CASE STUDY QUESTIONS

CBSE Class 6 Science | Chapter 7: Temperature and its Measurement

Instructions: Read each case study carefully and answer the three questions that follow. Answers for all case studies are given at the end of this document.
Marks: Each case study carries 3 marks (1 mark per question) = 45 marks.

Case Study 1: Lambok's Fever

Lambok and his sister Phiban live in Shillong. One day Lambok came home from school and said he felt feverish. Phiban touched his forehead and felt he might have a fever. To confirm, she took the thermometer from the almirah, washed its tip with soap and water, and measured his temperature. His temperature was normal. She washed the tip again, dried it and put it back.

1. Why did Phiban use a thermometer instead of only touching Lambok's forehead?
2. Why did Phiban wash the thermometer tip before and after use?
3. What is the normal temperature of a healthy human body in °C?

Case Study 2: The Three Containers

Ria has three containers: A with warm water, B with tap water and C with ice-cold water. She keeps her right hand in A and her left hand in C for 1–2 minutes. She then places both hands together in container B.

1. What will the right hand feel on dipping it in B?
2. What will the left hand feel in B?
3. What does the activity tell us about our sense of touch?

Case Study 3: Digital versus Mercury Thermometers

Dr. Meena replaced the mercury thermometer in her clinic with a digital clinical thermometer. She explained that mercury is extremely toxic and difficult to dispose of if the thermometer breaks. The digital one runs on batteries and its numbers are easy to read. It finds temperature using heat sensors.

1. Why is mercury unsafe in thermometers?
2. How does a digital thermometer determine temperature?
3. State one advantage of a digital thermometer.

Case Study 4: Thermometers During COVID-19

During the COVID-19 pandemic, a security guard at a mall pointed a small device at each visitor's forehead. The device showed their temperature without touching them. These are called non-contact or infrared thermometers.

1. What are such thermometers called?
2. What is the main advantage of non-contact thermometers?
3. Why were they especially useful during a pandemic?

Case Study 5: Body Temperature of Friends

Aarav measured the body temperature of five healthy friends with a digital thermometer: 36.8 °C, 37.0 °C, 37.2 °C, 36.6 °C and 37.1 °C. He noticed that not everyone had exactly 37.0 °C.

1. Are the readings abnormal? Explain.
2. Name two factors that influence body temperature.
3. Between which two temperatures does human body temperature normally stay?

Case Study 6: Grandmother's Temperature

Aarti's grandmother is 85 years old. Aarti's mother places a digital thermometer in her grandmother's armpit. The thermometer shows 36.2 °C.

1. Why was the armpit used?
2. How does the armpit reading compare with the actual body temperature?
3. Estimate the actual body temperature.

Case Study 7: A Friend's Thermometer Reads 98.6

Kabir saw his friend's digital thermometer read 98.6 °F for a healthy person. He wondered why it did not show 37.0.

1. Which scale does the thermometer use?
2. What is 98.6 °F in the Celsius scale?
3. What is the SI unit of temperature, and what is 37 °C in it?

Case Study 8: Looking at a School Thermometer

Nisha examines a thermometer in her school laboratory. It has a long, narrow, sealed glass tube with a bulb at one end filled with a red liquid. The lowest mark is –10 °C and the highest is 110 °C. Between 0 °C and 10 °C there are 10 small divisions.

1. What is the range of this thermometer?
2. What is the smallest value it can read?
3. Which liquid is generally used and why is it coloured red?

Case Study 9: Four Students Measure Water

Four students measure the temperature of warm water in a beaker. Student 1 tilts the thermometer. Student 2 holds it vertically with the bulb in the water, not touching the beaker. Student 3's bulb touches the bottom. Student 4's bulb touches the side of the beaker.

1. Who followed the correct method?
2. Why are the methods of Students 1, 3 and 4 wrong?
3. Why must the reading be taken while the thermometer is in the water?

Case Study 10: Ice and Boiling Water

In a science lab, under the teacher's supervision, students observed laboratory thermometers placed in crushed ice and in boiling water. They noted the readings again after some time.

1. What happens to the temperature of water while it is boiling?
2. What happens to the temperature of ice while it is melting?
3. Name one safety precaution for this activity.

Case Study 11: Readings in Shillong

Phiban and her classmates measured the temperature of boiling water. Their readings were: Phiban 97.8 °C, Shemphang 98.0 °C, Onestar 97.9 °C, Kloi 98.0 °C and Bandarisha 98.1 °C.

1. Who recorded the highest reading?
2. What is the difference between the highest and lowest readings?
3. Suggest a reason for the differences.

Case Study 12: Weather Report Diary

Ishaan recorded the air temperature for five days. Day 1: max 32 °C, min 22 °C. Day 2: max 33 °C, min 23 °C. Day 3: max 35 °C, min 24 °C. Day 4: max 34 °C, min 24 °C. Day 5: max 36 °C, min 25 °C.

1. On which day was the difference between maximum and minimum the greatest?
2. What trend do you notice and which season is approaching?
3. Why are air temperature data collected at weather stations?

Case Study 13: Vaishnavi's Temperature Record

Vaishnavi was ill and her mother recorded her temperature. Day One: 38.0, 37.8, 38.0, 38.0, 40.0, 39.0 °C (7 am, 10 am, 1 pm, 4 pm, 7 pm, 10 pm). Day Two: 38.6, 38.8, 39.0, 39.0, 39.0, 38.0 °C. Day Three: 37.6, 37.4, 37.2, 37.0, 36.8, 36.6 °C.

1. What was the highest temperature recorded?

2. What trend does Day Three show?
3. Why is it better to record temperature at different times?

Case Study 14: The Weather Woman of India

Anna Mani (1918–2001) was an Indian scientist known as the "Weather Woman of India". She invented and built many weather measurement instruments. This reduced India's reliance on other nations for such instruments. She also explored wind and solar energy.

1. Why is Anna Mani called the "Weather Woman of India"?
2. How did her work help India?
3. Name the other energy sources she explored.

Case Study 15: Choosing the Right Thermometer

Meera wants to measure the temperature of 22.5 °C. She has three thermometers. Their smallest values are 1 °C, 0.5 °C and 2 °C. A laboratory thermometer with 50 divisions between 0 °C and 100 °C reads in steps of 2 °C.

1. Which thermometer should Meera choose for 22.5 °C?
2. Why are the others not suitable?
3. Find the smallest value of a thermometer with 50 divisions between 0 °C and 100 °C.

ANSWER KEY – CASE STUDY QUESTIONS

Case Study 1: Lambok's Fever

1. Touch cannot always judge correctly whether a person has fever; a thermometer gives a reliable measure.
2. To keep it clean and prevent the spread of germs (a precaution for digital clinical thermometers).
3. 37.0 °C.

Case Study 2: The Three Containers

1. The water in B will feel cool to the right hand.
2. The same water will feel warm to the left hand.
3. We cannot always rely on our sense of touch to decide how hot or cold a body is.

Case Study 3: Digital versus Mercury Thermometers

1. Mercury is extremely toxic and difficult to dispose of if the thermometer breaks accidentally.
2. With the help of heat sensors.
3. It poses no mercury risk and the display is easier to read.

Case Study 4: Thermometers During COVID-19

1. Non-contact (infrared) thermometers.
2. They measure temperature without touching the body, reducing the risk of spreading disease.
3. A person's temperature could be checked from a distance, so infection was less likely to spread.

Case Study 5: Body Temperature of Friends

1. No. Normal temperature is the average of many healthy people, so a healthy person may be slightly different from 37.0 °C.
2. Age, time of the day and activity level (any two).
3. Between 35 °C and 42 °C.

Case Study 6: Grandmother's Temperature

1. For small children or old people, the digital thermometer can be placed in the armpit.
2. It is about 0.5 °C to 1 °C lower than the actual body temperature.
3. About 36.7 °C to 37.2 °C (36.2 + 0.5 to 36.2 + 1).

Case Study 7: A Friend's Thermometer Reads 98.6

1. The Fahrenheit scale (unit: degree Fahrenheit, °F).
2. 37.0 °C.
3. The SI unit is kelvin (K); 37 °C = 37 + 273.15 = 310.15 K.

Case Study 8: Looking at a School Thermometer

1. –10 °C to 110 °C.
2. 10 °C ÷ 10 = 1 °C.
3. Alcohol (or mercury); alcohol is coloured red so it is easy to see.

Case Study 9: Four Students Measure Water

1. Student 2.
2. The thermometer must be vertical, and the bulb should not touch the bottom or sides of the beaker.
3. Because the liquid level begins to fall as soon as the thermometer is taken out.

Case Study 10: Ice and Boiling Water

1. It remains constant.

2. It remains constant.
3. Do it only under the teacher's supervision and do not touch the experimental setups.

Case Study 11: Readings in Shillong

1. Bandarisha (98.1 °C).
2. 98.1 – 97.8 = 0.3 °C.
3. The correct way of reading the thermometer may not have been followed by all students.

Case Study 12: Weather Report Diary

1. Day 3 and Day 5 (difference 11 °C each); the other days differ by 10 °C.
2. Temperature is rising; the summer season is approaching.
3. They are used with other parameters for making weather forecasts.

Case Study 13: Vaishnavi's Temperature Record

1. 40.0 °C (Day One, 7 pm).
2. The temperature keeps falling and reaches 37.0 °C at 4 pm and below that afterwards, so she recovered.
3. Body temperature changes with the time of the day, so a record shows the pattern of the fever.

Case Study 14: The Weather Woman of India

1. She invented and built many weather measurement instruments.
2. India relied less on other nations for such instruments.
3. Wind and solar energy.

Case Study 15: Choosing the Right Thermometer

1. The one with smallest value 0.5 °C.
2. With 1 °C or 2 °C steps, 22.5 °C cannot be read exactly.
3. 100 ÷ 50 = 2 °C.