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| Collins Connect section | Lesson title | Learning objectives  |
| 2 | Exploring energy transfers | Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, burning fuelsEnergy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change. |
| 3 & 4 | Understanding potential energy and kinetic energy | Other processes that involve energy transfer: changing motion, dropping an object |
| 5 | Understanding elastic potential energy | Other processes that involve energy transfer: stretching a spring.Work done and energy changes on deformation.Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy in elastic distortions |
| 6 | Looking at dynamos | Other processes that involve energy transfer: changing motion, completing an electrical circuit |
| 7 | Knowing the difference between heat and temperature | Heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler oneComparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with temperatures |
| 8 | Investigating fuels | Fuels and energy resources; other processes that involve energy transfer: burning fuelsComparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy in chemical compositions |
| 9 | Exploring and Describing sound | Sound produced by vibrations of objects, in loudspeakers; detected by their effect on microphone diaphragm and the ear drum Frequencies of sound waves, measured in hertz (Hz) |
| 10 | Measuring the speed of sound and how it travels through materials | Echoes; the speed of sound in airSound needs a medium to travel; the speed of sound in air, in water, in solids |
| 11 | Learning about the reflection and absorption of sound |  Echoes, reflection and absorption of sound |
| 12 | Hearing sounds – the human ear | Sound produced by vibrations of objects, detected by their effects on microphone diaphragm and the ear drumWaves transferring information for conversion to electrical signals by microphone and how the human ear detects sounds.Testing auditory range of humans (and other animals). |

Obstacles to learning

You may need extra guidance with the following common misconceptions:

**Energy** Students’ misconceptions include: energy is ‘used up’; we can run out of energy; all energy transfers are useful; energy is a kind of ‘stuff’, a material object; energy and force are the same thing.

**Potential energy** Students may think that height can have nothing to do with energy; all fuels have the same energy; all fuels are called petrol.

* **Heat and temperature** Heat and temperature may be confused; students think there can be a quantity of ‘cold’.

**Sound** Students may think that sounds are only made in the air; you don’t need materials to make sounds; pitch and loudness are the same; sounds waves travel instantaneously; sounds can be heard in space; the ear only consists of the part we can see; loud sounds cannot harm the ear; ultrasounds are very loud sounds.