# NHSG Key Stage 3 Unit Overview for Y7 Science: Energy and Heat Transfers

| Scheme of Learning | Y7 Science: Energy and Heat Transfers |
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| Learning Objectives | 1. I know that energy is needed to do work.<br>2. I can state that energy can be stored by objects or transferred from one object to another.<br>3. I can describe the energy transfers in some devices.<br>4. I can calculate the efficiency of energy transfer<br>5. I know that fuels release energy when they are burnt.<br>6. I can describe the difference between heat and temperature.<br>7. I can explain the transfer of energy by conduction.<br>8. I know that heat energy will flow more easily through good thermal conductors and less well through poor conductors (insulators).<br>9. I know that most metals are good thermal conductors.<br>10. I know that liquids and gases are poor thermal conductors.<br>11. I can explain the transfer of energy by convection.<br>12. I can use the idea of particles moving apart to make a fluid less dense and to explain simple applications of convection.<br>13. I know that heat can be transferred through empty space by infrared radiation<br>14. I know that radiation does not require the movement of particles. Any hot or warm object gives off or emits radiation.<br>15. I know that infrared radiation travels as waves. It can be reflected and it can also be focused.<br>16. I know that when something takes in heat energy from radiation, it is said to absorb it. |
| Key Question | How can physical processes be explained using energy analysis? |
| Knowledge | • energy as a quantitative tool rather than energy being a substance<br>• explanations that explore processes rather than rely on energy<br>• start and end points in energy analyses<br>• quantifiable terms |

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| | • heating (as a process) rather than 'heat' as a substance<br>• differences as the cause of change<br>• dissipation and ideas from the second law |
| **Ongoing Assessment** | Retrieval questions at the start of every lesson.<br>Worksheets in booklet format for all major concepts to be used for self and peer assessment.<br>Revision checklist at beginning of handout pack and retrieval questions at the end.<br>Misconceptions: avoid suggesting that energy is a substance that can exist on its own, avoid spurious, invented 'forms' of energy |
| **End Product Assessment** | Assessment of graph skills following practical work<br>End of topic test, 30 marks in 35 minutes. Including a mixture of MCQ, short answer and long answer questions. |
| **Clear sequencing of content** | Narrative: comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions<br><br>At Key Stage 4, students will start to carry out calculations. At Key Stage 3, it is useful to introduce a way of talking about energy that can lead to calculations (even if they do not perform those calculations at KS3)<br><br>• the terminology of energy stores<br>• defining a start and end point in an analysis<br>• introduce the idea of heating as a pathway |
| **Career pathways** | Engineering |

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| **Diversity and Inclusion** | Take the opportunity to give examples and images for energy analyses to be diverse and inclusive. |
| **Intervention support** | Learning checklist and key terminology are highlighted throughout. Online textbook via Kerboodle includes working scientifically, glossary and literacy support. Adaptive teaching in the classroom supports all learners. |
| **Challenge** | Stretch challenge question on end of topic test.<br>Stretch and challenge question sheet. |