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Explore and Learn

Science

For
Preparatory Stage - Year 1

Second Term

Prepared by

Dr. Reda Al Sayed Hegazy

Dr. Ali Al Sayed Abas

Mr. Abdul Samee Mukhtar Mohamed

Mr. Hassan Al Sayed Moharam

Mr. Ali Ismael Abdul Hameed

Mr. Sameh William Sadek

Science Consoltant

Dr: Aziza Ragab Khalifa

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المقدمة

عزيزى التلميذ/ التلميذة

يسعدنا ونحن نقدم هذا المنهج لأبنائنا تلاميذ الصف الأول الإعدادى أن نؤكد على أن تعلم العلوم متعة و بهجة، متعة فى القيام ببعض الأنشطة العلمية البسيطة، و بهجة فيما يمكن الوصول إليه من نتائج. فتعلم العلوم يعتمد على الملاحظة والتفكير والتجربة واستخلاص النتائج.

وقد تم اختيار عنوان لهذا المنهج يعكس فلسفته؛ وهو اكتشف وتعلم. وقد شارك فى إعداد هذا المنهج مجموعة من المتخصصين فى المناهج وطرق تدريس العلوم والخبراء والموجهين والمعلمين، كما تم فيه تجربة الاستعانة بمجموعة من تلاميذ المرحلة المستهدفة تأكيدًا لفلسفة المنهج من حيث مراعاة طبيعة المرحلة العمرية وطبيعة المعرفة والمجتمع.

و يهدف هذا الكتاب إلى مساعدة التلميذ على إدراك العلاقة بين العلم والتكنولوجيا ورؤية العلم من منظور شخصى ومجتمعى وفهم تاريخ وطبيعة العلم وتنمية مهارات التفكير العليا وامتلاك المفاهيم العلمية الأساسية. ولتحقيق هذه الأهداف تم استخدام أسلوب علمى تقدم فيه المفاهيم فى شكل وحدات دراسية فى ترابط منطقى بعضها مع البعض وتكامل مع المواد الدراسية الأخرى. كما أن الموضوعات المتضمنة فى هذا المنهج تتناول المفاهيم الرئيسية فى مجالات المادة وتركيبها، والطاقة، والتنوع والتكيف فى الكائنات الحية، والتفاعلات الكيميائية، والقوى والحركة، والأرض والكون؛ مما يساعد على تشجيع البحث والاستقصاء العلمى.

و يتضمن الفصل الدراسى الثانى ثلاث وحدات لكل منها عنوان يدل على محتواها. فقد جاءت الوحدة الأولى بعنوان: التفاعلات الكيميائية والوحدة الثانية بعنوان: القوى والحركة، والوحدة الثالثة بعنوان: الأرض والكون. وتشمل كل وحدة مجموعة دروس مترابطة ومتكاملة.

و يعتمد المنهج على إثارة رغبة التلاميذ والتلميذات فى المعرفة والتعلم، والاستفادة من الخبرات المحيطة بهم من كل جانب وذلك من خلال الاعتماد على الأنشطة والتدريبات المتنوعة. كما يعتمد المنهج على استراتيجيات التعلم النشط والتعليم المتمركز حول المتعلم فى تنفيذ دروسه؛ ولذلك تم تزويد الدروس بمصادر المعرفة ووسائل التكنولوجيا الحديثة بما يشجع مهارات البحث والتعلم الذاتى وتنمية مهارات التفكير الناقد ويساعد التلميذ على التأمل والتقييم الذاتى فيما يدرسه ويتعلمه، بما يتفق وفلسفة التقويم الشامل.

ونحن إذ نقدم هذا الكتاب نرجو الله أن يحقق الفائدة منه.

والله ولى التوفيق

المؤلفون

Contents:

Unit One
Chemical Reactions

Unit lessons

1- Chemical combination .
2- Chemical Compounds.
3- Chemical Equations and Reactions.

Objectives

By the end of this unit, a student will be able to:

1. Distinguish between the atom and the ion in terms of their behavior in chemical reactions.
2. Compare between metals and nonmetals.
3. Identify the concept of ionic bonds and covalent bonds.
4. Design a model for ionic bond , and covalent bond molecules.
5. Identify the concept of valence.
6. Identify the concept of chemical formula and the atomic group.
7. Write the most famous symbols for elements and compounds formulae.
8. Identify the concept of acids and alkalies.
9. Understand the concepts of chemical reactions, and chemical equations.
10. Identify the relation between mass conserving law and the chemical reaction.
11. Express chemical reactions via balanced symbolic and ward equations.
12. Carry out experiments of some types of chemical reactions.
13. Mention examples for chemical reactions life, environmental and industrial.
14. Highlight the mutual relation between technology and chemical reactions.
15. Appreciate the benefits of experimental methods in chemical reactions and their control.
16. Give examples for the positive and negative social attitudes to word chemical reactions.
17. Appreciate the role of scientists in the environmental discoveries.
18. Appreciate the efforts of scientists in the field of chemical reactions.
19. Appreciate the glorious God grants and the marvellous creation in the universe.

Chemical combination

Lesson One

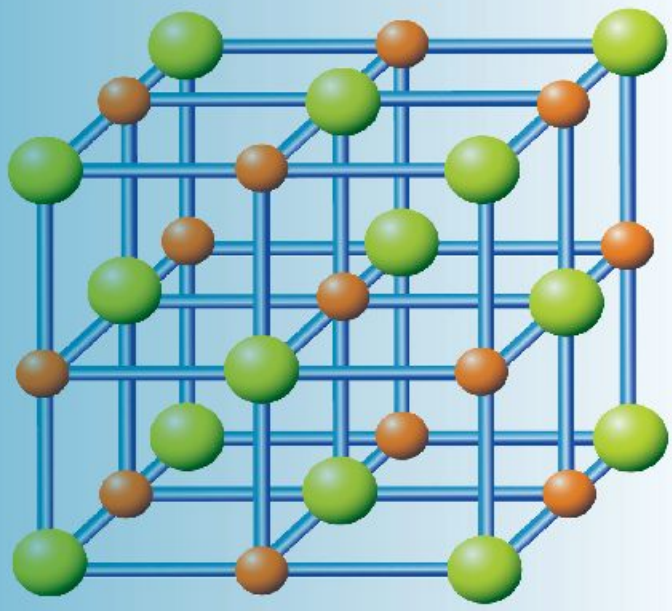
Lesson Items

1. Atom and Ion.
2. Chemical Bonds.

Lesson objectives

By the end of this lesson, a student will be able to:

- Compare between metals and nonmetals.
- Identify an element type through its electronic configuration.
- Compare between the positive ion and the negative ion.
- Write the electronic configuration to an atom and its ion.
- Explain the meaning of ionic bond.
- Show the ionic bond formation in one of the compounds or elements.
- Explain the meaning of the covalent bond and give its types.
- Illustrate the formation of a covalent bond in a compound and in an element.
- Design a model to a molecule of an ionic compound and a covalent one.



Life Issues

- Investing the environmental resources.

The Atom and the Ion

The number of the well known elements till now is 118.

Those elements can be classified- according to their properties and electronic structure into metals , nonmetals and noble gases.

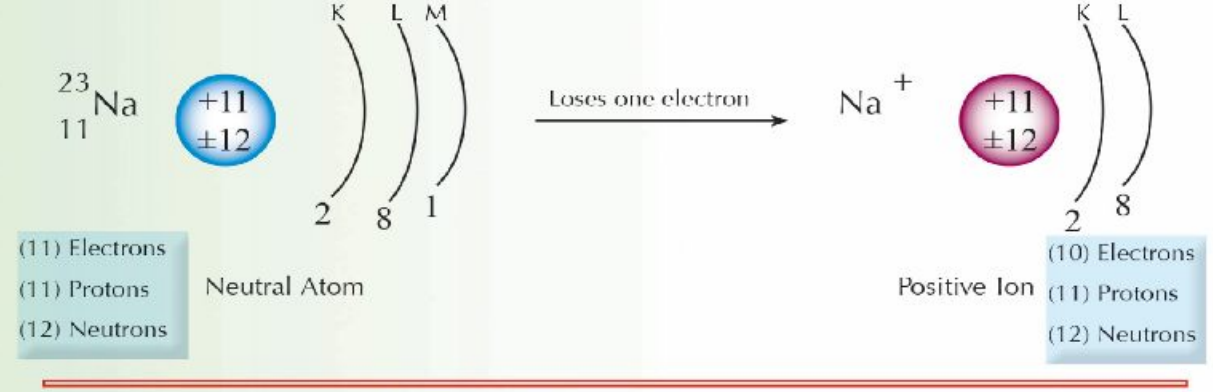
Metals:

Metals are solids (except for mercury which is a liquid) having luster . most of them are good conductors of heat and electricity, malleable and ductile, containing 1,2 or 3 electrons in their outer electron shells.

During a chemical reaction , atoms of metals are likely to give their outer electrons to other atoms of different elements. by this, the metallic atom is changed into a positive ion with equivalent number of positive charges to the given electrons.

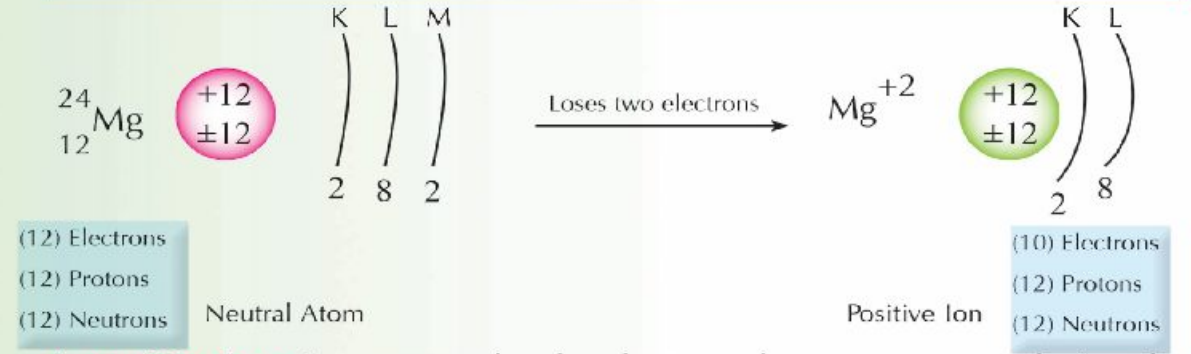
Examples:

(1) Sodium $^{23}_{11}Na$ | (2) Magnesium $^{24}_{12}Mg$ | (3) Aluminum $^{27}_{13}Al$



(11) Electrons
(11) Protons
(12) Neutrons
Neutral Atom

Positive Ion
(10) Electrons
(11) Protons
(12) Neutrons



(12) Electrons
(12) Protons
(12) Neutrons
Neutral Atom

Positive Ion
(10) Electrons
(12) Protons
(12) Neutrons

A positive ion: is an atom that has lost an electron or more during the chemical reaction.

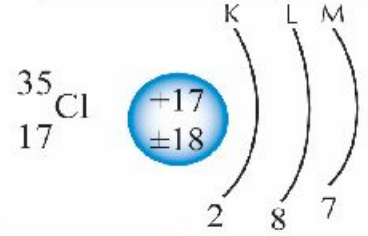
Nonmetals:

Some of the non - metals are solids, others are gases and only there is one liquid element which is bromine. They have no luster, niether malleable or ductile (brittle), most of them are bad conductors of heat and electricity, except Graphite which is a good conductor of electricity. Most of non-metals contain 5,6 or 7 electrons in their outer shells.

Nonmetal atoms are likely to gain electrons from other atoms to fill their outer electron shells and therefore change into negative ions in which the number of negative charges equal to the number of electrons gained.

Examples:

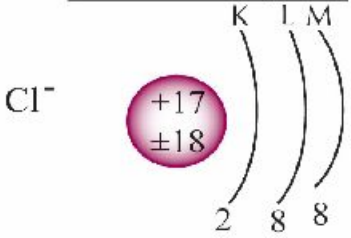
1- Chlorine $^{35}_{17}Cl$



(17) Electrons
(17) Protons
(18) Neutrons

Neutral atom

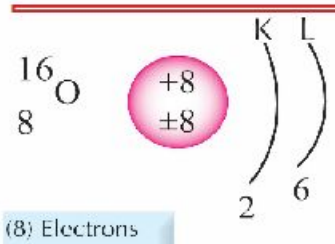
gains one electron →



negative Ion

(18) Electrons
(17) Protons
(18) Neutrons

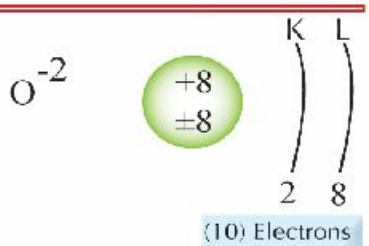
2- Oxygen $^{16}_{8}O$



(8) Electrons
(8) Protons
(8) Neutrons

Neutral atom

gains two electrons →



negative Ion

(10) Electrons
(8) Protons
(8) Neutrons

A negative ion: is an atom that has gained an electron or more during the chemical reaction.

Exercise

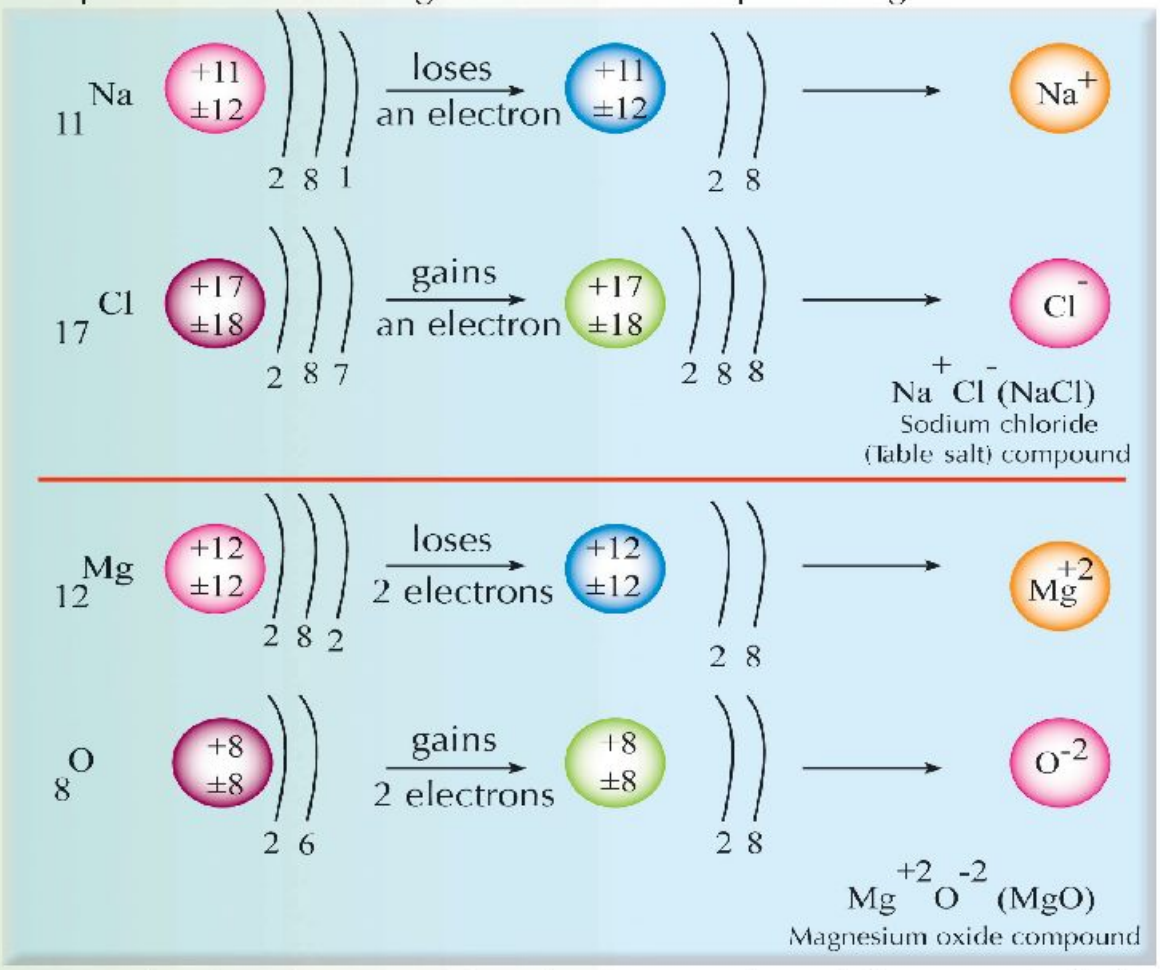
Write the electronic configuration of: Aluminum $^{27}_{13}Al$, Nitrogen $^{14}_{7}N$
Then conclude the following :

- Type of the element.
- The electronic configuration of their ions.

Ionic bond

Activity 1

Study the following chart describing the formation of sodium chloride compound NaCl and magnesium oxide compound MgO.



Describe the changes in the electron number of the outer shell for both atoms.

Conclusion: .....

When proper conditions for combination between a metal atom and a nonmetal atom exist. the metal atom gives its outer shell electrons (and become positive ion) to the nonmetal atom. (and become negative ion) A strong electrical attraction takes place among the metal positive ions and the nonmetal negative

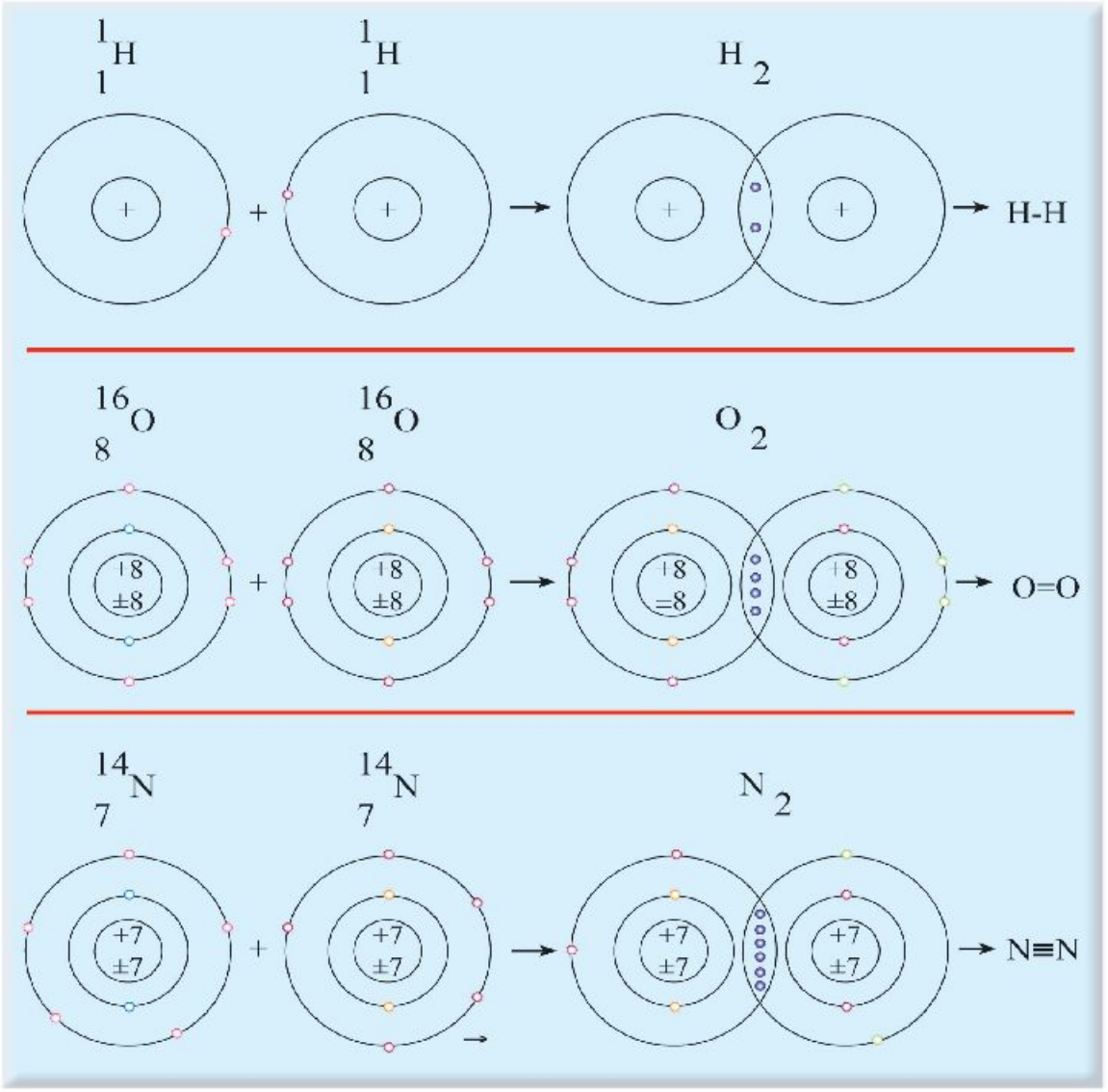
ions forming ionic compound molecules, this type of linkage is known as the ionic bond.

Ionic bond : is a bond resulting from the electric attraction between a positive ion and a negative ion .

Activity 2

Covalent bonds

The following figure indicates the formation of hydrogen H_2, oxygen O_2 and nitrogen N_2 molecules.



For each element atom, (in the previous figures) what do you observe on the outer shell electrons?

Conclusion.....

When two non metal atoms are interacting with each othr, no one of them loses or even gains any electrons. But simply, each atom shares the other atom with a number of electrons from its outer shell equal to the number of electrons needed by each atom to Complete each outer shell with electrons. An interference occurred between both atoms, resulting in bonding known as Covalent bond, which produces Covalent molecule

Covalent bond:

Is a bond originated between non metals through sharing each atom with a number of electrons filling its outer elecron shell.

Types of covalent bonds:

1- Single covalent bond: where each atom shares the other atom with one electron (-).

2- Double covalent bond: where each atom shares the other atom with two electrons. (=

3- Triple covalent bond: where each atom shares the other atom with three electrons. (≡)

Noble (inert) elements:

Are elements in which their outer electron shells are completely filled with electrons, so they don't need a chemical combination with any other atoms. Their molecules still have the same structure. Thus each molecule consists of one single atom. Noble elements are not expected to form positive or negative ions in the ordinary conditions.

Enrichment information

- A covalent bond may occur among various atoms of elements resulting in a covalent compound such as hydrogen chloride molecule HCl and the water molecule (H_2o).
- Berzelius (1779 - 1848) was the first scientist who classified elements into metals and nonmetals in the 19th century.
- The Egyptian scientist Ahmed Zweil has been granted Nobel prize in chemistry 1999 in favour to his appreciated role in inventing new brands of camera working via laser technologies.
- When an atom gives an electron or more, its diameter decreased, and consequently its volume decreased due to the leakiness of electrons rather than protons, and the increased attraction from nucleus to the remaining electrons.
- By gaining an electron or more, an atom's diameter is likely to increase and its volume as well, due to the increasing number of electrons rather than protons and the occurrence of repelling doming electrons.
- A positive ion diameter is smaller than its atom diameter, but a negative ion diameter is bigger than its atom diameter.

Exercise

Write the electronic configuration of the following atoms:

$^{1}_{1}H$ $^{23}_{11}Na$ $^{14}_{7}N$ $^{36}_{18}Ar$ $^{16}_{8}O$ $^{24}_{12}Mg$ $^{35}_{17}Cl$

Then indicate: 1- Type of the element. 2- Type of the ion.

EKB: Use the EKB to find more information a bout the two scientists above mentioned.

Optional activities:

Select one of the following activities and try to perform it within a group of your classmates, consult your teacher, then add it to your portfolio:

1- Writing an essay about the properties of metals and non metals according to their usages.

2- Writing a short essay on scientist Ahmed Zweil's life.

3- Design a model of a molecule shows the covalent bond from materials found in your environment .

Summary

- Metals: are solids (except mercury which is a liquid) having luster, most of them are good conductors to heat and electricity, malleable and ductile. They contain 1,2 or 3 electrons in their outer electron shell.
- Positive ion: is an atom that has lost an electron or more during the chemical reactions.
- Nonmetals: They are solids, liquids or gases not lusters, most of them are bad conductors of heat and electricity, not malleable or ductile (brittle) and containing 5,6 or 7 electrons in their outer shells.
- Negative ion: is an atom that has gained one electron or more during the chemical reactions.
- Ionic bond: is a bond resulting from the electric attraction between a positive ion and a negative ion.
- Covalent bond: is a bond formed between two non - metallic atoms through the participation of each atom with a number of electrons to complete the outer electron shell of each atom.
- Types of covalent bonds:
  1- Single covalent bond: where each atom shares the other atom with one electron (-).
  2- Double covalent bond: where each atom shares the other atom with two electrons. (=)
  3- Triple covalent bond: where each atom shares the other atom with three electrons. (≡)
- The ion: is an atom that (lost or gained) one electron or more during the chemical reaction .
- Noble elements: don't participate in any chemical interactions due to the completeness of their outer electron shells.

Exercises

Question 1:

(A) Write the scientific term in front of each of the following:

1- An atom that has lost an electron or more during the chemical reaction.

2- A bond resulting from the electric attraction between a positive ion and a negative ion.

3- An atom gained one electron or more during the chemical reactions.

4- A bond resulting from the participation of each of two atoms with 3 electrons.

5- An atom of an element that neither loses nor gains any electrons.

6- Elements have luster, good conductors of heat and electricity, They contain less than (4) electrons in their outer electron shells.

7- Elements that may be solids, liquids or gases having no luster, bad conductors of heat and electricity, and containing more than (4) electrons in their outer shell.

(B) you see one of the iron smiths hitting a rod of iron without being broken, but if somebody hits a piece of coal it will be easily broken into pieces. How do you explain?

Question 2:

(A) Fill in the following table:

Atom	electronic configuration				Molecule	Type of bond
	K	L	M	N		
$_{11}Na$ $_{17}Cl$	.....	.....	.....	.....	NaCl	.....
	.....	.....	.....	.....		
$_{7}N$	.....	.....	.....	.....	N_2	.....

(B) On a diagram show the electronic configuration of the atom of oxygen $_{8}^{16}O$ then show how two of its atoms are bonded to form an oxygen molecule O_2.

Question 3:

(A) Write down the electronic configuraion of the atoms of the following elements: ^{12}Mg ^{16}S ^{18}Ar

then indicate:

1- The type of each atom (metal-nonmetal-noble).

2- The type of each ion (positive- negative-has no ions).

(B) Give reasons:

1- When an atom of chlorine $_{17}Cl$ is joined with an atom of sodium $_{11}Na$, the product will be an ionic compound but when two atoms of chlorine are joined together the product will be a covalent molecule.

2- When an atom loses an electron or more, it directly becomes a positive ion.

3- When an atom gains an electron or more, it becomes a negative ion.

4- Ionic bonds produce compounds only not elements, but the covalent bonds may produce both types an element or even a compound.

5- The bond in an oxygen molecule is a double covalent one.

6- The bond in a compound of magnesium oxide MgO is an ionic bond,regarding that the atomic number for magnesium (Mg=12) and Oxygen (O=8).

Question 4:

1- Compare each pair of the following:

(a) Metals and nonmetals.

(b) Positive ion and negative ion.

(c) An atom and an ion.

(d) Ionic bond and covalent bond.

2- What do we mean by?

Positive ion - Negative ion - The ion .

Chemical Compounds

Lesson Two

Lesson Items

1. Chemical formulae.
2. Types of compounds.

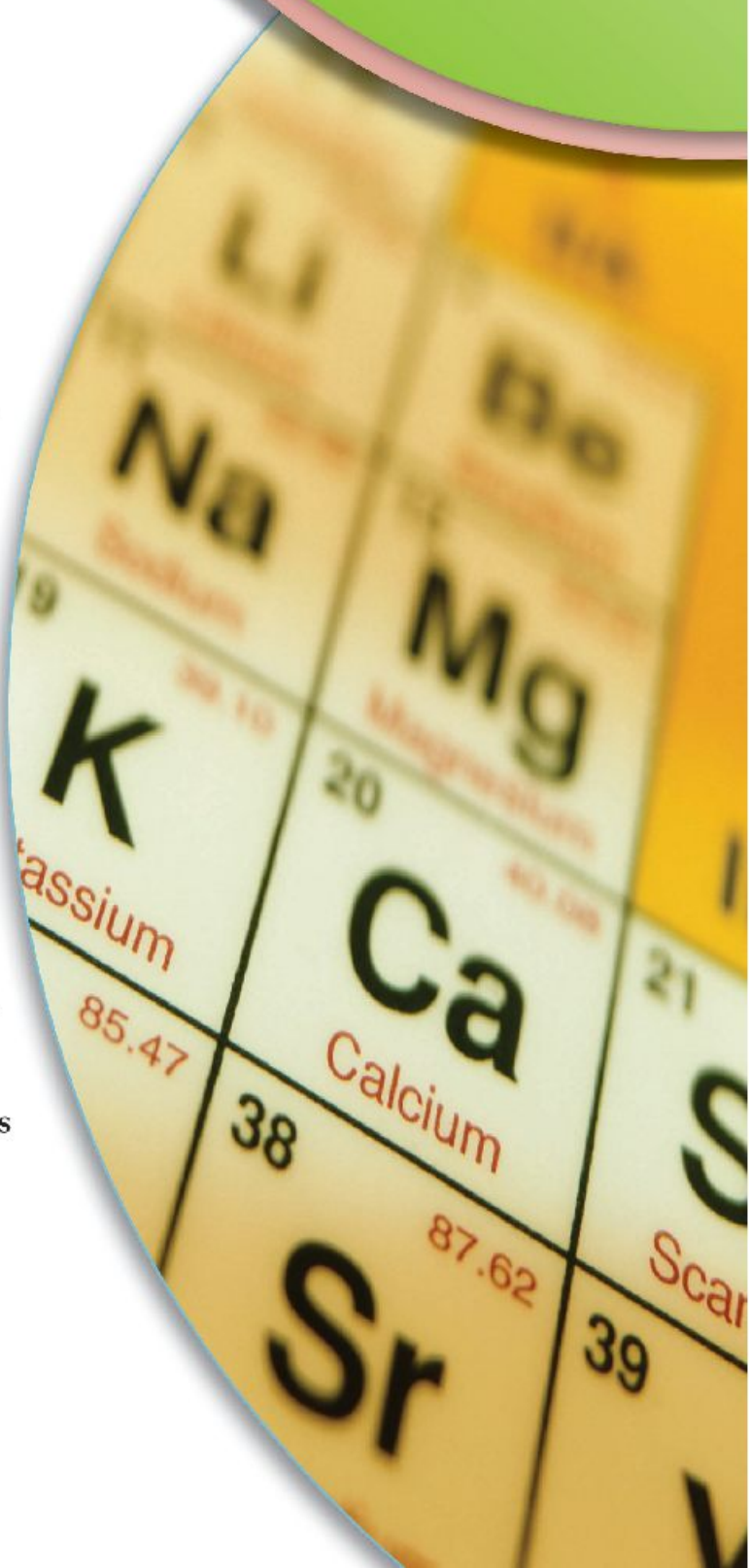
Lesson Objectives

By the end of this lesson, a student will be able to:

- Explain the meaning of valencies.
- Mention examples to some elements having different valencies.
- Explain the meaning of the atomic group.
- Write the chemical formulae of the atomic groups.
- Write the chemical formulae of some compounds.
- Explain the meaning of acids and bases as well.
- Explain the meaning of salts and oxides.
- Give examples of an acid, a base, an oxide and salts.
- Mention examples of salts which easily dissolve in water and others which do not dissolve in water.

Life Issues

- Environment



The Valency

Previously, we have known that the number of existing electrons in the outer electron shell of an atom reflects the atomic behavior during a chemical reaction with another atom.

Furthermore, there are atoms which gain electrons in order to complete their outer electron shells to reach the number of 8 electrons, other atoms don't lose electrons, and don't even gain any, but they share a number of electrons with other atoms.

The process of gaining or losing electrons or sharing with other atom with a number of electrons is determining the valency of the element

valency: is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

Exercise

Write the electronic configuration of the following elements then conclude their valencies $\overset{8}{O}$ $\overset{17}{Cl}$ $\overset{12}{Mg}$ $\overset{11}{Na}$

Here are some elements and their valence electrons:

The element (Metals)	Symbol	Valency	the element (Nonmetals)	Symbol	Valency
Lithium	Li	1	Hydrogen	H	1
Potassium	k	1	Oxygen	O	2
Sodium	Na	1	Nitrogen	N	3 or 5
Calcium	Ca	2	Chlorine	Cl	1
Magnesium	Mg	2	Fluorine	F	1
Aluminum	Al	3	Bromine	Br	1
Zinc	Zn	2	Iodine	I	1
Iron	Fe	2 or 3	Sulphur	S	2 or 4 or 6
Lead	Pb	2	Phosphorus	P	3 or 5
Copper	Cu	1 or 2	Carbon	C	4
Mercury	Hg	2			
Silver	Ag	1			
Gold	Au	3			

We observe that some elements have more than one valency such as Iron (Fe), it has 2 different valences, (Fe^{+2}) which is known as Ferrous and (Fe^{+3}) which is known as Ferric.

The Atomic Group

It is a set of atoms joined together conducting the behavior of one atom during a chemical reaction, having its own valency and it is not existed solely.

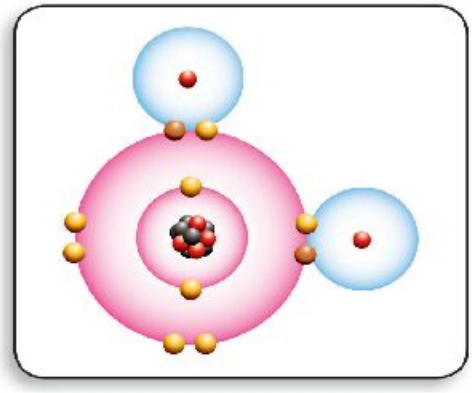
Here are some examples of atomic groups and their valencies:

Atomic group	Symbol	Valency	Atomic group	Symbol	Valency
Hydroxide	OH^-	1	Sulphate	$(SO_4)^{-2}$	2
Nitrate	NO_3^-	1	Carbonate	$(CO_3)^{-2}$	2
Bicarbonate	HCO_3^-	1			
Ammonium	NH_4^+	1	Phosphate	$(PO_4)^{-3}$	3
Nitrite	NO_2^-	1			

Chemical formula

We can express a molecule of a compound via a certain formula known as the chemical formula which expresses the number of atoms in a molecule and their types. For example sodium chloride molecule (Table salt) expressed as NaCl, that means it is composed of two atoms of two elements sodium Na and chlorine Cl.

The chemical formula of water is H_2O, which means that the water molecule is composed of 3 atoms of two elements, one atom of oxygen and two atoms of hydrogen.



Exercise

Study the following table that indicates some compounds and their chemical formulae. Notice the way of writing each formula then complete the missing parts:

Compound	Chemical formula	No. of atoms in molecule	No. of forming elements
Sodium Carbonate	Na_2CO_3	.....	.....
Copper Carbonate	$CuCO_3$	.....	.....
Sodium Hydroxide	$NaOH$	.....	.....
Magnesium Hydroxide	$Mg(OH)_2$	.....	.....
Aluminum Sulphate	$Al_2(SO_4)_3$	.....	.....
Calcium Sulphate	$CaSO_4$	.....	.....
Sodium Oxide	Na_2O	.....	.....
Calcium Oxide	CaO	.....	.....

You may use the following helping steps to write the chemical formula for a compound:

1- Write the name of the compound in words.
2- Write the symbol of each element or atomic group down to the name.
3- Write the valency down to each symbol.
4- All numbers are to be shortened as much as you can.
5- Interchange the written numbers (you don't have to write the digit (1))
6- In case of atomic groups, if the number was not (1), put the atomic group parenthesis and write the number right down to it.

Exercise

Write the molecular formula for each of the following:
Hydrogen chloride. - Calcium Sulphate - Sodium oxide. -
Sodium Nitrate- Aluminum Carbonate - Carbon dioxide.

Types of Compounds

In nature there is a countless number of existing compounds.

Only they can be classified according to their properties to many types as acids, bases, salts and oxides

Activity

Study the following chart which indicates examples of some acids, bases, and their chemical formula.

Type of compound	Name	Chemical formula
Acids	Hydrochloric Acid Sulphuric Acid Nitric Acid	HCl H_2SO_4 HNO_3
Bases	Sodium Hydroxide (caustic soda) Potassium Hydroxide Calcium Hydroxide (Lime water)	NaOH KOH $Ca(OH)_2$

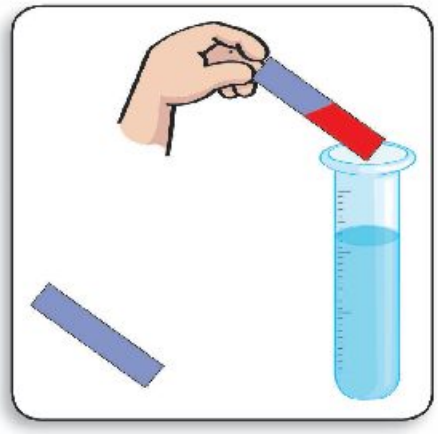
What do you observe on the chemical formula of each of them.

Conclusion: . . . . . .

Acids:

Acids are materials that dissociate in water producing positive ions of hydrogen (H^+).

Acid are common in some of their properties such as : the sour taste and changing the colour of litmus to be red due to the presence of the hydrogen ion (H^+).

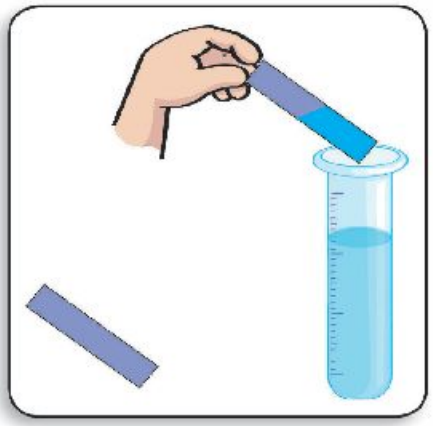


Chemical formulae of mineral acids begin with hydrogen joined with one of the negative atomic groups (except hydroxide group(OH^-) such as Sulphuric acid H_2SO_4,Nitric acid HNO_3 .Hydrogen may join with some nonmetals like chlorine or bromine composing some acids such as Hydrochloric acid HCl.

Bases:

They are compounds that produce negative hydroxide ions (OH^-) when decomposed in water.

Aqueous solutions of bases have bitter taste and feel slippery, they change the colour of litmus into blue due to the presence of (OH^-). such as sodium by droxide NaOH and potassium hydroxide KOH.



Exercise

Having two unmarked tubes, one contains an acid and the other contains a base. How can you distinguish or classify them?

Caution

Don't touch acids or even bases with your bare hands

Oxides:

An element joins with oxygen producing either oxides of metal or non metal, such as:

Sodium oxide Na_2O Aluminum oxide Al_2O_3

Carbon dioxide CO_2 Sulphur trioxide SO_3

Salts:

Salts are produced as a result of the chemical combination of a positive metal ion (or positive atomic group) with a negative atomic group or a negative ion (except oxygen).

Salts exist in earth's crust or dissolved in water. They vary in some of their properties such as taste, colour, smell, solubility in water and other properties.

Examples:
Table salt (sodium chloride), the hydrous copper sulphate, and sodium nitrate.

Examples for some minerals:

Salts dissolve in water	Salts do not dissolve in water
Sodium chloride $NaCl$ Potassium sulphate K_2SO_4 Calcium nitrate $Ca(NO_3)_2$ Sodium sulphide Na_2S	Silver chloride $AgCl$ Lead iodide PbI_2 Lead sulphate $PbSO_4$

Optional activities:

Use EKB and Select one of the following activities. Perform it then consult your teacher and add it to your portfolio.

1- Prepare a report includes examples for acids, bases, oxides and salts then write their chemical formula in addition to their daily usages.

2- Prepare a research on the types of chemical reactions.

- Acids are completely variants in strength. There are strong acids such as nitric acid, hydrochloric acid and weak acids such as carbonic acid depending on the degree of ionization.

  Make asearch in EKB about the properties of acids.

Summary

- Valency: is the number of electrons gained, lost or even shared by an atom during the chemical reaction.
- Atomic group: a set of atoms joined together, behave like one atom only, having a certain valence and can not be exist solely. (individually)
- Chemical formula: a formula represents the number and types of atoms in a molecule.
- Types of compounds:

  Acids: are substances that dissociate in water producing positive hydrogen ions (H^+).

  Bases: are substances that dissociate in water producing negative hydroxide ions (OH^-).

  Oxides: are resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.

  Salts: are produced as a result of the combination of a positive metal ion (or a positive atomic group) with a negative atomic group or a negative nonmetal ion (except oxygen).

Exercises

Question 1:

(A) Write the chemical formula for the following molecules:

Magnesium oxide - Sodium sulphate - Copper nitrate - Sulphuric acid - Calcium chloride - Aluminum hydroxide

(B) Write the scientific term in front of each of the following statements:

1- The number of electrons gained, lost or even shared by an atom during a chemical reaction.

2- A set of atoms joined together, behave like one atom only, having a certain valence and can not be existed solely.

3- A formula represents the number and types of atoms in a molecule.

4- Compounds that dissolve in water producing positive hydrogen ions (H^+).

5- Compounds that dissolve in water producing negative hydroxide ions (OH^-).

Question 2:

(A) Compare between acids and bases, giving examples for each.

(B) Give reason:

1- All acids turn the colour of litmus into red, having a sour taste, where all bases turn the colour of litmus into blue with a bitter taste.

2- Potassium $_{19}K$ is monovalent while oxygen $_{8}O$ is divalent.

3- An oxygen atom combine with two atoms of sodium when composing one molecule of sodium oxide.

Question 3:

(A) The following formulae represent some molecules, name each one:

$$NaNO_3 - Ca(OH)_2 - CO_2 - Al_2(SO_4)_3 - CaCO_3$$

(B) Identify which type of compounds are the following:

KOH- NaCl-MgO-H_2SO_4

(C) Once you collected an amount of rain water and another amount of sea water, and placed a litmus paper in each sample of water. You observed that its colour changed into red in case of rain water where it changed into blue in case of sea water. Explain?

Self reflection and self evaluation

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Acids are of different strengths.

There are strong acids such as nitric, acid hydrochloric acid and sulphuric acid and other are weak such as carbonic acid depending an how easy they are ionised. Search EKB about the properties of acids.

Lesson Three

Chemical Equation and Chemical Reactions.

Lesson Items

1. Chemical equation.
2. Types of chemical reactions.

Lesson Objectives

By the end of this lesson, a student will be able to:

- Explain the meaning of a chemical reaction.
- Give an example to a chemical equation.
- Prove via a balanced chemical equation that the total mass of reactants through a chemical reaction is equal to the total mass of products.
- Identify the types of chemical reactions.
- Explain the meaning of direct combination reactions.
- Explain the benefits of the chemical reactions.
- Show some harms of chemical reaction.
- Cooperate his (her) classmates to avoid the negative effect of some chemical reactions.

Life Issues

- Environmental pollution.

Chemical Reactions:

We can simply get a plenty of necessary substances through chemical reactions, in which we can transform less used substances to other useful substances.

Most of the modern industries are deemed to depend basically on the chemical reactions as resources of electrical and heat energy such as fertilizers, car batteries , fuel, plastics, and food industries... etc.

Activity 1

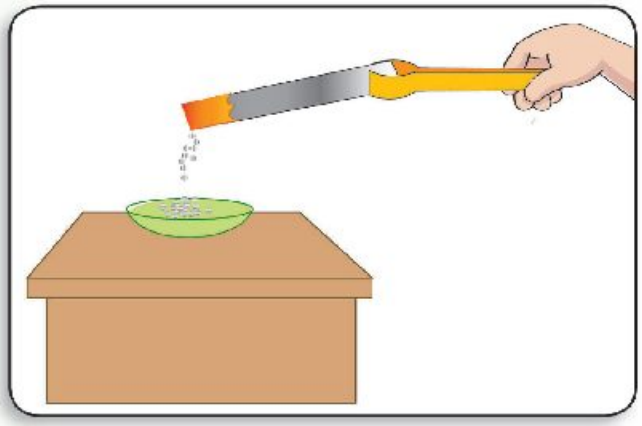
Burn a ribbon of magnesium in air.

What do you observe?

. . . . . .

Conclusion:

. . . . . .



The magnesium shape has completely changed and turned from a bendable bright solid into white powder of a new substance known as magnesium oxide (MgO).

$$\text{Magnesium} + \text{Oxygen} \xrightarrow{\triangle} \text{Magnesium oxide}$$

Heat energy has broken the double covalent bond in the oxygen molecule (O_2) and consequently changed into two atoms of chemically active oxygen , Then each oxygen atom combines with another atom of magnesium forming a molecule of magnesium oxide.

Chemical reaction

Is breaking the existing bond between the atoms in the reactant molecules and forming new bonds between the atoms of the product molecules.

A chemical reaction can be represented by a chemical equation.

Chemical equation:

Is a set of symbols and chemical formulae representing the reactant and the product molecules in the chemical reaction, it represents the conditions of the reaction as well.

A chemical equation should be balanced, that means the number of reactant atoms of an element should be equivalent to the number of its atoms produced from the reaction.

Examples:

$$2Mg + O_2 \xrightarrow{\triangle} 2MgO$$

Activity 2

In the chemical reaction that is expressed by the following balanced equation:

$$2Mg + O_2 \xrightarrow{\triangle} 2MgO$$

If you know that the mass of magnesium atom Mg=24, the oxygen atom mass=16, you should be able to calculate the masses of reactant and product molecules.

$(24 \times 2) + (2 \times 16)$	$2(16 + 24)$
$48 + 32$	2×40
80	80

What do you observe?

. . . . . .

Conclusion: . . . . . .

> The total masses of reactants is equal to the total masses of products. This is known as law of conservation of mass.

A compound is produced from a chemical combination between atoms of two or more different elements by constant weight ratios this is called law of constant ratios. So each 48 g of magnesium combines with 32 g of oxygen to form 80 g of magnesium oxide.

Some Types of chemical reactions:

There are many types of chemical reactions, we will study only one of them which is the Direct combination reactions.

Direct combination reactions:

a- An Element with another Element:

Carbon which is a nonmetal joins with oxygen which is a nonmetal too, forming carbon dioxide gas. This can be represented by the following equation:

$$\text{Carbon} + \text{Oxygen} \xrightarrow{\text{Heat}} \text{Carbon dioxide}$$

$$C + O_2 \xrightarrow{\triangle} CO_2$$

The type of reaction between magnesium and oxygen to form magnesium oxide is considered as a direct combination reaction.

b- An element with a compound :

Oxygen combines with carbon monoxide

$$\text{Carbon monoxide} + \text{Oxygen} \xrightarrow{\triangle} \text{carbon dioxide}$$

$$2CO + O_2 \xrightarrow{\triangle} 2CO_2$$

C- A compound wih another compound:

Activity 4

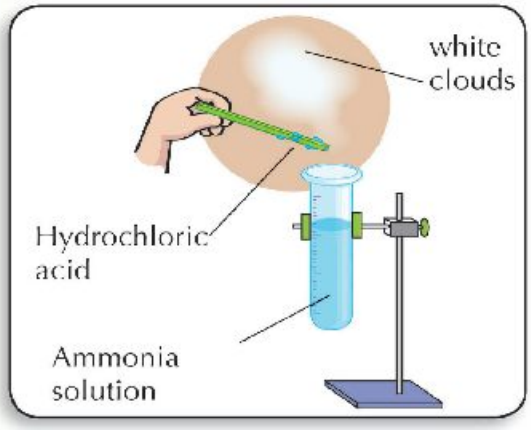
Place a glass rod wet with hydrochloric acid close to the mouth of a test tube containing ammonia solution, and observe what happens?

. . . . . .

Conclusion :

. . . . . .

White clouds of ammonium chloride is composed as a result of the direct combination reaction between ammonia NH_3 and the hydrochloric acid HCl.



$$\text{Ammonia} + \text{Hydrochloric acid} \xrightarrow{\text{Conc}} \text{Ammonium chloride}$$

$$NH_3 \text{ (gas)} + HCl \text{ (gas)} \xrightarrow{\text{Conc}} NH_4Cl \text{ (solid)}$$

Exercise

Define the type of each of following chemical reactions.

Type of reactions	Chemical reaction
	$2NO + O_2 \longrightarrow 2NO_2$
	$H_2 + Cl_2 \xrightarrow{\triangle} 2HCl$
	$NH_3 + HNO_3 \longrightarrow NH_4NO_3$

Chemical Reactions in our life:

Chemical reactions play an essential role in our life, through these reactions thousands of compounds are commonly used in many industries such as medicines, fertilizers, fuel, plastics and others. These chemical reactions also have negative effects such as the emissions that pollute the environment.

So you have to be cautious, and stay far apart from these harmful reactions which have negative effects on human and environment.

Fuel burning is an example for environmental pollution due to the presence of harmful gases such as: Carbon oxides which increase the atmospheric temperature where

carbon dioxide acts as a green house gas . It permits the penetration of thermal rays from the sun to the Earth and never let them return back.

Carbon monoxide (CO) has a dangerous impact on the human beings, that it causes headache, fainting in addition to severe stomach aches and may lead to death.

- Sulphur oxides like sulphur dioxide (SO_2) and sulphur trioxide (SO_3), are acidic gases causing respiratory systems malfunctions and building corrosion.
- Nitrogen oxides are normally resulted at the time of lightning. They are poisonous, and they are acidic gases that affect the nervous system and the eye.
- Burning of coal and cellulose fibers such as paper and cigarettes causing air pollution and lung cancer.

Optional activities:

Select one of the following activities, do it with your classmates, consult your teacher and add it to your portfolio.

1- Prepare a research on the importance of reactions in our life, and its harms.

2- Prepare a research on technology and chemical reactions.

Summary

- Chemical reaction: is the breaking down of the bonds existed in reactants molecules , and forming new bonds between the atoms of the product molecules.
- Chemical equation: is a set of symbols and formulae representing the reactants, the products and the conditions of the reaction as well. The equation should be balanced.

- Types of chemical reactions:

Direct combination reactions:

a- An element with another element:

$$C + O_2 \xrightarrow{\triangle} CO_2$$

b- An element with compound

$$2CO + O_2 \xrightarrow{\triangle} 2CO_2$$

c- A compound with another compound:

$$NH_3 + HCl \longrightarrow NH_4Cl$$

Note:

Some chemical reactions have a vital role in our life and some others have negative impacts on both the human beings and the environment.

Exercises

Question 1:

a- Write the chemical equation representing the following reactions, then indicate the type of each reaction:

1- Carbon burning in the presence of oxygen.

2- Hydrochloric acid is combined with ammonia gas.

3- The reaction between carbon monoxide and oxygen .

b- What do we mean by:

Chemical reaction - Chemical equation .

Question 2:

a- Give reasons:

1- A chemical equation should be balanced.

2- White clouds are formed when hydrochloric acid reacts with ammonia gas

b- Write a short paragraph on fuel burning and its harmful effects on human beings and environment.

Question 3:

Knowing that the mass of carbon C=12 and Oxygen O=16

Find the total masses of reactants and products through the following reaction:

$$C + O_2 \xrightarrow{\triangle} CO_2$$

Unit 1 General Exercises:

Question 1: Write the scientific term:

1-The numbers of electrons gained or lost via an atom during a chemical reaction.

2- A bond resulted from the electrical attraction between a metal atom (positive ion) and non metal atom (negative ion)

3- Substances dissociate in water producing positive hydrogen ions (H^+).

4- Breaking the reactants bonds and forming new ones among the products.

5- A set of joined atoms behaving like a single atom during the chemical reaction.

6- A set of chemical formulae and symbols expressing the reactants, the products and the reaction conditions.

7- Substances are dissociated in water producing negative hydroxide ions (OH^-).

Question 2:

(a) knowing that the atomic number for oxygen is O =8,show via a diagram the way by which two atoms of oxygen can combine, then show the type of the produced bond.

(b) Compare each pair:

1- An atom and an ion.
2- Acid and an alakali.
3- Ionic bond and covalent bond.
4- Metals and non metals.

Question 3:

(a) Indicate using symbolic and word equations, an example for the types of direct combination reaction between :

1- Element with an element.
2- Element with a compound.
3- Compound with another compound.

(b) Write the chemical formula for the following:

-Calcium nitrate
-Copper sulphate.
-Sodium carbonate.
-Aluminium oxide.

(c) One of your classmates has asked you to share him writing a report on the role of technology in chemical reactions, indicating its importance and highlighting its bad effects on the environment. What is the information you will support him with?

Unit Two

Force and Motion

- Universal forces in nature.
- Motion.

Unit Lessons

1- Fundamental forces in nature.
2- Accompanied force to motion.
3- Motion.

Objectives

By the end of this unit, a student will be able to:

1. Classify fundamental forces in nature into gravitational, electromagnetic, strong and weak nuclear forces.
2. Identify the concept of force.
3. Infer the effective factors on the attraction force between two objects.
4. Name the forces which affect an object and that resulted from an object mass effect.
5. Interpret the static and moving objects.
6. Describe the periodic motion.
7. Identify what wave motion mean.
8. Apply logic interpretations for the results of wave motion experiments.
9. Give examples of technological applications in wave motion domain.
10. Mention life examples for forces effect on living systems.
11. Prove the importance of experimentation in order to investigate the information.
12. Graph an object motion phase.
13. Cooperate with his (her) classmates to carry out experiments and deduce concepts.
14. Apply the scientific thinking skills to understand and interpret motion phenomena.
15. Identify the relative motion to an object in proportion to another one or a fixed benchmark (frame of reference).
16. Form an electric circuit to make an electromagnet.
17. Realize greatness of God in ordering the forces controlling the universal phenomena.
18. Appreciate scientists role in interpreting force and motion.

Lesson One

Fundamental forces in nature

Lesson Items

1. Gravitational force.
2. Electromagnetic forces.
3. Nuclear forces.

Lesson objectives

By the end of this lesson, a student will be able to:

- Classify universal forces in nature into gravitational , electromagnetic, strong and weak nuclear forces.
- Identify the concept of force.
- Interpret the attraction force relation between two objects and the effective factors on it.
- Name the forces that affect on the object as a result of the object mass.
- Make an electric circuit to make an electromagnet.

Life Issues

- Forces around us.

You may ask about the forces which cause some phenomena such as lightning, thunder, wind motion, Earth's pull to objects, magnet attraction to iron, generating the electric current, fire weapons, nuclear explosions and nuclear reactors..... .

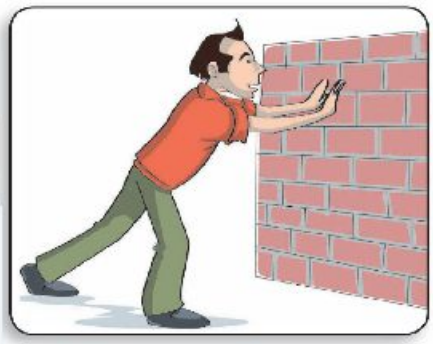
When we analyze these forces, we find that these forces are belonging to three main divisions:

1- Gravitational forces
2- Electromagnetic forces.
3- Nuclear forces.

The concept of force

Activity 1 Moving the objects

- Look at the static objects around you such as a book on a table or a static ball on the ground.
- Why do these objects remain static?
  .....
- Kick the ball gently by your foot, lift the book by your hand and transport it to another place.
- Why do these objects move?
  .....
- Push the wall by your hand . what do you observe? .....
- As you watch a football match, when the attacker kicks the ball by his head. what is the effect of the attacker's head pushing force on the ball direction?
  .....



Conclusion: Objects move when a proper force acts upon them which works on moving and changing these objects direction.

Force: Is an effect attempts to change the object state from being static to motion or vice versa, or attempts to change the motion direction.

First: Gravitational forces:

Activity 2 Earth attracts objects

- Have a set of objects that differ in mass, say (1 kg - 5 kg - 10 kg) and put them on the ground.
- Try to lift each mass and to put them on a table beginning with the smallest mass then the next in order.

- Record your observations .....
- Conclusion: The Exerted work to lift an object increases when the object's mass becomes greater.
- Interpretation: Earth attracts objects towards its center by a force known as the object's weight, this force increases when the object's mass becomes larger.

So an object weight: is the earth's ability to attract that object and it can be measured in the Newton unit and the object's effective point is located at the center of the object, this known as the object's center of gravity.

- An object's weight (w) : The product of an object mass (m) × Earth's gravitational acceleration (g). $w = m \times g$

Note: An object's weight changes from a place to another on the Earth's surface whereas its mass remains constant.

- Calculate the weight of an object if its mass is 100 kg if the Earth's gravitational acceleration is 9.8 m/sec^2.

Solution : Weight = mass x Earth's gravitational acceleration

= 100 x 9.8

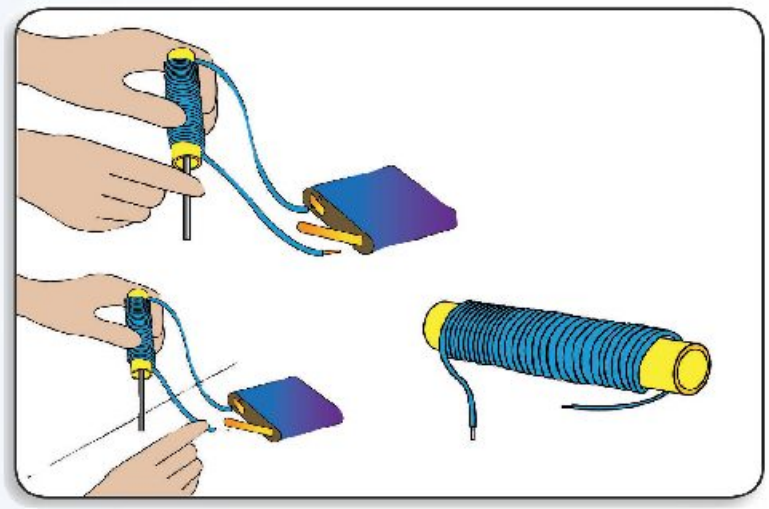
= 980 Newton

Using the Egyptian Knowldge Bank (EKB) search for the gravitational acceleration on each planet in the solar system then conclude your body weight on these plantes.

Second : Electromagnetic forces.

Activity 3 (Magnetic forces of electric current)

Materials: scissors - a long insulated copper wire - a soft iron bar or an iron nail - a dry battery (about 4.5 volts) - iron filings - two open ended plastic tubes.



Procedure:

1- Coil the wire in a spiral shape around the plastic tube as shown.

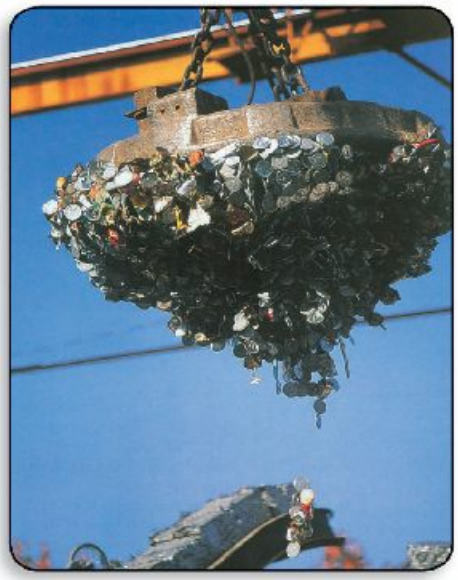
2- Insert the iron bar or the iron nail in the tube, and connect the two ends of the wire with the battery then approach the iron core inside the tube to the iron filings.

Record your observations: .....

Conclusion: Electric current has a magnetic effect.

Electromagnet

- It is made up of an isulated copper wire coiled around a bar of soft iron, and when an electric current passes through the coil, it works as a magnet.
- Electromagnet is used in many devices such as the cranes which lift scrap iron and cars in ports. In addition, it is used in making electric bells as well.



Electric generators and electric motors

These devices depend mainly on electromagnetic forces to work.

1- Electric generators: are devices converting the mechanical energy into an electric one such as dynamo.

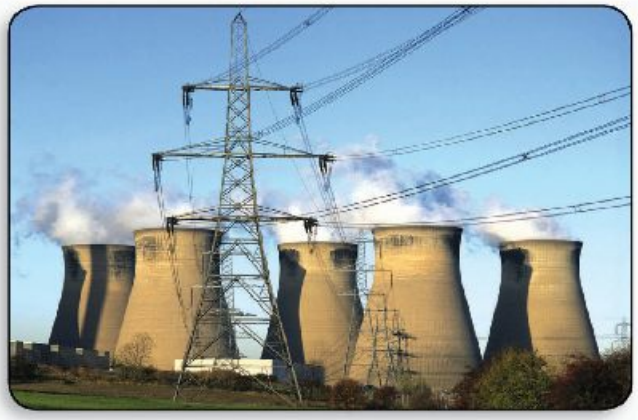
2- Electric motors: Work on converting electric energy into mechanical energy such as the electric motor in the fan or the blender (mixer).

Electric generator

Third: Nuclear forces

Scientists have discovered that an atom stores a massive amount of energy inside the nucleus. They succceeded in releasing this nuclear energy out and use it in the military and peaceful purposes.

This massive energy is accompanied with forces known as nuclear forces which can be divided into:



1- Weak nuclear forces: used to get radioactive elements and radiations used in medicine, scientific researches and in industry.

2- Strong nuclear forces: used in producing electric energy from the nuclear energy and in the military purposes too.

Egypt hopes to use nuclear energy in producing electricity.

Summary

The universal forces in nature are :-

1- Gravitational forces. 2- Electromagnetic forces.

3- Nuclear forces

- Force: is an effect that attempts to change the object state from being static to motion or vice versa or attempts to change the motion direction.
- An object weight is the amount of earth's attraction to that object.

The electromagnet: consists of a coil of insulated copper wire around a rod of soft iron. When an electric current passes through the coil, it acts as a magnet.

Optional activities:

Choose an activity of the following and perform it then add it to your portfolio.

- Form a simple dynamo using an isolated thin copper wire and a strong magnet on a shape of a bar.
- Make an album for technological applications of the electromagnetic forces.

Exercises:

Question 1 Choose the correct answer:

1- Earth's gravitational acceleration changes from a place to another on the earth's surface because of the.....

a) objects' masses
b) earth's mass
c) distance from the earth's center
d) temperature.

2- The electromagnet is used in making the .....

a) calculator
b) electric bell
c) microscope
d) night vision system

Question 2: Define the following:

force - weight.

Question 3:

a) If the earth's gravitational acceleration in a place is 9.8 m/s ^{2}, find the weight of the following.

1- A 0.3 Kg mass ball.

2- A 50 kg mass boy.

b) What is the input energy and output energy in the following devices?

1 Electric motor

2 Electric generator

Lesson Two

Accompanied forces with motion

Lesson Items

1. Inertia.
2. Friction.
3. Forces inside living systems.

Lesson Objectives

By the end of this lesson, a student will be able to:

- Identify the concept of inertia.
- Identify the benefits and harms of friction.
- Give life examples of force effect in living systems.
- Cooperate with his (her) classmates to perform experiments and deduce concepts.

Life Issues

- Safety and security.

First: Inertia:

Every day, you may watch things like:

1- Vehicles (buses) passengers or the driver are rushed forward once the vehicle suddenly stops.

2- Vehicles (buses) passengers are rushed back once the vehicle starts motion suddenly from rest.

3- A football player rushes forward and falls on the ground if he is tripped during running.

To interpret that, let's perform the following activities.

Activity 1 (Objects resist change)

Carry some small plastic cubes on your palm and stretch your arm forward ..... then walk forward fast and stop at once.

What happened? .....

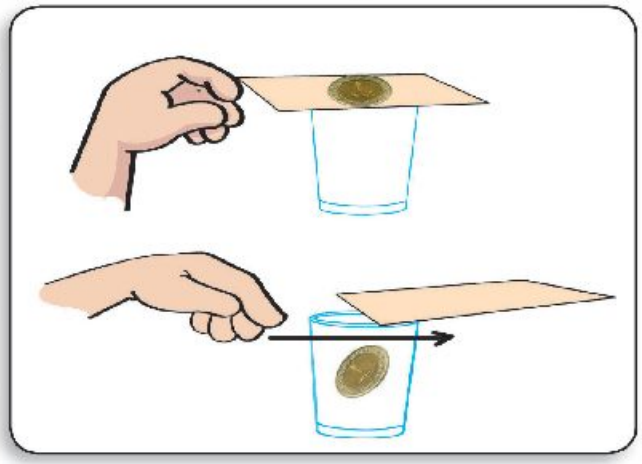
Conclusion: .....

Forces of inertia affect on objects either in motion or at rest. It is the same force that affects the car passenger during its sudden stop. Any object inside the car is in motion having the same car speed. When the driver applies the brakes suddenly, the car stops, but the objects inside the car keep moving.. and also the forces of inertia affect the objects at rest. The same as movement of passengers to backward in a car at rest when it moves forward suddenly.

Activity 2 Inertia

1- place a piece of cardboard paper on the top of a glass cup and put a coin on it.

2- Use your index (fore) finger to deliver a quick hit to the paper.



What happens? .....

.....

Conclusion: .....

.....

The paper moves because your finger's hit was at a high speed . But the coin could not match up with your finger's rapid hit due to its inertia and resistance to the sudden movement. so, it remains static then it fell into the cup.

Inertia: is a property of an object to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acts upon it.

Or each object can't change its state (either motion or rest) unless an external force acts upon it.

Safety belts and inertia forces: work on stopping the forces of inertia not to injure (hurt) car or plane passengers when a sudden change in motion occurs.

Second: friction:

Activity 3 (friction brakes)

- When you ride a bike and it becomes fast then you want to slow it down or stop it, what do you do? .....
- What is your interpretation to the bike stopping? .....

Conclusion: Friction between the object in motion with the ground, air or the surrounding medium generates a force against the motion to resis it.

Benefits of friction

1- It prevents feet from slipping on roads during walking.

2- It helps to stop and start cars' motion.

Harms of friction

1- It causes a great loss of mechanical energy because this energy is changed into heat .

2- Generated heat due to friction causes some parts of the machines to get hot, in addition this heat causes expansion of these parts so it affects their performance.

3- It causes the erosion of machine parts and damages them as well.

Exercise Give the reason.

A) Car tyres are covered with a very coarse substance.

B) lubricating and oiling mechanical machines.

Third: Forces inside living systems:

Activity 4 (Force effects on living systems)

Record your observations about the following:

1- Blood rises (goes up) to the heart from the bottom (lower parts) of the body against gravity.....

2- The heart pumps the blood all over the body organs .....

3- Using the water pump to pump water upwards from canals and the ground water to irrigate plants.....

4- Water and salts go up from soil to plants .....

● **Conclusion:** There ara forces inside living systems that enable living organisms to do their different biological operations. This happens in all simple systems from the unicellular living organisms to complex systems inside multicellular living organisms such as:

1- Heart muscle contraction and relaxation.

2- Pulse inside blood vessels.

3- Liquids transport through pores and the walls of cells from the lower concentration to the higher one.

4- The contraction and relaxation of muscles to move the body organs.

Use the Egyptian Knowldge Bank to make an essay about the benefits and damages caused by friction and How it affects man's life? Discuss your findings with your teacher and classmates.

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Summary

There are forces produced when objects move or when their motion state changes:

- Inertia: Is a property of an object to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acts on it.
- Friction forces: are resistant forces (against motion) originated between the surface of the object in motion and the medium touching it.
- There are forces inside living systems that help changes to continue insid the living organism and keep its survival and vitality.

Optional activities:

- Write down a report about the daily applications of inertia, then add it to your portfolio.
- Write briefly about the scientists who studied the universal forces in nature.

Exercises:

Question 1: Choose the correct answer:

1- The car brake performance is an application of .....

a) gravitational forces
b) friction forces
c) centrifugal forces
d) forces of inertia.

2- The inertia force affects the ..... objects

a) moving
b) static
c) moving and static
d) no correct answer

3- Of the examples of forces inside living systems :

a) Pulse inside blood vessels.
b) inertia
c) brakes
d) all the previous.

Question 2:

Name three benefits and three harms of friction forces.

Question 3: Give reasons:

1- The car passengers are rushed forward when the car stops suddenly.

2- The car passengers are rushed backward when the car moves suddenly.

3- Policemen advise drivers to use safety belts in cars and planes.

Lesson Three

Motion

Lesson Items

1. Relative motion.
2. Types of motion.
3. Applications on wave motion.

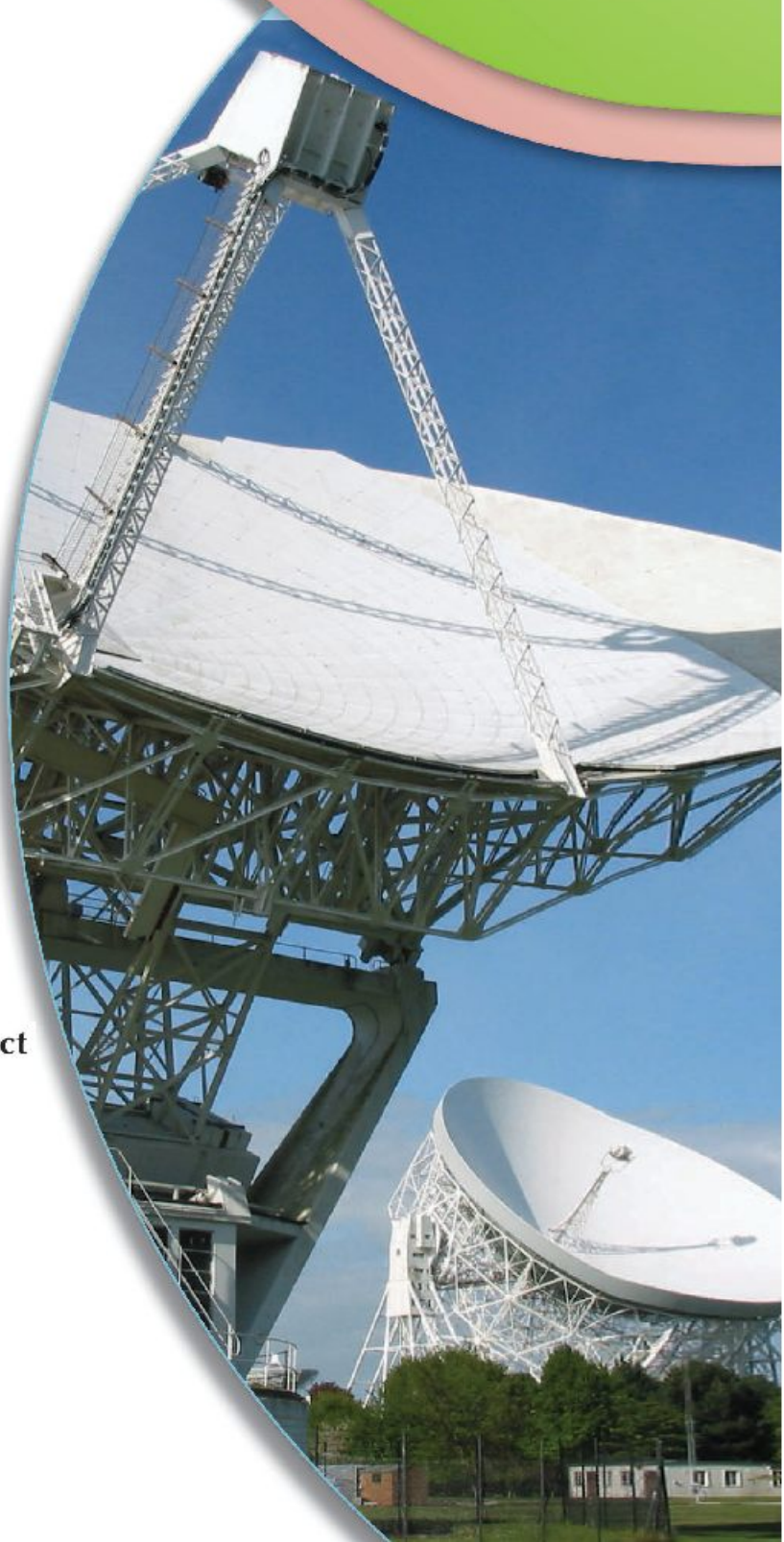
Lesson Objectives

By the end of this lesson, a student will be able to:

- Identify wave motion.
- Give logic interpretations for the results of wave motion experiments.
- Give examples for technological applications in the field of wave motion.
- Cooperate with his (her) classmates to perform the experiments and deduce the concepts.
- Use scientific thinking skills to understand and interpret the motion phenomena.
- Identify the relative motion to an object in proportion to another object or a fixed frame of reference.

Life issues

- Globalization



First: Concept of motion:

Activity 1

Motion is a change in position of an object over time relative to a reference point.

The body is said to be at rest, motionless, if the position of the body is not changing with respect to the reference point.

Activity 2

Second: Concept of relative motion:

Imagine that you are in a moving car and another car is going by your side in the same direction, and another car is moving against your direction ..Record your observations about your car motion in relative to the other cars:

1- The car moves by your side with the same speed.
2- The car moves against your direction.
3- A stopping car.
4- When you stop your car, when do you feel that your car is moving forward and another time backward although it is at rest?

Record your observations: ..... Conclusion: .....

Relative motion: It is the change of an object's position or its direction as time passes in relative to another object or a fixed point known as a frame of reference

Third: Typer of motion

Activity 3

(Diversity of motion)

(A) Observe the following objects' motion:

- one of the fan arms while it is on.
- a piece of cork on water surface.
- the pendulum motion.

Record your observations: .....

(B) Observe the following objects' motion.

- A car motion
- A train motion
- A football player motion.

What do you observe? .....

Conclusion: motion is divided into several types transitional motion and periodic motion.

(1) Transitional motion:

It is the motion which the object position is changed relative to fixed frame of reference from time to time from an initial position to final one, such as the train and bike motion.

(2) Periodic motion:

It is the motion which is regularly repeated in equal periods of time such as.

- Vibrating motion: such as the pendulum.
- Circular motion: such as movement of the moon around earht.
- Wave motion: such as water waves shown by a piece of cork which appears on the vibrating water surface.

Applications on wave motion:

You have known that sound and light are forms of energy and transfer from a place to another in a form of wave motion .... what is the difference between those two types of energy?

Lightning and thunder

Lightning and thunder occur just before raining, but we see lightning before hearing the thunder. (However), both occur at the same time.

Thunder sound transfers in a form of mechanical waves (sound) where as lightning flash transfers in an other type of waves known as electromagnetic waves:

- Waves are divided into two types:

(A)- Mechanical waves: they are characterized by:

1- vibration of the medium particles.

2- It needs a medium to transfer through.

3- Its speed is relatively low.

Examples of mechanical waves:

sound waves - water waves.

(B)- Electromagnetic waves: They are composed of electromagnetic fields and spread out in all media and space, these waves' speed are extremely great and can be accounted as 300 million m/s

Examples of electromagnetic waves:

Light waves - micro waves - radio waves - ultra violet and infrared rays radiated by sun.

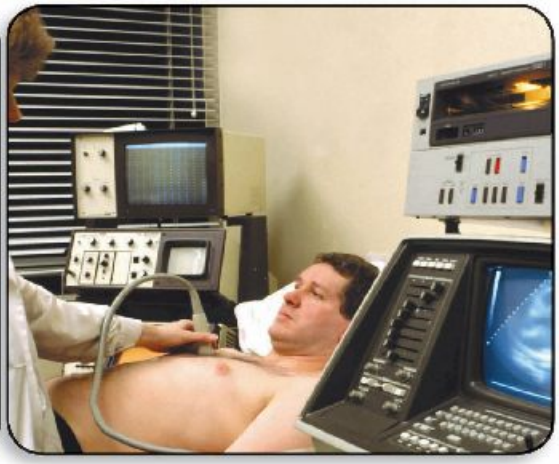
Some technological applications for waves:

First: some Technological applications for mechanical waves:

1- Examining and curing equipment for the human body using sound waves.

2- Stringed musical instruments (having strings) such as violin, lute and guitar and pneumatic musical instrument such as flute and the reed pipe with all its types.

3- Amplifiers and the devices of distributing and controlling sound used in broadcasting studios.



Second: Some technological applications for electromagnetic waves:

Night vision apparatus

1- Applications of infra red reys:

- Night vision systems are used by modern military forces.
- Remote sensing instrument that photograph Earth's surface using satellites.
- Cooking food since it has a heat effect.
- Operation of remote control units to control and operate electric appliances.

Captured photo via night vision apparatus

2- Applications on ultraviolet rays.

- Sterilizing the sets of surgical operation rooms.

3- X - rays applications:

- Imaging bones to detect the sites of bone fractures.
- Examining metal raws in industry and showing defects pores and cracks in these metals.
- Studing the inner structure of mineral crystals .

4- Gama rays applications:

- Used in medical purposes such as the treatment and detecting some tumors.

5- Visible light (seen):

- Used in photographic cameras, television cameras and data show devices.

Summary

- Motion: it is a change in an object position or direction as time passes with respect to another object or a fixed point known as point of reference and can be divided into periodic and transitional motion.
- In general, waves are divided into two types:

(A) Mechanical waves. it has this name because:

1- It causes a vibration to the particles of a medium.

2- It needs a medium to transfer through.

Examples of mechanical waves:

- Sound waves -The waves on the water surface.

(B) Electromagnetic waves: These waves are composed of electromagnetic fields and spread out in all the material and vacuum (space).

Examples of electromagnetic waves:

Light waves - micro waves - radio waves - ultraviolet rays and thermal rays (infrared rays) which are emitted by the sun.

Optional activities:

1- Write a report about the technological uses and applications of electromagnetic waves, then add it to your portfolio.

2- Make an album of the pictures to show different applications of the motion types in our daily practical life then add it to your portfolio.

Exercises:

Question 1 Choose the correct answer:

1- In the periodic motion, ...

a) the pathway is straight
b) motion is regularly repeated
c) mass is regularly repeated
d) speed is regularly changed.

2- All the following are periodic motions except for the .....

a) fan motion
b) pendulum motion
c) train motion
d) sun flower motion.

Question 2: Define each of the following

- Speed
- Relative motion
- Transitional motion
- Periodic motion

Question 3: Give reasons

1- We receive the sunlight at the same time we don't hear the sound of solar explosions.

2- Astronauts can't hear each other voices directly in space.

Unit two General Exercises:

First: Choose the correct answer:

1- A force is an effect that .....

a) always changes the phase of an object motion.

b) never changes the phase of an object motion.

c) always changes an object position and direction.

d) may change the phase of an object motion.

2- An object weight on the Earth's surface is related to the ..... forces.

a) electromagnetic

b) gravitational

c) weak nuclear

d) strong nuclear.

3- The amount of earth's gravitational pull on the object is :

a) object mass

b) object weight

c) gravity acceleration

d) centrifugal force.

4- Electromagnetic forces affect on the operation of the following except for the.....

a) dynamo (electric generator)

b) electric motor

c) car internal combustion engine

d) electromagnet.

5- When the horse is tripped, the horse rider is suddenly pushed forward, this is related to the force of .....

a) inertia

b) centrifugal

c) attraction

d) The horse pushing

6- The following forces and operations are an application on friction except for .....

a) walking on the road.

b) car motion due to rotation of its wheel.

c) operation of dynamo (electric generator).

d) Stopping the car using the brakes.

7- All the following are periodic motions except for.....

a) the fan motion

b) the pendulum motion

c) the projectile motion

d) the light waves

8- All the following are electromagnetic waves except for the .....

a) thermal rays (infrared)

b) visible light

c) sound waves

d) ultraviolet rays

Second: various questions

1- What is meant by .....?

a) relative motion.
b) periodic motion.
c) an object weight 60 N
d) inertia

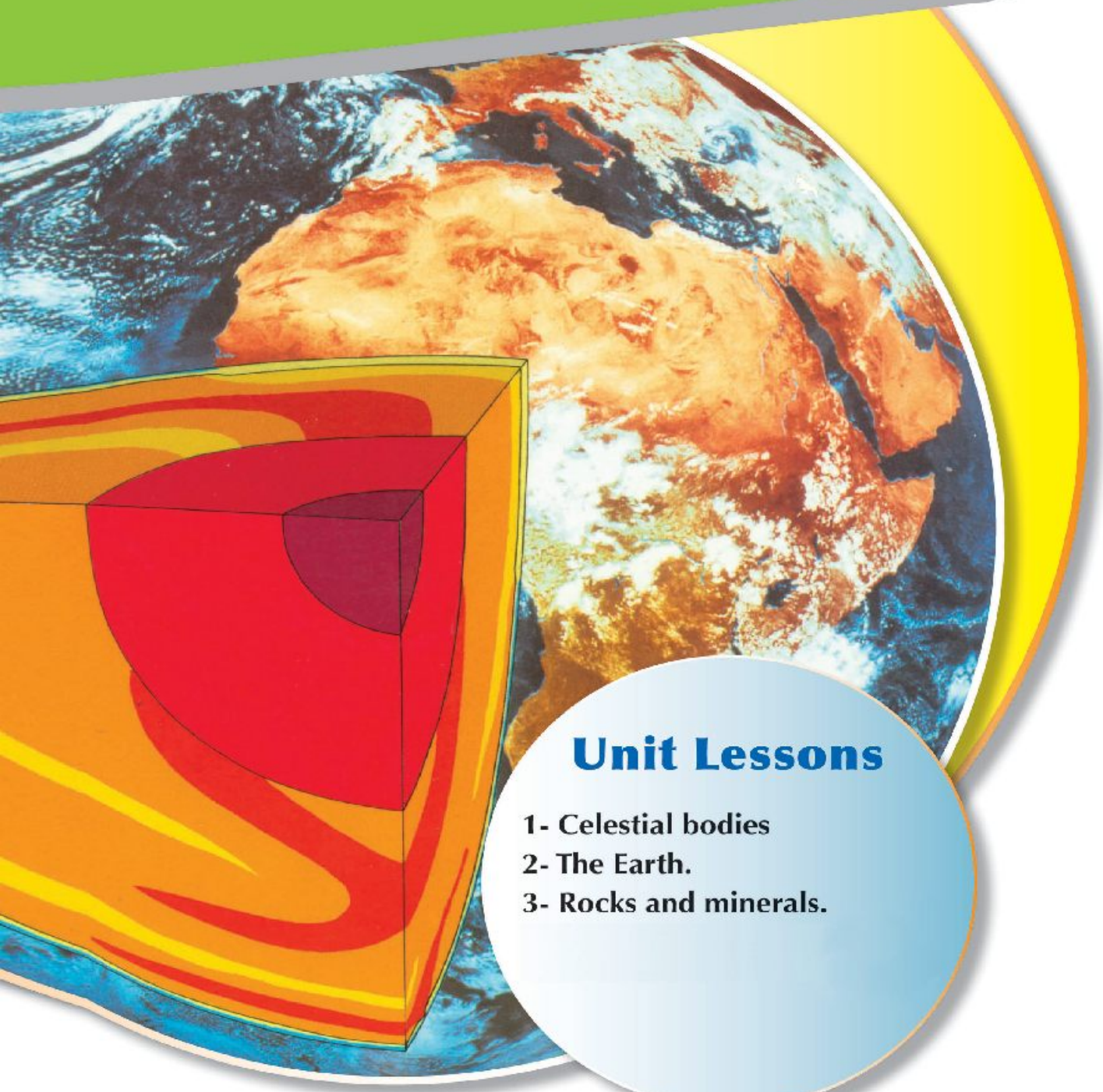
2- Give reasons:

a) Gravitational acceleration is changed on earth's surface from place to another.
b) An object weight is changed from a place to another.
c) When a car stops suddenly, passengers are pushed forward.

3- Give the scientific term.

a) An object position changes as time passes from its initial position to a different final one.
b) The amount of earth's gravitational pull on an object.

Unit Three
Earth and Universe



Unit Lessons

1- Celestial bodies
2- The Earth.
3- Rocks and minerals.

Objectives

By the end of this unit, a students will be able to:

1. Identify planets, stars and moons.
2. Identify asteroids, comets and meteorites.
3. Compare between the planet, the star and the moon.
4. Compare between the planets and asteroids.
5. Identify the location of Earth in the solar system.
6. Identify Earth's volume, shape and mass.
7. Explain the characteristics of the Earth that support the continuity of life.
8. Explain the difference of gravity from a planet to another.
9. Identify the characteristics of the inner and outer planets.
10. Compare between the characteristics of both inner and outer planets.
11. Explain some celestial bodies pictures that are taken by telescopes or satellites.
12. Indicate the inner structure of the Earth.
13. Explain the different types of rocks.
14. Compare between the three types of rocks.
15. Give examples of different types of rocks.
16. Identify some minerals that forming rocks.
17. Appreciate the grandeur of Allah in providing all reasons of life on Earth's surface.

Lesson One

The celestial bodies

Lesson Items

1. The Galaxy
2. The Solar System
3. The Planets of the Solar System

Lesson Objectives

By the end of this lesson, a student will be able to:

- Identify the galaxy as the universe unit.
- Identify planets, stars and moons.
- Compare the planets, the stars and the moons.
- Compare between the planets and asteroids.
- Compare between the inner and the outer planets.
- Explain the difference in gravity from a planet to another.
- Design a model of the solar system.
- Appreciate the grandeur of Allah in his Excellence for the universe creation.

Life Issues

- Globalization

The celestial bodies:

Celestial bodies that include every thing such as stars, planets, moons and rocky or even gaseous bodies all move in space. They are in a permanent motion according to the will of Allah.

If you look at the sky in a clear night, you will see so many of stars that appear small although they are big sized bodies. They emit enormous amounts of heat and light. They are millions of kilometers away from us. So, astronomers don't measure the distance between stars in kilometers but in light years.

The light year:

It is the distance covered by light in a year. It equals $9.467x\ x10^{12}$ km.

Celestial bodies are found in groups known as galaxies.

Galaxies:

Are the greatest units that form the universe. A galaxy is a tremendous collection of stars which are estimated by thousands of millions. The galaxy that our solar system belongs to is known as «The way of chopped hay» or «the Milky way».

It takes an oval shape from which coiled spiral arms are extended. The lies on one of these spiral arms.

The solar system

The solar system exists in the Milky way or the way of chopped hay. Throught the astronomical explorations, astronomers knew that the solar system consists of one star, which is the sun, and eight planets revolving around it. In addition to some smaller sized other components.

Planets:

they are eight spherical opaque bodies revolve around the sun in one direction (mostly anti clockwise) in a semi - circular or elliptical (oval) paths. These paths lie in one plane perpendicular to the sun's axis of rotation (spinning) around itself.

Milky way

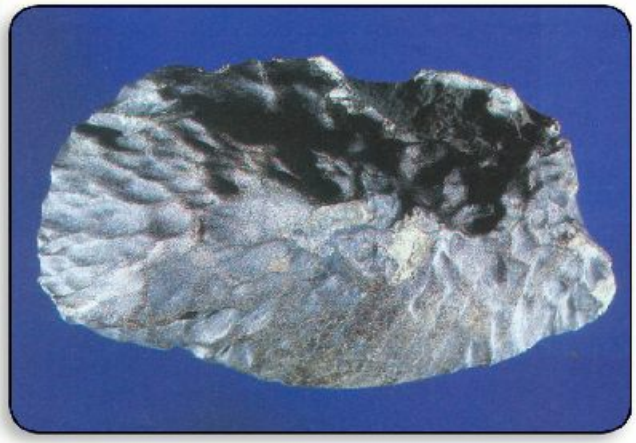
Moons:

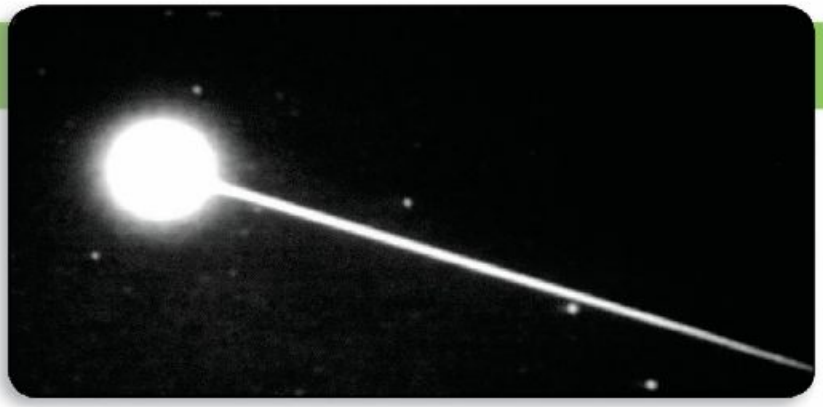
They are small bodies that are affected by the gravity of the larger planets and rotate around them, as in the case of the moon which is the follower of the Earth.

The planet	Number of moons rotating around it
Mercury	None
Venus	None
Earth	One
Mars	Two
Jupiter	Sixty two
Saturn	Sixty
Uranus	Twenty seven
Neptune	Twelve

Asteroids:

They are thousands of different sized rocky masses. Most of them rotate between the two orbits of Mars and Jupiter in a certain region known as the wonderer asteroid belt. This belt separates the group of the inner planets from that of the outer planets.





Meteors:

They are the small rocky masses that fall within the atmosphere and burn due to the heat produced from their friction with air. They are in the form of luminous arrows that can be seen with the naked eye.

Meteorites:

They are the huge solid rocky masses that fall and did not burn completely as they penetrate the atmosphere. Some parts of them reach to the Earth's surface.

The biggest meteorite till now is a mass of 80 tons and exists at the southern west of Africa.

Comets:

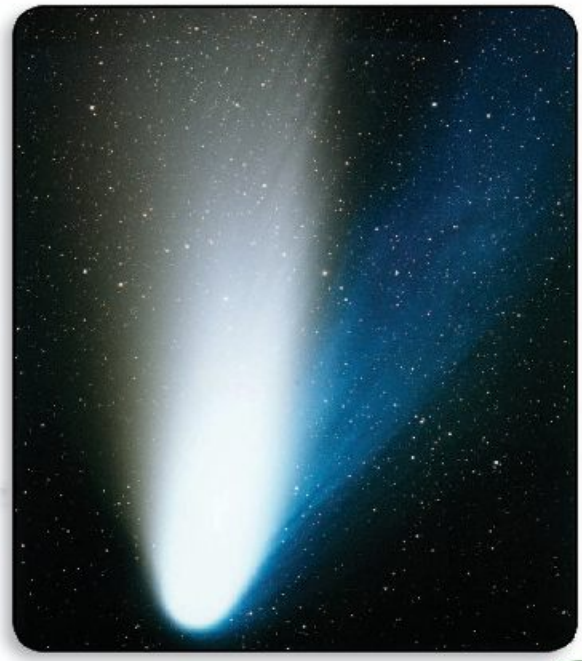
They are masses composed of rocks, ice and solidified gases. They rotate around the sun in more elongated elliptical orbits intersecting with the orbits of the planets.

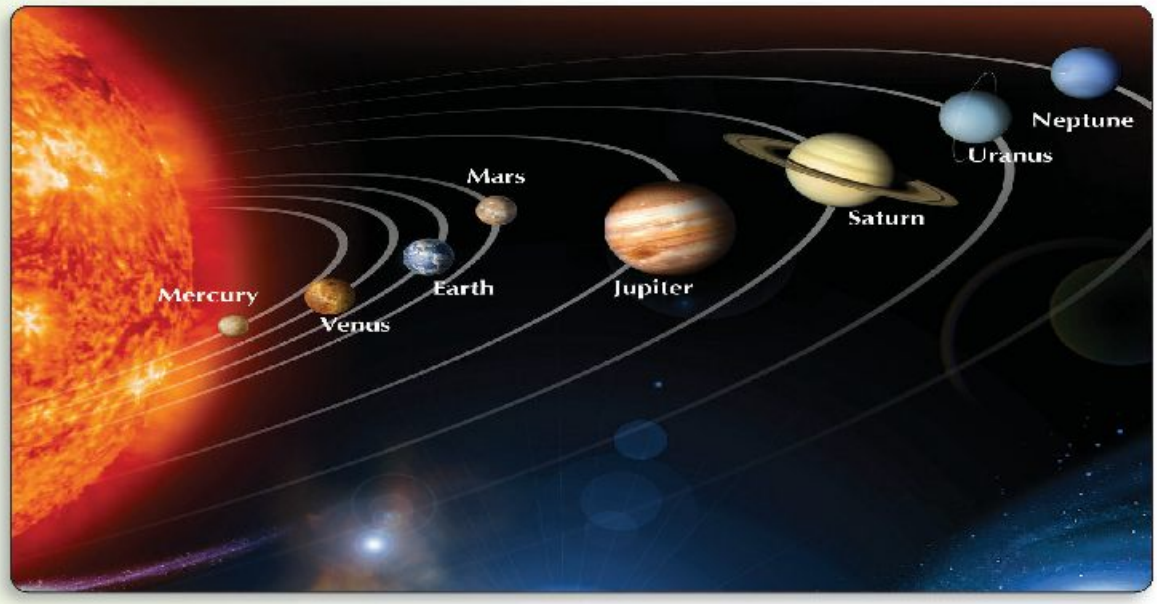
A comet is consisted of a head contains ice spheres which is a mixture of solidified gases (carbon dioxide, nitrogen and methane gases) and rocky parts, dust and water molecules.

The second part of a comet is the tail which is consisted of a gaseous cloud.

The most famous comet is Halley's comet.

It completes one rotation around the sun every 76 years.





Planets of the solar system

Activity 1 (Dividing the planets of the solar system)

In the following table, divide the planets of the solar system into two groups in view of their distance from the sun.

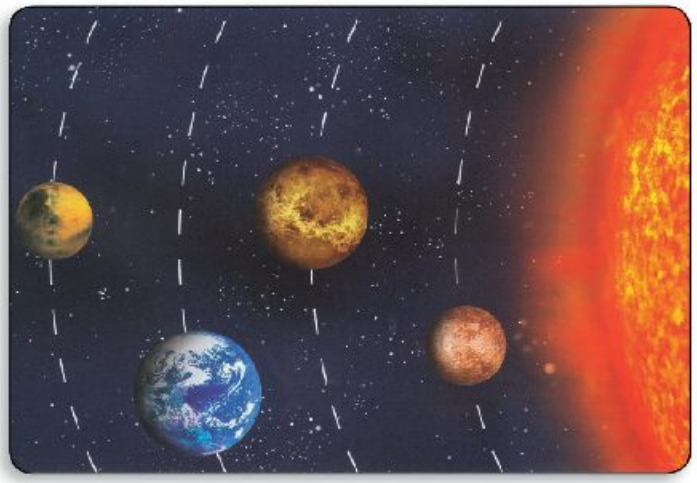
The nearest group of planets to the sun	The farthest group of planets from the sun
1-	1- . . . . .
2-	2- . . . . .
3-	3- . . . . .
4-	4- . . . . .

- What do you observe? .....
- Conclusion: .....

Based on their distance from the sun, the planets of the solar system are divided into two groups:

a- The inner planets group (the nearest to the sun).
b- The outer planets group (the farthest from the sun).

a- The small or inner planets group:



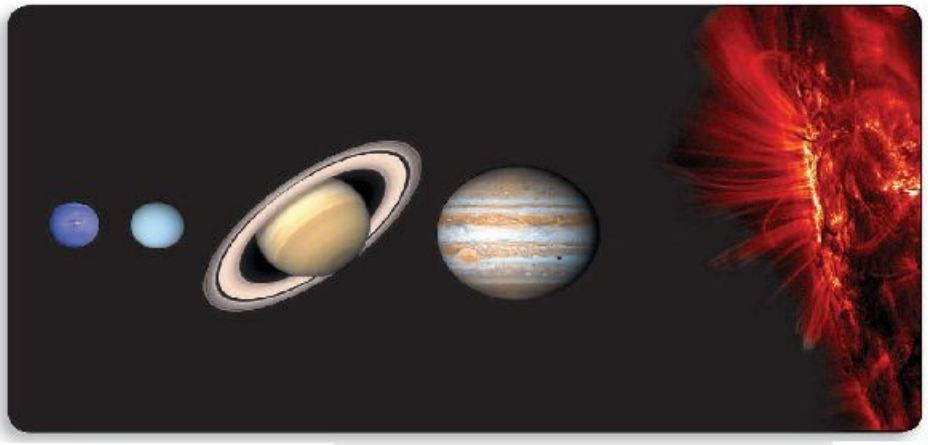
It is the nearest to the sun and includes: Mercury, Venus, Earth and Mars.

They all are small solid bodies and their densities are high ranging between 3.3 to 5.5 g/cm^3.They have a solid surface and all of them have an atmosphere except Mercury.

b- The big or outer planets group:

They are the farthest planets from the sun including: Jupiter, Saturn, Uranus, and Neptune. They are also known as the giant planets because they are big sized. They have low densities ranging from 0.7 to 1.3 gm/ cm^3 because they are consisted of gaseous elements, where the most important of them are the hydrogen and helium.

Scientists explained the presence of hydrogen gas in a solidified state due to the high pressure and extreme coldness on these planets surface. These outer planets are characterized by the presence of a large number of moons rotating around each one of them

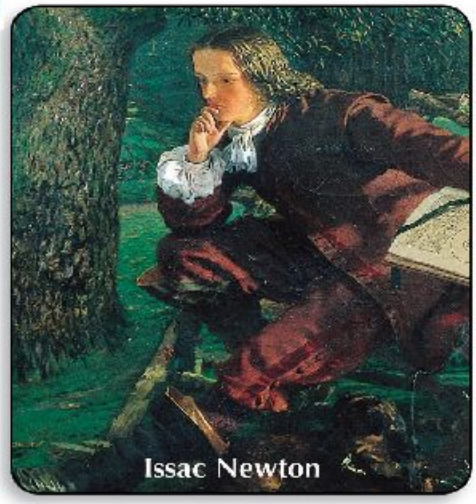


Exercise

In the light of the characteristics of inner and outer planets that you have studied, complete the following table:

Planets characteristics / Planet group	Inner planets	Outer planets
1- Planets names.	. . . . .	. . . . .
2- Distance from the sun.	. . . . .	. . . . .
3- Composition	. . . . .	. . . . .
4- Density	. . . . .	. . . . .

The difference of gravity acceleration on the planets surfaces:


Issac Newton

Once upon a time, sir Isaac Newton was sitting under an apple tree in his home garden. Suddenly an apple fell on his head. Newton's explanation of this phenomenon was the Earth has a gravity caused the apple falling towards the ground.

He proved that there is a force of gravity between any two objects in the space.

This force of gravity depends upon the mass of the two objects and the distance between them. All planets in the solar system revolve around the sun by action of the Sun's gravity on them.

The gravity on the surface of any planet differs from that on the surface of any other planet. The following table shows the acceleration of gravity on the surface of all planets:

Planet	Acceleration of gravity on the surface (meter/second^2)
Mercury	3.78
Venus	8.60
Earth	9.78
Mars	3.72
Jupiter	22.88
Saturn	9.05
Uranus	7.77
Neptune	11.00

Activity 2 (Planets gravity):

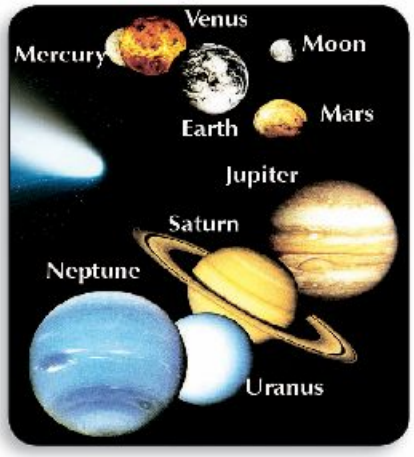
Arrange the solar system planets ascending regarding of their force of gravity mentioned in the table above.

..... , ... , ... , ... , ... ,
..... , ... , ...

Activity 3 (Studying the celestial bodies pictures):

- The figure in front of you shows celestial bodies picture from the space by a satellite.

Try to differentiate between these celestial bodies that spread over the space regarding of their: shape - volume - type.



Telescope:

It is one of the most important instruments that are used in identifying the celestial bodies.

There are many Types of it, the most important are the reflecting telescope and the refracting telescope.

Reflecting telescope

Refracting telescope

Optional activities:

Choose one of the following optional activities, carry it out, and keep it in your portfolio:

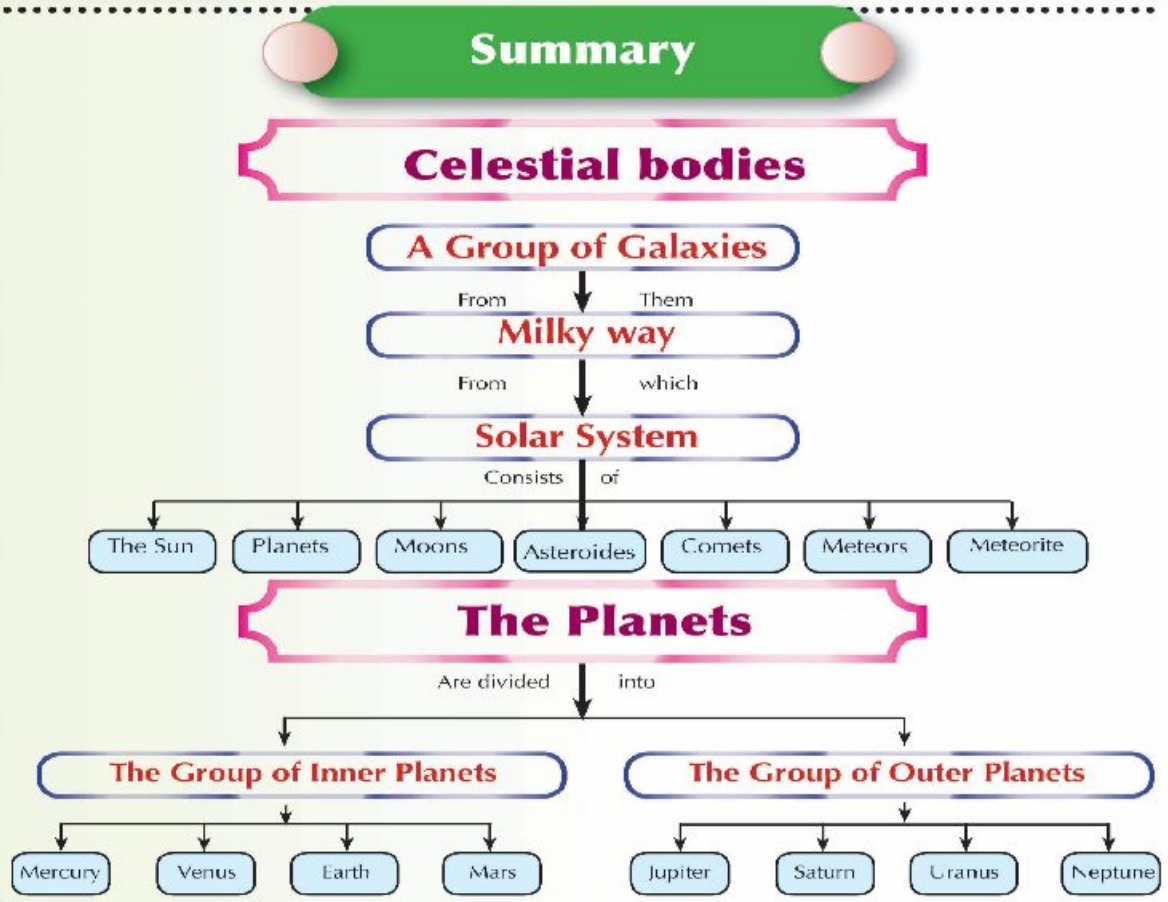
1- Write a brief account about the inner planets.

2- Design a model of the solar system.

Use EKB the first scientist who invented a telestope wase the scientist Galileo and it is called Galileo telescope.

By the help of EkB make a research aboute telescopes and attach photo and videos.

Summary



Exercises:

Question 1: Give the scientific term for each of the following:

a- A system that consists of thousands of millions of stars.

b- Small space bodies that are affected by the planets gravity.

c- Solidified masses of ice, gases and rock pieces revolving around the sun.

Question 2: Give reason:

a- The density of outer planets is low.

b- The gravity on Earth's surface is larger than that on Mars's surface.

c- Astronomers do not measure the distance between the planets by kilometers.

Question 3: Compare between each of the following

a- Meteorites and meteors

b- Asteroids and planets

Question 4: Complete each of the following:

a- The force of gravity between two objects depends on .....and .....

b- The biggest planet in volume is .....and the highest one in density is the.....

c- The nearest planet to the sun is .....where the farthest one from the sun is .....

Question 5: Choose the correct answer:

1- Planets revolve around the sun in .....paths.

a- circular b- elliptical c- spiral d- irregular.

2- Which of the following planets has the largest gravity on its surface?

a- Mars b- Mercury c- Venus d- Earth.

3- In addition to the sun, the solar systems includes:

a- eight planets only.

b- asteroids, meteorites and comets only.

c- stars and planets.

d- eight planets with the asteroids, meteorites and comets.

Self reflection and self evaluation

Dear student .. after you finished studying the celestial bodies, please fill in the following card:

a- What are the parts that admired you in this lesson?

.....

b- What are the parts that not admired you in this lesson?

.....

c- What are the mistakes that you do during carrying out the activities and exercises in the celestial bodies lesson?

.....

d- What are the mistakes that you can avoid in the next activities?

.....

The Earth

Lesson Two

Lesson Items

1. Location and characteristics of the Earth.
2. Earth is the planet of life.
3. Inner structure of the Earth.

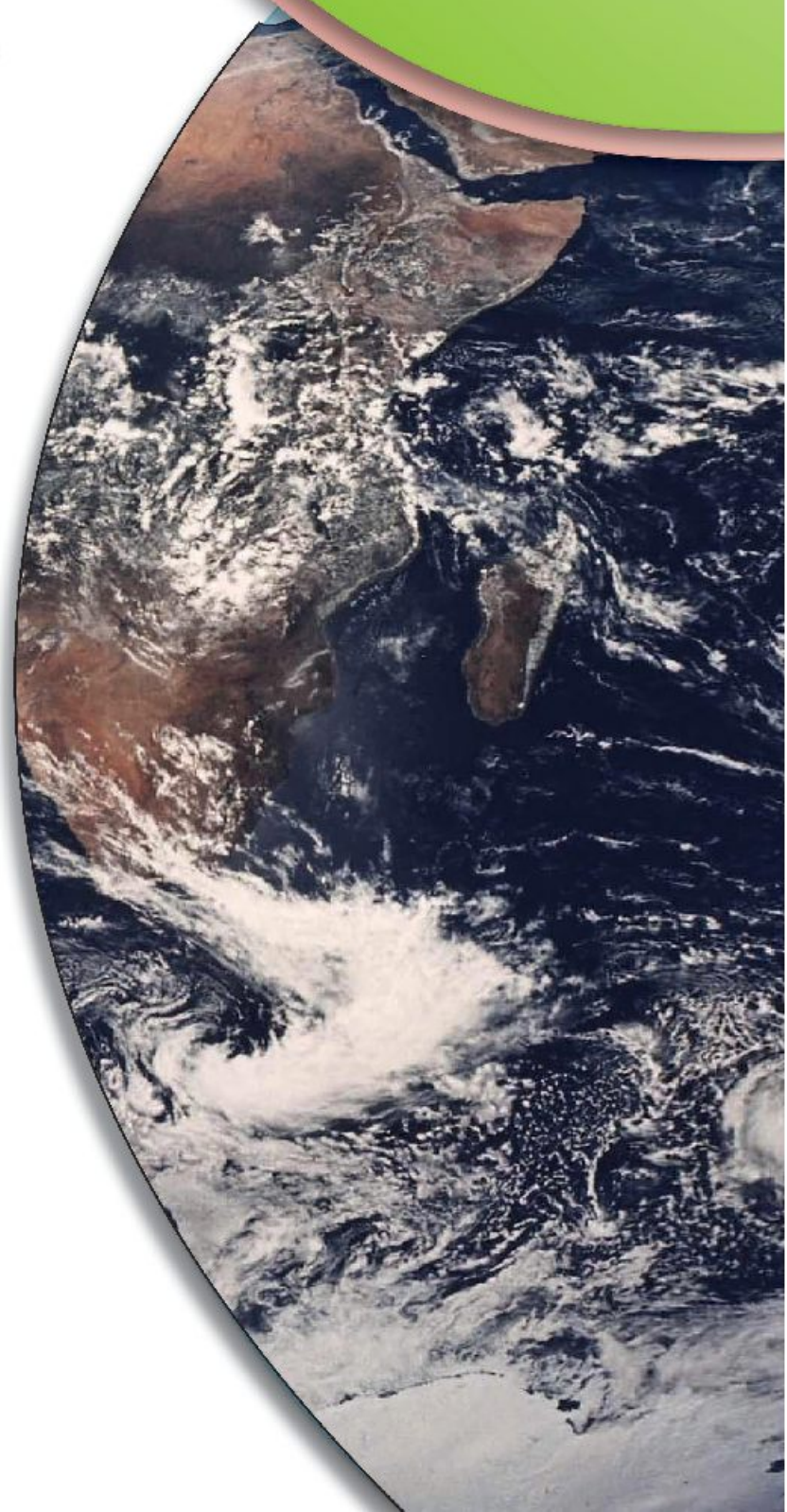
Lesson Objectives

By the end of this lesson, a student will be able to:

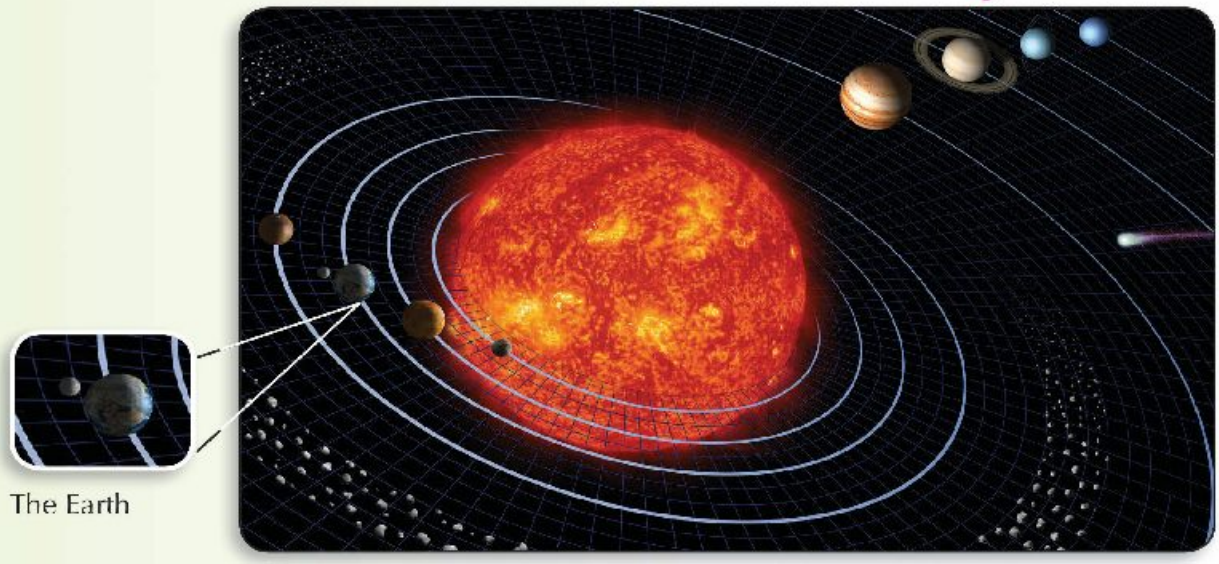
- Identify the Earth location in the solar system.
- Infer the Earth volume in proportional to the other planets of the solar system.
- Explain the causes of life existence on the earth's surface.
- Identify the Earth's atmosphere and hydrosphere.
- Explain the inner structure of Earth.
- Draw a section showing Earth structure.
- Appreciate the grandeur of Allah in creation the Earth and providing all causes of life existence on Earth`s surface.

Life Issues

- Earth protection.



Earth location within the solar system



The Earth

Earth that we live on is one of eight planets revolving around the sun by the action of gravity in a group known as the solar system. Sun occupies the center of the solar system, and the earth revolves a complete revolution around the sun within 365.25 days.

You have learnt some information about the Earth through your study to the social studies curriculum.

Activity 1 (Earth location within the solar system)

Look at the picture of solar system and try to identify earth location regarding:

First: its distance from the sun.

Second: its volume in proportion to other planets of the solar system.

Record your observations: .....

Earth locates in the third arrangement regarding the distance from the sun. It is proceeded with Mercury and Venus. The distance between the Earth and the Sun is about 150 million kilometers.

Earth shape:

Earth is a spherical object accompanied with a slight flattening at the 2 poles and indented at the equator where the tropical radius increases 22km approximately than the polar radius.

Earth volume:

Concerning volume, Earth occupies a medium position in the solar system. It is bigger than the small planets (mercury,) Venus and Mars so it occupies the fourth order regarding the volume. Its average radius is about 6386 kilometers approximately.

Earth mass:

Earth is considered as the biggest mass in the inner planets of the solar system, where its mass is 5.9×10^{24} kilograms.

Characteristics of the earth supporting the continuity of life:

Allah creates the Earth granting it some of the characteristics that keeps the continuity of life on its surface.

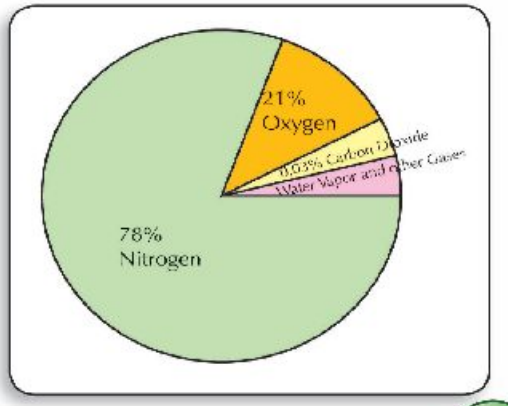
Activity 2 **First: The Earth's atmosphere (Earth's atmosphere):**

The picture in front of you shows the Earth. This picture is captured from the moon surface. Explain why does a white colour exist around the earth?

Conclusion:.....

The earth is surrounded by an atmosphere consisting of a group of gases that are shown in the following table:

Components of the atmosphere	Percentage
1-Oxygen	21 %
2- Nitrogen	78 %
3- Carbon dioxide	0.03 %
4- Water vapour	Variable percent
5- Other gases	Very little percent



Importance of the Earth's atmosphere:

1- The atmosphere is consisted of very important gases like oxygen which is used by the living organisms in their respiration process and helps in burning processes burning of (fuel). Nitrogen gas is one of the atmosphere components as well which reduces the effect of oxygen in burning processes. Plants use nitrogen gas to form the proteins. In addition to carbon dioxide gas which is used by green plants in photosynthesis process to form food for all other living organisms, including people.

2- The great extension of atmosphere in the space helps in burning millions of small falling meteors completely before reaching Earth's surface. It also reduces the high speed of large meteorites and burn a part of them before their hitting with Earth's surface.

3- The weather and climate phenomena take place within the atmosphere, such as wind movements, clouds formation, and rain falling in order to complete the water cycle.

4- It participates in keeping the temperature suitable on Earth.

5- Atmosphere contains the «ozone layer» which protects the living organisms from the harmful «ultraviolet» sun rays this layer protects all of the living organisms.

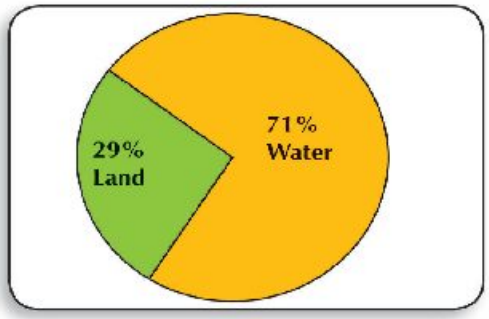
Activity 3 Second: Earth's hydrosphere:

(Water distribution on Earth's surface):

Look at the previous picture and answer the following questions:

- In your opinion, what does the blue colour in the picture represent?
- What is the percentage of the blue colour in proportion to land?
- In your opinion, what does the green colour in the picture represent?
- What is the percentage of the green colour in proportion to the earth?

The blue colour you see on the earth's surface represents the water bodies that include oceans, seas, lakes, and rivers. They represent about 71% of the Earth's surface area.



This water is divided into:

Salty water: which represents 97% and exists in oceans and seas.

Fresh water: which represents 3% and exists in rivers, lakes, and the snow at the two poles.

Ground water: which exists in the pores and cracks of rocks that forming the solid mass of Earth.

Importance of water for living organisms:

Water is necessary for the life of all living organisms (plants, animals and human).

1- Plants use it in photosynthesis process to form food.

2- Man benefits from it in completion of food digestion and absorption processes within his digestive system. Water also share in blood formation, and in keeping the constancy of body temperature.

3- Hydrosphere helps in keeping temperature on land during day and night within the proper limits for the living organisms.

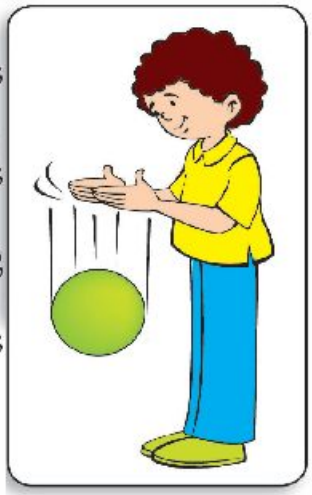
4- Hydrosphere is the suitable environment for large numbers of living organisms, where more than 50% of known living organisms live in the aquatic environments.

Third: A suitable temperature:

The presence of Earth in the third order far from the sun makes the temperature suitable for the continuity of living organisms life at day and night on the Earth's surface.

Fourth: The gravity:

When you leave any free object, you observe it is falling towards the Earth.



Earth has a force of gravity makes the life continues through:

1- constancy and steadfastness of objects and living organisms on its surface.
2- Steadfastness of the hydrosphere position on its surface.
3- Keeping the earth surrounded with the atmosphere.

Fifth: The suitable atmospheric pressure:

The Earth is characterized by the presence of a suitable atmospheric pressure of about 76 Cm Hg. This pressure suits the continuity of life on Earth's surface.

The inner structure of Earth

Scientists think that the inner part of the earth was a molten form due to the high temperature and descending of heavy metals (iron and nickel) towards earth's centre and ascending of the lighter components upwards. This leads to the formation of a number of layers, each one has characteristics distinguishing it from the others.

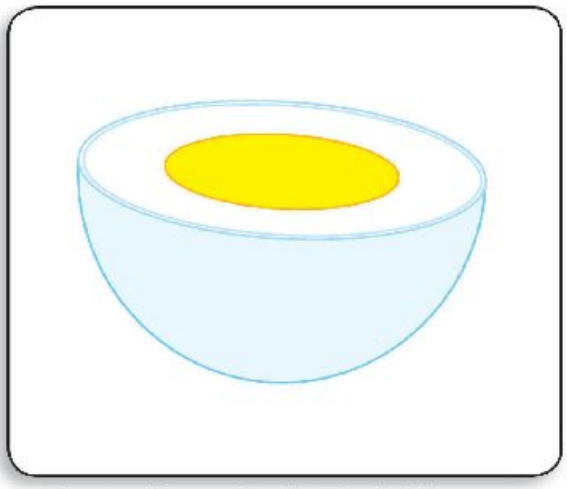
Activity 4 (Earth section):

1- Bring a boiled egg.
2- Remove the outer shell from one half of the egg only and cut the egg into two halves.
3- Draw and colour the layers that you see.

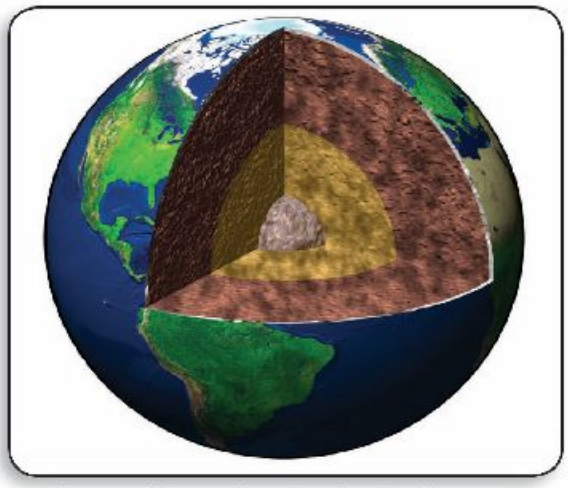
Record your observations: .....

Do you observe a similarity between the inner structure of the egg and that of the Earth?

Conclusion: .....



a picture of a section in the boiling egg.



a picture of a section in the Earth.

Earth consists of a number of arranged layers from the surface into the center, as shown in the following figure:

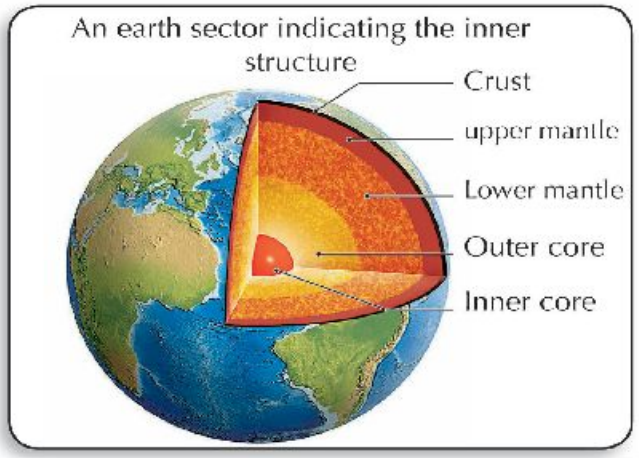
1- The crust:
Is a relatively light outer layer. Its thickness is ranging between 8 - 60 km.

2- The mantle: Is a rocky layer with a thickness of about 2885 km.

3- The core: Is divided into:

a- Outer core: is a layer of molten metals with a thickness of about 2100 km.

b- Inner core: is a solid layer rich in iron and nickel. Its diameter is about 1350 km.

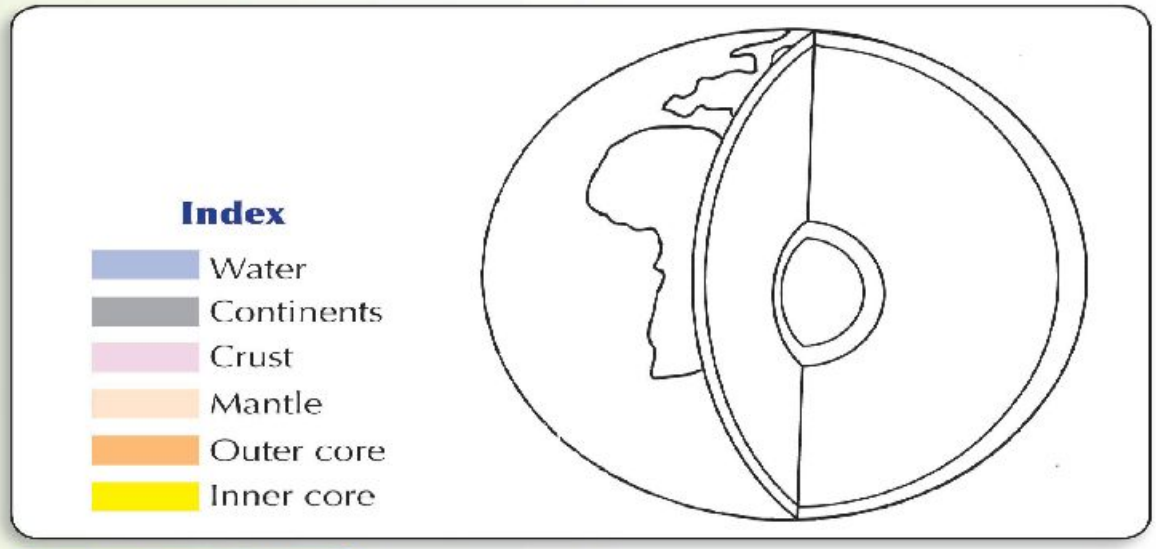


Exercise

Earth is not only continents and oceans. Under your feet, there are 4 layers:

The crust - Mantle - Outer core - Inner core.

Use the colours of the index in colouring the earth's layers .



Optional activities:

Choose one of the following activities, carry it out, and keep it in your own portfolio:

1- Write a short brief about our planet we live on.

2- Put a picture of the Earth, then write an identification card on it as shown below:

The name: . . . . . .

The mass : . . . . . .

The Kind : . . . . . .

Temperature: . . . . . .

The age: . . . . . .

The pressure on the surface: . . . . . .

Other informations: . . . . . .

You can get these informations through your search on different internet web sites.

Egyptian Knowledge Bank بنك المعرفة المصري

By the help of EBK answer the following question.

How scientists studied the inner structure of earth? then share your informations with your classmates and your teacher.

Summary

1 The Earth

- **Location**: The third planet far from the sun
- **Shape**: Spherical
- **Radius**: 6386 km
- **Mass**: 5.9×10^{24} kg

2 Some characteristics of the Earth

- Presence of an atmosphere
- Presence of a hydrosphere
- A suitable temperature
- Presence of gravity
- A suitable atmospheric pressure

3 The Earth inner structure

- **The Crust**: 8 - 60 km
- **The mantle**: 2885 km
- **The core**
  - **Inner core:** 1350 km
  - **Outer core:** 2100 km

Exercises:

Question 1: Choose the correct answer:

a- Earth locates in the solar system regarding its distance from the sun in the ..... order.

(fifth - fourth - third - seventh).

b- Regarding the volume, earth occupies the ..... order in the solar system.

(fifth - fourth - third - Eighth).

c- Water masses on earth's surface form about.....

(30% - 50% - 71% - 90%).

Question 2: Give reasons:

1- Temperature on earth's surface suits the life of living organisms.

2- Earth's inner core is rich in iron and nickel.

3- Steadfastness of the hydrosphere on earth's surface.

Question 3: Complete the following statements:

1- Ground water exists in the ..... of rock that forming the Earth mass.

2- Green plants use ..... gas in photosynthesis process.

Question 4: Put (✔) in front of the correct statements and (✘) in front of wrong ones:

1. The water of oceans is fresh water. ( )
2. The Earth's inner core is rich in iron and nickel. ( )
3. Green plants use carbon dioxide gas in photosynthesis process. ( )
4. Mantle layer lies beneath the Earths outer core. ( )
5. Air pressure on Earth's surface is suitable for the continuity of life. ( )
6. Earth radius between the two poles is larger than that at the equator. ( )

Question 5: Explain briefly the importance of:

a- Oxygen gas.

b- Carbon dioxide gas.

Question 6: Choose from group (B) what suits the words of group (A), then write the complete sentence:

Group (A)	Group (B)
• Atmospheric pressure on Earth's surface • Earth's crust • Earth occupies in solar system • The force of Earth's gravity	• An outer light layer, its thickness ranging between 8 - 60 km. • helps in the steadfastness of the atmosphere and hydrosphere on its surface. • is about 76 Cm Hg. • third position in view of distance from the sun. • is rich in iron and nickel.

Lesson Three

Rocks and Minerals

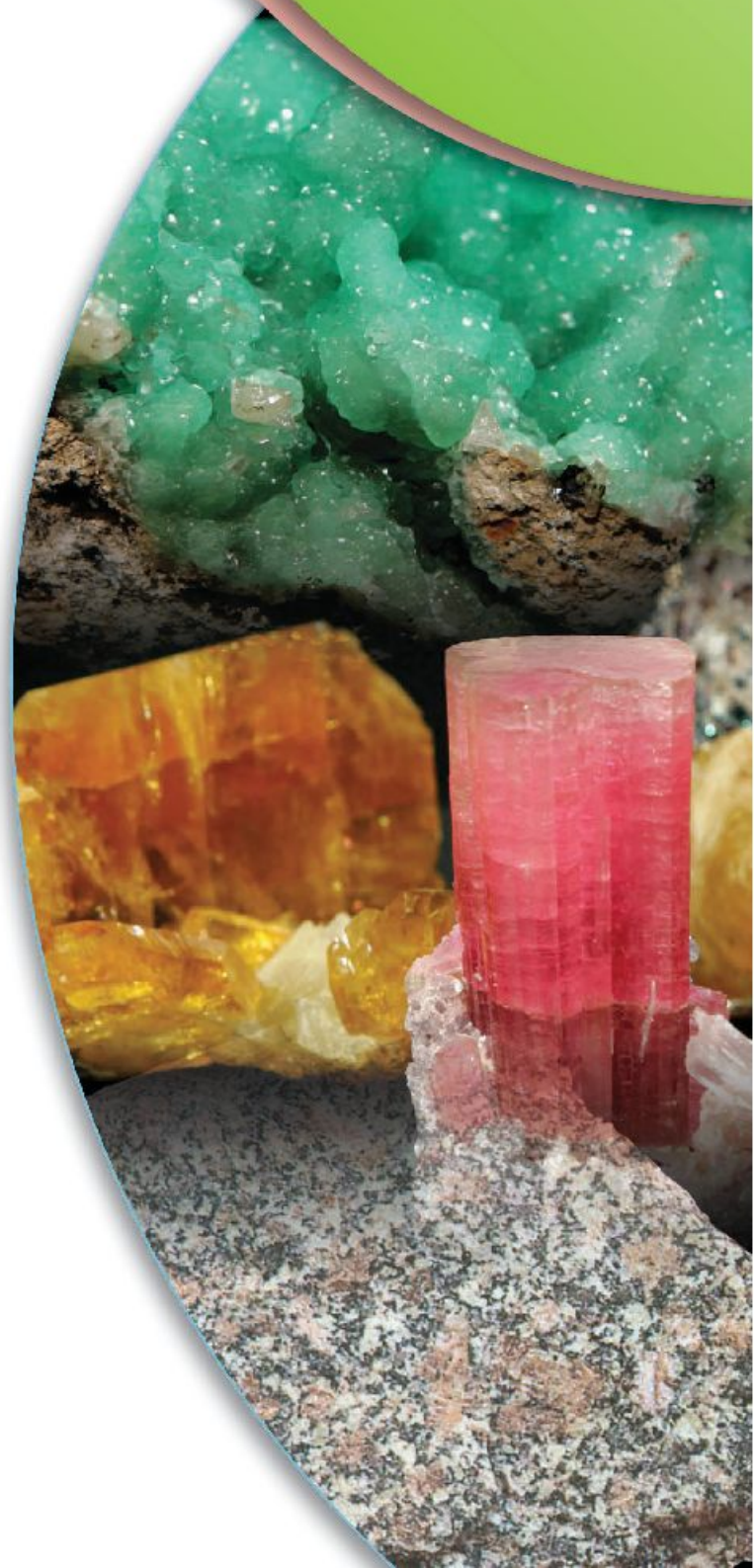
Lesson Items

1. Types of rocks.
2. Minerals.

Lesson Objectives

By the end of this lesson, a student will be able to:

- Identify the types of rocks.
- Explain the formation of igneous, sedimentary and metamorphic rocks.
- Compare between the types of rocks.
- Identify the mineralogical structure of some rocks.
- Appreciate the importance of rocks as a natural resource.



Life Issues

- Rationalizing the consumption.

Rocks and Minerals

Introduction:

From your previous study to the topic of earth and its inner structure.. you know that the earth's crust is consisted of a group of different rocks that formed through millions of years.

Activity 1 (The rocks and soil)

The picture in front of you shows a section in the upper part in the earth's crust. Try to differentiate the layers exist in it.

Why the trees roots extend easily through the upper part of the section While it is difficult in the lower part?

Record the observations: .....

Conclusion: .....

The superficial layer of the crust is fragmented and loosened, and consisted of a mixture of mineralogical substances, in addition to water, air, decayed organic materials and plant roots. The thickness of this layer is thin and it is known as the soil. The lower part represents the solid basis beneath the soil and is formed of the different types of rocks.

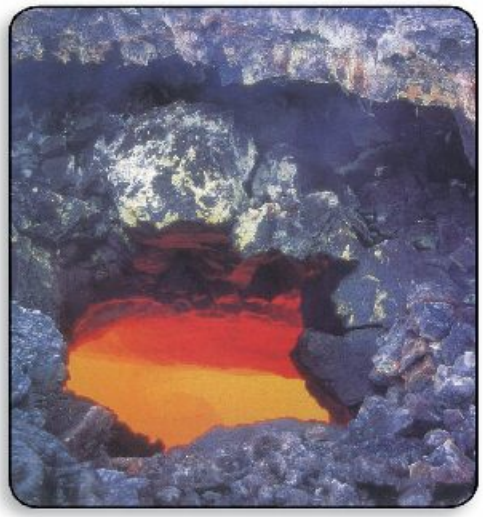
The rock can be defined as each natural solid material exists in earth's crust and is formed of one mineral or a group of minerals.

Rocks are classified according to their mode of formation into three main groups which are: igneous, sedimentary and metamorphic rocks.

First: The igneous rocks:

They are rocks that formed from the molten material which exists underneath earth's crust This material is extremely hot and a viscous liquid, called magma. If the magma is extruded to the surface in the form of volcanic flows, it is known as lava.

Igneous rocks can be divided according to the place of their formation in proportion to earth's surface into two main divisions, which are:



a- Plutonic rocks:

They are the rocks that formed inside earth's crust at great depths. They are in the form of huge masses and cover wide areas.

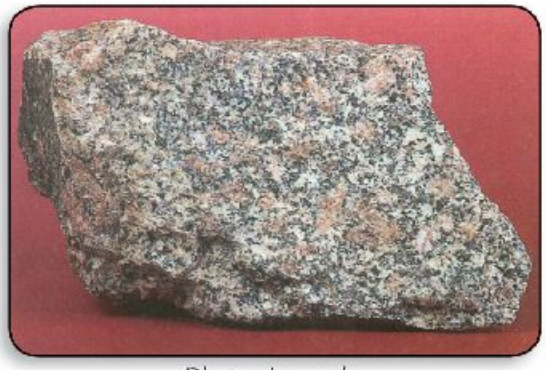
b- Surface or volcanic rocks:

They are the rocks which formed when magma reaches earth's surface as it extruded from volcanoes. They are in the form of a flow of lava.

The difference between the plutonic and volcanic rocks:

Activity 2 (Size of granules):

Compare the two rocks shown in the pictures regarding the size of granules of minerals that form each of them.



Plutonic rock.

Volcanic rock

Record your observations: . . . . . .

Conclusion: . . . . . .

The igneous plutonic rock has a coarse texture with a relatively large sized crystals where magma at depth gets cool slowly. Therefore, minerals take a longer time to crystallize and their crystals are large sized.

On the contrary, the minerals that form the surface (volcanic) rocks do not take the time required for crystallization where lava cools quickly on the surface. Therefore, their crystals become small sized.

Examples of igneous rocks:

Granite:

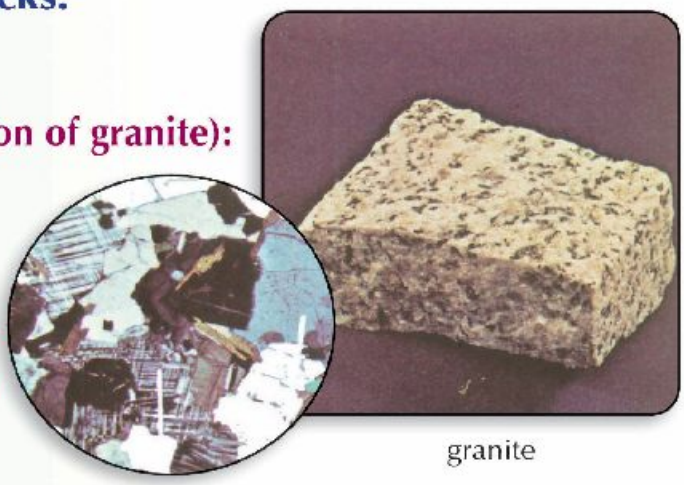
Activity 3 (Examination of granite):

Examine the samples in front of you by the naked eye.

Record your observations about the shape, colour, texture and solidarity:

.....

.....



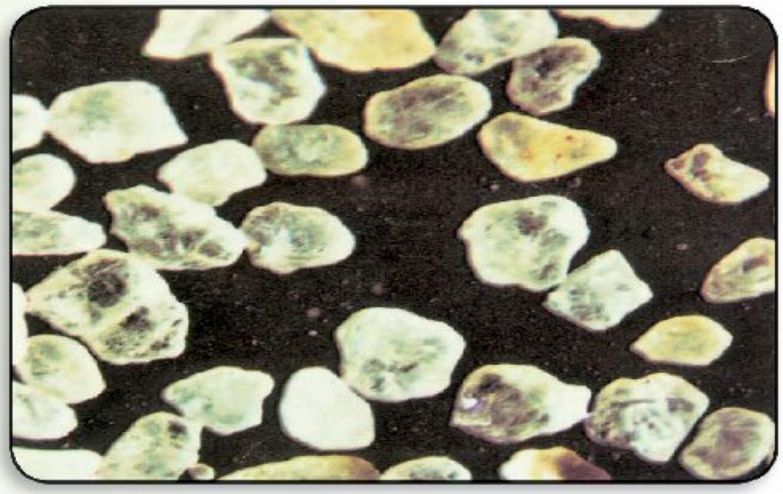
granite

Granite:

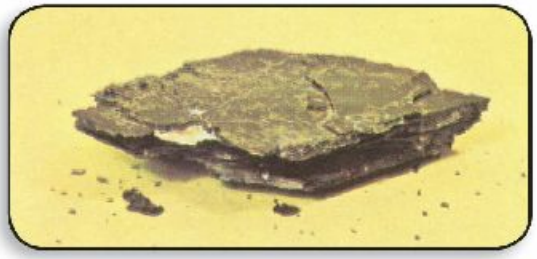
A plutonic rock, its colour is pink or grey. The minerals forming it are seen by the naked eye. It exists in the eastern desert and Sinai Peninsula. This rock is heavy, rough, solid, cohesive and hard breakable.

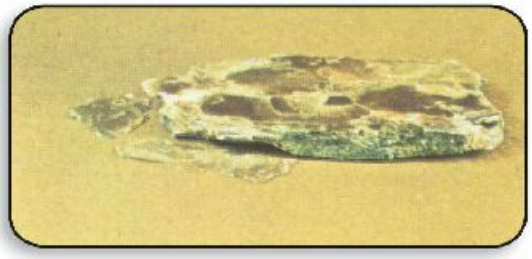
The minerals forming the granite:

Granite rock is consisted of three main minerals which are quartz, feldspar and mica



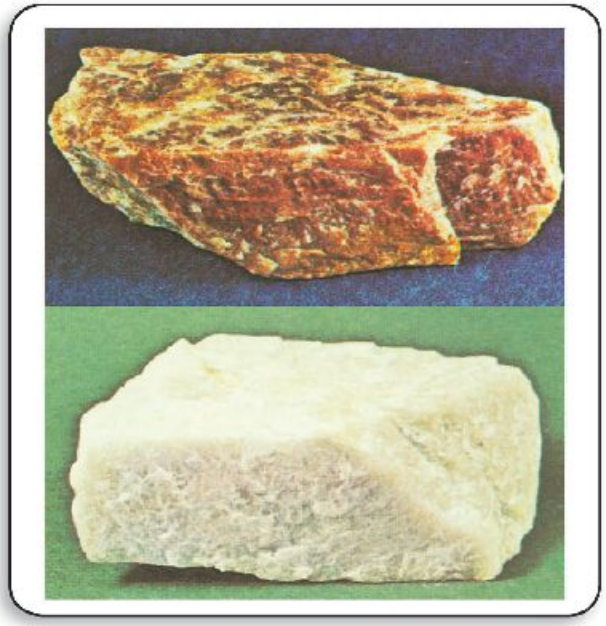
Dark Mica





Light Mica

Feldspar



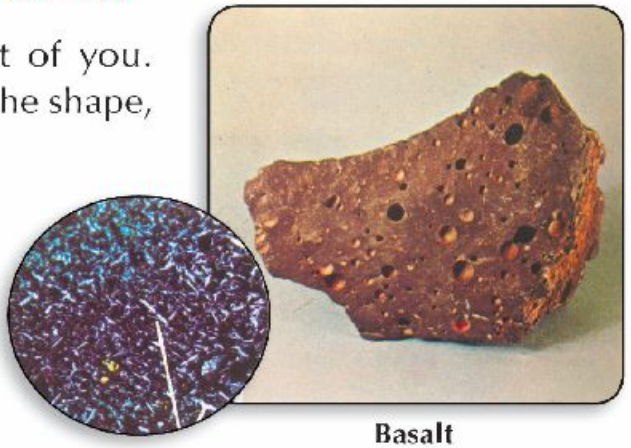
4- Basalt:

Activity 4 (Basalt examination):

Examine the sample in front of you. Record your observations about the shape, colour, solidarity.....

Do you see small circular holes in the sample?

Try to find an explanation .....

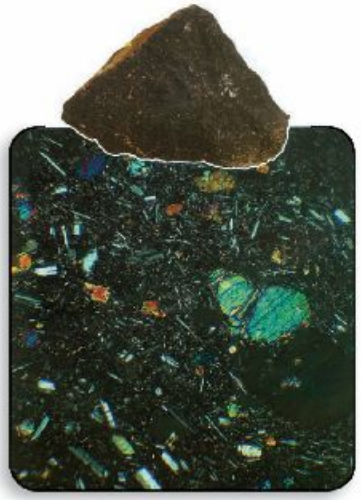


Basalt

Basalt is surface (volcanic) rock formed of the lava flows as they cool on Earth's surface. It is a dark colored rock.

Its components can not be seen by the naked eye. In Egypt, it exists in Abu - Zaabal and close to Abu - Rewash and Faiyoum.

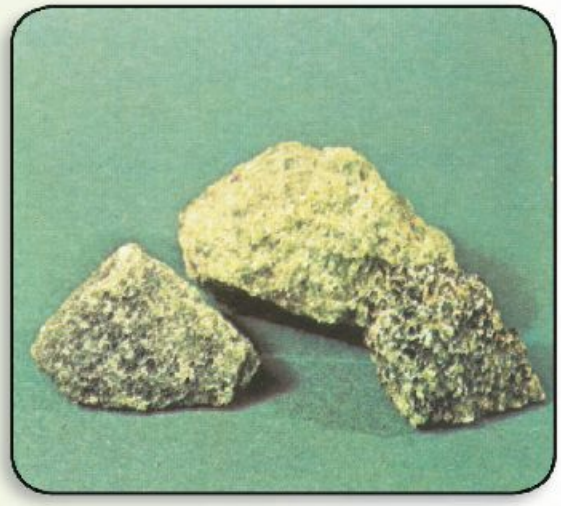
Volcanic rocks (solid, cohesive) contain small holes indicating the extruding of gases from volcanic flows during their cooling and formation of the rock.



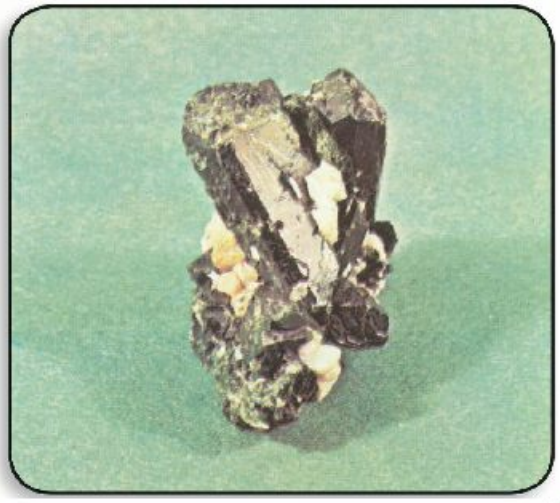
Basalt under microscope

The minerals forming the basalt:

By the microscopic examination, basalt is consisted of Olivine, pyroxene and feldspar minerals.



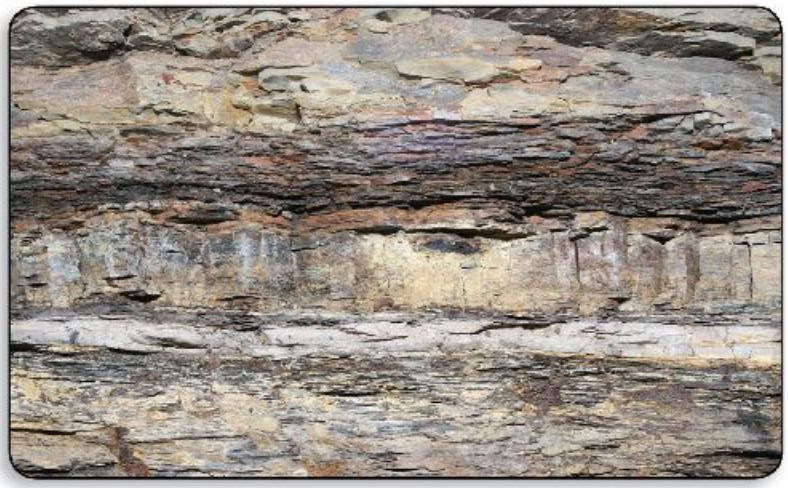
Olivine



Pyroxene

Second: The sedimentary rocks:

Sedimentary rocks form a thin cover that wrap about 75% of the surface of the Earth solid mass. At the same time, it represents 5%only of the total volume of the Earth's crust rocks.



Activity 5 (Transportation and deposition):

Bring a rectangular basin and place it in an inclined position. Put a mixture of sands, shingles and gravels at its upper parts. Pour water upon this mixture.

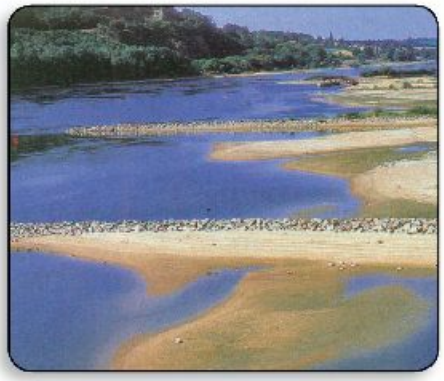
Record your observations:

.....

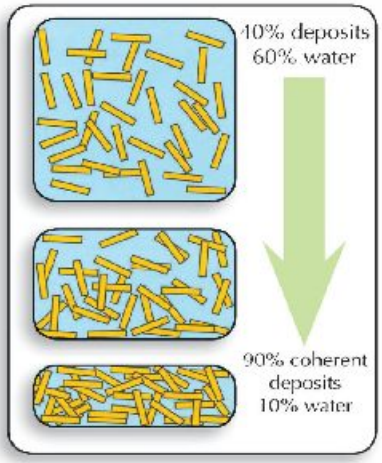
Conclusion:.....

We observe that water takes the smooth sands in its way. Sands deposit at the lower part of basin whereas shingles and gravel remain at its upper part. As the speed of water is increased, the size of the transported gains increase. This represents what happens in rivers and seas, and it produces sediments in the form of layers.

Sedimentary rocks are formed as a result of the processes of fragmentation and disintegration of the igneous, sedimentary or metamorphic rocks that are previously existed. After that the detritus (fragmented particles of rocks) is deposited in a watery or an aerial medium, then this deposited particles adhere together forming the sedimentary rocks.



Deposition of sand in water.



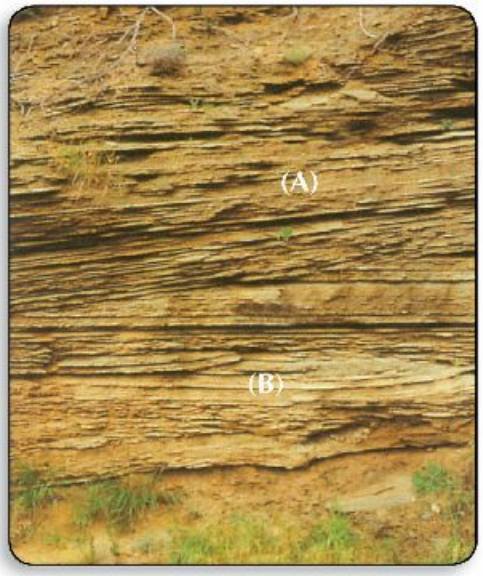
Activity 6 (Lithification):

-The picture in front of you shows the stages of a sedimentary rock formation.

-Record your observation about the amount of water and the effect of pressure on the grains.

Exercise

Look at the opposite picture, then identify the layers that are deposited at first, (A) or (B).



The deposits (sediments) of the bottom are exposed to high pressure resulted from the weights of the deposits above them. This decreases the ratio of water exists between the grains. As the pressure increases, more grains are deposited. By the time, they become solid and appear as layers above each other, where the layers in the bottom are the older and the ones above are the more recent.

Examples of the sedimentary rocks:

a- Sandstone:

Sandstone

Activity 7

(Examination of sandstone):

Examine the sample in front of you.

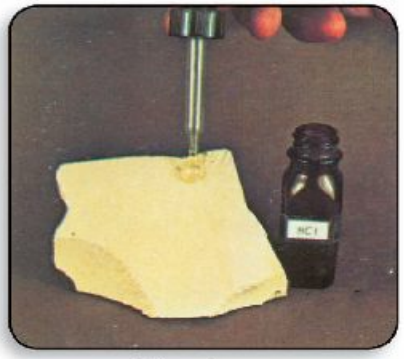
Record your observations about the shape, colour and texture.

Sandstone is consisted of sand grains that are less than 2mm in diameter. The main componant almost is quartz.

Colour : yellow. Texture: coarse.

Shape: thin layers as shown in the picture.

b- Limestone:



Limestone

Activity 8 (Limestone examination):

Examine the sample in front of you.

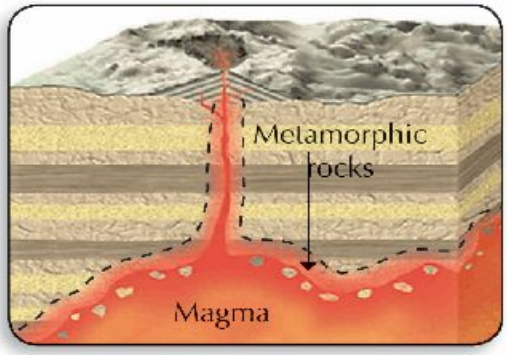
Record your observations about the shape, colour and texture.

Add some dilute hydrochloric acid to it.

Observe what happens?.....

Limestone consists of a mineral calcite due to the precipitation of calcium carbonate in lime solutions. It is characterized by a white colour and smooth touch. It reacts with dilute hydrochloric acid producing an effervescence due to the evolving of carbon dioxide gas.

Third: The metamorphic rocks:



These rocks are originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature which convert them into another rock. This conversion takes place often in the rocks that the magma interferes within them. This effect depends upon the mass of magma and temperature, and also upon the type of rock which surrounds them.

The most important metamorphic rocks:

a- Marble:

Marble

Activity 9 (Marble examination):

Examine the sample in front of you.

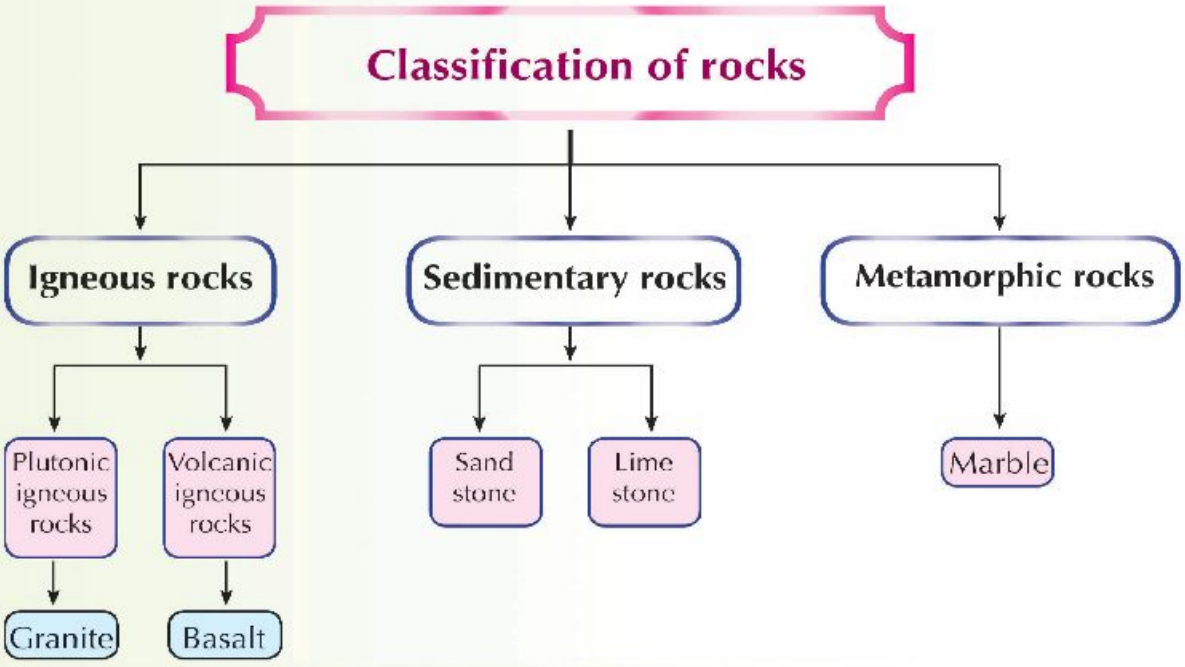
Record your observations about the colour, touch and solidarity.

Record your observations:.....

Marble is produced from the conversion of limestone. It is a rock with a rough texture and white colour if it is pure. It has other colours when it contains impurities. It has more solidity and solidarity than the limestone.

Summary

Rocks are every natural solid material exists in Earth's crust and consisted of one mineral or a group of minerals.



Execises:

Question 1: Complete the following:

a- The molten material that exists beneath..... which extremely hot and as a thick fluid in earth interior is known as ....., and after its going out on earth's surface in the form of ..... is called.....

b- Sedimentary rocks form a thin cover that wraps about ..... of earth's surface although they represent .....of the total volume of the earth's crust rocks.

Question 2: Which of the following rocks is sedimentary, igneous or metamorphic?

Marble - Granite - Limestone - Sandstone - Basalt

Question 3: Mention the main minerals that share in structure of the following rocks:

a- Granite. b- Basalt . c- Limestone.

Question 4: Give reasons:

1- The crystals of the minerals that form the plutonic igneous rocks are large sized.

2- Volcanic rocks contain small circular holes.

3- Effervescence takes place when hydrochloric acid is added to a sample of limestone.

Question 5: What are the characteristics we depend on to distinguish between the plutonic igneous rocks and the volcanic igneous rocks?

Question 6: What are the main factors that lead to the formation of the metamorphic rocks?

Unit Three General Exercises:

Question 1: Give the scientific term for each of the following:

a- A molten material exists at depths beneath the crust.

b- A rock formed of lava flows when it comes on earth's surface.

c- The rock masses that fall from the space and reach earth's surface.

Question 2: Complete the following:

a- Planets revolve around the sun in..... orbits, which lie in a level ..... on the sun's axis of rotation.

b- Granite consists of ..... , ... and ..... minerals, while basalt consists of ....., ... and ..... minerals.

c- The planet Earth occupies the ..... position in the solar system in view of the volume, regarding the density it occupies ..... position, and concerning the force of gravity on its surface it occupies the ..... position.

Question 3: Give reasons:

a- Some rock masses that fall in the space do not reaches earth's surface.

b- The plutonic igneous rocks are characterized by the presence of large sized mineral crystals that can be seen by naked eye.

c- The earth's inner core is rich in iron and nickel.

Question 4: Choose the correct answer:

a- Water bodies on earth's surface form the percentage of:

(50% - 71% - 40% - 30%)

b- The metamorphic rock is produced as a result of the effect of the heat and pressure on the ..... rocks.

(Igneous only - sedimentary only - metamorphic only - Igneous, sedimentary)

c- The telescope is used to study the .....

(minerals - earthquakes - celestial bodies - volcanoes)

Question 5: Compare between each of the following:

a- The crust and mantle.

b- The sandstone rock and the limestone rock.

c- The comets and the meteors.

Question 6: If you and your classmates made a trip in the space to the planet Mars, and play the basket ball game there. Is it easier for you to jump towards the basket and put the ball inside than you play on earth's surface?

Explain your answer in the light of your previous study.

قائمة نهائية بالروابط الخاصة بموضوعات العلوم للصف الأول الإعدادى الفصل الدراسى الثانى2019/2018

QR	عنوان الفيديو	الوحدة
	Different types of ions	ONE : Chemical reactions
	Bonds and molecules : types of bonds	
	Combination of atoms to form molecules	
	Modern periodic table	
	Chemical bonds, elements, atoms , and compounds	
	Chemical changes	
	Watching Chemical changes	

	Chemical reactions	
	Chemical reactions	
	Nuclear powers	Two : Force and motion
	Physics under microscope: The main forces	
	Inertia	
	Stars and Galaxies	Three: The earth and universe
	Earth : Fundamental facts	

المواصفات الفنية:

مقاس الكتاب	٥٧ $\frac{١}{٨}$ × ٨٢ سم
طبع المتن	٤ لون
طبع الغلاف	٤ لون
ورق المتن	٨٠ جرام أبيض
ورق الغلاف	٢٠٠ جرام كوشيه
عدد الصفحات بالغلاف	١٠٨ صفحة
التجليد	حصان
رقم الكتاب	١٥٣٠|١٠|١٥|٢٢|١|٥٧