Heat Transfers MS

Q1 (1 mark)
Average kinetic energy of particles / how hot or cold something is

Q2 (1 mark)
From hotter object to colder object

Q3 (1 mark)
When two objects are at the same temperature and no net heat flows

Q4 (1 mark)
Transfer of heat through a solid by particle collisions

Q5 (1 mark)
Transfer of heat by movement of liquids or gases

Q6 (1 mark)
Transfer of heat by infrared radiation

Q7 (1 mark)
Any suitable insulator (e.g. wool, foam, plastic, air)

Q8 (1 mark)
Particles gain kinetic energy and move faster

Q9 (1 mark)
Liquids and gases

Q10 (1 mark)
Radiation

Q11 (2 marks)
Heat transfers from hot drink to cooler surroundings (1)
Until temperature difference decreases / thermal equilibrium is reached (1)

Q12 (2 marks)
Metals have free electrons that transfer energy (1)
Energy is passed quickly through the metal (1)

Q13 (2 marks)
Particles are far apart (1)
Less energy transfer between particles (1)

Q14 (3 marks)
Particles vibrate and collide (1)
Energy passes from particle to particle (1)
No overall movement of material (1)

Q15 (2 marks)
Warm less dense fluid rises (1)
Cooler, denser fluid sinks (1)

Q16 (3–4 marks)
Heat transfers through spoon by conduction (1)
Energy moves from hot tea to spoon (1)
Through particle collisions in metal (1)
Heat spreads along spoon (1)

Q17 (3–4 marks)
Warm air rises (1)
Cool air sinks (1)
Convection currents form (1)
Heat circulates around room (1)

Q18 (3–4 marks)
Heat transferred by radiation (1)
Infrared waves travel through air (1)
No contact needed (1)
Energy absorbed by skin (1)

Q19 (3–4 marks)
Air trapped in material (1)
Air is a poor conductor (1)
Reduces heat transfer (1)
Slows energy loss (1)

Q20 (3–4 marks)
Heat flows from hot drink to surroundings (1)
Temperature difference decreases (1)
Energy spreads out (1)
Eventually equilibrium reached (1)

Q21 (6 marks)

Level 1 (1–2 marks)
Basic statements about heat transfer
Limited mention of conduction, convection or radiation

Level 2 (3–4 marks)
Some correct description of heat transfer methods
Heat flows from hot to cold
Some understanding shown

Level 3 (5–6 marks)
Clear explanation of conduction, convection and radiation
Heat always flows from hot to cold
Processes described correctly and linked
Scientific reasoning is clear and accurate

Model Answer:
Heat is transferred from hotter objects to colder ones. In solids, conduction transfers heat as particles vibrate and pass energy along. In liquids and gases, convection transfers heat as warm, less dense fluid rises and cool, more dense fluid sinks, creating currents. Heat can also transfer by radiation using infrared waves, which do not need a medium.

Q22 (6 marks)

Level 1 (1–2 marks)
Simple statements about heat or cooling
Limited understanding of equilibrium

Level 2 (3–4 marks)
Mentions temperature difference reduces
Some idea of energy transfer slowing
Basic explanation of insulation

Level 3 (5–6 marks)
Clear explanation of thermal equilibrium
Heat flows from hot to cold until equal temperature
Insulation reduces energy transfer
Correct use of scientific terms and reasoning

Model Answer:
Thermal equilibrium is reached when two objects are at the same temperature and no net heat flows between them. Heat always transfers from hotter to colder objects, reducing the temperature difference over time. Insulators slow down this energy transfer by trapping air or reducing conduction, convection, or radiation, so equilibrium is reached more slowly.