Lesson 1.5: Heat Transfer Basics

Starter	A fun way to introduce conduction is a full class version of The Telephone game. Make two lines of students, give the first person in each line a piece of paper with a sentence to whisper to the next student. The whisper gets passed on student to student and the final student in the line needs to repeat what they heard. A great common-sense piece of information, a joke or a pun are good to use for this and later, the physical analogy of the message being passed person to person could be used to visualise heat energy being passed particle to particle. Examples of statements/jokes to use: 1. What did one pig say to the other at the beach? (I'm bacon) 2. Which is faster, heat or cold? (Heat, you can catch a cold) 3. Does black attract heat? (Come back to that wee gem when discussing radiation)
Activity	True-False game: From the middle of the room, learners move to the true side of the class or the false side to show their understanding to the provided statements. Instructions and a PowerPoint *Heat Transfer* to go through questions/statements and answers is provided. Outline that heat is a type of energy that moves from warmer objects to cooler objects through three methods. 1. Set up a lamp in the middle of two conical flasks, one silvered and one matte black. Add bungs with thermometers and once they are both reading room temperature, switch the light on. Set timer for 2 minutes and read temperatures after this as per video. A more fun version of this could be to use a little melted chocolate to glue marshmallows or other lollies to the side of a silvered object and a matte black object and see which drops their lollies first. Use this to explain that some heat energy travels independent of particles, as electromagnetic energy **radiation.** Can be useful to discuss that this is how the sun's energy (light and infrared heat) can travel through (empty) space to the planet's even though there are no particles. 2. Playdough modelling - In small groups get students to create models of the particles in a solid, liquid and gas. - Students can make short videos of what happens as each substance heats up (particles vibrate more and, in liquids & gases, move faster, so they expand in volume) - Name the type of heat transfer here as **conduction** 3. Measure out 5 g of water and 5 g of oil in boiling tubes and then pour the water into the oil. What happens to the water? Why is this? Use this to refresh/explain density with students. Get them to remake their playdough models of a liquid only, this time get them to build two, one cold and one hot. Which one is more dense, less dense? What will happen to the more dense liquid/the less dense liquid? Use this to define **convection.** Students could heat a beaker of water here and, using a straw, add a few crystals of potassium permanganate or tea leaves into the bottom of the beaker to observe **convection currents.**
Video	https://www.youtube.com/watch?v=lvyCe0UagJY
Close	Recap the learning with a set of cloze notes for the students to complete. This could be in class or for homework. Answers provided at the end of the PowerPoint for true-false game.

There are a wide variety of resources available for teaching heat transfer and many teachers will have their favourites already to cover the key points. It is hoped the ideas above may provide a new take on some of the old favourites to either help teach or help revise the key concepts.

This lesson may take one lesson or more than this depending on the prior learning of the akonga in your class and your timetable. This lesson includes a True-False activity and a cloze style worksheet designed to work alongside, replace, or be replaced by teachers' activities as the teacher sees fit. You know your students best so choose the resources that will work best in your classroom. A PowerPoint *Heat Transfer* has been created to go over answers to the activities provided.