

How water melts, boils and freezes

Grade 6 science (Year 7 · Class 6) · Lab answers

Use the sample table to check your own readings and calculations. Notice that the plateau lasts several readings. When explaining it, always mention that the heat changes the arrangement of the particles rather than their speed.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS1-4

Question 1 Length of the melting plateau

The temperature was 0 °C from 2 min to 8 min: $8 - 2 = 6$ min.

Question 2 Rate of warming

Rise = $80 - 13 = 67$ °C in $24 - 12 = 12$ min. $67 \div 12 = 5.6$ °C/min (to 2 s.f.).

Question 3 Explain the flat sections

During melting and boiling, the heat is used to separate particles, not to make them move faster. **The temperature stays constant until the change of state is complete.**

Question 4 Boiling point reading

The thermometer may have a small calibration error (about ± 1 °C), and the air pressure may be a little lower than at sea level. **Both can lower the boiling point reading.**

Question 5 Why stir?

Stirring spreads the heat so the thermometer measures the temperature of the whole mixture, not hotter or colder patches. **This makes readings representative.**

Question 6 Use of crushed ice

Small pieces have a bigger surface area, so they melt evenly and the thermometer is surrounded by ice and water; **readings are more reliable.**

Question 7 Improve the lab

Take readings every minute near 0 °C and 100 °C and repeat the lab to find the mean; **more data points show the plateaus more clearly.**