

TOPIC 2.17:	Heat (Learning outcomes by syllabus reference: OP22, OP23)
HOW MANY LESSONS?	2 – 3 lessons

KEYWORDS / TERMS TO BE TAUGHT			
Thermometer	Medium	Expand	Contract
Conductor	Vacuum	Insulator	

KEY CONCEPTS IN THE LESSON (OBJECTIVES)		
<i>What students must know or be able to do</i>	<i>What students should know or be able to do</i>	<i>What students could know or be able to do</i>
To be able to identify heat as a form of energy To be able to carry out simple experiments to investigate the effect of heat on solids, liquids and gases	To be able to give Joules as the unit of heat To be aware of the issue of contraction and expansion in design, e.g. gaps in rail tracks etc	To recall the Law of Conservation of Energy and apply it to examples involving heat

SEQUENCE OF LESSON
<ol style="list-style-type: none"> 1. Introduce the concept of heat. This could be facilitated by using the <i>Heat</i> PowerPoint and encouraging student input during the presentation. 2. Carry out experimental activities in groups emphasising safety (identify risks and safety rules). Discussion of vocabulary, results and conclusion. 3. Review – whole class discussion/dissemination of ideas. Possibility of using <i>Inflating Balloon Activity</i> sheet in the <i>Experiments</i> section of this resource pack 4. Further class work/homework – see <i>Heat Worksheet</i>.

1. DIFFERENTIATE BY CONTENT (In what ways can I vary the content of what I am teaching?)		
<i>(A) Complexity of content: (concrete, symbolic, abstract)</i>		
Concrete	Symbolic	Abstract

Real materials associated with heat and the experiments, e.g. Bunsen burner and ball with ring	Drawings of equipment for experiments	Appreciation of how heat causes expansion at the molecular level
<i>(B) Variety of resources</i>		
As listed above		
<i>(C) Variety of learning environments</i>		
Classroom, school laboratory, computer room, visit outside to measure gaps in concrete paths		

2. DIFFERENTIATE BY PROCESS (How will I teach the lesson?)

Sequence of lesson as laid out above

- Introduction – using concrete or symbolic material or a general class discussion
- Teacher may demonstrate use of apparatus to the class, emphasising safety.
- Divide class into groups. Assist the students, as required, to plan, carry out the experiment, record results and draw conclusions as appropriate. Enable students to extend their thinking and language skills. For resources, guidance and support related to facilitating student experiments and investigations, see www.juniorscience.ie
- Possible use of *Inflating Balloon Activity* to facilitate review and discussion

3. DIFFERENTIATE BY OUTCOME / PRODUCT

(How will the student demonstrate understanding?)

See *Worksheets*, *Classroom Activities* and *Experiments* sections of this resource pack

- Students may use a template from the *Experiments* section to assist them with the write-up.
- Whole class review work completed at end of class.
- Homework: *Heat Worksheet* if not used for class work. Specify time to be allocated to this work at home.

FINALLY - ANY OTHER POSSIBILITIES FOR THIS LESSON?

- Collage of scenes showing objects being heated (with relevant labels)
- A choral reading, jingle or rap to help students remember 'Solids, liquids and gases expand when heated and contract when cooled'
- Extension exercise: 'Do all liquids expand when heated and contract when cooled?' before introducing syllabus learning outcome OP24
- Cross-curricular links: Geography, Technology
- Internet search for material on heat
- Suggested Internet links include www.juniorsscience.ie, www.bbc.co.uk/schools, www.scoilnet.ie, www.skool.ie and <http://classroom.jc-schools.net/sci-units/energy.htm>
- For advice on enhancing curricular access through the use of mobile ICT, see www.laptopsinitiative.ie