

How heat moves and how to measure temperature

Grade 7 science (Year 8 · Class 7) · Test answers (mark scheme)

The model answers show the full reasoning and how each mark is earned. Give credit for correct science even if the wording differs. Add the marks to check the total of 20.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS3-3, MS-PS3-4

Question 1 Heat and temperature (2 marks)

Temperature measures how hot an object is, using a thermometer, while heat is the transfer of thermal energy from a hotter object to a colder one.

Marking: 1 mark for describing temperature; 1 mark for describing heat as energy transfer.

Question 2 Air in a room (3 marks)

- a. Convection.
- b. The air is warmed, expands and becomes less dense than the surrounding air.
- c. Air at the far wall has cooled, becomes denser and sinks.

Marking: 1 mark for each part.

Question 3 Pan handle (2 marks)

Metal is a good conductor, so heat passes quickly to the food. Wood is an insulator, so little heat reaches the handle and it stays safe to hold.

Marking: 1 mark for metal conducts well; 1 mark for wood insulates.

Question 4 Cooling rate (3 marks)

- a. $90 - 66 = 24\text{ }^{\circ}\text{C}$.
- b. $24\text{ }^{\circ}\text{C} \div 8\text{ min} = 3.0\text{ }^{\circ}\text{C/min}$.

Marking: 1 mark for $24\text{ }^{\circ}\text{C}$; 1 mark for the method; 1 mark for $3.0\text{ }^{\circ}\text{C/min}$ with unit.

Question 5 Roof colour (3 marks)

- a. Radiation.
- b. Black surfaces absorb more radiation, but white surfaces reflect most of it, so the black

tin absorbs more energy and heats faster.

Marking: 1 mark for radiation; 1 mark for black absorbs more; 1 mark for white reflects.

Question 6 Insulation (2 marks)

Wool traps pockets of air. Air is a poor conductor and cannot circulate in the small pockets, so conduction and convection are reduced.

Marking: 1 mark for trapped air; 1 mark for reduced conduction or convection.

Question 7 Comparing cups (3 marks)

- a. X: $85 - 49 = 36\text{ }^{\circ}\text{C}$. Y: $85 - 67 = 18\text{ }^{\circ}\text{C}$.
- b. $36 \div 18 = 2$ times.
- c. Foam is a good insulator.

Marking: 1 mark for each part.

Question 8 Spot the mistake (2 marks)

Heat flows from hot things to cold things, not the other way round, until both are at the same temperature.

Marking: 1 mark for identifying the wrong direction; 1 mark for the correct direction.