Section 1

NUTRIENTS IN THE BODY AND BALANCED DIET

After completing this section, you will be able to:

- Explain the role of nutrients in the body
- Explain the concept of a balanced diet
- Understand food labelling to plan well balanced meals

Section 1

Nutrients in the Body and Balanced Diet

Vocabulary

balanced diet	carbohydrate	diet	elements
energy	fats	fibre	food
food groups	vitamins	protein	fortified
BMR	lipids	macronutrients	minerals
nutrients	obesity	food pyramid	RDA
micro nutrients	food portions	water	salt

Abbreviations:

- BMR – Basal Metabolic Rate
- GDA - Guideline Daily Allowance
- RDA – Recommended Daily Allowance
- BMI - Body Mass Index

About Food Choices

Activity

Many factors affect the choice of foods.
Discuss these factors using the headings given.

Heading	Factors
Personal	culture, working times, likes/dislikes, traditions, religion, eating patterns
Consumer awareness	nutritional awareness, food scares, individual state of health, growing environment
Economic	cost, availability
Marketing	Special offers, shop layout, advertising, marketing, variety available, time of year

Are there other factors that can be identified by the group?

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The Importance of Food

Food eaten has a strong influence on body health and on reducing the risks of developing diseases including heart disease and some types of cancers.

Energy in the diet is provided from food. Food is made up of nutrients and water. Food nutrients are protein, carbohydrate, fats, vitamins and minerals.

Energy in Food

The body needs energy for life. The primary need of the body apart from water is for energy. Every single cell in the body requires a constant supply of energy. When the body needs energy it gets hungry. Food is the fuel that supplies energy to the body.

Energy is needed for:

- Breathing keeping vital organs – the heart and lungs working.
- Digestion and absorption of food.
- Muscle movement and activity.
- Nerve function.
- Cell activity and growth.
- Maintaining body temperature at 37°C.

Measuring Energy

The amount of energy needed and used by the body is measured in calories.

When people speak of calories in every day conversation they actually refer to kilocalories.

A thousand calories make up a kilocalorie (kCal) or Calorie (with a capital C)

Energy can also be measured in kilojoules or kJ.

1 kCal = 4.2 kJ.

Kilocalories
Remember a kilocalorie is a measurement of the energy from a nutrient. It does not provide energy or increase fat in the body. A kilocalorie is the amount of heat required to raise the temperature of a litre of water by 1 °C

Basal Metabolic Rate (BMR)
The rate at which energy is used is the metabolic rate. The body needs a basic amount of energy to keep the heart beating, lungs functioning and to maintain body temperature. This basic amount is called the **basal metabolic rate(BMR)**

Estimated average energy requirements at different life stages:

Group.	Active Male	Active Female
Child 5-13 years	1400-2200 kCal	1400 – 2000 kCal
Teenager	2400 - 2800 kCal	2000 kCal
Adult (19-50)	2400-2800 kCal	2000-2200 kCal
Older Adult (51+)	2200-2400 kCal	1800-2000 kCal
Pregnancy		2400 k Cal

Energy Balance

In order to maintain body weight the number of kilocalories taken into the body must match the amount of energy used up by activities. If more kilocalories are consumed than are used, the result is *weight gain.* If fewer kilocalories are consumed than are used, the result is *weight loss.*

Eating healthy foods and being physically active are the two most important steps taken to improving health.

All activities burn calories, the harder activity the more calories that are burnt and the greater the total energy requirement.

Activity	Kilocalories per hour used
Resting	70
Light activity such as walking	150-300
Moderate activity such as gardening	300-450
Heavy activity such as soccer, rugby	450-600
Very heavy activity such as power training	600+

The benefits of physical exercise:

1. Increases aerobic activity leads to a healthier heart
2. Strengthens bones and makes joins more flexible
3. Increases the **b**asal **m**etabolic **r**ate (BMR)
4. Increases vitality and well being
5. Burns stored up fat

Check out physical activity at www.nutrionandhealth.ie. Under the Keeping Fit section, see the Interactive Exercise Pyramid. Also check out

www.getactive.ie

Body Mass Index (BMI)

The **b**ody **m**ass **i**ndex (BMI) is the number that relates body weight to height. The BMI number gives a general indication if weight is within a healthy range. It is the most widely used measurement for overweight and obesity. The score is valid for both men and women.

Activity

To find out your BMI range lot onto www.nutrionandhealth.ie
Go to the Eat Smart section and use the BMI calculator.

Activity

Greater than **>** Less than **<**

Write the correct symbol between these pairs of numbers:

99		199
23		78
345		768
34		21
4		9

Energy Value of Nutrients

1g of pure protein releases 4kCal(29kJ) of energy
1g of pure carbohydrate releases 4 kCal (29kJ) of energy
1g of pure fat releases 9 kCal (37kJ) of energy
1g of alcohol releases 7 kCal (27kJ) of energy
Water
Vitamins minerals and water supply very little or no energy.

Almost every food is a source of energy. The amount of energy from a food depends on the proportion of nutrients in it.

Foods that are high in fat are high in kilocalories.

Those that have large amounts of water such as fruit and vegetables are low in kilocalories.

Food composition tables can be used to see the amount of energy and other nutrients in food:

100 g of milk contains the following nutrients

- 3.3 g protein
- 3.8 g fat
- 4.8 g carbohydrate

To calculate the energy values the food nutrients can be multiplied by the amount of kilocalories they produce.

3.3g of protein x 4 kCal = 13.2

3.8g of fat x 9 kCal = 34.2

4.8g of carbohydrates x 4 kCal = 19.2

Total 66.6 kCal in Milk

To convert to kJ's

(66.6 kCal x 4.2 = 279.72Kj)

To calculate the energy values of foods the food nutrients can be multiplied by the amount of kilocalories they produce.

Activity

Using a label from a cereal box, calculate the total kCal for protein, fat and carbohydrate.

All About Food

Food is made up of nutrients and water.

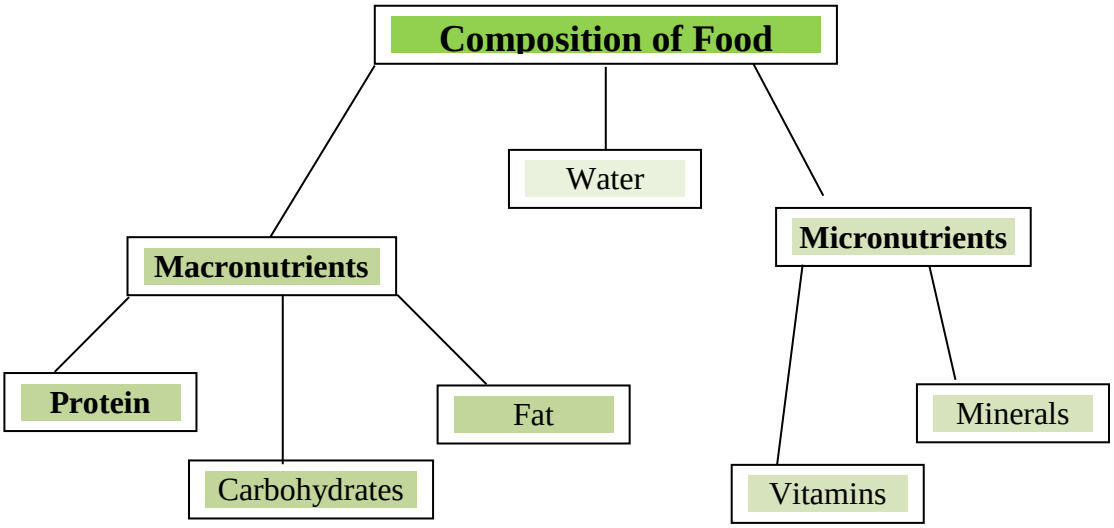
Nutrients are chemical substances which are digested and used by the body for growth and repair, heat and energy and protection from disease.

Each nutrient is made up of units called molecules which in turn are made up of elements.

The nutrients in food are protein, carbohydrate, fats, vitamins and minerals.

Nutrients are classed as either **macro or micro nutrients**.

Macro Nutrients	Micro Nutrients
Macro nutrients are large molecules that are too big to be absorbed into the blood stream and must be broken down into smaller units. Macronutrients are needed in large quantities by the body	**Micro Nutrients** are small molecules that do not need to be broken down to be absorbed into the bloodstream. Micronutrients are needed in trace or very small amounts by the body
There are three main macro nutrient groups: 1. protein 2. carbohydrates 3. Fats 4.	There are two main micro nutrient groups : 1. vitamins 2. minerals
Water is needed by the body for the digestion of food so is an essential nutrient	
Macro nutrients are usually measured in grams (g) 1g=1000mg	Micro Nutrients are usually measured in milligrams (mg) or micrograms (ug) 1mg = 1000 ug



Composition of the Human Body- Based on Adult Male:

Water	60%
Protein	15%
Fat	17%
Carbohydrate	2%
Vitamins and Minerals	6%

Activity

Convert the milligrams (mg) to grams (g) listed on this label:

NUTRITION FACTS			
Serving Size: ½ cup (114g) Servings Per Container: 4			
Amount Per Serving			
Calories: 90		Calories from Fat 30	
			% Daily Value*
Total Fat: 3g			**5%**
Saturated Fat**:** 0g			**0%**
Trans Fat: 0g			**0%**
Cholesterol: 0g			**0%**
Sodium: 300g			**13%**
Total Carbohydrate: 13g			**4%**
Dietary Fibre: 3g			12%
Sugars: 3g			
Protein: 3g			
Vitamin A	80%	- Vitamin C	60%
Calcium	4%	- Iron	4%
*Percentage Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:			
	Calories	**2,000**	**2,500**
Total fat:	less than	65g	80g
Sat fat:	less than	20g	25g
Cholesterol:	less than	300g	300g
Sodium:	less than	2,400g	2,400g
Total Carbohydrate:		300g	375g
Dietary Fibre		25g	30g
Calories per gram: Fat: 9 - Carbohydrate: 4 - Protein: 4			

Cholesterol - 300mg is equal to _____g

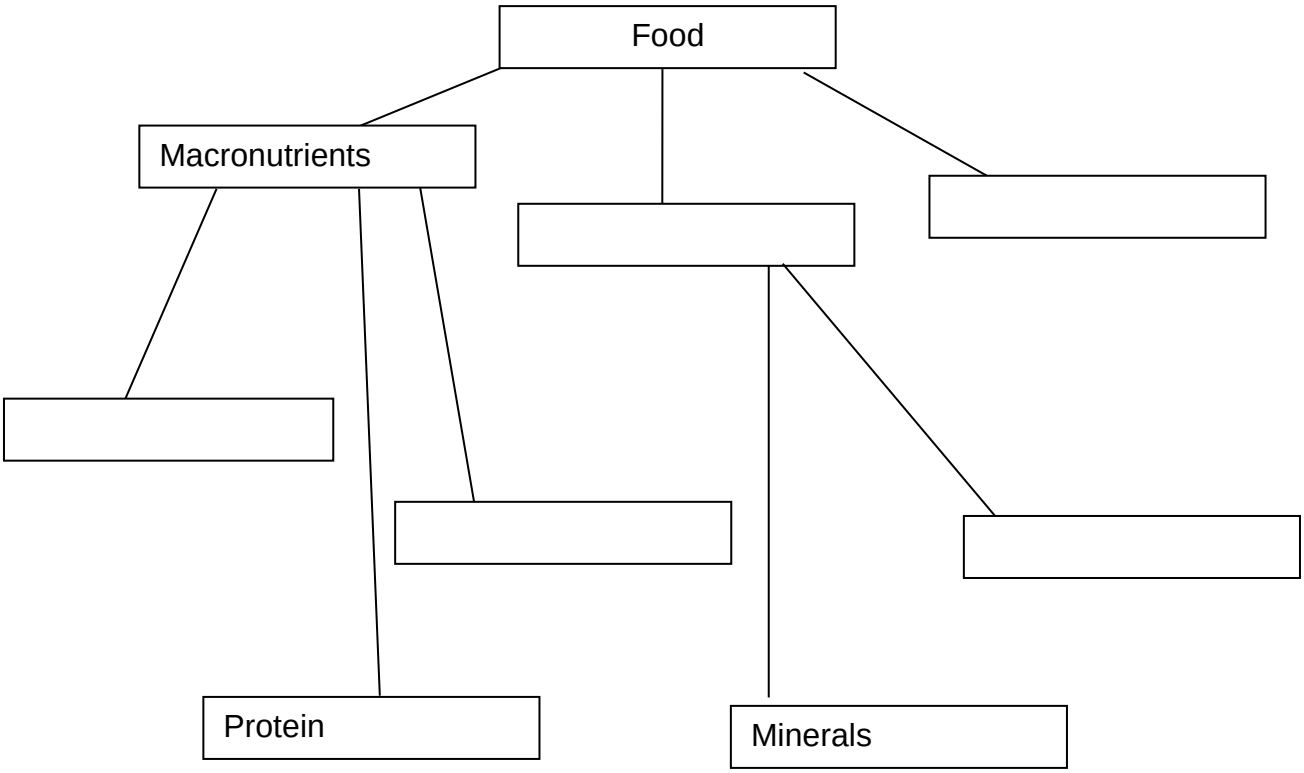
Sodium - 2400mg is equal to _____g

Dietary fiber - 25mg is equal to _____g

Activity

Fill in the empty boxes with the correct words from the word bank.

carbohydrates	fats	micronutrients	vitamins	water



Complete the following table on the composition of the Human Body- Based on Adult Male:

Water	
Protein	
Fat	
Carbohydrate	
Vitamins and Minerals	

Recommended Daily Allowance (RDA)

In Ireland the term used for measuring nutrients is RDA (**R**ecommended **D**aily **A**llowance). This is the recommended amount of energy, proteins, vitamins and minerals that should be included in the diet each day. There is no RDA for carbs or fats as they are interchangeable sources of energy. RDA requirement is based on the rate of growth and body weight.

In the UK the terms used are:

1. RNI (**R**eference **N**utrient **I**ntake) - defined for protein, vitamins and minerals
2. EAR (**E**stimated **A**verage **R**equirement) - the nutrient intake for energy, protein and vitamins.

Some manufacturers give **g**uideline **d**aily **a**mounts GDA for energy, fat, sugar and salts. They are intended as guide for comparing products.

Function of Nutrients

Nutrient	Needed for	Sources
Protein	growth and repair of body cells	mostly animal sources meat, fish, chicken, eggs, yogurt
	growth of antibodies, enzymes and some hormones	mostly plant sources cereals, wheat , oats pulses(peas, beans, lentils) soya beans, soya protein, nuts
Alternative protein source from Soya Beans Alternative Protein foods from Myco protein= Quorn.	examples of soya food products are soya milk, tofu a paste made from soya beans, tempeh a chewy soya cake and miso a soya bean paste used in stews and soy sauce TVP - Textured vegetable protein is a protein meat substitute	
Fats	heat and energy	butter cream margarine
Carbohydrates	heat and energy	cereals- wheat, oats, potatoes, pasta, rice, breads, sweet foods
Vitamins	protection from disease.	fruit and vegetables
minerals	protection from disease.	in most foods
Water	to stay alive	drinks, fruit and vegetables

Activity

1. Which nutrient is used mainly for energy?

2. Which nutrient used for growth and repair of the body?

3. Which nutrient is mainly used for energy and can be either starch or sugar?

4. What are the two types of micronutrients?

Section 1

5. What food group(s) are the best source of micronutrients?

6. Which group provide the energy the body uses, macronutrients or micronutrients?

7. RDA means:

- recommended dietary average
- recommended dosage annually
- recommended daily allowance

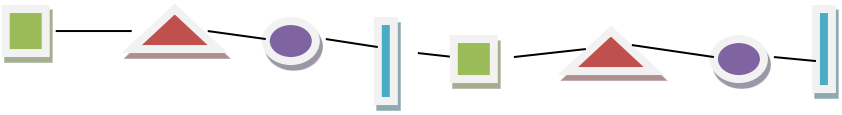
8. Macronutrients are nutrients that are needed in large amounts. True or false?

- True
- False

Protein – The Body Builders

Protein is a very important nutrient in the diet. Protein is needed by every body cell. It is made up of four elements, carbon hydrogen, oxygen and nitrogen. It is the only nutrient that contains nitrogen which is needed for growth and repair. Once the body has taken what protein it needs for growth and repair the rest is used for energy and heat.

Proteins are made up of smaller units called amino acids. These are linked together like beads in a necklace to form chains of protein. When protein is e digested chemicals in the body called enzymes cut the chains and breaks the protein down into amino acids which are easily absorbed into the blood stream.



Protein chain

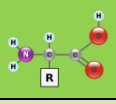
Separated amino acids

Protein Facts

Protein is needed for

- Growth of the body
- Repair of body cells
- To produce heat and energy
- Production of enzymes that help digestion
- Production of hormones for growth and general good health
- Production of antibodies that help fight disease.

There are **a total of 22 essential amino acids** that must be taken into the body from food.

Amount of Essential Amino Acids Required 	
Adults	**Children & Teenagers**
8	**10**
Non-essential Amino Acids are produced within the body to meets its needs	

There are two types of protein:

Animal Protein → meat, fish, chicken, eggs and cheese

Plant Protein → soya beans, nuts, lentils, peas and cereals

It is recommended that the amount of protein eaten each day be half from each protein type.

Protein content for some food:

Source	Food	% Protein
Animal	Meat - Lean raw	20 -21%
	Whole Egg	12.5%
	Whole Cows Milk	3.2%
Vegetable	Peanuts	25.5%
	Lentils	24.3%
	Whole meal bread	9.2%



Biological Value of Protein

Biological value is a measure of the quality of a protein.

It is measured as a %. A protein with 100% means it contains all the essential amino acids needed by the body in the right amounts.

Type	Source	Food	Biological Value BV
High Biological Value (HBV) Contains all 10 essential amino acids in correct amount	Animal protein Mostly animal sources Plant protein High in protein	Whole Egg Breast Milk Cow's Milk Meat Soya Beans	100% 100% 95% 80-90% 74%
Low Biological Value(LBV) 8 amino acids are in the food but one or more may not be in the amounts needed by the body	Plant protein Mostly plant sources Contains more fibre Less fat than animal protein	Rice Wheat Maize	68% 53% 45%

Activity

Go to http://www.bbc.co.uk/skillswise/topic/percentages to learn more about percentages.

RDA – **R**ecommended **D**aily **A**llowance

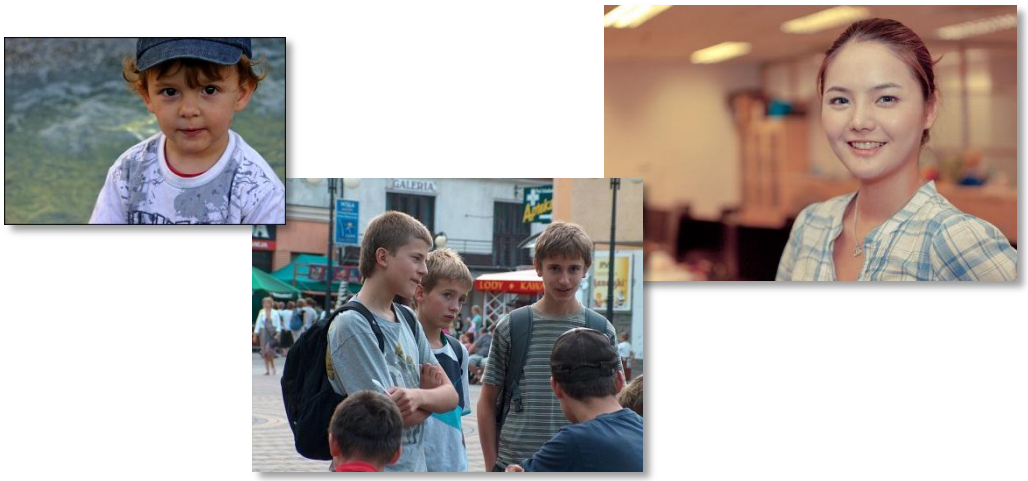
The RDA is the **r**ecommended **d**aily **a**llowance or amount of a nutrient needed by the body to keep it in good health and to prevent disease.

The general rule is 1g of protein per kilogram (kg) of body weight

RDA (**R**ecommended **D**aily **A**llowance)	
Child	30-40 g
Teenager	60-80 g
Adult	50-75 g

Energy Value of Protein:

Food component	**Energy**	
	kCals/g	**kJ**
Protein	1g = 4 kCal	17 kJ



Activity

Calculate the amount of protein required by the following individuals:

Individual	Weight	Protein
2 year old child	12Kg	
Teenager	43Kg	
Adult male	72 Kg	
Older adult	73 Kg	

Low biological value protein normally comes from _____ food.

Pick out four functions of protein from the list below:

- ☐ growth
- ☐ repair
- ☐ production of hormones
- ☐ heat and energy
- ☐ production of enzymes
- ☐ protection of delicate organs

The RDA for protein is one gram per _____ body weight

Activity

Answer the following questions:

1. Protein contains which four elements?

   1) _____

   2) _____

   3) _____

   4) _____

2. The elements in protein are arranged as:

   - □ glucose units
   - □ fatty acids
   - □ amino acids

3. The type of protein that contains the most essential amino acids is called?

   - □ low biological value protein
   - □ general biological value protein
   - □ high biological value protein

4. Good sources of HBV protein are:

   - □ meat
   - □ fish
   - □ wheat
   - □ eggs
   - □ milk
   - □ bread
   - □ cheese
   - □ soya beans
   - □ pasta

Activity

Calculate how much protein is needed by each individual below:

Weight	Individual	Protein needed
62Kg	Adult female	
34Kg	Teenager	
12Kg	2 year old girl	
73Kg	Older adults	

Activity - Buzz group or Brainstorm

Make a list of the foods eaten recently (within the last two to four hours) by the group and answer the questions.

Foods	% contained HBV protein	% contained LBV protein
Total Proteins		

Fats and Oils: The Fuel Foods

Fats and oils are also called lipids. They are the most powerful fuel food in the diet.

They include:

- fats when solid (butter, margarine) at room temperature
- oils(olive or corn oil) when liquid at room temperature.

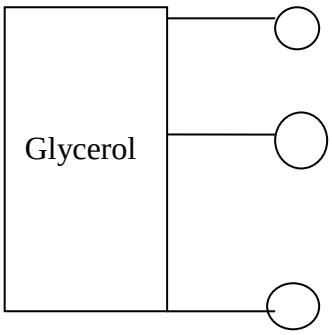
Fat Facts:

1. The body stores extra fat intake as body fat also called adipose tissue.
2. Too much fat in the diet may lead to obesity, heart disease, stroke and some cancers.

Fats are made up of three elements Carbon, Hydrogen, Oxygen.

The basic building blocks of fats are made up of glycerol and fatty acids. They link together to form an E shape. Most fatty acids can be made in the body.

Before digestion:



Fatty acids

During digestion the links break and the glycerol is separated from the fatty acids.

After digestion

Fats are needed for:

1. Providing heat and energy
2. Preventing heat loss from the body
3. Protection of delicate organs such as the kidneys and nerves
4. To act as a source of fat soluble vitamins A, D, E and K
5. To add flavor to the diet
6. A feeling of fullness and delays hunger

Types of Fat

Type	Food Source	Facts
Animal or saturated fats Mainly animal sources	butter , cream, hard margarines meat fat (suet and lard) oily fish, egg yolk, full fat cheese	Can cause a build up of cholesterol causing blood pressure, strokes and heart attack. Too much fat intake may lead to obesity.
Vegetable or unsaturated fat. Hydrogenated fat- is hardened vegetable oils used in processed foods e.g. biscuits cakes and pastries Mainly plant sources	cooking oils, nuts and seeds, cereals, margarines	Helps reduce cholesterol. Omega 3 and 6 fatty acids found in oily fish, seeds and nuts reduce the risk of heart disease and may improve brain function

Five ways to cut down on saturated fats linked to heart disease and obesity:

1. Do not eat large amounts of fried foods.
2. Do not spread butter or margarine too thickly
3. Choose low fat varieties of dairy products
4. Grill food instead of frying
5. Cut down on the 5 C.s Crisps - Cream - Cakes - Chocolate - Chips

RDA (Recommended **D**aily **A**llowance)
Ideally ⅓ of the RDA for energy should come from lipids
½ each from saturated (animal) and unsaturated (vegetable) fats.

Energy Value of Fats

Food component	Energy	
	kCals/g	kJ
Fat	1g = 9 kCal	37 kJ

Fat contains twice as much energy as 1g protein or 1g carbohydrates. (4kCals/7kJ)

High fat foods	Low fat substitutions
Butter for cooking	Smaller amounts of butter or small amounts of olive oil or cooking spray
Whole milk	Low fat or skimmed milk
Pork	Turkey
Fried chicken	Roasted or grilled chicken
Mayonnaise	Low fat mayonnaise

Activity

What foods are high sources of fats?

Circle the food that is a high source of fat:

lettuce	peppers
whole milk	broccoli
butter	mushrooms
cream	sardines
mango	turnip
lemon	sesame seeds
kiwi	grapefruit
coconut oil	strawberries
margarine	tomatoes
melon	olive oil
bananas	walnuts
asparagus	

Activity

True or false?

1	Fats are a source of heat and energy	True/False
2	Fats are a source of vitamin B	True/False
3	Fats prevent constipation	True/False
4	Fats protect delicate organs	True/False

Activity

Fill in the table below using food labels:

Food	Amount Fat (g)	Origin Animal or Saturated	Vegetable or unsaturated

Activity

Suggest three ways of reducing the intake of fat in the diet:

1. _____

_____

_____

_____

_____

2. _____

_____

_____

_____

_____

3. _____

_____

_____

_____

_____

Activity

Place each of the following foods under the correct heading.

nuts, whole grains, flora, yoghurt, bacon, soya milk eggs, cheese, sunflower oil, sirloin steak, salmon cream, olive oil, TPV

Animal or saturated fats	Vegetable or unsaturated fats

Activity

1. What is a good substitution for butter?

2. What is a good substitution for whole milk?

3. What is a good substitution for mayonnaise?

4. What is a good substitution for pork?

5. Cooking spray is a good substitution for _____

6. Grilled chicken is a good substitution for _____

7. Low fat mayonnaise is a good substitution for _____

8. List one idea for a healthy low-fat food.

Activity

Food	Total Fat (grams)
Regular burger	13
Quarter Pounder	25
Fried fish fillet sandwich	18
Crispy fried chicken	23
Chicken nuggets (10 pieces)	13

How many grams of total fat are in a quarter pounder?

_____

How many grams of total fat are in a cheese burger?

_____

Tick the food with the least fat:

quarter pounder	chicken nuggets
cheese burger	regular burger
fried chicken	fish fillet sandwich

List thee ways to make low fat choices when eating out:

1. _____
2. _____
3. _____

Activity

cholesterol	heart	saturated

Eating a diet high in _____ fat can lead to a build up in the system, eventually leading to high blood _____ and increasing the chances of developing _____ disease, type 2 diabetes and some cancers.

Activity

Name the 5 C's that are linked to heart disease**:**

C _____

C_____

C_____

C_____

C_____

Carbohydrates – The Fuel Foods

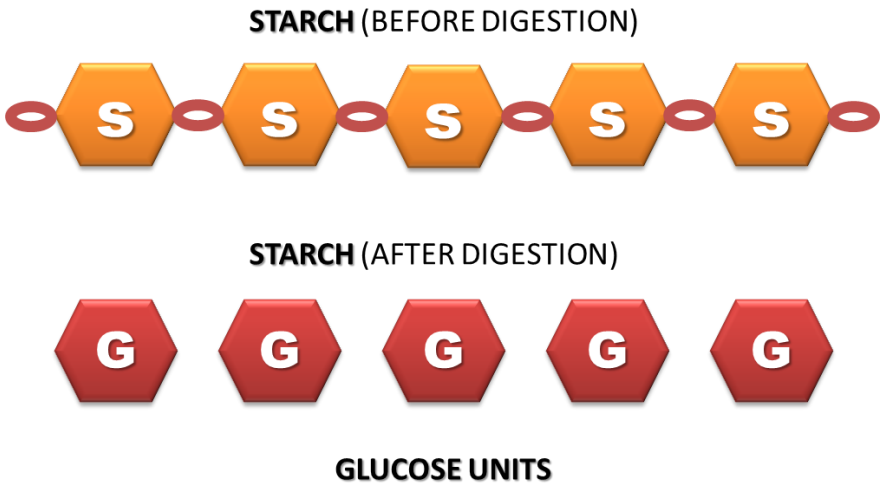
Carbohydrates come from plant foods. They are important in the diet as they provide plenty of energy. They are the most plentiful of the nutrients. Many carbohydrate foods are processed or refined during production such as white bread. Unprocessed carbohydrate such as whole cereals and brown bread are healthier.

Carbohydrate is made up of three elements - Carbon, Hydrogen, and Oxygen.

1. The basic unit of a carbohydrate is a single sugar called glucose

2. When several glucose units join they form a long chain of starch

3. During digestion the starch chains are broken down into glucose units, which are the basic units used by the body cells to provide energy.



Carbohydrates facts:

- The body uses carbohydrates (carbs) to make glucose.
- The body can use glucose immediately or store it in the liver and muscles for when it is needed.
- Any glucose not needed is stored as fat.

Carbohydrates are found in the following:

- Fruits
- Vegetables
- Breads, cereals and other grains
- Milk and milk products
- Foods containing added sugars such as cakes, cookies and sugar.

Healthier foods are higher in carbohydrates and include those that provide dietary fibre and whole grains as well as those without added sugars.

Carbohydrate is needed for:

- Heat and energy in the body
- Excess carbohydrate is stored as fat that helps to insulate the body
- Carbohydrate are bulky so help avoid over eating
- Cellulose (dietary fibre) helps move food through the intestines.

Activity

Carbohydrate is the element in food that supplies?

Any unused carbohydrate is stored in the liver or the tissues as?

Carbohydrates come mainly from which food types?

Activity

Carbohydrates around the world

Some foods rich in carbohydrates form the basis of many peoples diets around the world. They are often called “staple” foods and are eaten almost at every meal. Staple foods supply a major part of dietary energy. The main types of staple foods are:

- Cereals: rice, maize, wheat, rye, barley, oats, millet, sorghum
- Roots and tubers: potatoes, yams
- Legumes: beans, peas, lentils
- Soybeans

Choose a country located in each of the following regions: Africa, Asia, Europe, and Middle East. Conduct an investigation using any resources available to you and find out what staple foods are eaten in these countries. Use this table to record your findings

Region	Country	Staple foods
Africa		
Asia		
Europe		
Middle East		

Dietary Fibre

Dietary fibre or cellulose is found on the skins of fruit, vegetables and the outside of cereal grains. During processing of foods the cellulose is often removed, fed to animals while humans eat the refined food that is left. White flour is a refined food that has to be fortified with vitamins. It is important to include high fibre foods in the diet, whole meal bread, pasta, rice, breakfast cereals and the skin of fruit and vegetables. Cellulose is not digested or absorbed by the body. It helps move nutrients quickly through the intestine, then passes out of the body out as waste. If waste food is not removed from the body it can cause serious diseases of the large intestine or bowel.
Dietary fibre reduces the risk of developing diseases of the heart, gall bladder, diabetes, varicose veins and appendicitis.

Types and sources of carbohydrate:

Type	Source	Facts
sugar	biscuits, cakes, jam, honey, sugar soft drinks	Too much leads to obesity. Caused tooth decay Prevents the growth of bacteria in foods.
starch	potatoes, wheat, oats, rice, pasta, bread	Should be the largest intake of the daily diet. Is used to thicken stocks and soups
Cellulose (dietary fibre)	fruit, vegetables, cereals	Not digested but passes through the intestine. Helps digestion of foods. Prevents constipation. Gives a feeling of fullness without the kilocalories

Associated Dietary Disorders.
Obesity from over eating high energy foods.
Bowel disorders from lack of or not enough dietary fibre.
Dental cavities for consuming too much sugar.

There are two main ways to reduce the risk of dietary disorders.

1. By reducing sugar intake
2. 2. Increasing fibre intake.

Energy Value of Carbohydrates:

Food component	Energy	
	kCals/g	kJ
Carbohydrates	1g = 4 kCal	17 kJ

RDA (Recommended Daily Allowance)	
Average Person	25-35 g

Activity

List 3 ways to reduce sugar intake:

1. _____

   _____

2. _____

   _____

3. _____

   _____

List 3 ways to increase fibre intake:

1. _____

   _____

2. _____

   _____

3. _____

   _____

Activity

Read the following and suggest ways Joe could include more fibre in his diet:

For breakfast Joe ate his CoCo Pops with milk and two slices of white toast. His lunch box contained a soft white roll with ham, a chocolate chip cookie and a can of lemonade. As he was going to football training directly after school his dad gave him some money to get chips on his way home.

Activity

Examine the label on four products. Record how much sugar is contained in 100g of the product.

Name of product	Grams of sugar per 100g

Activity

Match each fact with the correct macronutrient:

A. Carbohydrates

B. Protein

C. Fats

1. It should be the main basis of daily diets
2. Called the “building blocks of life”
3. Protects internal organs and provides insulation against cold.
4. Contains 9 calories per gram
5. Fibre is a form of this
6. Made up of amino acids
7. Contains 4 calories per gram
8. Meat is the major source of this
9. Helps absorb the fat-soluble vitamins
10. Starch is a form of this
11. Butter is made of this
12. Important for growth and repair of tissues
13. Sugar is a form of this

Vitamins

Vitamins are complex chemical substances. Vitamins are needed in very small or trace amounts by the body. They are essential for good health. Each vitamin has its own function within the body. A lack of vitamins can lead to ill health and cause deficiency diseases. Most have to be made in the body with the exception of Vitamin D which is made when the skin is exposed to sunlight.

Vitamin Facts:

- Vitamins are available as food supplements in tablet or liquid form.
- Vitamins supplements are not required if a balanced diet is eaten.
- Vitamins are easily destroyed during cooking.

Two types of vitamins:

Type	Name	Facts
Fat soluble	A,D,E K	Dissolve in fat and stored in body tissue
Water soluble	B, C	Dissolve in water and not stored in the body, removed in urine. Need to eat foods rich in these every day

RDA (Recommended Daily Allowance)
Vitamin intake varies between different groups of people, infants, children, adults and elderly people.
Only small amounts are required each day

Fat-Soluble Vitamins:

Vitamin	Sources	Functions
Vitamin A (Retinol) Carotene (This is a substance which changes to vitamin A in the body)	Oily fish, fish liver oils, Liver, kidneys, margarine, eggs Carrots, peppers, dark green vegetables, such as cabbage, spinach	Needed for good eyesight Healthy lining tissue in nose, mouth and throat
D	Oily fish, cod liver oil, tinned salmon and sardines, margarine, butter, eggs, cheese, sunlight	Healthy bones and teeth Assists in absorption of calcium
E	Seeds, nuts, cereals	Protects against heart disease Keeps skin healthy
K (made in the body by bacteria)	Green vegetables, milk cheese	Assists normal blood clotting

Water-Soluble Vitamins:

Vitamins	Sources	Functions
B group B1 B2 B6 B12 Niacian, Biotin Panthothenic Acid Folate/Folic Acid	Meat, fish, eggs, milk, cereals, flour, yeast, nuts, pulse vegetables Whole meal bread	Controls the release of energy from food Healthy nervous system Folic acid is particularly important during pregnancy
C (Asorbic Acid)	Fruit – especially blackcurrants, oranges, lemons, grapefruit and strawberries Vegetables – especially cabbage, cauliflower, tomatoes, lettuce, new potatoes	General health Healthy gums Healing of cuts and wounds

Activity

Draw a line from the vitamins to the foods that contain them. Keep in mind that some foods can have more than one vitamin:

Mushrooms

Asparagus

Oranges

Bananas

Carrots

Vitamin A

Vitamin D

Vitamin E

Vitamin K

Thiamin

Riboflavin

Niacin

Vitamin B6

Folate

Vitamin B12

Vitamin C

Nuts

Cabbage

Red Meat

Milk

Cheese

Activity

Name two fat-soluble and two water-soluble vitamins:

Fat-soluble vitamins

1. _____

2. _____

Water-soluble vitamins

1. _____

2. _____

Activity

State one function of each to the following vitamins

Vitamin	Function
B group	
Vitamin C	
Vitamin A	
Vitamin D	
Vitamin K	

Activity

1. What are the main sources of Vitamin C in the diet?

_____

_____

2. Food that is a rich source of vitamin A is:

    - liver
    - bread
    - broccoli
    - apricot

3. An important function of vitamin A is to:

    - help with blood clotting
    - act as an anticoagulant
    - helps maintain eyesight
    - prevent osteoporosis

4. An excellent natural food source of vitamin D is:

    - fish liver oils
    - wheat germ oil
    - mineral oil
    - margarine

5. Good food sources of the vitamin K are:

    - leafy, green vegetables
    - cereals and grains
    - vegetable oils
    - meat fats

Minerals – The Trace Elements

Minerals are single chemical elements that are important to a lot of systems within the body. They are essential for good health.

There are many minerals in food so all minerals needed by the body are provided from the diet.

Mineral facts:

- Minerals are not destroyed by cooking.

The most important minerals are:

calcium	iron	potassium	flourine
chlorine	iodine	phosphorus	sodium

Females can be often lacking in calcium and iron.

Mineral	Sources	Functions
Calcium	milk, cheese, green vegetables, hard water, white flour, tinned fish such as sardines, salmon	healthy bone and teeth
Phosphorous	found in most foods especially cheese, oatmeal, liver, eggs	helps calcium to form teeth and bones
Iron	red meat, liver, kidneys, cereals, raisins dark green vegetables - cabbage	necessary to form haemoglobin in the red blood cells
Iodine	sea fish, seaweed, cereals and vegetables grown near the sea	iodine is used to produce thyroxine, a substance made in the thyroid gland in the neck. Thyroxine helps to control metabolism (the way the body uses food to produce energy)
Flourine	water	helps prevent tooth decay
Sodium	salty foods, bacon, peanuts, crackers	found in all body fluids, e.g. the blood

To convert sodium to salt multiply by 2.5

Activity

List one important function of each of the following minerals:

Mineral	Function
Calcium	
Sodium	
Iron	
Phosphorous	
Flourine	

FOODS HIGH IN ZINC

Activity

Find and circle each of the words from the list below:

H C P H O S P H O R O U S I C
A C A E A G B E Q G F J Z K G
E H L L N Q D G I O T W I H Y
M N I R C E W E L N C V D Q W
O F P R P I R A S A L P H B O
G S Q N O S U G R Y N I B A X
L I O D I N E M Y G O D K G Z
O T I D P E J A E H P T X P E
B H E S G N A W W X N D N U Z
I Y B J O F C E R E A L S G J
N R H N U D F P B U E V C K U
G O S M R O I I R R I D T H P
F I O P L F B U D L G T K F G
K D U G K C O V M Y U F S Y G
Q H E C L Y R M X J Q O G A A

thyroid	haemoglobin	seaweed
gland	sodium	iron
calcium	energy	iodine
phosphorous	cereals	

Activity

Read the passage below and answer the questions on the following page:

Minerals are needed to form body structures and regulate chemical reactions. They are taken up from the soil into plants and used by animals and people when they eat the plants. Like vitamins, minerals are needed in small amounts and do not provide energy. Also much like vitamins, minerals are required to regulate many body processes, such as heart beat, nerve response and reactions, blood clotting, fluid regulation and energy metabolism (release of energy from food). Minerals form part of the structure of bones, teeth, nails, muscles and red blood cells. Minerals cannot be broken down or changed by the body and are not destroyed by heat or air.

Each essential mineral is important and although some are needed in only very small amounts, the body does not function properly unless all are supplied in sufficient quantities. Eating a varied and balanced diet is the best way to be sure to have a diet sufficient in required minerals. The minerals currently known to be essential in human nutrition are: calcium, iron, iodine, phosphorus, sodium, chlorine, fluorine. While all of these minerals are important for good health, four of them - calcium, iron, iodine and zinc - are discussed in detail below, as deficiencies of these four essential minerals are more common and can lead to serious health problems.

Section 1

Questions:

Using a dictionary, look up the following words:

Deficiencies -

Essential -

Regulation -

Why are minerals needed in the diet?

What vegetable and cereals foods are good sources of minerals?

Activity

Minerals: Name me!

I help to build strong bones and I am found in dairy products and in broccoli.

I help your thyroid gland to function and am very important in pregnancy for the unborn baby. I come mostly from the sea and I am added to other foods.

I help to heal your cuts and wounds and help your sense of taste. I am found in fish, oysters and crabs.

If my levels are low, your bones can become brittle and break.

You can find me in the soil and in the sea and in plants in many parts of the world, especially in coastal areas, but I am absent in many other places.

Water

Water is a part of all body tissues and fluids, muscles, cells, blood and digestive juices. It is essential for life. It makes up 70% of the human body.

Water is made up of two elements, hydrogen and oxygen with twice as much hydrogen as oxygen- H^2O.

The average daily water loss is= 2.5 litres. This amount must be replaced to keep the body healthy.

Decimals

For more information on decimals check out:

http://www.bbc.co.uk/skillswise/factsheet/m04deci-e3-f-the-decimal-point-and-reading-decimals

Water is needed to:

1. Carry nutrients and oxygen around the body
2. Help remove waste from the body through urine
3. Regulate body temperature by perspiration and evaporation
4. Be a source of minerals – fluorine and calcium dissolved in water

RDA (Recommended **D**aily **A**llowance)
2.5 litres per day

Activity

Describe three functions of water in the body

1. _____

_____

2. _____

_____

3. _____

_____

Explain the term H^2O

_____

_____

_____

_____

_____

_____

Sources of Water

Most foods contain water – many fruits and vegetables contain over 90% water. Dry foods contain much less water, biscuits contain 2% water

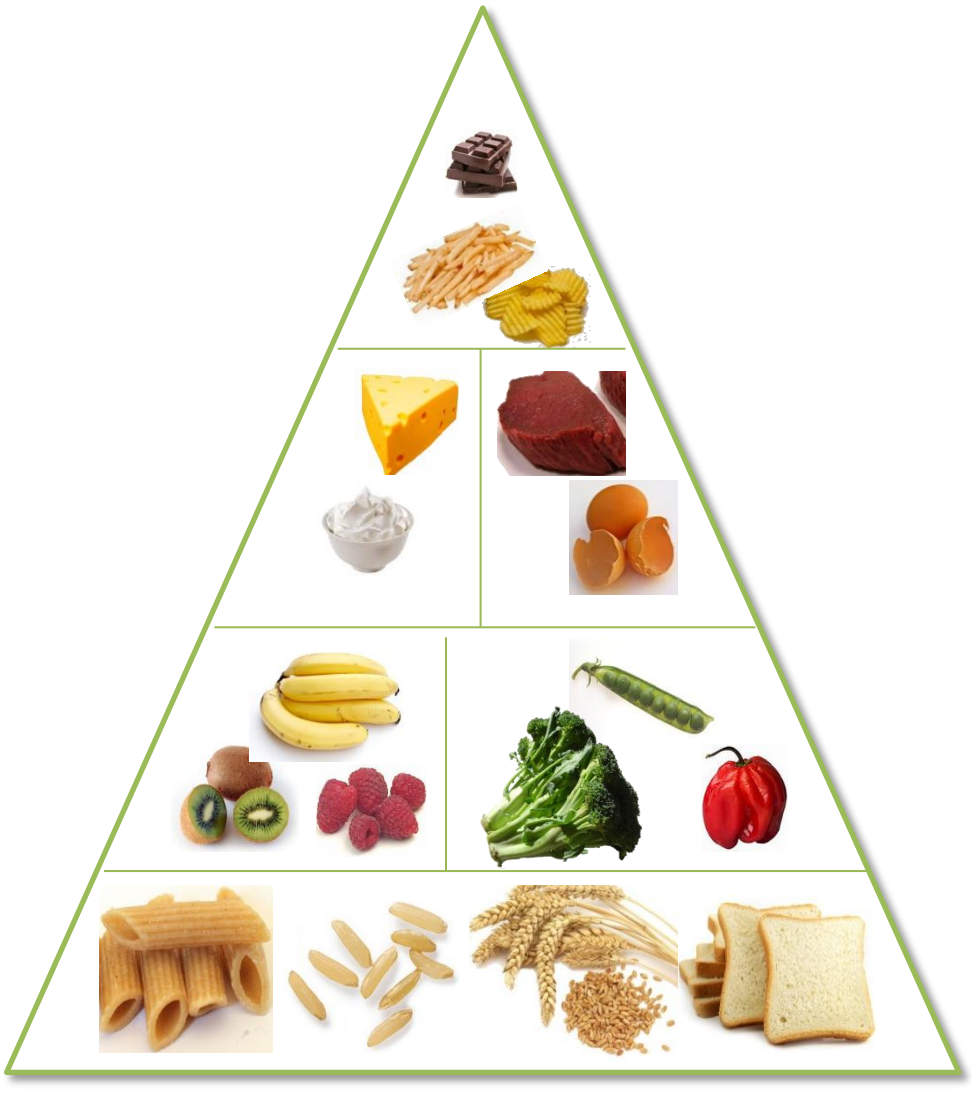
Rehydrating: The water is evaporated from dried foods such as fruit and vegetables during processing and is replaced during cooking.

Foods	Drinks
Fruit and vegetables Milk and soup	Tap water, mineral water, soft drinks, Tea, coffee, alcoholic drinks

Food Pyramid

Healthy eating is about choosing the right amounts of food from each food group.

The shape of the food pyramid shows the types of foods needed needed for healthy eating. The pyramid is recommended and promoted by The Department of Health and Children www.dohc.ie, The Health Service Executive(HSE)www.hse.ie, The Health Promotion Unit (HPU) www.hpu.ie and the Irish Nutrition and Dietetic Institute www.indi.ie



Group	General individual dietary requirements.
Adults	eat wide variety of foods balance energy intake with activity level eat foods rich in fibre and starch but not sugar. eat fruit and vegetables in large amounts reduce amount of saturated or animal protein intake replace with unsaturated to help reduce cholesterol and to supply omega fatty acids. reduce amount salt in the diet alcohol in moderation adequate calcium and iron intake for women.
Older Adults	eat a varied diet, lower energy intake. reduce fat especially saturated/ animal fat eat lots of fibre rich foods. eat high protein foods especially fish vitamin a and d & vitamin c cut down on intake of salt. iron intake is important. avoid high sugar intake avoid tea and coffee in the evenings limit consumption of alcohol.

To plan balanced diets for groups or individuals foods are sub divided into six food groups:

1. Bread cereals, pastas and potatoes
2. Fruit vegetables and salads.
3. Milk and dairy foods.
4. Meats red and white and alternative proteins.
5. Lipids- fats spreads and oils.
6. Foods high in fats, salt or sugar

FOOD LABELLING

Labels are necessary:

- To help identify a product for the consumer
- To provide information about the product, what it is made of , how to store it, how to cook it
- To advertise the product

Labelling should be:

- Clear
- Legible
- Not mislead the consumer
- Written in the language of the country where it is sold

The Food Safety Authority of Ireland (FSAI) is responsible for all food labelling legislation being adhered to.

Information found on packaged and non-packaged foods:

Package Foods	Non-Packaged Foods
The name of the product	Name of the food either on the food or near the product (shelf sticker or a chalk board)
List of ingredients in descending order of quantity	Fruit and vegetables must indicate their origin, variety and class near the product
The net quantity	
Country of origin	
Name and address of manufacturer, packer or seller within the EU	
Instructions for storage and use	
Cooking instructions	
A date of minimum durability	
Alcoholic strength – if a beverage contains more than 1.2 % alcohol	

The ingredients on a label must be listed in order of descending weight, with the heaviest ingredients first. If the product contains more than 5% water it must be listed on the label.

Ingredients lists and nutritional values are especially useful to the following groups

- People who must follow special diets, for example, coeliac or diabetics.
- People on low calorie, low salt or low sugar diets.
- People with allergies to specific foods.

Activity

Log onto:
http://www.indi.ie/docs/1919_food_labels_-_what_do_they_mean.pdf
to find out more information about food labels

Revision Worksheets

Select some food labels and record the amounts of:

Food Selected	Energy kJ/100g	Carbohydrate g/100g	Carbohydrate of which sugars g/100g	Dietary fibre g/100g

Section 1

Revision Worksheets

What do the letters RDA stand for

Explain the following:

Amino acid -

High biological value protein -

Name four foods that are good sources of high biological value protein:

1.
2.
3.
4.

Revision Worksheets

List three sources of both animal and plant protein

Animal protein

1. _____
2. _____
3. _____

Plant protein

1. _____
2. _____
3. _____

What is the energy value in kilocalories of:

1g protein	
1g fat	
1g carbohydrate	

Section 1

Revision Worksheets

True or False

1	Fats give more energy than protein or carbohydrates	**TRUE** ☐	**FALSE** ☐
2	Fibre is found in the skins of fruit and vegetables	**TRUE** ☐	**FALSE** ☐
3	Vitamins are macronutrients	**TRUE** ☐	**FALSE** ☐
4	Carbohydrates are classed as saturated or unsaturated	**TRUE** ☐	**FALSE** ☐
5	Calcium helps strengthen bones and teeth	**TRUE** ☐	**FALSE** ☐
6	Vitamin A is found in sunshine	**TRUE** ☐	**FALSE** ☐

Section 1

Revision Worksheets

Answer the following questions

1. List four factors that influence an individual's energy requirements.

   a. _____

   b. _____

   c. _____

   d. _____

2. Food energy is measured in _____ or _____

3. What is the recommended energy intake in kilocalories for

Male teenager	
Adult female (19-50)	
Older male adult (51+)	
Pregnancy	

4. Study the food composition tables and list four high-energy and four low energy foods

   a. _____

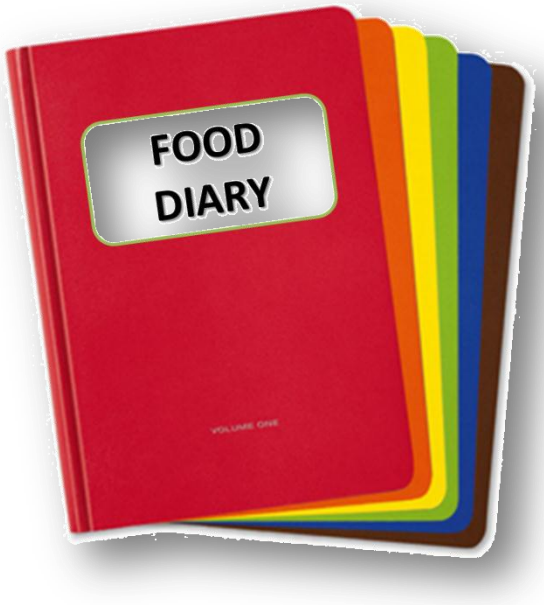
   b. _____

   c. _____

   d. _____

Revision Worksheets

Keep a food diary for four days over the next two weeks.



See link for online food diaries and information.

www.nutritionandhealth.ie/Sectors/NHF/nhf.nsf/vPages/Eat_Smart~overview?OpenDocument

Revision Worksheets

Download and read the booklet "Your guide to healthy eating using the food pyramid" (http://www.dohc.ie/publications/yourguide_food pyramid.html).

Using the food pyramid booklet as a guide answer the questions below:

1. To achieve 100-135 kCals how many scoops of mash potatoes should be eaten?

2. How many ml's in a disposable cup?

3. One cup of low fat milk contains how much calcium?

4. Why is there a limit to the intake of processed meats such as sausage and salami?

5. A teaspoon of oil contains _____ calories; a teaspoon of butter contains _____ calories.

6. How many calories are there in each of these products?

Food	calories
1 packet of crisp	
1 iced doughnut	
1 large chocolate muffin	
Average chocolate bar	
1 slice of apple tart	

7. How many servings of vegetables should be eaten every day?

Revision Worksheets

Using the link **:** www.fsai.ie/WorkArea/DownloadAsset.aspx?id=11387 read the booklet - Healthy Eating and Active Living for Adults, Teenagers and Children over 5 years

Using the booklet as a guide make up a day's menu suitable for school children, adolescents and older adults -

a. When planning the menu consider the nutritional content, foods available, cost and time of year.

b. Calculate the energy intake for one meal for each group using the selected foods. Use the food pyramid and the food composition tables in Appendix 1 as aids.

c. Compare the nutritional value of the menus to similar ready to eat convenience foods.

Revision Worksheets

Devise a poster for one of the groups in the booklet that shows:

1. The recommended daily portion sizes for each food group.
2. Using the pictures given for the portions calculate the approximate weight of the portions for cereals and meat products.

Complete the table:

Recommended daily nutritional intake

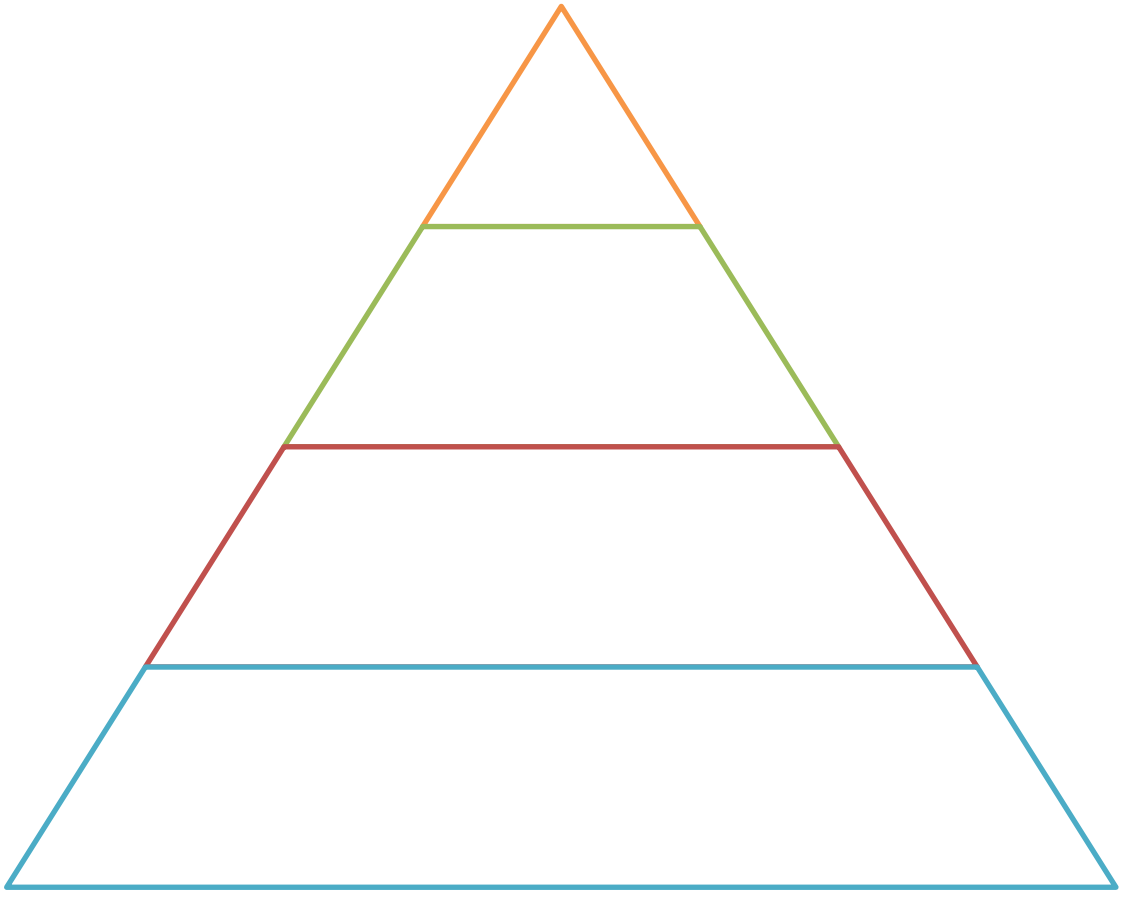
	Older male	Female	Adolescent	Male Manual worker
calories				
protein				
carbohydrates				
fat				
fibre				
salt				

Revision Worksheets

From the food diaries kept, create a summary food pyramid

Discuss how the summary pyramid compares with the healthy eating guidelines food pyramid.

Discuss any changes that could be made to the diet to make it healthier.



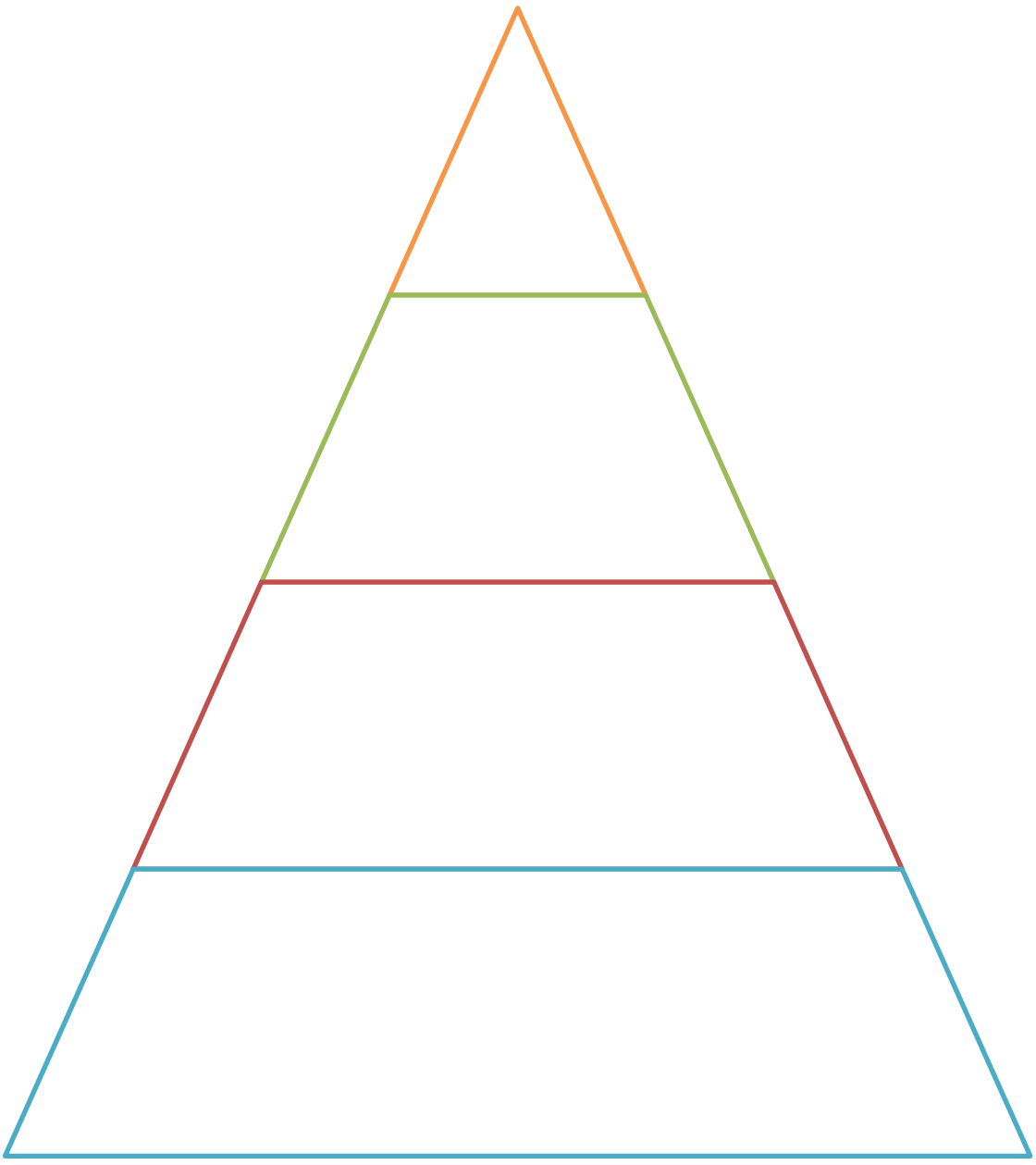
Log onto

www.nutritionandhealth.ie/Sectors/NHF/NHF.nsf/vPages/NHF_Initiatives~workplace-wellbeing-campaign

Download your own personal nutrition and exercise planner for the workplace.

Revision Worksheets

Complete the diagram of the food pyramid by writing in the correct food groups.



Revision Worksheets

Replace the food items given with alternative healthy snacks:

Slice of white bread	
Crisps	
Packet of sweets	
Biscuit	
Salted peanuts	
Crackers/cheese	
Slice of cake/chocolate	

Replace the food items in the table with healthier carbohydrate alternatives

White bread	
Mash/roasted/chipped fried potatoes	
White pasta	
White rice	

Section 1

Replace the food items in the table with healthier protein alternatives:

Minced red meat	
Lamb	
Red meat	
Round steak minced meat	
Chicken/turkey	
Beans	

Section 1