables to: * draw a justified conclusion about the power rating of the kettle * identify inconsistencies in results   Analysis of the method and the quality of data collected to explain how effective actions will improve the quality of evidence | * Concise and coherent use of appropriate language and representations when communicating findings and ideas   Accurate use of appropriate symbols and conventions and units in formulas and data tables | A |
|  |  |  |  |
|  |  |  |  | B |
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| * Explanation of the factors affecting energy transfer with reference to the particle model | * Design of a method that includes the: * control and accurate measurement of variables * systematic collection of data * description of safety considerations | * Calculation of resistance and analysis of trends in data to identify relationships between variables and identify inconsistencies in results   Analysis of the method and the quality of the data collected  Explanation of specific actions to improve the quality of evidence | * Use of appropriate language and representations when communicating findings and ideas   Use of symbols in circuit diagrams and conventions and units in formulas and data tables | C |
|  |  |  |  |
|  |  |  |  | D |
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| * Restatement of science facts | * Use of a given method | * Restatement of data   Statements about methods, data and explanations | * Fragmented use of language and representations | E |
|  |  |  |  |