Science – Y6 Sp2 - Heat

Subject Knowledge Notes:	**For this lesson you will need:**
- This lesson draws together everything the students have been learning in this topic to enable them to create and investigate a container to fit an ice cube in to ensure that it melts as slowly as possible - First the must consider why ice cubes melt by understanding that there are particles all around the ice cube which allow heat to be transferred from the surroundings into the ice cube - Then they will have time to think of a range of ideas before creating and then testing their design - An evaluation section for their design enables them to reflect on what they did	- A large number of ice cubes (enough for the class) - One cup to place an ice cube in to demonstrate initially - A large range of conducting and insulating materials that students can use to build a container for their ice cube (the more the better). Examples may include paper, cotton, foil sheet, foil cups, other metal objects, cloth, bubble wrap, cling film etc. - NB – consider what guidance you will give to fair use of these materials across the class (e.g. ration the amounts) - NB – if they work well, the ice cube may take longer to melt that you have allocated for a lesson. You may need to leave them over lunch or another period of time to enable them to have enough time to melt

<u>Lesson Six: How can we prevent heat from getting to an ice cube?</u>

 **10 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**	IDEALLY – have an ice cube in a cup to use as a prompt for this and the following exercise • Get students to look at the diagram and state that this does not show all the particles that are *really* present • Get them to discuss how we could make this diagram better if we considered all the particles around the ice cube • Annotate the diagram as a class to say: - It is accurate because it shows the particles in the solid ice cube close together and in a regular arrangement - It is too simple because it does not show that there are particles in the cup that it is in that are in contact with ice cube
 **10 minutes**	• Get students to look at the second diagram and state that this STILL does not show all the particles that are *really* present • Get them to discuss how we could make this diagram better if we considered all the particles around the ice cube and in the surroundings • Annotate the diagram as a class to say: - It is accurate because it shows the particles in the solid ice cube close together and in a regular arrangement, and that the solid cup has particles shown accurately - It is too simple because it does not show that there are particles in the surface that it is in that are in contact with cup but there are also particles in the air bouncing around the cup and knocking into the ice cube Discuss the idea that there will be heat being transferred to the ice cube across all of these sources Also mention the fact that we ignore all the other particles normally to help us just understand the substance we are interested in but on this occasion we need to take them into account as we are going to be trying to STOP heat from getting to the ice cube

Science – Y6 Sp2 - Heat

 **5 minutes**	• Explain to the students what the job is going to be for the rest of the lesson – their job will be to try and keep an ice cube frozen for as long as possible. • Show them the range of materials that they will be able to select • Prompt an initial discussions for students to draw out things that have been learned about heat across the topic that will help them to consider aspects of their design (e.g. whether they ought to use thermal insulators or thermal conductors and why)
 **10 minutes**	• Students to discuss in pairs or as a table to try and think of things they could do to make sure their ice cube stays cold for as long as possible. • Write down their ideas as a group • Circulate the class during this time to prompt students with ideas from previous lessons to help their thinking. Encourage students to explain in the box in their booklet why they are going to do the things that they are going to do and to try and use key words such as heat, particles, conductor and insulator.
 **10 minutes**	• Students have 5 minutes to write out and complete their designs. Once the design has been checked by the teacher they can start to build their design
 **15 minutes**	• Once all students have built their designs, teacher to place ice cubes in container next to each group so that they can all place their ice cubes in their designs at the same time NOTE THE TIME THAT YOU START TO SEE HOW LONG THEY TAKE TO MELT. • While the ice cubes are in place, students could carefully move around the room and observe each other's design. If there is time, this could be done before putting the ice cubes in so they can make a prediction as to who they think has the most effective design • **NB – if some of the designs are 'too' effective, they may not melt during the time left in the lesson – if this is the case you may have to leave the designs in place and tidy up/leave them to one side to come back to later**
 **10 minutes**	• Students to write in the results – teacher to coordinate who took the longest to melt for everyone to write out • Prompt discussion to suggest how students will fill out the rest of the results section and the evaluation
 **10 minutes**	• Students to look at the pictures of 'professional scientists' on the board and consider which kinds of organisations or companies might want to do the kind of research that they have been completing in this lesson • Students discuss with a partner • Look at the examples of thermos flasks, fridge and freezer designers, or indeed any kind of insulation application (such as building designers who want to keep heat from leaving a building, especially in extremely cold conditions)
 **5 minutes**	• Return to page 3 and explain how we can keep an ice cube from melting is in a couple of sentences.