

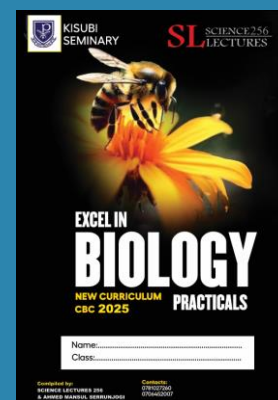
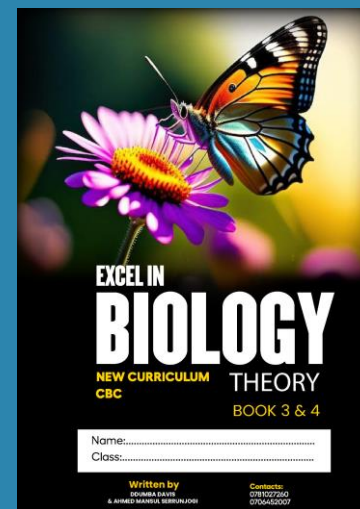
TYPES OF NUTRITION AND NUTRIENT TYPES

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KISSEM BIOLOGY DEPARTMENT

2025

A PRODUCT OF SCIENCE LECTURES256



LEARNING OUTCOMES

- ☒ Application
- ☒ Communication skills
- ☐ Awareness of the link

- understand the term Nutrition
- identify the food nutrients, their sources and importance to humans
- perform food tests for various nutrients
- appreciate the importance of a diet containing the different nutrients
- appreciate the concept of balanced diet in relation to age, sex and an individual's activity
- appreciate the causes and effects of nutrient deficiency in humans, including diseases related to malnutrition
- calculate body mass index (BMI) and explain its implication
- identify the major plant mineral nutrients, their role and the symptoms of deficiencies

NUTRITION

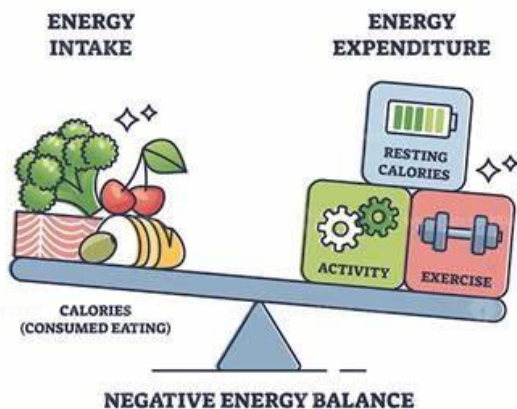
Nutrition refers to the process by which living organisms obtain, consume and use food substances to maintain their life processes.

TYPES OF NUTRITION

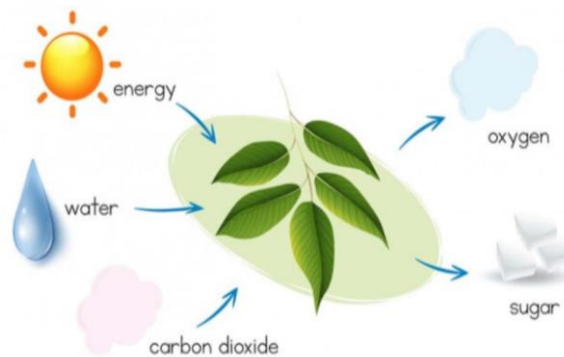
These food substances are called nutrients.

- The nutrients are important for provision of energy

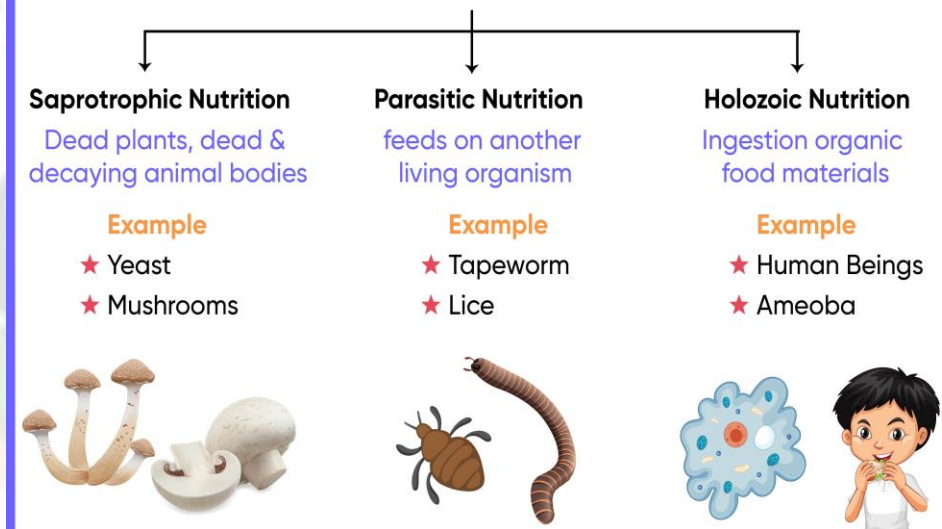
ENERGY BALANCE



Autotrophic Nutrition



TYPES OF HETEROTROPHIC NUTRITION



TYPES OF NUTRIENTS

FOOD

PROTEINS

VITAMINS

BALANCED DIET

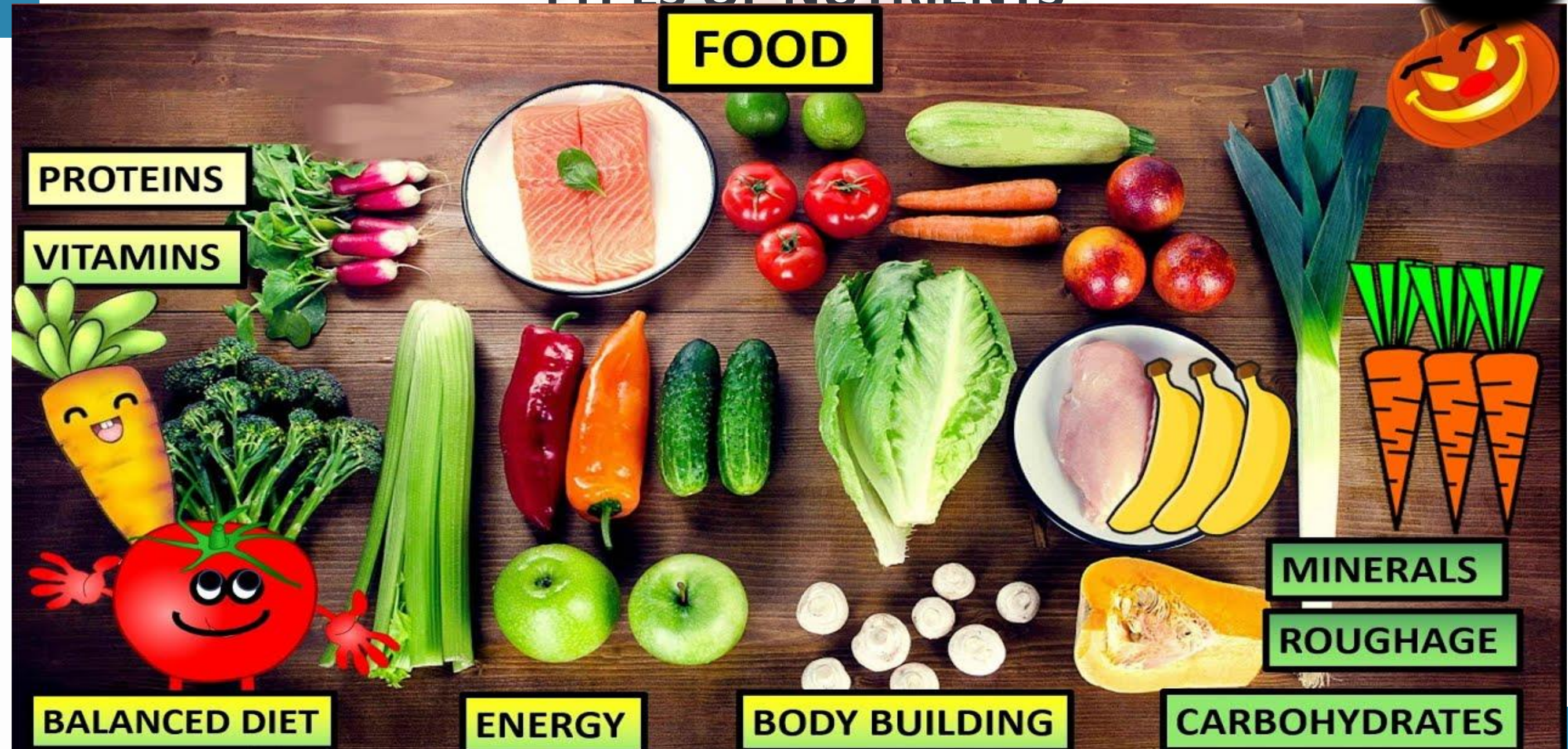
ENERGY

BODY BUILDING

CARBOHYDRATES

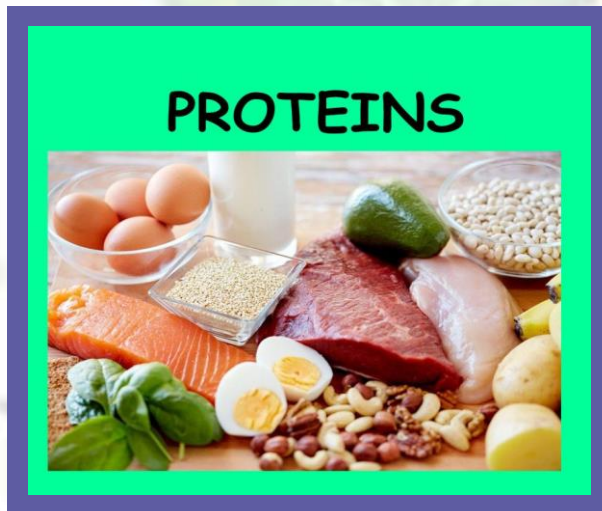
MINERALS

ROUGHAGE





ENERGY GIVING FOODS



BODY BUILDING FOODS



FATS AND OILS



VITAMINS

CARBOHYDRATES



- These are the main sources of energy in our body
- From the images above identify the foods that are sources of carbohydrates

WHAT DO YOU
THINK IS THE
IMPORTANCE OF
CARBOHYDRATES



Sweet potatoes



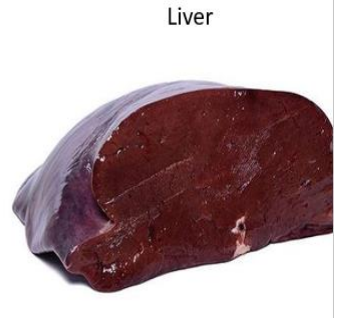
sorghum



Sugar canes



Cassava



Liver



meat



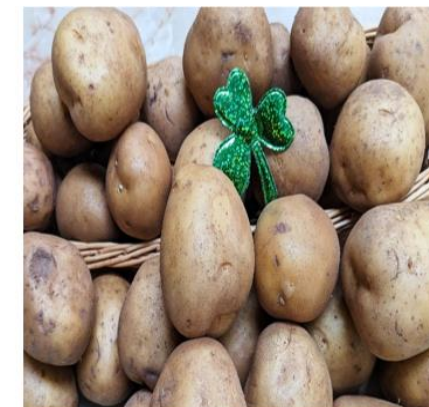
eggs



Yams



maize



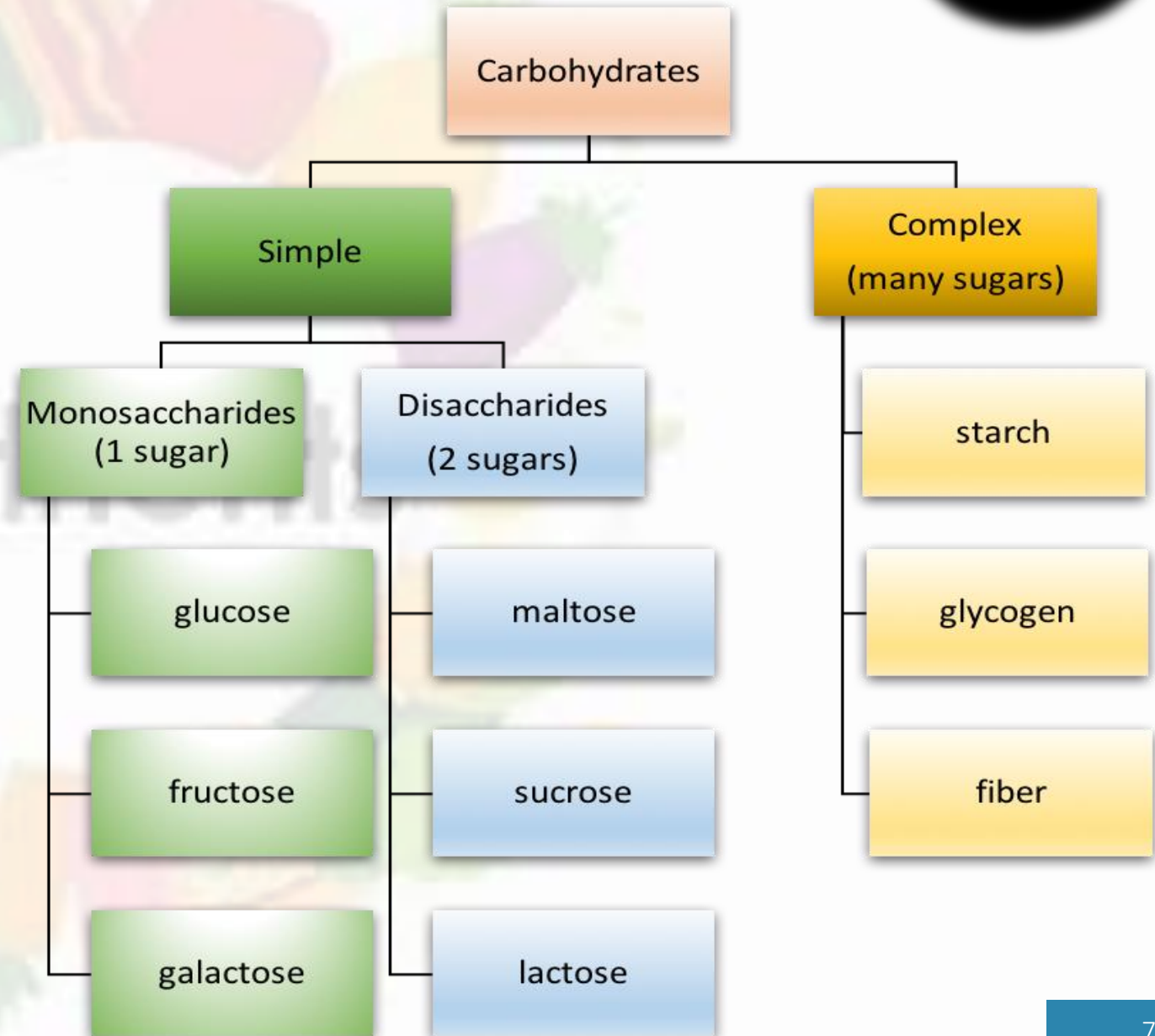
Irish potatoes



bananas

TYPES OF CARBOHYDRATES

- Properties of monosaccharides
- They have a sweet taste
 - They dissolve in water
 - They form crystals
 - Can pass through a selectively permeable membrane
 - They change the colour of benedict's solution from blue to orange when boiled with the solution thus they are known as reducing sugars.



DISSACCHARIDES AND POLYSACCHARIDES

Properties of di-saccharides

- They are sweeter than monosaccharides
- They can be crystallized
- They are soluble in water
- Do not change the colour of Benedict's solution when heated with it (apart from maltose)- they are known as non-reducing sugars
- Can be broken down into simple sugars by dilute mineral acids and enzymes

Properties of poly saccharides

1. They are not sweet in taste.
2. Many are insoluble in water.
3. They are hydrophobic in nature.
4. They do not form crystals on desiccation.
5. Can be extracted to form a white powder.
6. They are high molecular weight carbohydrates.
7. Inside the cells, they are compact and osmotically inactive.

Identify the different types of carbohydrates present in these foods



DEFICIENCY OF CARBOHYDRATES

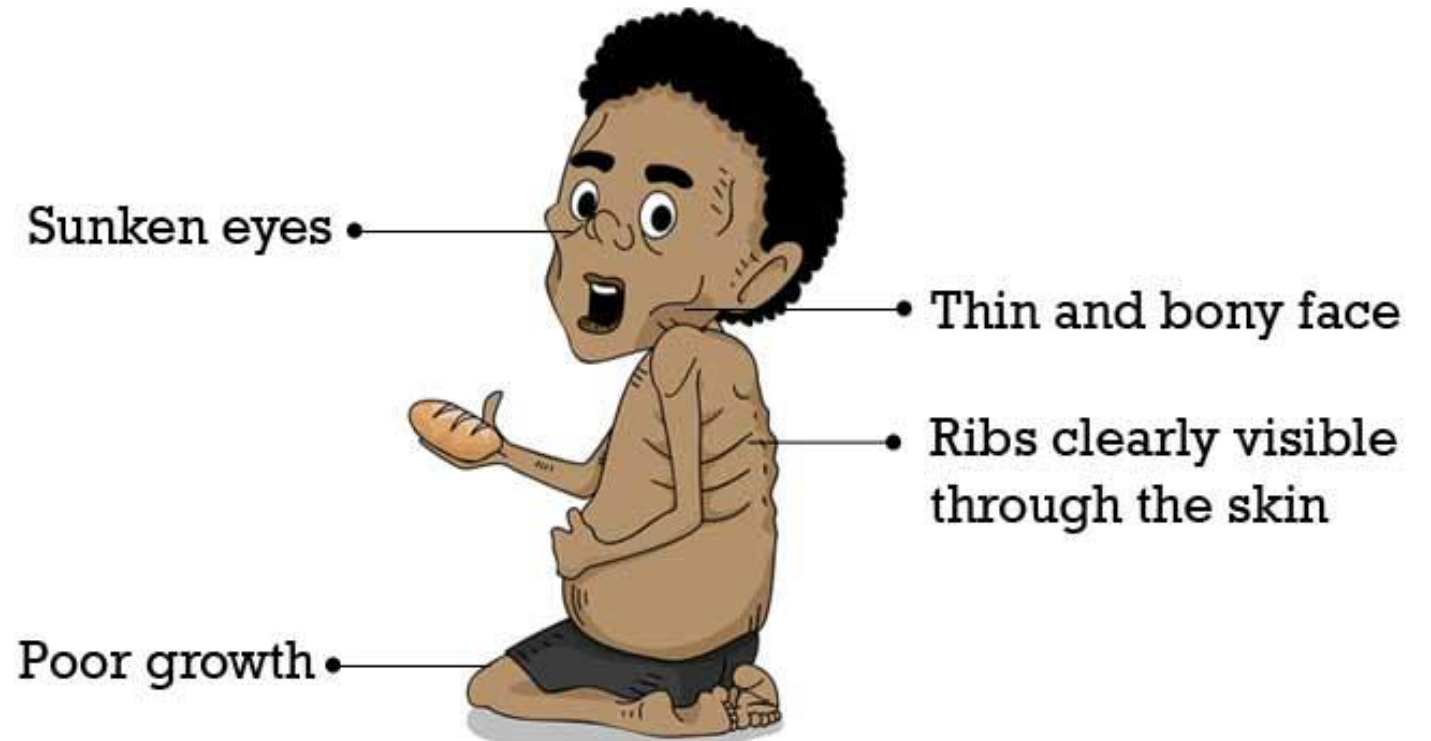
- MARASMUS

what causes Marasmus?

What other signs and symptoms have you not seen in the image?

How would you advise people to go about that problem?

Symptoms & Signs of Marasmus

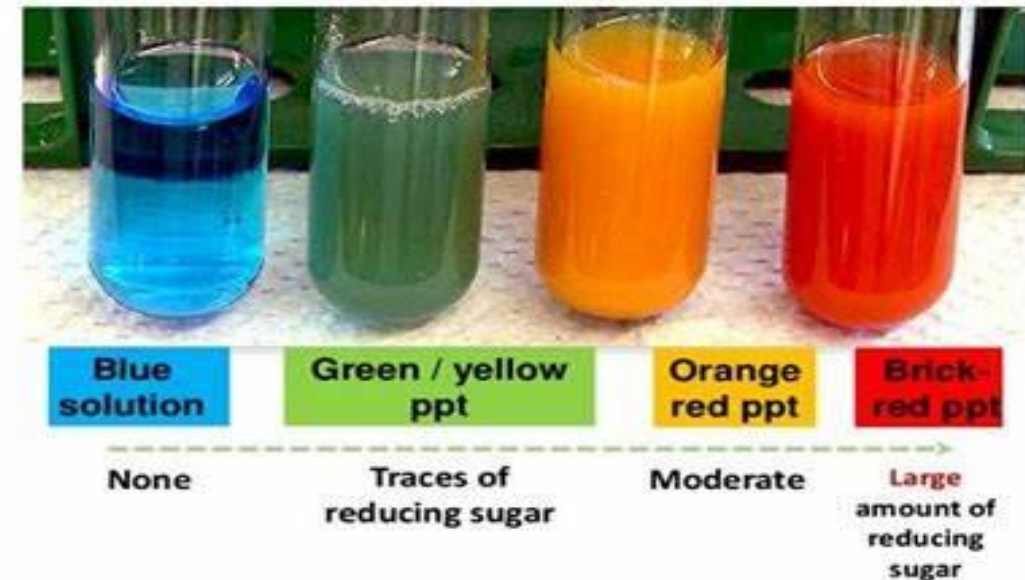
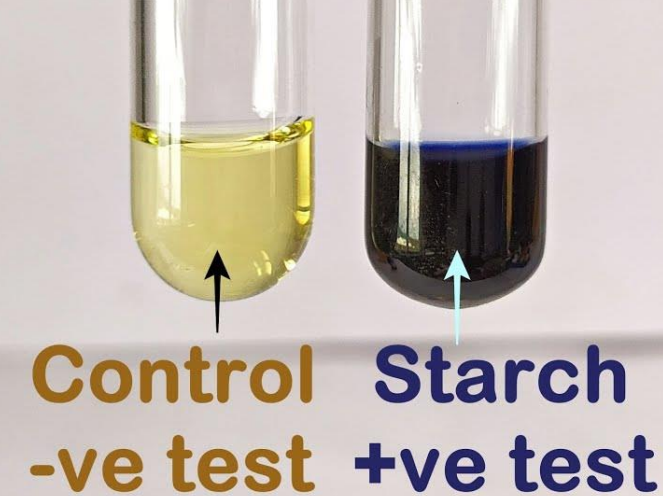


FOOD TESTS ON CARBOHYDRATES

- Carbohydrates that are tested for include :
- Starch
- Reducing sugars
- Non-reducing sugars

How did they arrive to each of the results shown on the sides?

Iodine Test for Starch



PROTEINS

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- They are made up of amino acids.
- What are the importances of proteins?
- Which foods are shown below are sources of proteins?



Sweet potatoes



milk



fish



Cassava



sorghum



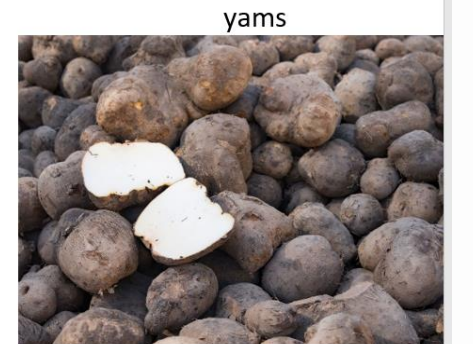
Liver



chicken



Avocado



yams



Beans



Irish potatoes



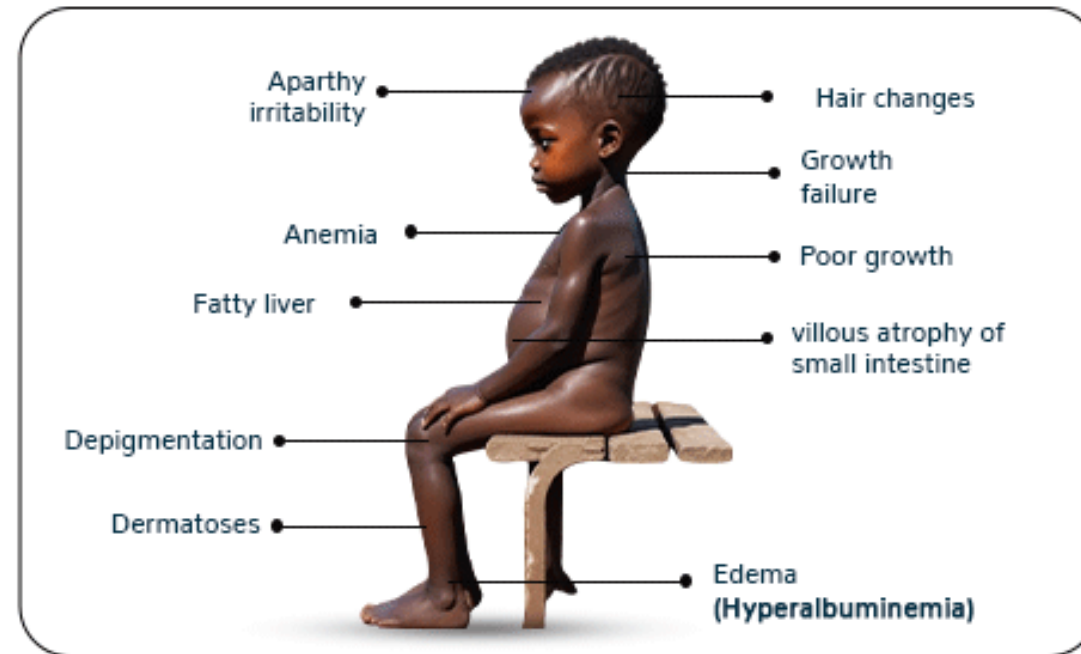
bananas

Deficiency of proteins

Kwashiorkor : Symptoms & Signs



Normal



Kwashiorkor

TEST FOR PROTEIN

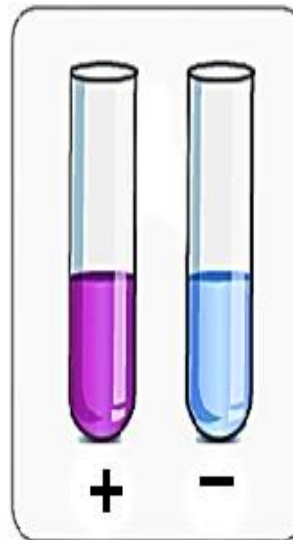
Dilute Copper
Sulphate Solution



Dilute Hydroxide
Solution



Purple Coloring
appears in food
sample solution



FOOD TESTS ON PROTEINS

how would you test for the
presence of proteins in a simple

BIURET'S TEST

FATS AND OILS (LIPIDS)

- When we cook beef at home and the soup is allowed to cool, **white** or **yellowish** solids form on the surface. These are **fats** and when heated, they melt to form a liquid called **oil**.
- Fats and oils are the most common forms of lipids and they are a concentrated source of energy.
- They are important nutrients for young children who need a lot of energy.
- Outline the differences between oils and fats
- Identify the various sources of fats and oils in our diets



Sweet potatoes



milk



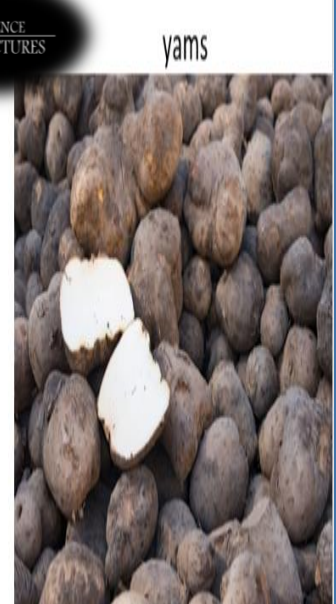
eggs



Cheese



Ground nuts



yams

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Ghee



Chicken



Liver



Beans



Irish potatoes

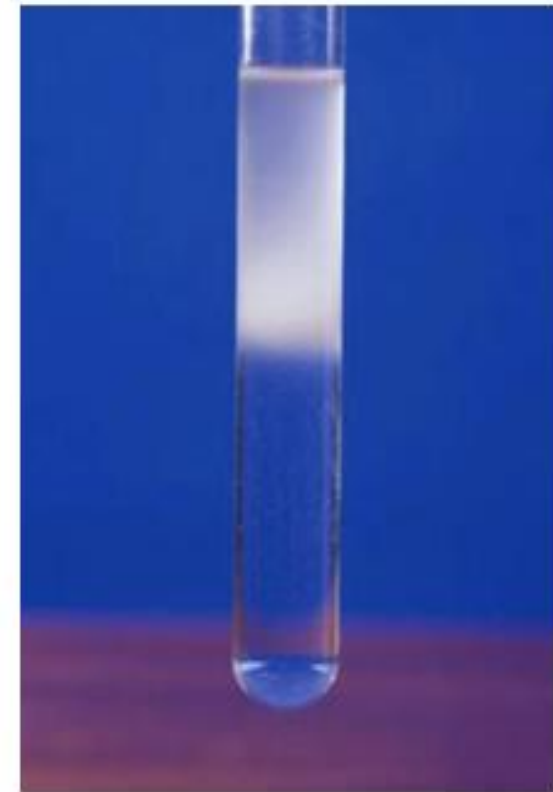


Sugar canes

Food test on lipids

Explain the procedure that led to the result shown on the sides and what deductions can you draw from it

Which test is shown ?



Rickets

vitamins

These are organic compounds required in small amounts in the diet for the normal functioning of the body.

Suggest reason (s) why;

1. Children who live in geographical locations where there is less sunshine are at a risk of getting rickets.
2. An individual whose diet is mainly animal products is most likely to develop scurvy.
2. Pellagra is mainly found among individuals who depend on a vegetarian diet.
3. Pregnant and menstruating women are at a high risk of being anaemic



Know your Vitamin

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Vitamin A



- Also known as RETINOL
- Sources include Carrots, Green leafy vegetables and Sweet Potatoes
- Important for a healthy vision
- Its Deficiency causes NIGHT BLINDNESS also known as XEROPHTHALMIA



Vitamin B

- Also known as VITAMIN B COMPLEX
- Sources include Animal and Dairy products
- Important for converting food into fuel, thus providing energy to the body
- List of Vitamin B includes Vitamin B1, B2, B3, B5, B6, B7, B9 & B12



Vitamin C



- Also known as ASCORBIC ACID
- Sources include Citrus fruits, Berries & Tomatoes.
- Important for growth & maintenance of all body tissues hence for healing wounds.
- Its Deficiency causes SCURVEY



Vitamin D

- Also known as CALCIFEROL
- Sources include Fatty fish like Salmon, Egg yolk and Cheese
- Important for maintaining strong bones and teeth.
- Its Deficiency causes RICKETS



Vitamin E



- Also known as TOCOPHEROL
- Sources include Almonds, Peanuts and Soyabean oil.
- Important for providing immunity and fertility in males
- Its Deficiency causes NERVE DAMAGE



Vitamin K

- Also known as PHYLLOQUINONE
- Sources include Collard Greens, Kale and Spinach
- Important for Blood Clotting
- Its Deficiency causes HEMORRHAGIC DISEASES



Test for vitamin C

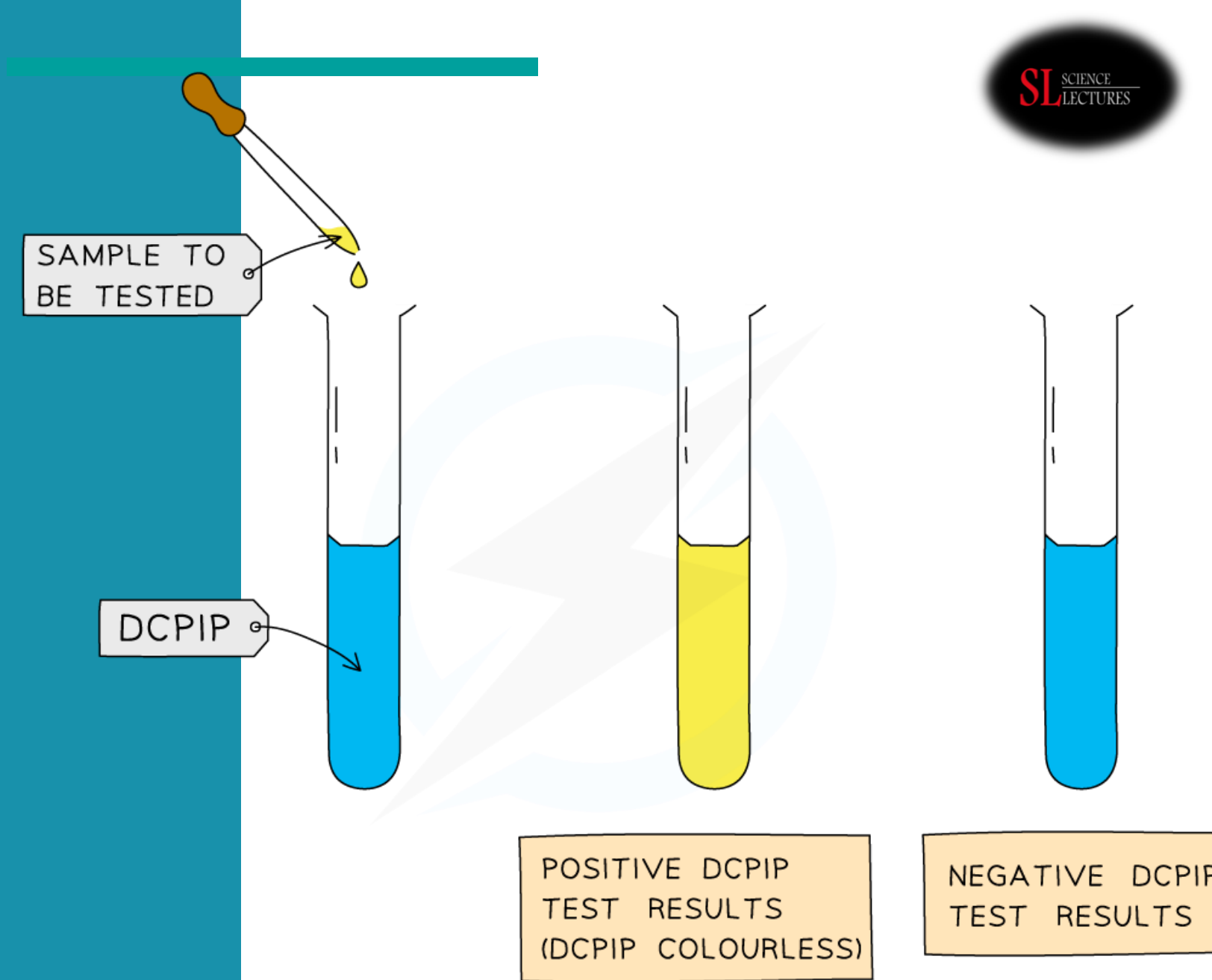
Explain how you would test for the presence of Vitamin C in a food sample

SAMPLE TO
BE TESTED

DCPIP

POSITIVE DCPIP
TEST RESULTS
(DCPIP COLOURLESS)

NEGATIVE DCPIP
TEST RESULTS



Mineral salts

These are inorganic food constituents required in small amounts but whose deficiency affects the normal functioning of the body leading to deficiency diseases.

Rickets



Fe Iron	- Beef, liver, kidney, G.nuts, beans, eggs, green vegetables.	- It is a constituent of Haemoglobin.	Anaemia - Reduced red blood cell account. - Reduction in oxygen transportation rate.
Ca Calcium	Vegetables, fish, milk, bread, eggs.	- In blood clotting - hardening of bones and teeth.	Rickets in children - Delay in blood clotting - Soft bone, poor skeletal growth.
P Phosphorus	- Most foods	- Constituent of cell membrane. - Formation of teeth & bones.	- It is not likely for one to be deficient of phosphorus since it is found in most foods.
I Iodine	- Iodised salts - Marine fish	- It is a constituent of a hormone Thyroxin	Goitre - Swelling of the Thyroid gland. - Muscle cramp (sharp pains in muscles).
	Drinking water	It is constituent of	Weak teeth in children.
F Fluorine	(National water and sewage cooperation	bones and teeth.	
K Potassium	Fish, beef, liver, mushroom and some tubers	Transmission of nerve impulse along neurons	Muscular cramp
Na sodium	Common salt(NaCl) and cheese	Transmission of nerve impulse along neurons	

WATER AND ROUGHAGES



Importance of water

- ✓ The plasma of blood is made up of water.
- ✓ It participates in many metabolic reactions or processes as a raw materials e.g respiration, photosynthesis, gaseous exchange, digestion, and removal of wastes.
- ✓ Plays a role in temperature regulation ie cooling the body on hot days and plants through transpiration.
- ✓ Offers turgidity thus acts as a hydrostatic skeleton- hence supporting organisms.
- ✓ It softens food.
- ✓ It is used in seed dispersal.
- ✓ It's a universal solvent in which absorbed foods, wastes and hormones are transported around the body in blood
- ✓ It is a habitat (home).
- ✓ It acts as a Lubricant e.g. saliva lubricant the mouth, tears lubricate eyes, synovial fluids lubricate the joints.

ROUGHAGES / DIETARY FIBRE

They are indigestible materials in food and consist mostly of cellulose, pectin, and lignin.

The major sources of roughages include: vegetables, such as cabbages, dodo, fruits, etc

Functions of roughages

They stimulate muscular movements called peristalsis which move food (propel) through the alimentary canal. Some delay food in the intestines whereas others enable food pass through the intestines very fast.

The deficiency or lack of roughages causes **constipation**.

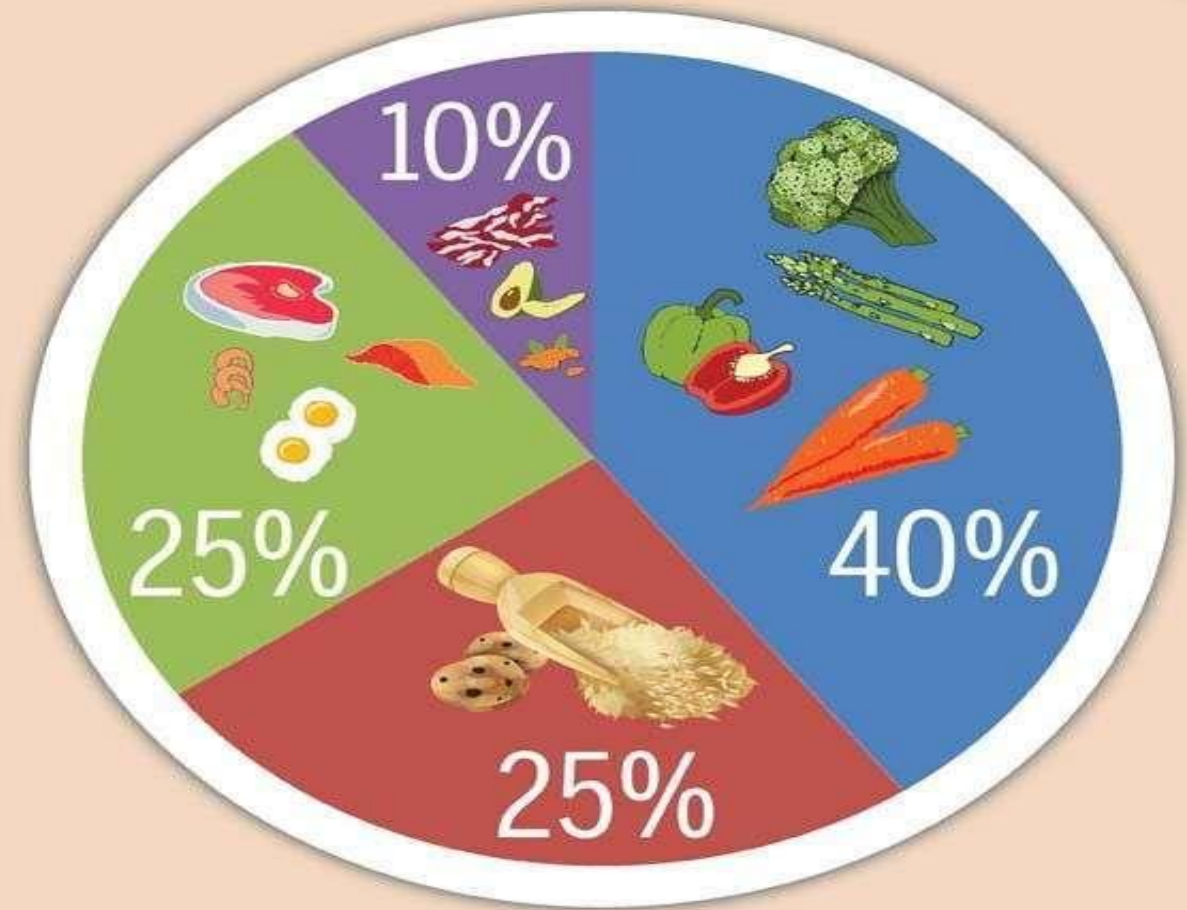
BALANCED DIET

What is a balanced diet?

Using the pie chart design a balanced diet meal for your family for breakfast ,lunch and dinner

Balanced diet

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● Fruits and vegetables

● Protein

● Fibre-rich carbohydrates

● Fats

Discuss the nutrients that should constitute a greater percentage in the diets of the individuals in the pictures below

Explain what would happen if their meals do not reflect a balanced diet



EATING DISORDERS

BULLIMIA NERVOSA

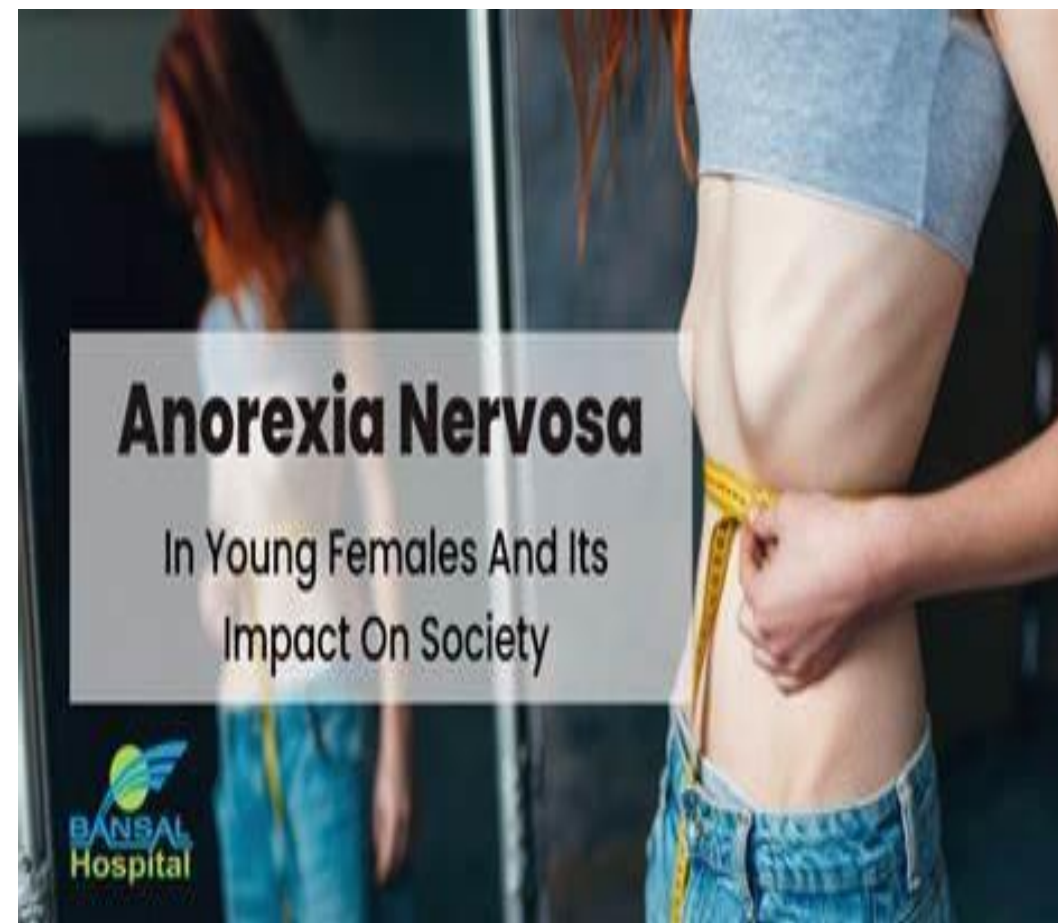
this disorder is associated with fear of gaining weight.

It involves eating large amount of food in a short period of time(binge eating) followed by self-induced vomiting, fasting, or excessive exercise (purging)



ANEROXIA NERVOSA

- many people look at being slim as a fashion.
- They starve themselves to avoid gaining weight.
- This eating disorder that is characterized by self-starvation is called anorexia nervosa



USE OF STERIODS AND DIET PILLS

STERIODS

- Steroids are synthetic hormones mainly used for muscle building , whose effects are more powerful than the usual hormones produced by our bodies.
- They can be taken in form of pills ,powder or injections.
- They are highly fat soluble.
- The use of diet pills and steroids to change body shape is highly addictive and has many health threats if not well monitored



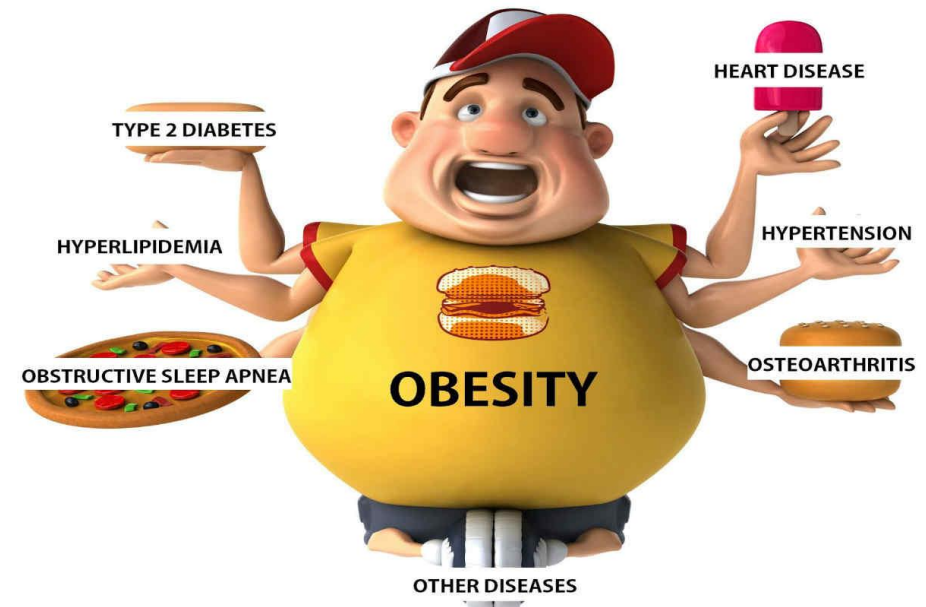
DIET PILLS

- Diet pills include a class of drugs with a similar goal of weight loss but different methods are employed in achieving that goal.
- Diet pills work by curbing appetite or by reducing the body's ability to absorb fats from food.



OBESITY

- The height of a person can only support a given mass.
- Excess accumulation of body fat is called Obesity.
- This is caused by eating a diet that contains a lot of energy rich foods e.g. carbohydrates and fat.
- The body stores the excess energy as fat, Obesity is evaluated by calculating Body Mass Index (BMI)



EFFECTS OF VARIOUS EATING DISORDERS

Eating disorder	Social effects	Health effects
OBESITY	❖ Increased risk of diseases ❖ High blood pressure ❖ Type 2 diabetes ❖ Coronary heart disease ❖ Stroke ❖ Breakdown of cartilage and bones ❖ Cancer ❖ Complications during pregnancy	❖ Increased aggression and violent behavior ❖ Nervousness ❖ Impaired judgment ❖ Depression ❖ Mood swings
ANEROXIA	☐ Cardiac complication ☐ Kidney and liver failure ☐ Anaemia ☐ Low blood sugar ☐ Constipation ☐ amenorrhea ☐ Fertility challenges ☐ Low testosterone in male	☐ Withdraw from social situations particularly those involving food ☐ Low self esteem ☐ Development of self-destructive behavior development of relationship difficulties

EFFECTS OF EATING DISORDERS

Eating disorder	Social effects	Health effects
STEROIDS	➤ Leads to dependence and addiction ➤ Failed relationships ➤ Avoiding social encounters and interactions	➤ Increased blood pressure ➤ Fast heart rate ➤ Restlessness ➤ Increased drug dependence ➤ Interference with fat absorption for example causing oil spotting ➤ Affects appetite
DIET PILLS	▪ Prevents sexual intimacy ▪ Low levels of testosterone in males can lead to erectile dysfunction ▪ Reduced exercise due to fear of being bullied ▪ The individual becomes prone to being bullied, humiliated or ostracized ▪ Creates a negative self image, demotivating the individual hence lacking self confidence	▪ Abnormal cholesterol levels ▪ Premature stopping of bone development and linear growth ▪ Baldness, breast formation, shrunken testicles in males ▪ Increased risk of liver and prostate cancer ▪ High blood pressure which increases the chance of heart attack and stroke

BULLIMIA NERVOSA

Health effects

- Feeling tired and weak
- Dental problems as stomach acids from persistent vomiting can damage tooth enamel
- Bad breath and sore throat due to stomach acid
- Irregular or absent periods
- Dry skin and hair
- Brittle finger nails
- Feet and muscle spasms
- Feet and muscle spasms
- Heart, kidney or bowel problems such as permanent constipation
- Bone problems such as osteoporosis
- Decreased breast size and masculine appearance in females.



Social effects

- Self isolation to achieve shape and being secretive to hide their behavior leads to relationship breakdown.
- The individuals feel down, lonely isolated and worthless due to frequent comparison of self to other people
- Low body weight, physical complications and hormonal imbalances can decrease the woman's sex drive.

CALCULATING BODY MASS INDEX AND ITS IMPORTANCE

- Body mass index is a persons' weight in kilograms divided by the square of his/her height in meters

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height}^2}$$

BMI	Weight classification	Risk illness
Less than 18.5	Under weight	Increased
18.5-24.9	Ideal weight	Normal
25-29.9	Over weight	Increased
30-39.9	Obsess	High
40-50	Morbid obese	Very high
50 or greater	Super obese	Extremely high

The village health team (VHT) of your village are conducting a study in which they checked on the health status of each and every member including the children. One of the activities carried out includes recording the ages and heights of the members.

They also have with them a chart as seen below.

task

Explain the significance of this activity to the locals and illustrate to them their health status using the results above.

The samples of results in one of the families is shown in the table below.

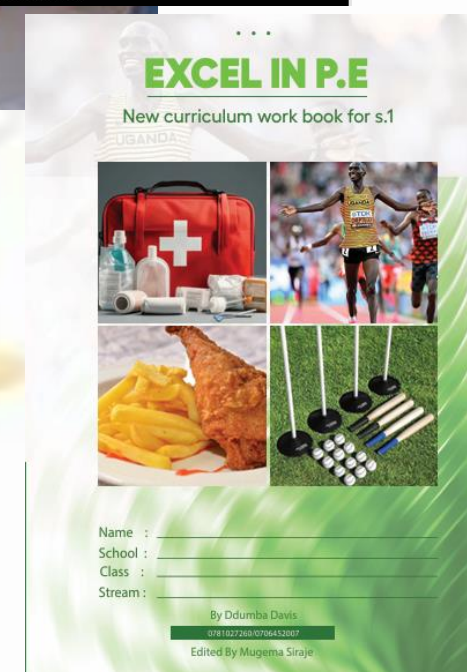
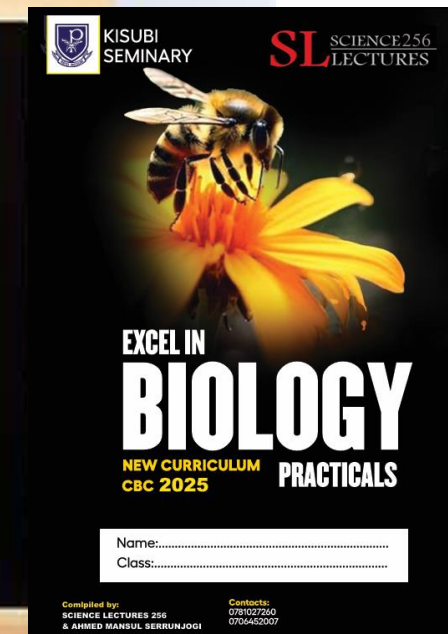
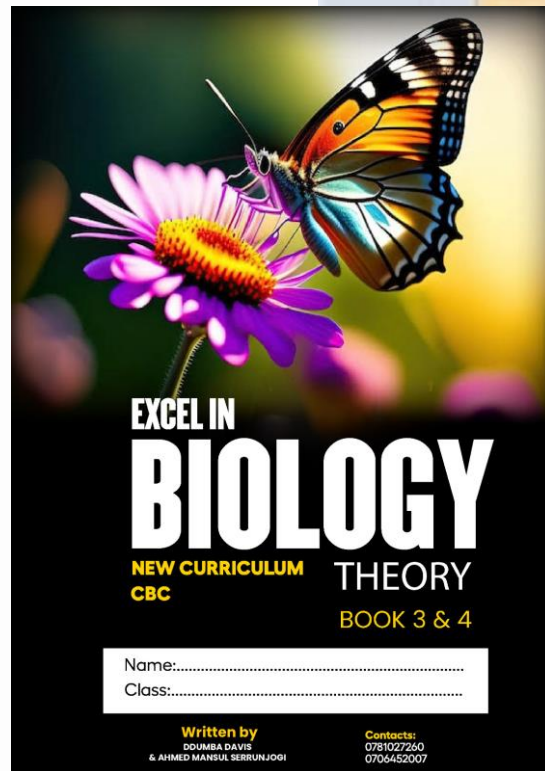
S/N	NAME	AGE(YEARS)	HEIGHT(cm)	WEIGHT(Kgs)
1	JOHN	17	125	50
2	MARY	30	160	78
3	CATHY	25	165	66
4	MARK	50	155	70
5	OKAFOR	40	150	70

BMI	Weight status
Below 18.5	Underweight
18.5-24.9	Normal weight
25.0-29.9	Overweight
30.0-34.9	Obesity class I
35.0-39.9	Obesity class II
Above 40	Obesity class III

IMPLICATIONS OF BEING UNDER WEIGHT OR OVER WEIGHT

Under weight	Over weight	Correcting under weight	Remedy for over weight
Malnutrition ,vitamin deficiencies	High blood pressure	Eat more frequently example you can have five to six smaller meals during the day	Follow a healthy eating plan with fewer calories
Osteoporosis from too little vitamin D and calcium	Type 2 diabetes	Chose nutrient rich food such as whole grains ,bread lean proteins	Start regular physical activity
Decreased immune function	Coronary heart diseases	Add extras such as scrambled eggs and fat free dried milk in soup and stews	Enroll in weight management programmes
Increased risk for complication from surgery	Stroke	Sip a high calorie beverage along with a meal or snack	Take weight loss medicines as prescribed by doctor
Fertility issues caused by irregular menstrual cycles in females	Complication during pregnancy	Eat enough proteins	Under go bariatric sugery for extreme obese individuals by making changes to individual's digestive systems
Growth and development issues		Eat meals with fibrous carbohydrates	Take calorie restricted diets such as 120 to 150 calories per day for women and 1500 to 1800 calories for men
			Conduct intermittent fasting

How to correct underweight or being over weight



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