**STEM**

**Unpacking the Content Descriptions**

**Levels 7–8**

**Unpacking the content descriptions – STEM**

**Levels 7 – 8**

**Integrating Science and Design and Technologies (STem)**

**Focus: Integration of content related to energy transformations with choice of materials**

| **Learning area** | **Science** | **Learning area** | **Design and Technologies** |
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| **Strand** | Science Understanding | **Strand** | Technologies and Society |
| **Sub-strand** | Physical Science |
| **Content Description** | Energy appears in different forms including movement (kinetic energy), heat, light, chemical energy and potential energy; devices can change energy from one form to another. | **Content Description** | Examine and prioritise competing factors including social, ethical, economic and sustainability considerations in the development of technologies and designed solutions to meet community needs for preferred futures. |
| **Related extract from Achievement Standard** | Students investigate different forms of energy and explain how energy transfers and transformations cause change in simple systems.  | **Related extract from Achievement Standard** | Students explain factors that influence the design of solutions to meet present and future needs. |
| **Suggested focus** | Learning may focus on:* identifying different forms energy in everyday situations; e.g. jumping on a trampoline, rolling a ball down a hill
* comparing the effects of kinetic and potential energy; e.g. heat as an example of kinetic energy and gravitational potential energy
* investigating how different forms of energy can cause changes; e.g. turning on a radio
* differentiating between energy transfer and energy transformation
* using energy flow diagrams to illustrate changes between different forms of energy within a system
* exploring the law of conversation of energy through experimentation
* understanding energy conversions within simple systems such as a radio often result in useful energy and wasted energy.
 | **Suggested focus** | Learning may focus on:* understanding what ethics are and how they affect the way people live and the decisions that they make
* brainstorming a variety of factors that can influence the selection of appropriate materials, components, tools and equipment
* defining profitability in terms of the production of a designed solution
* investigating how various competing factors impact on design and technologies
* considering environmental and sustainability factors
* analysing an environment to decide if it meets personal or community (may include the school) needs.
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| **Sample activities (integrating both learning areas)** |
| * Developing a doorbell that is appropriate for individuals with hearing difficulties and/or appropriate for the elderly.
* Investigating Australia’s journey in the development of hypersonic and supersonic travel (planes)
* researching a scramjet and/or scramjet’s engine in terms of material use and design, particularly given that there are no moving parts and therefore, minimal wasted energy.
* Comparing various charging stations, including the wire-free options, for portable electronic devices and smart telephones
* developing an energy flow diagram to show the energy transformations occurring with the re-charging of an electronic device
* considering the materials used in the constructions of the charging stations.
* Critiquing the use of compact fluorescent globes and removal of incandescent light globes
* energy efficiency comparing the two types of globes.
* Exploring the effects of insulating a family home in terms of minimising heat loss
* benefits of using fire retardant material versus the cost of installing such material.
* Reviewing generation of electricity using non-renewable resources such as coal and gas with that generated by renewable resources; such as water and sun
* investigating use of solar panels at a domestic and national level
* considering the profitability and sustainability of different fuels
* examining the environmental impacts of using non-renewable versus renewable resources.
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**Unpacking the content descriptions – STEM**

**Levels 7 – 8**

**Integrating Digital Technologies and Mathematics (sTeM)**

**Focus: Integration of content related to data collection and interpretation with data visualisation**

| **Learning area** | **Digital Technologies** | **Learning area** | **Mathematics** |
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| **Strand** | Data and Information | **Strand** | Statistics and Probability |
| **Sub-strand** | Data representation and interpretation |
| **Content Description** | Analyse and visualise data using a range of software to create information, and use structured data to model objects or events | **Content Description** | Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data |
| **Related extract from Achievement Standard** | They analyse and evaluate data from a range of sources to model solutions and create information. | **Related extract from Achievement Standard (Level 7)** | Students identify or calculate mean, mode, median and range for data sets, using digital technology for larger data sets. |
| **Suggested focus** | Learning may focus on:* exploring different ways that data can be presented to produce information
* looking at various types of data, such as text, numbers and dates
* creating and formatting tables with a variety of different data types
* visualising data to create and/or summarise information; e.g. creating graphical representations from tables in a spreadsheet
* exploring the functions within a spreadsheet to organise and filter data
* extracting relevant data for further analysis
* exploring the features of a database other than that presented in a spreadsheet.
 | **Suggested focus** | Learning may focus on:* defining the measures of centre (mean, median and mode) and a measure of spread (range)
* arranging data in ascending order
* calculating the mean, median and mode for ungrouped data, with and without the use of technology
* determining the median for an even and odd number of data values
* determining the appropriateness between mean and median when discussing measures of centre
* exploring data that is bimodal and multimodal
* calculating the range and interpreting it in terms of the spread; identifying an outlier that may affect the range
* summarising numerical data and drawing conclusions based on the statistics calculated.
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| **Sample activities (integrating both learning areas)** |
| Please note that the sample activities listed below can be applied to a large variety of STEM units of work. For example, as part of promoting a healthy eating program within Victorian schools, students can collect numerical data from a survey and perform relevant statistical calculations; e.g. the amount of money spent at the school canteen per student during lunchtime or the number of carbonated drinks brought by year 7, 8, 9, 10 11 and 12 students. * Introduction to spreadsheets; e.g. column, row or cell, formula bar.
* Using spreadsheet software to:
* construct tables
* perform calculations such as count and sum
* arrange numerical data in descending and ascending order
* undertake simple statistical analysis including mean (average), median, mode and range
* convert data tables into graphical representations such as charts; e.g. bar charts, pie charts; importance of discussing the advantages and disadvantages of 3D charts as compared to 2D charts.
* By hand, perform calculations involving measures of centre and measure of spread on numerical data, even and odd number of data values; compare these calculations with that when using a spreadsheet software.
* Interpret a variety of different sets of numerical data based on the measures of centre and spread; e.g. mean or median in terms of the range, reliability of the mode as a measure of centre.
* Drawing conclusions from information created and represented visually.
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