Science – Y6 Sp1 – Heat

Subject Knowledge Notes:	**For this lesson you will need:**
- In this lesson, we explore why and how heat moves from one place to another - The key principle is that heat will always move from a hotter object/place to a colder object/place. Students should identify which is the hotter or colder object/place and therefore in which direction heat will be transferred in. - One concept that can be tricky is the idea of the a surroundings – the surrounding include any solid, liquid or gas that is in contact with something. As a result (for example), an ice cube in a glass will gain heat from the glass, the air and indirectly from the surface the glass is on as they are all warmer than the ice cube. The inverse is true for a hot drink as each of those parts of the surroundings will be colder that the hot drink.	- IF POSSIBLE – trays/buckets of (bearably) hot water, iced water and room temperature water that students can dip their hands in (gloves can be worn if necessary) - Demo - Ice cube in a paper/plastic cub that is placed in a bowl/saucepan of freshly boiled water - A metal bowl/plate/pan on which another ice cube can be placed to observe it melting.

<u>Lesson Three: What is thermal equilibrium?</u>

 **5 minutes**	• Ask children to try their best to recall the information previously learnt. • If they struggle to do this, ask them to move onto the next question. • After 5 mins, pick children to share their answers aloud, ask children to use a different coloured pen to tick or fix their answers.
 **10 minutes**	• **This may be a difficult task to arrange and depends on classroom layout** but the principle is that students have one bowl of warm water (as close to hot without it being uncomfortable) and a bowl of ice water. They should place their hands in the hot or cold water for about 20 seconds (or as long as they are comfortable doing in the icy water) and then place their hands in some tap water that has been resting in the room for a long time to match the room temperature. • Prompt students to describe how it feels to put their hands in the room temperature water after they have put their hands in the warm or the cold water. After putting their hands in the cold water, the room temperature water feels warm. After putting their hands in the hot water, the room temperature water feels cold. • If possible, you can even get students to put one hand in hot and one hand in cold water and then putting both hands in the same bowl of room temperature water – it is a very confusing sensation! • Fill in the observation together as a class (a video demonstrating this can be found here in case it is not possible and will require strong prompting for students to image what this will feel like)
 **10 minutes**	• Inform children that the following questions we will answer will be based on this text about thermal equilibrium. • Begin reading aloud and ask children to follow under each word with their finger. • Switch readers every so often. • Emphasise any words in bold as key words/phrases.
 **10 minutes**	• Ask children to answer the following questions using the text just read about thermal equilibrium to find the answer. • Inform children that some of the words are in bold; this gives us a clue about where the key information is, which will help us to find the answers. • Model doing this for the first question • Highlight the answer in the text and talk aloud about the clues that helped you to find the answer e.g. *"I have to fill in the gap, so I'm looking for a word in the text that begins with an a"*

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	• Continue reading the text and stop children to answer the questions. • Cold call children to share their answers aloud, ask children to use a different coloured pen to tick or fix their answer.
 **20 minutes**	• These two demonstrations are in place to show that heat will move from a warmer area/object to a colder area/object • In the first instance, an ice cube inside a plastic/paper cup is place in a bowl of freshly boiled water. Students will observe that the ice cube melts even though the ice cube is not in direct contact with the hot water. Prompt the students with the following questions: - What do you observe happening to the ice cube? - Why is it melting? - Where does the heat come from? - How can we describe heat transfer in this example? - How will we know when it reaches **thermal equilibrium**? • In the second instance, an ice cube onto a metal plate (saucepan or any other metal surface will do here). Students will observe that the ice cube melts even though the ice cube is not in direct contact with any obvious heat. The reason is melts is because the surroundings (i.e. the plate, the surface that the plate is on and the air around the ice cube) are warmer than the ice cube so heat has transferred from the surroundings into the ice cube. Prompt the students with the following questions: - What do you observe happening to the ice cube? - Why is it melting? - Where does the heat come from? - How can we describe heat transfer in this example? - How will we know when it reaches **thermal equilibrium**?
 **10 minutes**	• Explain to the class that we can use apply our understanding of heat transfer to some every day examples • Go through the first task together, discussing the answer as a group • For the rest of this task, the level of support provided depends on the students in the class. You can either leave the class to discuss and attempt the rest of the examples independently or you can discuss each class and fill in the answers all together as you go along to ensure everyone completes it at the same speed. • If the class are attempting it independently, go through the answers on the board once they have attempted all the tasks and get students to mark/correct their work with a different pen of a different colour
 **10 minutes**	• This task is one which allows students to consider other examples where heat transfer may take place – if confident, they should be able to attempt this task independently. If needed, provide suggestions that they can use (such as a hot cup of tea, an iced drink, food that is hot from the oven, a fire that has gone out)
 **5 minutes**	• Look at the diagram an ice cube melting and consider any ways that we might be able to stop them from melting • Students to discuss which things they could try to prevent heat from getting to the ice cube • Take answers from the class and prompt them to think about materials that prevent heat from moving from one place to another (such as wool) – explain that these materials are known as insulators and we will be learning about them in the next

	lesson. Another suggestion for how we can keep them cold is to keep them in a cold place (e.g. a freezer) to prevent heat from being near them in the first place
 **5 minutes**	• Return to page 3 and explain what a raw material is in a couple of sentences.