

THERMODYNAMICS

VCE PHYSICS - UNIT 1

INTRODUCTION

Recent advances and improvements to Infra-Red technology have made thermal imaging commonplace in sport, law enforcement and manufacturing. The use of thermal imaging in a construction setting allows for subtle heat expressions to be visualised and for inefficient heat transfers to be identified, thus informing best practice in sustainable housing.

INDUSTRY FOCUS



Construction Technology

PROGRAM OUTLINE

In this program, students use FLIR thermal imaging cameras and STELR Sustainable Housing kits to investigate the use of materials in housing. By comparing the heat absorption and emission of different materials, they will inform their own insulated house designs, which they will then assemble, test and evaluate. They will also explore some innovative modern approaches in sustainable house design and consider the possibility of homes being built that do not require any active heating or cooling at all.

Students will have the opportunity to apply a range of thermodynamic principles, including:

- Describing temperature with reference to the average kinetic energy of the atoms and molecules within a system
- Investigating and applying the First Law of Thermodynamics to simple situations: $Q = U + W$
- Distinguishing between conduction, convection and radiation with reference to heat transfers within and between systems
- Explaining why cooling results from evaporation using a simple kinetic energy model
- Describing power radiated by a body as being dependent on the temperature of the body according to the Stefan-Boltzmann Law: $P \propto T^4$

CURRICULUM LINKS



VCE Physics Unit 1

- Area of Study 1: Thermodynamics

DURATION



2 hours

(times negotiable)

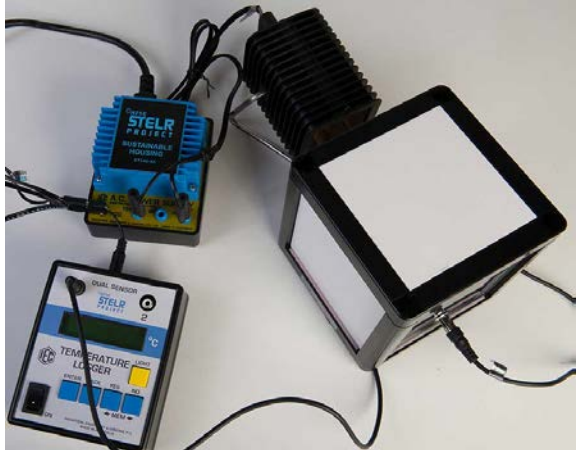
TEACHER INFORMATION

THERMODYNAMICS

AT KIOSC

Expectation of the school classroom teacher as KIOSC is to be involved in the learning program. Basic classroom management will be managed by the KIOSC STEM Educators, but extra assistance may be required. Within each lesson, the KIOSC STEM Educator may require your assistance for various activities. We understand that you may not be familiar with the technology/content of the lesson; but ask you to engage with your students by asking great “teacher” questions and learning alongside your students. This makes the learning transition back into classroom smooth and continuous.

SUGGESTED PRE-VISIT IDEAS

Topic	Suggested Pre-Visit Ideas/knowledge to incorporate into your curriculum
Key Knowledge	<ul style="list-style-type: none">Describe temperature with reference to the average kinetic energy of the atoms and molecules within a systemDistinguish between conduction, convection and radiation with reference to heat transfers within and between systems.Explain why cooling results from evaporation using a simple kinetic energy model.Describe power radiated by a body as being dependent on the temperature of the body according to the Stefan-Boltzmann Law: $P \propto T^4$ 
Key Skills	Investigate and apply theoretically and practically the First Law of Thermodynamics to simple situations: $Q = U + W$
Key Terms	Thermodynamics, conduction, convection, radiation, Stefan-Boltzmann Law, infrared wavelengths, housing insulation, thermal conductivity rate, dependent and independent variables.



SUGGESTED POST-VISIT IDEAS

Topic	Suggested Post-Visit ideas to incorporate into your curriculum
Assessment Task	<p>Suitable tasks for assessment may be selected from the following:</p> <p>For Outcomes 1 and 2</p> <ul style="list-style-type: none">• An annotated folio of practical activities• Data analysis• Design, building, testing and evaluation of a device• An explanation of the operation of a device• A proposed solution to a scientific or technological problem• A report of a selected physics phenomenon• A modelling activity• A media response• A summary report of selected practical investigations• A reflective learning journal/blog related to selected activities or in response to an issue• A test comprising multiple choice and/or short answer and/or extended response.