EXPERIMENT NO.: 10 **DATE:**

AIM: RECORDING OF BODY TEMPERATURE (USING MERCURY, DIGITAL AND IR THERMOMETERS AT VARIOUS LOCATIONS), PULSE RATE/ HEART RATE (AT VARIOUS LOCATIONS IN THE BODY, BEFORE AND AFTER EXERTION), RESPIRATORY RATE

1. RECORDING OF BODY TEMPERATURE:

REQUIREMENT: Clinical Thermometer, Digital Thermometer, IR Thermometer

THEORY:-

What is body temperature?

- Body temperature is a measure of the body's ability to generate and get rid of heat.
- The body is very good at keeping its temperature within a narrow, safe range in spite of large variations in temperatures outside the body.
- When you are too hot, the blood vessels in your skin expand (dilate) to carry the excess heat to your skin's surface.
- You may begin to sweat, and as the sweat evaporates, it helps cool your body.
- When you are too cold, your blood vessels narrow (contract) so that blood flow to your skin is reduced to conserve body heat.
- You may start shivering, which is an involuntary, rapid contraction of the muscles.
- This extra muscle activity helps generate more heat.
- Under normal conditions, this keeps your body temperature within a narrow, safe range.

Where is body temperature measured?

- Your body temperature can be measured in many locations on your body.
- The mouth, ear, armpit, and rectum are the most commonly used places.
- Temperature can also be measured on your forehead.

METHOD (SITE)	NORMAL TEMPERATURE RANGE	METHOD (SITE)	NORMAL TEMPERATURE RANGE
ORAL (MOUTH)	36.4–37.2°C 97.6–99.6°F	RECTAL (RECTUM)	37.0–38.1°C 98.6–100.6°F
TYMPANIC (EAR)	35.9–37.6°C 96.6–99.7°F	TEMPORAL (FORHEAD)	35.8–36.9°C 96.5–99.6°F
AXILLARY (ARMPIT)	35.2–36.9°C 95.3–98.4°F		

What are Fahrenheit and Celsius?

Thermometers are calibrated in either degrees Fahrenheit (°F) or degrees Celsius (°C), depending on the custom of the region. Temperatures in the United States are often measured in degrees Fahrenheit, but the standard in most other countries is degrees Celsius.

If you'd like to convert a temperature reading in Fahrenheit to Celsius:

1. Start with the temperature in Fahrenheit (e.g., 100 degrees).
2. Subtract 32 from this figure (e.g., 100 - 32 = 68).
3. Divide your answer by 1.8 (e.g., 68 / 1.8 = 37.78)

What is a fever?

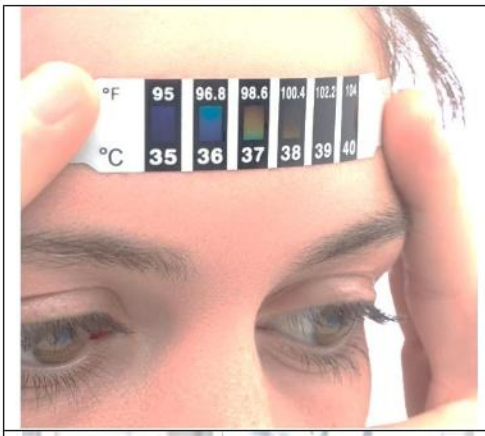
- In most adults, an oral temperature above 100°F (37.8°C) or a rectal or ear temperature above 101°F (38.3°C) is considered as a fever.

BODY TEMPERATURE CHART

Condition	Child		Adult	
Hypothermia	<35°C	<95°F	<35°C	<95°F
Normal	35.8°C - 37.5°C	96.4°F - 99.5°F	36.5°C - 37.5°C	97.7°F - 99.5°F
Low Fever (Hyperthermia)	>38.3°C	>100.4°F	>38.3°C	>100.9°F
High Fever (Hyperpyrexia)	>40°C	>104.0°F	>41.5°C	>106.7°F

SEVERAL DIFFERENT TYPES OF THERMOMETERS ARE AVAILABLE:

Thermometer Figure	Types and Description
	**Electronic thermometers** are plastic and shaped like a pencil, with a display window at one end and the temperature probe at the other end. They work by measuring how well electricity travels through a wire. Electronic thermometers are used in the mouth, rectum, or armpit. They are easy to use and easy to read. If you buy an electronic thermometer, check the package for information about its accuracy.
	**Ear thermometers** are plastic and come in different shapes. They use infrared energy to measure body temperature. The small cone-shaped end of the thermometer is placed in the ear, and body temperature shown on a digital display. The results appear within seconds. Some models also show the corresponding oral and rectal readings. See a picture of an ear thermometer.

	**Disposable thermometers** are thin flat pieces of plastic with colored dots and temperature markings on one end. The color of the dots shows the temperature. Disposable thermometers can be used in the mouth or rectum. A patch form can be used on a baby's skin to measure temperature continuously for 48 hours. These thermometers are safe, but they are not as accurate as electronic or ear thermometers. They do not contain glass, latex, or mercury. You can reuse the thermometer during an illness and then throw it away.
	**Forehead (temporal) thermometers** use skin temperature to determine body temperature. Some have a soft disc that are pressed against the forehead and show the temperature on a digital display. Other types are thin pieces of plastic with numbers on them. You press the strip against a person's forehead, and the temperature makes some numbers change colors or light up. These thermometers are not as accurate as electronic and ear thermometers.
	**Pacifier thermometers** are shaped like a baby's pacifier but have a display that shows the temperature. You place the pacifier in your child's mouth to measure temperature. These thermometers may take longer to get a reading and are not as accurate as other types.

How to take an oral temperature

Oral is the most common method of taking a temperature.

1. Place the digital or disposable thermometer under the tongue, just to one side of the center, and close the lips tightly around it.
2. Leave the thermometer in place for the required amount of time. Time yourself with a clock or watch. Some digital thermometers give a series of short beeps when the reading is done.
3. Remove the thermometer and read it.
4. Clean a digital thermometer with cool, soapy water and rinse it off before putting it away.

How to take an armpit (axillaries) temperature

Taking a temperature in the armpit may not be as accurate as taking an oral or rectal temperature.

1. Place the thermometer under the arm with the bulb in the center of the armpit.
2. Press the arm against the body and leave the thermometer in place for the required amount of time. Time yourself with a watch or clock.
3. Remove the thermometer and read it. An armpit temperature reading may be as much as 1°F (0.6°C) lower than an oral temperature reading.
4. Clean a digital thermometer with cool, soapy water and rinse it off before putting it away.

Body temperature	
Normal:	The average normal temperature is 98.6°F (37°C). But "normal" varies from person to person. Your temperature will also vary throughout the day, usually being lowest in the early morning and rising as much as 1°F (0.6°C) in the early evening. Your temperature may also rise by 1°F (0.6°C) or more if you exercise on a hot day. A woman's body temperature typically varies by 1°F (0.6°C) or more through her menstrual cycle, peaking around the time of ovulation.
Abnormal:	**Oral, ear (tympanic), or rectal temperature** • Fever: 100.4°F (38°C) to 103.9°F (39.9°C) • High fever: 104°F (40°C) and higher
	Armpit (axillary) temperature • Fever: 99.4°F (37.4°C) to 102.9°F (39.4°C) • High fever: 103°F (39.5°C) and higher
	A rectal or ear temperature of less than 97°F (36.1°C) means a low body temperature (hypothermia).

RESULT:

My Body temperature is:

Before Exercise		**After Exercise**	
In °C	**In °F**	**In °C**	**In °F**

Conclusion

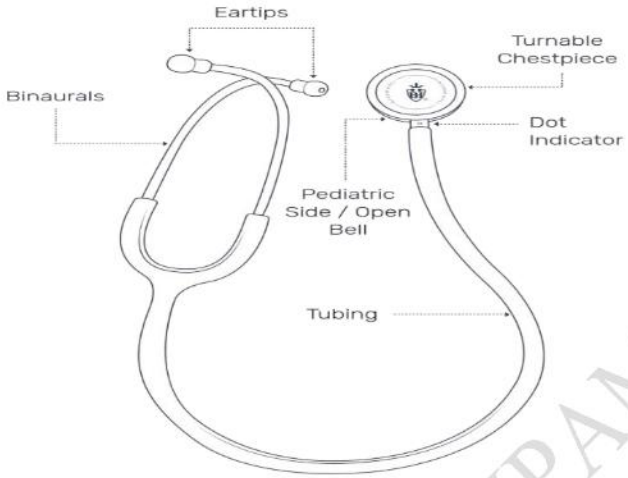
My body temperature is in normal / abnormal range.

After exercise body temperature decrease/increase.

2. DETERMINATION OF HEART RATE AND PULSE RATE

REQUIRMENTS

Stethoscope



THEORY

Heart rate and pulse rate are different because a heart rate measures the heartbeats of the heart, whereas a pulse rate measures the rate of blood pressure. A heartbeat pushes the blood through the body.

A normal resting heart rate for adults ranges from 60 to 100 beats per minute.

There are different techniques to measure the pulse rate and heart rate.

There are a few places on your body where it's easier to take your pulse:

- The insides of your wrists
- The insides of your elbows
- The sides of your neck
- The tops of your feet

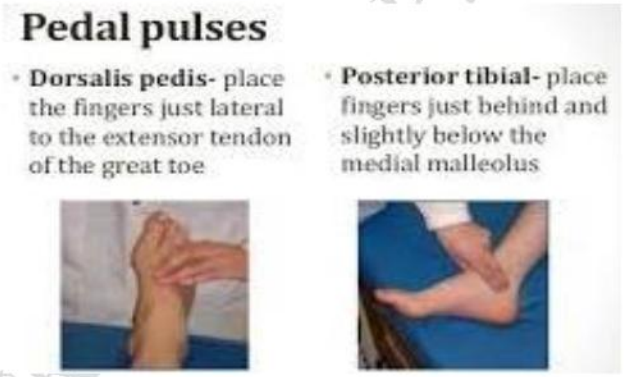
Put the tips of your index and middle fingers on your skin. Press lightly until you feel the blood pulsing beneath your fingers. You may need to move your fingers around until you feel it.

Count the beats you feel for 15 seconds. Multiply this number by four to get your pulse per minute

PROCEDURE:

For Pulse rate:

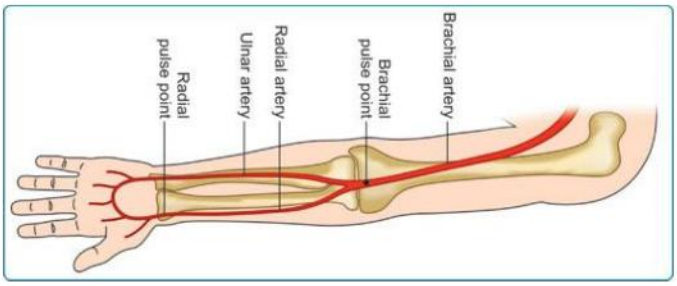
1. **Radial Pulse Method:**
   - It check your pulse through wrist.
   - At your wrist, place two fingers between the bone and the tendon over your radial artery — which is located on the thumb side of your wrist.
2. **Carotid Pulse Method:**
   - It check pulse rate through windpipe.
   - Place your index and third fingers on your neck to the side of your windpipe.
3. Pedal pulse Method



You can also find your pulse on the top of your foot. This is called the pedal pulse.

- Place your index and middle fingers above the highest point of the bone that runs along the top of your foot. You may have to move your fingers along the bone or slightly to either side to feel the pulse.
- Once you have found your pulse, count the beats for 15 seconds.
- Multiply by 4 to obtain your heart rate.

4. **Brachial pulse Method**



Another location for checking your pulse is the brachial artery. This method is used most commonly in young children.

- Turn your arm so it's slightly bent and your inner arm is facing up toward the ceiling.
- Place your index and middle fingers along the side of your arm between the crook of your elbow on the top and the pointy part of your elbow bone on the bottom. Then move your fingers an inch up your arm. You may have to press quite firmly to feel your pulse.
- Once you can feel the pulse, count how many beats occur in 15 seconds.
- Multiply this number by 4 to obtain your heart rate.

For Heart Rate:

- A stethoscope is a medical instrument which is useful to hear sounds made by the heart, lungs, and intestines. Using a stethoscope to hear sounds is called auscultation
- Procedure:
- Get a high-quality stethoscope.
- Adjust your stethoscope's earpieces.
- On the chest piece of stethoscope before use.
- Hold the diaphragm over the subject's heart. Position the diaphragm on the left upper part of the chest where the 4th to 6th ribs meet, almost directly under the breast. Hold the stethoscope between your pointer and middle fingers and apply enough gentle pressure so that you don't hear your fingers rubbing together.
- Listen to the heart for a full minute. Ask the subject to relax and breathe normally. You should hear the normal sounds of the human heart, which sound like "lub-dub." These

sounds are also called systolic and diastolic. Systolic is the "lub" sound and diastolic is the "dub" sound.

- The "lub," or systolic, sound happens when the mitral and tricuspid valves of the heart close.
- The "dub," or diastolic, sound happens when the aortic and pulmonic valves close.

- Count the number of heartbeats you hear in a minute. The normal resting heart rate for adults and children over 10 years old is between 60-100 beats per minute. For well-trained athletes, the normal resting heart rate may only be between 40-60 beats per minute.
- Listen for abnormal heart sounds. As you count the heartbeats, you should also listen for any abnormal sounds. Anything that does not sound like lub-dub may be considered abnormal. If you hear anything abnormal, your subject may need further evaluation by a doctor.

RESULT:

Pulse Rate		Heart Rate	
Before Exercise	**After Exercise**	**Before Exercise**	**After Exercise**

DISCUSSION:

To measure your heart rate, simply check your pulse. When you feel your pulse, count the number of beats in 15 seconds. Multiply this number by four to calculate your beats per minute.

Normal heart rates and pulse rate at rest:

Age	Pulse rate (beats per minute)
Newborn (resting)	100-180
Infant (resting)	80-150
Child up to 6 years	75-120
Child 6-12 years	70-110
Adolescent-adult	60-90

Above 100 beats a minute indicate as tachycardia and resting heart rate is below 60 beats a minute indicate bradycardia.

3. DETERMINATION OF RESPIRATORY RATE

REQUIRMENTS: Stop watch

Theory:

Respiratory rate is also known as breathing rate. This is the number of breaths person take per minute. Person can measure their breathing rate by counting the number of breaths they take over the course of one minute while they are at rest.

We are doing 12 breaths (Inspiration and Expiration) in each minute so the minute ventilation (MV) is the the total volume of air inhaled and exhaled in each minute.

Minute Ventilation (MV) = Tidal volume (VT) x 12
= 500 mL/ breath x 12 breaths/min = 6 litres/min

Principle:

Healthy adult doing 12 breaths in each minute and with each inhalation and exhalation moving about 500 mL of air into and out of the lungs. The volume of one breath is called the tidal volume (VT).

Procedure:

- Sit down and try to relax.
- It's best to take your respiratory rate while sitting up in a chair or in bed.
- Measure your breathing rate by counting the number of times your chest or abdomen rises over the course of one minute.
- Record this number.

Result:

I have taken _____ respiration per minute.

SIGNATURE OF TEACHER