

SOLVED EXAMPLES

1. Convert the boiling temperature of gold 2836 °C, into degree Fahrenheit and Kelvin.

Solution

To convert boiling temperature of gold from Celsius to Fahrenheit, we use the formula.

$$F = \frac{9}{5}C + 32$$

$$F = \frac{9}{5} \times 2836 + 32$$

$$F = \mathbf{5136.8^{\circ}F}$$

For Kelvin we can use the formula

$$K = C + 273$$

$$K = 2836 + 273 = \mathbf{3109\text{ K}}$$

2. Convert the temperature of the coldest area in a freezer, -10 °F to degrees Celsius and Kelvin.

Solution

To convert the temperature of Fahrenheit we can use the formula.

$$C = \frac{5}{9}(F - 32)$$

$$C = \frac{5}{9}(-10 - 32)$$

$$C = \frac{5}{9}(-42) = \frac{-210}{9} = \mathbf{-23.3^{\circ}C}$$

For Kelvin we can use,

$$K = C + 273$$

$$K = -10 + 273 = \mathbf{263\text{ K}}$$

3. Convert the temperature of hot water, 54 °C into degree Fahrenheit and Kelvin.

Solution

To convert the temperature from Celsius to Fahrenheit we can use the formula.

$$F = \frac{9}{5}C + 32$$

$$F = \frac{9}{5} \times 54 + 32 \qquad F = \frac{486}{5} + 32$$

$$F = 97.2 + 32 = \mathbf{129.2^{\circ}F}$$

For Kelvin we can use the formula

$$K = C + 273$$

$$K = 54 + 273 = \mathbf{327\text{ K}}$$

4. Convert 223 °F to Kelvin

Solution

To convert degree Fahrenheit and Kelvin, we can use the formula

$$K = (F - 32) \frac{5}{9} + 273$$

$$K = (223 - 32) \frac{5}{9} + 273$$

$$K = 191 \times \frac{5}{9} + 273 = \frac{955}{9} + 273$$

$$K = 106.1 + 273 = \mathbf{379.1\text{ K}}$$

5. Convert 425 K to Celsius

Solution

To convert Kelvin to Celsius we can use the formula,

$$C = K - 273 = 425 - 273 = \mathbf{152^{\circ}C}$$

NCERT QUESTIONS WITH SOLUTIONS

1. The normal temperature of a healthy human being is close to .

- (1) 98.6 °C (2) 37.0 °C
(3) 32.0 °C (4) 27.0 °C

Solution

(ii) 37°C

2. 37 °C is the same temperature as .

- (1) 97.4 °F (2) 97.6 °F
(3) 98.4 °F (4) 98.6 °F

Solution

$$F = \frac{9}{5} \times 37 + 32$$

$$F = 98.6^\circ \text{ F}$$

3. Fill in the blanks:

- (i) The hotness or coldness of a system is determined by its_____
- (ii) The temperature of ice-cold water cannot be measured by a _____thermometer.
- (iii) The unit of temperature is degree_____

Solution

(i) Temperature

(ii) clinical

(iii) °C, °F (Celsius, Fahrenheit)

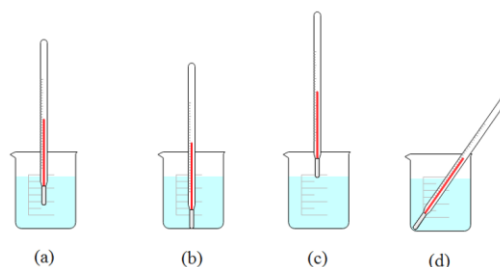
4. The range of a laboratory thermometer is usually .

- (1) 10 °C to 100 °C
(2) -10 °C to 110 °C
(3) 32 °C to 45 °C
(4) 35 °C to 42 °C

Solution

(ii) -10°C to 110°C

5. Four students used a laboratory thermometer to measure the temperature of water as shown in Fig.



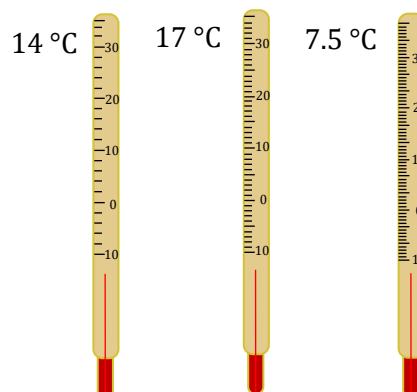
Who do you think followed the correct way for measuring temperature?

- (1) Student 1 (2) Student 2
(3) Student 3 (4) Student 4

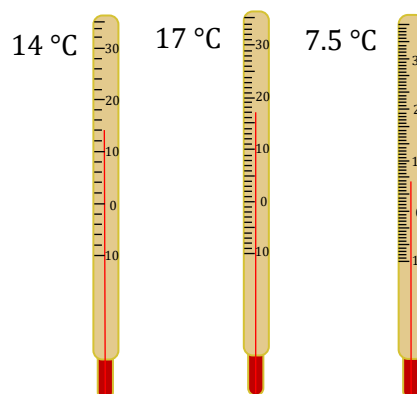
Solution

Student 2

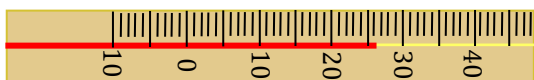
6. Colour to show the red column on the drawings of thermometers (Fig) as per the temperatures written below:



Solution



7. Observe the part of thermometer shown in Fig. and answer the following questions:



- What type of thermometer is it?
- What is the reading of the thermometer?
- What is the smallest value that this thermometer can measure?

Solution

- Laboratory
- 26°C
- 10°C

8. A laboratory thermometer is not used to measure our body temperature. Give a reason.

Solution

Laboratory thermometer is calibrated according to laboratory measurements and cannot measure the precise human body temperature. Moreover, Laboratory thermometer does not have a 'kink' constriction which is present in clinical thermometer, which does not allow the mercury fall back to bulb.

9. Vaishnavi has not gone to school as she is ill. Her mother has kept a record of her body temperature for three days as shown in Table.

Day	7am	10am	1pm	4pm	7pm	10pm
One	38.0°C	37.8°C	38.0°C	38.0°C	40.0°C	39.0°C
Two	38.6°C	38.8°C	39.0°C	39.0°C	39.0°C	38.0°C
Three	37.6°C	37.4°C	37.2°C	37.0°C	36.8°C	36.6°C

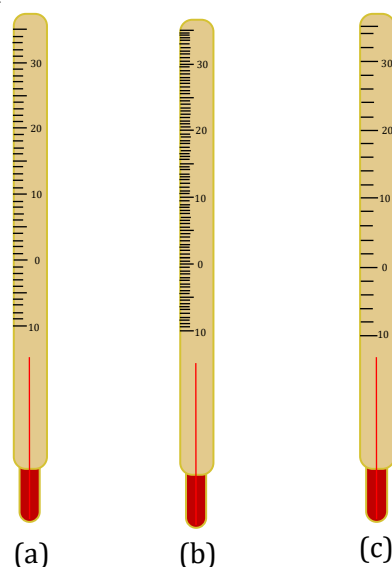
- What was Vaishnavi's highest recorded temperature?
- On which day and at what time was Vaishnavi's highest temperature recorded?
- On which day did Vaishnavi's temperature return to normal?

Solution

- 40°C
- Day one, 7 pm
- Day three

10. If you have to measure the temperature 22.5 °C, which of the following three thermometers will you use figure?

Explain



Solution

(b) The scale is properly calibrated and having proper number of divisions.

11. The temperature shown by the part of thermometer in Fig. is



- 28.0 °C
- 27.5 °C
- 26.5 °C
- 25.3 °C

Solution

- 27.5°C

NCERT Basics : Class 6

- 12.** A laboratory thermometer has 50 divisions between 0 °C and 100 °C. What does each division of this thermometer measure?

Solution

$$\text{Each division} = \frac{100 - 0}{50} = 2^{\circ}\text{C}$$

- 13.** Draw the scale of a thermometer in which the smallest division reads 0.5 °C. You may draw only the portion between 10°C and 20°C.

Solution



- 14.** Someone tells you that she has a fever of 101 degrees. Does she mean it on the Celsius scale or Fahrenheit scale?

Solution

It will be 101°F as in clinical thermometer range for Celsius scale varies from 35°C to 42°C only

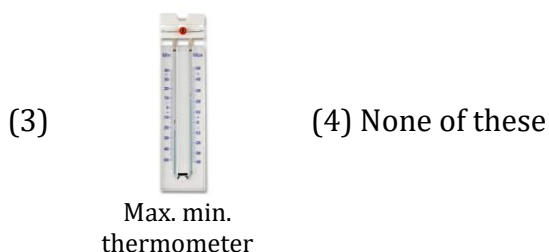
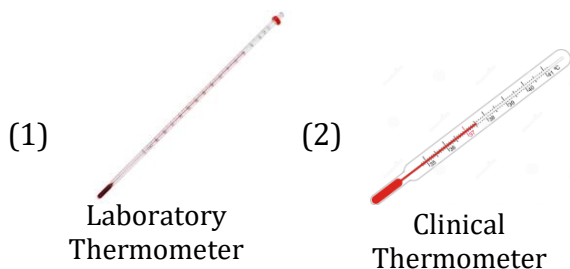
EXERCISE-01

Multiple choice questions

- | | |
|---|--|
| <p>1. What must be true about two given objects for energy to be transferred as heat between them? PTA063</p> <p>(1) The objects must be large.
 (2) The objects must be hot.
 (3) The objects must contain a large amount of energy.
 (4) The objects must have different temperatures.</p> <p>2. If two objects are in thermal equilibrium with each other PTA064</p> <p>(1) they can not be moving.
 (2) they can not be undergoing collisions.
 (3) they can not have different pressures.
 (4) they can not be at different temperatures.</p> <p>3. The boiling point of liquid hydrogen is -252.87°C. What is the value of this temperature in kelvins? PTA065</p> <p>(1) 273 K (2) 20.13 K
 (3) -525.87 K (4) 0 K</p> <p>4. A cake has to be baked at a temperature of 350.6°F. What is this temperature on the Celsius scale? PTA066</p> <p>(1) 162°C (2) 194°C
 (3) 177°C (4) 212°C</p> <p>5. The temperatures of the two glasses of water are 30°C and 0°C. The difference in temperature of the two glasses of water is 30°C. What is their difference in temperature on the Kelvin scale? PTA067</p> <p>(1) 30 K (2) 243 K
 (3) 86 K (4) 303 K</p> <p>6. Room temperature is about 20 degrees on the PTA068</p> <p>(1) Kelvin scale (2) Celsius scale
 (3) Fahrenheit scale (4) Absolute scale</p> | <p>7. A thermometer indicates 98.6°C. It may be PTA069</p> <p>(1) outdoors on a cold day.
 (2) in a comfortable room.
 (3) in a cup of hot tea.
 (4) in a normal person's mouth.</p> <p>8. Which of these thermometers would you use to measure your body temperature? PTA070</p> <p>(1) Any mercury based liquid-in- glass thermometer
 (2) Clinical thermometer
 (3) Alcohol based liquid-in- glass thermometer
 (4) Laboratory thermometer</p> <p>9. One litre of water at 30°C is mixed with one litre of water at 50°C. The temperature of the mixture will be PTA071</p> <p>(1) 80°C
 (2) more than 50°C but less than 80°C
 (3) 20°C
 (4) between 30°C and 50°C</p> <p>10. An iron ball at 40°C is dropped in a mug containing water at 40°C. PTA072</p> <p>The heat will</p> <p>(1) flow from iron ball to water.
 (2) not flow from iron ball to water or from water to iron ball.
 (3) flow from water to iron ball.
 (4) increase the temperature of both.</p> |
|---|--|

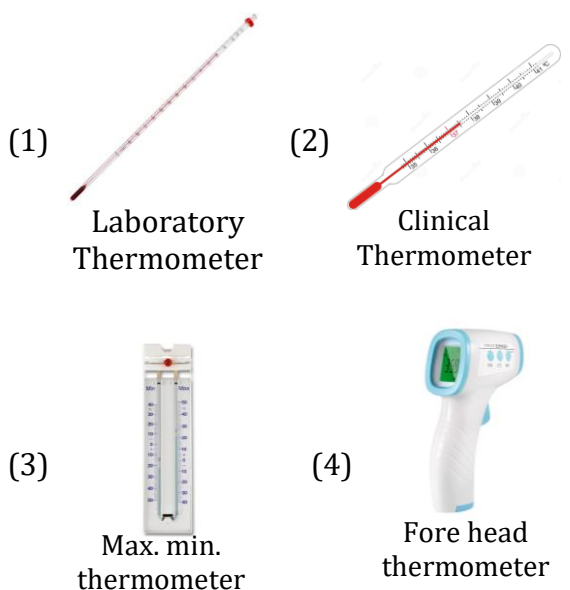
11. You have to measure the temperature of food you cooked. Which thermometer you are going to use?

PTA073



12. You have to measure the temperature of the your friend by examine infrared rays. What thermometer you are going to use?

PTA074



13. This temperature point indicates.

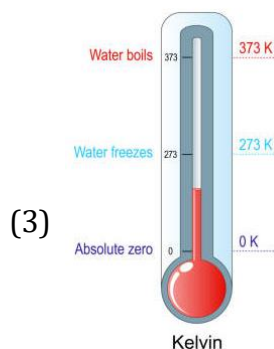
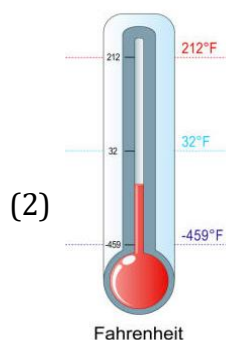
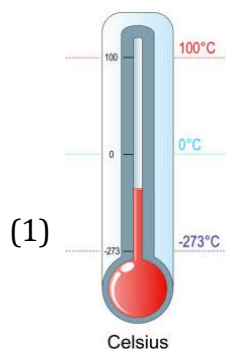
PTA075



- (1) Normal human temperature
(2) Room temperature
(3) Boiling point of water
(4) Freezing point of water

14. Among three temperature scales. Which is most convenient to use?

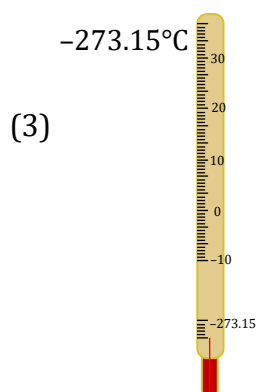
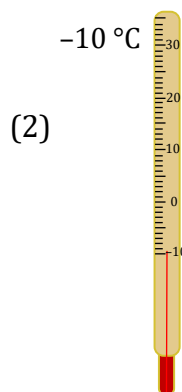
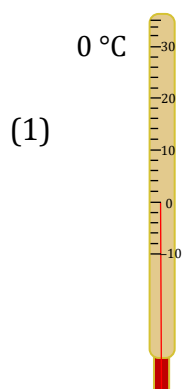
PTA076



(4) None of these

15. Mark the correct option with absolute zero marking.

PTA077



(4) none of these

True or false

- We can always trust our senses to measure temperature. **PTA078**
- When two substances at different temperatures are kept in thermal contact, heat flows from the warmer body to the cooler body until they reach the same temperature. **PTA079**

- For 1 °C change in the temperature of an object, there is a change of 1.8 °F in its temperature. **PTA080**
- The boiling point of water is 100 degree Celsius. **PTA081**
- Mercury does not wet the surfaces in contact thus it does not stick to the inner surface of capillary tube. **PTA082**
- The maximum and minimum temperatures of any day, reported in weather reports, are measured by a thermometer called the clinical thermometer. **PTA083**
- A thermometer measures heat, not temperature. **PTA084**
- The liquid in thermometer expands when the temperature increases. **PTA085**
- Mercury and alcohol are commonly used liquids in thermometer. **PTA086**
- Digital thermometer do not have liquid inside. **PTA087**
- Match the column** **PTA088**

Column-I		Column-II	
(A)	Heat flow takes place	(p)	Temperature
(B)	Energy	(q)	Heat conductors
(C)	Fahrenheit	(r)	Liquid-in-glass thermometer
(D)	Alcohol and mercury	(s)	Heat

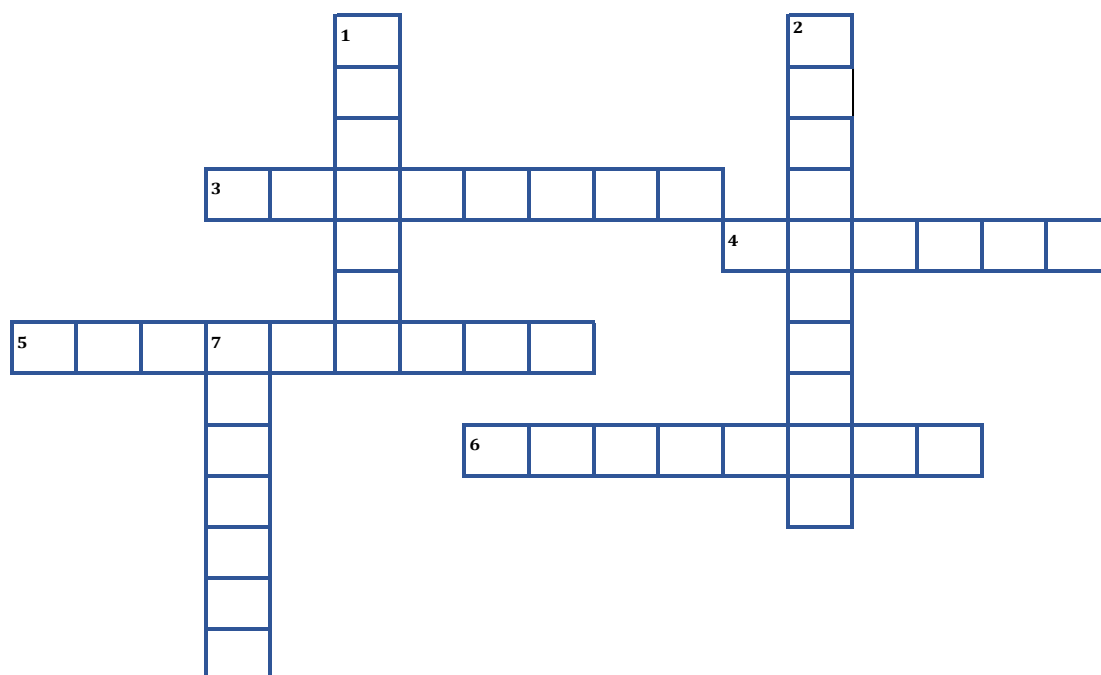
- Match the column** **PTA089**

Column-I		Column-II	
(A)	Lower fixed point	(p)	-40° F
(B)	Human body	(q)	373 K
(C)	Steam point	(r)	98.6° F
(D)	A temperature that is same on Celsius and Fahrenheit scale	(s)	32° F

Fill in the blanks

- | | |
|--|--|
| <p>1. When two objects initially at different temperatures are placed in contact with each other, heat flows from the body which is at a _____ temperature to the body which is at a _____ temperature. PTA090</p> <p>2. The temperature scale on which the freezing point of water is at 32° is the _____ scale. PTA091</p> <p>3. _____ is the freezing temperature of water. PTA092</p> <p>4. The lowest possible temperature in the universe is _____. PTA093</p> <p>5. Matter _____ when heated and _____ when cooled. PTA094</p> | <p>6. An _____ thermometer is used to measure very low temperature. PTA095</p> <p>7. The boiling point of water at sea level is _____ $^{\circ}\text{C}$. PTA096</p> <p>8. Among metals, _____ is one of the best heat conductors. PTA097</p> <p>9. Air trapped in wool or fur act as a _____ to keep us warm. PTA098</p> <p>10. _____ is used to insulate refrigerator to prevents heat loss/transfer. PTA099</p> |
|--|--|

1. Crossword



Across

3. _____ Zero is the lowest possible temperature in the universe.
4. S.I unit of temperature is _____
5. Liquid in glass thermometer is based on thermal _____, the mercury or alcohol expands as it temperature rises.
6. _____ of water occurs at 0°C

Down

1. _____ is a temperature scale in which water freeze at 0 degree and boils at 100 degrees.
2. _____ is the temperature scale in which water freezes at 32 degrees and boils at 212 degree.
7. Common thermometric liquids are mercury and _____.

ANSWER KEY

Multiple choice questions

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Solution	4	4	2	3	1	2	3	2	4	2	1	4	2	1	3

True or false

1. False 2. True 3. True 4. True 5. True
 6. False 7. False 8. True 9. True 10. True

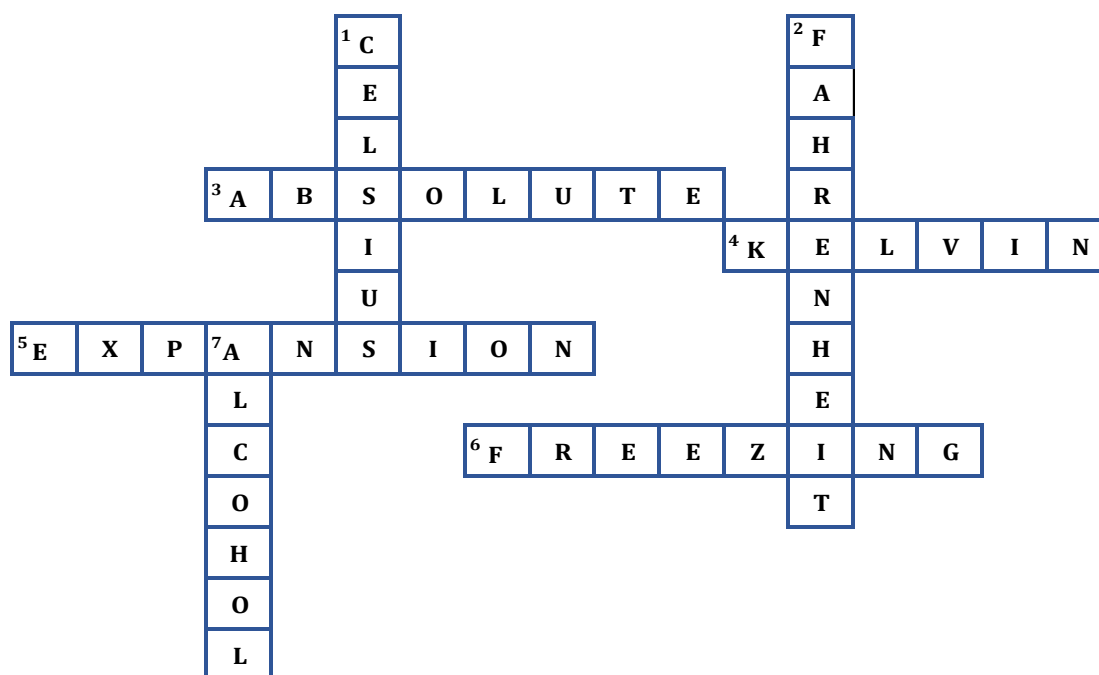
Match the column

1. $(A \rightarrow q); (B \rightarrow s); (C \rightarrow p); (D \rightarrow r)$ 2. $(A \rightarrow s); (B \rightarrow r); (C \rightarrow q); (D \rightarrow p)$

Fill in the blanks

1. Higher; lower 2. Fahrenheit 3. 0°C or 32°F or 273 K
 4. 0 Kelvin or -273°C 5. Expands; contracts 6. Alcohol
 7. 100 8. Copper 9. Heat insulator
 10. Foam

1. Crossword



EXERCISE-02

Very short answer type questions

1. Which is the larger change in temperature, 1°C or 1°F ? **PTA101**
2. How can the Fahrenheit and Celsius scales be converted from one to another? **PTA102**
3. Which is the larger change in temperature, 1 K or 1°C ? **PTA103**
4. Find the difference between 0° on the Celsius scale and absolute zero. **PTA104**
5. What do you think, whether the size of an inflated balloon would change or remain the same if you placed it in a freezer? **PTA105**
6. Normal body temperature is 98.6°F . Neeta has a temperature of 38.5°C . Does Neeta have fever? **PTA106**
7. A hot copper pan is dropped into a tub of water. If the water's temperature rises, what happens to the temperature of the pan? **PTA107**
8. Why petrol storage tanks are sprayed with silver paint? **PTA108**
9. Give two examples each of conductors and insulators of heat. **PTA109**
10. Look at Figure. Mark where the heat is being transferred by conduction, by convection and by radiation. **PTA110**



Short answer type questions

1. Explain an activity that shows that we cannot rely on our senses to measure temperature. **PTA111**
2. A metal cup containing water at 100°F is placed in an aquarium containing water at 80°F . **PTA112**
 - (i) Which way will heat flow? Why?
 - (ii) When will the flow of heat stop?
 - (iii) What is it called when heat no longer flows?
3. Since it is fairly easy to tell when the temperature is high or low, why do we need thermometers, or other devices for measuring temperature? **PTA113**
4. What is the use of maximum and minimum thermometer? **PTA114**
5. When a mercury thermometer is heated, the mercury expands and rises in the thin tube of glass. What does this indicate about the relative rates of expansion for mercury and glass? What would happen if their expansion rates were the same? **PTA115**
6. Why mercury is preferred in thermometer? **PTA116**
7. State similarities and differences between the laboratory thermometer and the clinical thermometer. **PTA117**
8. What are the precautions that should be taken while measuring temperature by a laboratory thermometer? **PTA118**
9. If the temperature reads 25°C , what does this temperature indicate? How would you represent the same temperature in Fahrenheit? **PTA119**

10. In hot countries, people wear bright white clothes and paint their houses white. Why? **PTA120**

Long answer type questions

1. Explain the concept and working of a clinical thermometer. Make figure. Write its important features. Why is it not convenient to use laboratory thermometer to measure our body temperature? **PTA121**
2. Explain the different temperature scales with the help of labelled diagram. **PTA122**

Numerical problems

1. Calculate the average human body temperature, 98.6 °F, on the Kelvin scale. **PTA123**
2. Convert –20 °C to the Kelvin scale. **PTA124**
3. What is the Celsius equivalent of 100 K? **PTA125**
4. What does 104 °F equal on the Kelvin scale? **PTA126**
5. What is a temperature of 86 °F on the Celsius scale? **PTA127**
6. What is a temperature of 22 °C in degree Fahrenheit? **PTA128**
7. The melting point of ethyl alcohol is –179 °F. What is the Celsius reading? **PTA129**

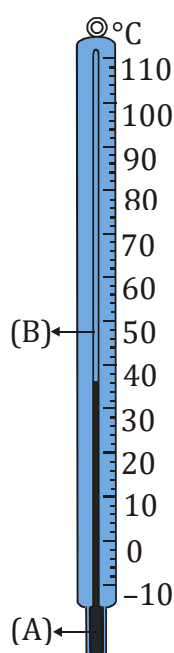
8. The melting point of gold is 1947 °F. Express this temperature in degrees Celsius and in Kelvin. **PTA130**
9. What temperature in Fahrenheit scale numerically twice its value in Celsius scale? **PTA131**
10. The melting point of pure iron is 1505 °C. What Kelvin temperature is this? **PTA132**
11. The melting point of mercury is – 38.0 °F. What Celsius temperature is this? **PTA133**
12. A welding white heat is approximately 1400 °C. Find this temperature expressed in Kelvin. **PTA134**
13. Find the temperature difference between (in °C and °F) and 55 °C and 131 °F. **PTA135**
14. Find the temperature difference (in °C) between 65 °C and 212 °F. **PTA136**
15. The temperature in a crowded room is 86 °F. What is the Celsius reading? **PTA137**

Activity based questions

1. Four identical kettles, having the same amount of water, have bases made of different metals of same thickness. If these kettles, are placed on identical flames, water will boil first in the kettle the base of which is made of **PTA138**
- (1) stainless steel
- (2) brass
- (3) aluminum
- (4) copper

See the figure and read the passage below (Q.2 & Q.3). There are some parts marked as A and B. You have to identify them.

When a thermometer is in contact with a system, energy is exchanged until the thermometer and the system are in thermal equilibrium with each other. A liquid-in-glass thermometer consists of following parts:



(1) **Glass Tube:** A thermometer is a sealed glass tube marked with a scale on the outside.

(2) **Capillary Tube:** Inside the glass tube there is another thinner tube, called the capillary tube.

(3) **Bulb:** The capillary tube ends in a bulb made of thick glass. The bulb contains thermo-metric liquid.

2. In the figure, A represents **PTA139**

(1) Glass tube

(2) Capillary Tube

(3) Bulb

(4) Ring

3. In the figure, B represents **PTA140**

(1) Glass tube

(2) Capillary Tube

(3) Bulb

(4) Ring

ANSWER KEY

Numerical problems

1. 310 K

2. 253 K

3. -173°C

4. 313 K

5. 30°C

6. 71.6°F

7. -117.2°C

8. 1063.8°C , 1336.8 K

9. 320°F

10. 1778 K

11. -38.8°C

12. 1673 K

13. 0°C or 0°F

14. 35°C

15. 30°C

Activity based questions

1. Copper

2. 3

3. 2

