UNIQUE STUDY POINT

By Sumeet Sahu

www.uniquestudyonline.com

Unique Study Point, Amitesh Nagar, Indore, MP | Contact: 8103405051

Class: VI	**Subject:** Science	**Session:** 2025-26
Chapter: 07 - Temperature and its Measurement	**Time:** 1½ Hours	**Max. Marks:** 40

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five sections A, B, C, D and E.
3. Section A contains 10 MCQs of 1 mark each.
4. Section B contains 4 questions of 2 marks each.
5. Section C contains 3 questions of 3 marks each.
6. Section D contains 1 question of 5 marks.
7. Section E contains 2 Case Study Based questions of 4 marks each.

SECTION A - Multiple Choice Questions (1 mark each)

1. The normal temperature of a healthy human body is approximately:
(a) 35.0 °C
(b) 37.0 °C
(c) 39.0 °C
(d) 40.0 °C

2. Which of the following thermometers is used to measure body temperature?
(a) Laboratory thermometer
(b) Clinical thermometer
(c) Room thermometer
(d) Maximum-minimum thermometer

3. The SI unit of temperature is:
(a) degree Celsius
(b) degree Fahrenheit
(c) kelvin
(d) joule

4. A laboratory thermometer typically has a range of:
(a) 0 °C to 50 °C
(b) –10 °C to 110 °C
(c) 35 °C to 42 °C
(d) 20 °C to 100 °C

5. The temperature 37.0 °C is equivalent to:
(a) 97.6 °F
(b) 98.6 °F

(c) 99.6 °F
(d) 100.6 °F

6. Which liquid is commonly used in laboratory thermometers?
(a) Water
(b) Mercury or alcohol
(c) Oil
(d) Glycerine

7. During the COVID-19 pandemic, which type of thermometer was commonly used to measure temperature from a distance?
(a) Mercury thermometer
(b) Digital clinical thermometer
(c) Infrared thermometer
(d) Laboratory thermometer

8. The temperature of boiling water remains constant at:
(a) 90 °C
(b) 95 °C
(c) 98 °C
(d) 100 °C (at sea level)

9. While using a laboratory thermometer, the bulb should:
(a) Touch the bottom of the beaker
(b) Touch the sides of the beaker
(c) Not touch the bottom or sides of the beaker
(d) Be kept above the liquid

10. The reliable measure of hotness or coldness of a body is called:
(a) Heat
(b) Temperature
(c) Energy
(d) Pressure

SECTION B - Short Answer Questions (2 marks each)

11. Why can we not always rely on our sense of touch to judge whether a body is hot or cold? Explain with an example.

12. Write two precautions that should be taken while using a digital clinical thermometer.

13. Why are mercury thermometers being replaced by digital thermometers?

14. Convert the following temperatures to Kelvin scale: (i) 25 °C (ii) –10 °C

SECTION C - Short Answer Questions (3 marks each)

15. Explain the correct way of measuring temperature using a laboratory thermometer. Mention at least three important points.

16. A laboratory thermometer has 10 divisions between 0 °C and 10 °C. What is the smallest value that this thermometer can read? Also mention the range of temperature if the thermometer shows markings from –10 °C to 110 °C.

17. Differentiate between a clinical thermometer and a laboratory thermometer on the basis of: (a) Range (b) Use (c) Precautions

SECTION D - Long Answer Question (5 marks)

18. Describe an activity to show that our sense of touch is not always reliable to judge the temperature of an object. Draw a labeled diagram and write the procedure, observations, and conclusion.

SECTION E - Case Study Based Questions (4 marks each)

19. Case Study 1:
Ramesh was feeling unwell and complained of fever. His mother used a digital clinical thermometer to check his temperature. She placed the thermometer under his tongue and waited for the beep sound. The thermometer showed a reading of 38.5 °C. His mother gave him medicine and asked him to rest. After 4 hours, she checked his temperature again, and it showed 37.2 °C.

Based on the above case study, answer the following questions:

(a) What was Ramesh's initial body temperature? Was it normal or did he have fever? (1 mark)

(b) After 4 hours, was Ramesh's temperature normal? Justify your answer. (1 mark)

(c) Why is it important to wash the thermometer tip before and after use? (1 mark)

(d) Can a laboratory thermometer be used to measure body temperature? Give reason. (1 mark)

20. Case Study 2:
In a science laboratory, students were asked to measure the temperature of water in three different beakers - one containing ice-cold water, second containing tap water, and third containing hot water. They used laboratory thermometers and recorded the following observations:
Beaker A (Ice-cold water): 5 °C
Beaker B (Tap water): 28 °C
Beaker C (Hot water): 75 °C

Based on the above case study, answer the following questions:

(a) Which beaker has the highest temperature and which has the lowest? (1 mark)

(b) What is the difference in temperature between hot water and tap water? (1 mark)

(c) While measuring temperature, should the thermometer be taken out of water before reading? Why or why not? (1 mark)

(d) Convert the temperature of hot water (75 °C) to Fahrenheit scale. (Formula: $F = 9/5 \times C + 32$) (1 mark)

DETAILED ANSWER KEY - PAPER 01

SECTION A - Answers to MCQs

1. (b) 37.0 °C

The normal temperature of a healthy human body is approximately 37.0 °C or 98.6 °F. This is the average body temperature, though it may vary slightly from person to person and at different times of the day.

2. (b) Clinical thermometer

A clinical thermometer is specifically designed to measure human body temperature. Digital clinical thermometers are now commonly used as they are safe, accurate, and easy to read.

3. (c) kelvin

The SI unit of temperature is kelvin (K). It is named after the scientist Lord Kelvin. Note that the degree symbol (°) is not used with kelvin.

4. (b) –10 °C to 110 °C

A laboratory thermometer typically has a range from –10 °C to 110 °C, which allows it to measure a wide variety of temperatures in laboratory experiments.

5. (b) 98.6 °F

The temperature 37.0 °C on Celsius scale is equivalent to 98.6 °F on Fahrenheit scale. This is the normal body temperature of a healthy human being.

6. (b) Mercury or alcohol

Laboratory thermometers commonly use mercury or alcohol (colored red) as the liquid. Mercury thermometers are being phased out due to toxicity concerns, and alcohol-based thermometers are preferred.

7. (c) Infrared thermometer

During the COVID-19 pandemic, infrared thermometers (also called non-contact thermometers) were commonly used. They can measure body temperature from a distance without touching the person, thus reducing the risk of spreading disease.

8. (d) 100 °C (at sea level)

The temperature of boiling water remains constant at 100 °C (at sea level atmospheric pressure). This temperature may vary slightly at different altitudes.

9. (c) Not touch the bottom or sides of the beaker

The bulb of the laboratory thermometer should not touch the bottom or sides of the beaker because these surfaces may be hotter or colder than the liquid, giving an incorrect reading.

10. (b) Temperature

Temperature is the reliable measure of hotness or coldness of a body. It is measured using a thermometer and provides an accurate quantitative measure.

SECTION B - Answers to Short Answer Questions

11. Why can we not always rely on our sense of touch?

Answer: We cannot always rely on our sense of touch to judge whether a body is hot or cold because our sense of touch can be misleading depending on the previous conditions our hands were exposed to.

Example: If we place our right hand in warm water and left hand in ice-cold water for 1-2 minutes, and then place both hands simultaneously in tap water, our right hand will feel that the tap water is cool, while our left hand will feel that the same water is warm. This shows that our sense of touch gives different results for the same object, making it unreliable for accurate temperature measurement.

12. Precautions while using a digital clinical thermometer:

Two important precautions are:
1. The tip of the thermometer should be washed with soap and water before and after use to maintain hygiene and prevent infection.

2. While washing the thermometer, care should be taken to keep the digital portion (such as the display) out of water to prevent damage to the electronic components.

13. Why are mercury thermometers being replaced?

Answer: Mercury thermometers are being replaced by digital thermometers due to the following reasons:

1. **Safety:** Mercury is an extremely toxic substance and is difficult to dispose of safely if the thermometer breaks accidentally. Digital thermometers pose no such risk.

2. **Ease of reading:** The numbers in digital thermometers are displayed clearly and are easier to read compared to mercury thermometers where one has to carefully observe the mercury column level.

14. Convert temperatures to Kelvin scale:

Formula: Temperature in Kelvin = Temperature in Celsius + 273.15

(i) 25 °C to Kelvin:
Temperature in K = 25 + 273.15 = 298.15 K

(ii) –10 °C to Kelvin:
Temperature in K = (–10) + 273.15 = 263.15 K

SECTION C - Answers to Short Answer Questions

15. Correct way of measuring temperature using laboratory thermometer:

The correct procedure includes the following important points:

1. **Position of bulb:** The thermometer should be immersed in the liquid such that its bulb does not touch the bottom or sides of the beaker. The bottom and sides may be hotter or colder than the liquid itself.

2. **Vertical position:** The thermometer should be held vertically and should not be tilted. This ensures accurate reading of the liquid column level.

3. **Reading while immersed:** The temperature must be read while the thermometer is still immersed in the water. If taken out, the liquid column will start falling immediately, giving an incorrect reading.

4. **Eye level reading:** While reading the thermometer, the eye should be directly in line with the level of the liquid column to avoid parallax error and get an accurate reading.

16. Smallest value and range of thermometer:

Given: 10 divisions between 0 °C and 10 °C

Calculation of smallest value:
Temperature difference = 10 °C – 0 °C = 10 °C
Number of divisions = 10
Value of one division = 10 °C ÷ 10 = 1 °C

Therefore, the smallest value this thermometer can read is 1 °C.

Range of temperature: If the thermometer shows markings from –10 °C to 110 °C, then the range is from –10 °C to 110 °C (or we can say the range is 120 °C).

17. Difference between clinical and laboratory thermometer:

Basis	Clinical Thermometer	Laboratory Thermometer
(a) Range	Has a narrow range, typically from 35 °C to 42 °C, as human body temperature stays within this range	Has a wider range, typically from –10 °C to 110 °C, to measure various temperatures in experiments
(b) Use	Used specifically to measure human body temperature (oral, armpit)	Used to measure temperature of various liquids and substances in laboratory experiments
(c) Precautions	Must be washed before and after use; digital portion should be kept away from water; should be reset before use	Bulb should not touch bottom/sides of container; should be held vertically; reading must be taken while immersed in liquid

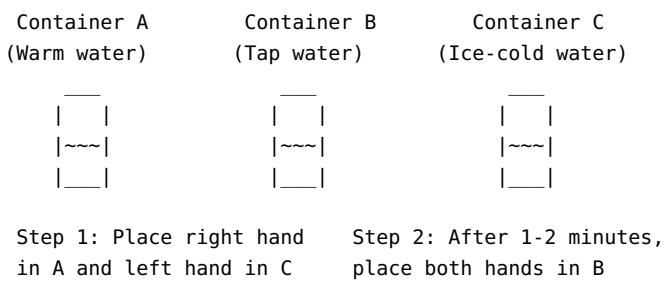
SECTION D - Answer to Long Answer Question

18. Activity to show that sense of touch is not reliable:

Aim: To demonstrate that our sense of touch is not always reliable to judge the temperature of an object.

Materials Required:
• Three large containers (labeled A, B, and C)
• Warm water
• Tap water (at room temperature)
• Ice-cold water

Diagram:



Procedure:
1. Take three large containers and label them A, B, and C.
2. Pour warm water in container A, tap water (room temperature) in container B, and ice-cold water in

container C.
3. Dip your right hand in container A (warm water) and left hand in container C (ice-cold water).
4. Keep both hands in their respective containers for 1-2 minutes.
5. Now take out both hands and place them simultaneously in container B (tap water).
6. Observe and note what each hand feels.

Observation:
• The right hand (which was in warm water) feels that the tap water in container B is cool or cold.
• The left hand (which was in ice-cold water) feels that the same tap water in container B is warm or hot.
• Both hands give different sensations for the same water at the same time.

Conclusion:
This activity clearly demonstrates that we cannot always rely on our sense of touch to decide correctly whether a body is hot or cold. Our perception of temperature depends on the previous condition our hands were exposed to. Therefore, we need a device like a thermometer to measure temperature accurately and reliably. Temperature measured by a thermometer is objective and does not depend on previous conditions.

SECTION E - Answers to Case Study Based Questions

19. Case Study 1 - Answers:

(a) Ramesh's initial body temperature and fever status:
Ramesh's initial body temperature was 38.5 °C. This is higher than the normal body temperature of 37.0 °C, so yes, Ramesh had fever. (1 mark)

(b) Temperature after 4 hours:
After 4 hours, Ramesh's temperature was 37.2 °C, which is very close to normal (37.0 °C). This can be considered nearly normal. The medicine worked effectively and his fever has come down. (1 mark)

(c) Importance of washing thermometer tip:
It is important to wash the thermometer tip before and after use to maintain hygiene and prevent the spread of germs and infections. The tip comes in contact with body fluids, so washing it with soap and water ensures it is clean and safe for reuse. (1 mark)

(d) Can laboratory thermometer be used for body temperature?
No, a laboratory thermometer should not be used to measure body temperature. This is because: (i) It has a wide range (–10 °C to 110 °C) which makes it less precise for the narrow range of body temperature. (ii) It does not have features specifically designed for safe and hygienic body temperature measurement like clinical thermometers do. (1 mark)

20. Case Study 2 - Answers:

(a) Highest and lowest temperature:
Beaker C (Hot water) has the highest temperature at 75 °C, and Beaker A (Ice-cold water) has the lowest temperature at 5 °C. (1 mark)

(b) Temperature difference:
Temperature difference = Temperature of hot water – Temperature of tap water
= 75 °C – 28 °C = 47 °C
Therefore, the difference in temperature between hot water and tap water is 47 °C. (1 mark)

(c) Should thermometer be taken out before reading?
No, the thermometer should not be taken out of water before reading the temperature. The reading must be taken while the thermometer is still immersed in the water. This is because as soon as we take the

thermometer out, the liquid column in the thermometer starts falling, which will give an incorrect lower reading. (1 mark)

(d) Convert 75 °C to Fahrenheit:
Given formula: $F = 9/5 \times C + 32$
$F = 9/5 \times 75 + 32$
$F = 9 \times 15 + 32$
$F = 135 + 32$
$F = 167$ °F
Therefore, 75 °C is equal to 167 °F. (1 mark)
