

Intermediate Science 7
Unit 1: Temperature and Heat
Topic 2: Measuring Temperature



Student Name _____

Thermometer: Mechanical or electrical device for measuring temperature.

Scale: A series of equally measured sections that are marked and numbered for use in measurement.

Thermometers Of The Past:

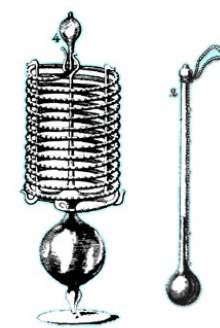
1) Galileo's Air Thermoscope

-As the air heats, the liquids drops and rises when air is cooled. It was not considered a thermometer because it did not have a scale.



2) Early Liquid Thermometer

-Liquid rising up the tube shows the temperature is rising



Temperature Scales: Scales are necessary for temperatures to be accurate and comparable. As scientists discovered more and more about the effects of temperature, they needed to measure temperatures precisely. There are three different commonly used scales.

1) **Fahrenheit:**

-Fahrenheit developed the first modern thermometer in 1714

-Fahrenheit is a temperature scale that bases the boiling point of water at 212 and the freezing point at 32.

2) **Celsius**

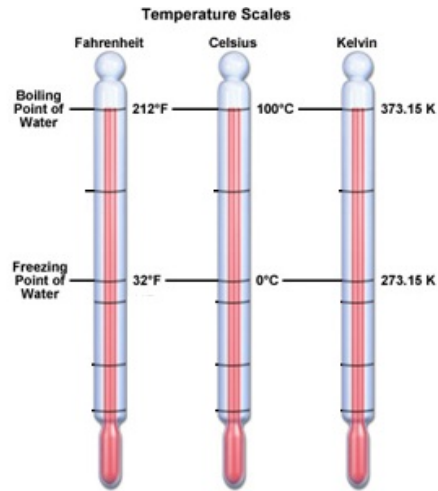
-Andres Celsius developed this temperature scale 1742

-Celsius is a measurement of temperature in which 0 degrees represents the freezing point of water, and 100 degrees represents water's boiling point at the standard atmosphere.

-This temperature scale is used today in Canada and many other countries.

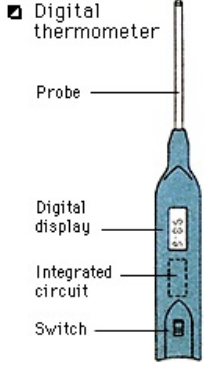
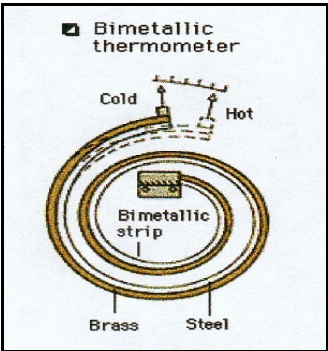

3) Kelvin

- William Thomson (Lord Kelvin) developed this temperature scale in
- Kelvin is a measurement of temperature in which 273.16 K represents the freezing point of water, and 373.16 represents water's boiling point
- Each unit on this scale, called a Kelvin rather than a degree



Different Types of Thermometers:

<p>Liquid-in-glass Thermometer</p>	<ul style="list-style-type: none"> -The lab thermometer contains colored alcohol rather than mercury for safety. -They include those used to determine the temperature in or outside a building, to measure the temperature of the body, and for cooking. -Mercury is the most common liquid in these thermometers. Alcohol is used in areas where the temperature frequently drops below the freezing point of mercury (-39 degrees C or -38 degrees F). -When the temperature goes up, the volume of the liquid expands and the liquid rises. A temperature scale is on the outside of the thermometer.
<p>Thermocouple</p>	<ul style="list-style-type: none"> -Made of two wires of different metals. -A temperature difference causes a current to flow through the wires. This current is measured by a meter. -Can measure higher temperatures than typical thermometers. -Thermocouples are widely used in science and industry because they're generally very accurate and can operate over a huge range of really hot and cold temperatures. Used for measurements in furnace, gas turbine, and diesel engines

<p>Resistance Thermometer</p> 	<p>- (digital thermometers)</p> <p>- Sensors used to measure temperature.</p> <p>-Digital thermometers are used in industry and in the home, in applications including food preparation, manufacturing, medical and scientific testing and procedures.</p>
<p>Bimetallic Strip (thermostat)</p> 	<p>-Made of two different metals fused together.</p> <p>-These metals expand and contract at different rates causing the strip to bend when heated</p> <p>-Bimetallic strips are used as switches in thermostats and electrical breakers</p>
<p>Infrared Thermometer</p> 	<p>-Converts infrared radiation into colors that can interpret a temperature difference.</p> <p>-Measurement can be taken from a distance, without making contact with the object</p>

PART A: MULTIPLE CHOICE

Instructions: Shade the letter of the correct answer on the computer scorable answer sheet provided.

1. What is temperature?
 - (A) How high or low something is
 - (B) How hot or cold something is
 - (C) How fast or slow something is
 - (D) How the weather works

2. What is used to measure temperature?
 - (A) Anemometer
 - (B) Barometer
 - (C) Odometer
 - (D) Thermometer

3. What is required to measure temperature?
 - (A) Bore
 - (B) Liquid
 - (C) Metal
 - (D) Scale

4. What is used to determine the scale of a thermometer?
 - (A) The freezing and boiling point of water
 - (B) The freezing and boiling point of alcohol
 - (C) The freezing and boiling point of mercury
 - (D) The freezing and boiling point of helium

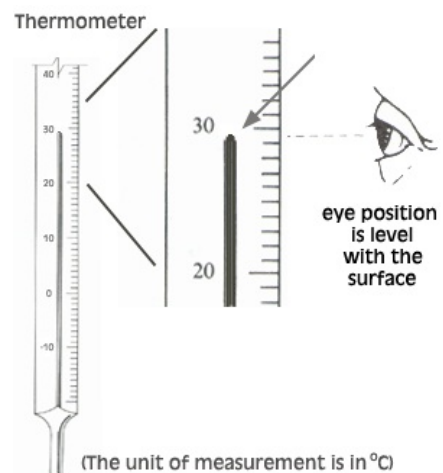
5. What temperature does water freeze?
 - (A) 100 degrees Celsius
 - (B) 0 degrees Celsius
 - (C) 37 degree Celsius
 - (D) 20°C degree Celsius

6. What temperature does water boil?
 - (A) 100 degrees Celsius
 - (B) 0 degrees Celsius
 - (C) 37 degree Celsius
 - (D) 20°C degree Celsius

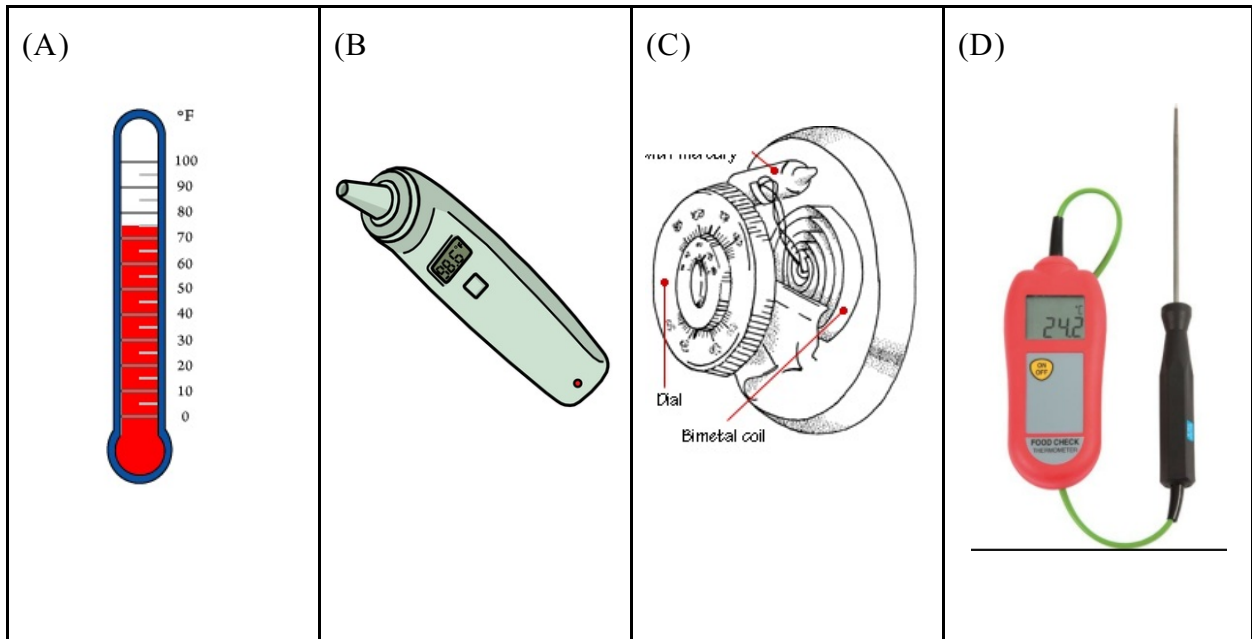
7. Which of the following is not a scale?
 - (A) Celsius
 - (B) Fahrenheit
 - (C) Kelvin
 - (D) Newton

8. Which of the following is not a type of thermometer?
 - (A) Graphical Thermometer
 - (B) Infrared Thermometer
 - (C) Resistance Thermometer
 - (D) Thermocouple Thermometer

9. What is the reading on the thermometer?
 - (A) 3 °C
 - (B) 20 °C
 - (C) 25 °C
 - (D) 30 °C



Use the diagrams below to answer questions 10 to 13



10. What is shown in picture A?
- (A) Bimetallic Strip Thermometer
 - (B) Infrared Thermometer
 - (C) Liquid-in-glass Thermometer
 - (D) Resistance Thermometer
11. What is shown in picture B?
- (A) Bimetallic Strip Thermometer
 - (B) Infrared Thermometer
 - (C) Liquid-in-glass Thermometer
 - (D) Resistance Thermometer
12. What is shown in picture C?
- (A) Bimetallic Strip Thermometer
 - (B) Infrared Thermometer
 - (C) Liquid-in-glass Thermometer
 - (D) Resistance Thermometer
13. What is shown in picture D?
- (A) Bimetallic Strip Thermometer
 - (B) Infrared Thermometer
 - (C) Liquid-in-glass Thermometer
 - (D) Resistance Thermometer

PART B : MATCHING

[5]

Match each thermometer on the left with the best Descriptor on the right. Each Descriptor may be used only once. Place your answer on the scantron

<u>Term</u>	<u>Descriptor</u>
14. ___ Bimetallic Strip Thermometer	A. Take temperature of a sick baby
15. ___ Infrared Thermometer	B. Measure temperature of water for yeast to make bread
16. ___ Liquid-in-glass Thermometer	C. Set your barbeque at 500 °C
17. ___ Resistance Thermometer	D. Used in a thermostat to ensure a room is comfortable
18. ___ Thermocouple Thermometer	E. Determine if your turkey is cooked

PART C: FILL IN THE BLANK

1. Temperature is measured in many different scales, including _____, _____, and _____ scales.
2. The fahrenheit scale was developed by _____
3. Normal human body temperature is _____? (answer in fahrenheit)

PART D: WRITTEN RESPONSE

1. Why is your skin a poor instrument for measuring temperature?

2. How is the Kelvin temperature scale similar to the Celsius temperature scale? How is it different?

3. What is the difference between the Celsius scale and the Kelvin scale of temperatures?

4. Explain the properties that a device must have in order to measure temperature.

5. Why did the scientists need to pick two things with constant temperatures in order to put scales on their thermometers?

6. What might be the advantages of using a thermocouple instead of a laboratory thermometer?

7. If you were told that an object had a temperature of -14°C , would you pick it up with your bare hands? Why or why not?

8. If a classmate told you that the coldest temperature ever recorded in Newfoundland and Labrador was -21°C , what would you tell your classmate?

9. Why do you think that scientists used coloured liquids in their thermometers?
