

# SCIENCE

GUIDE ANSWERS

2023

BY A GROUP OF SUPERVISORS

SECOND TERM



 **EL-MORASSER**  
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# SCIENCE

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## GUIDE ANSWERS

SECOND TERM



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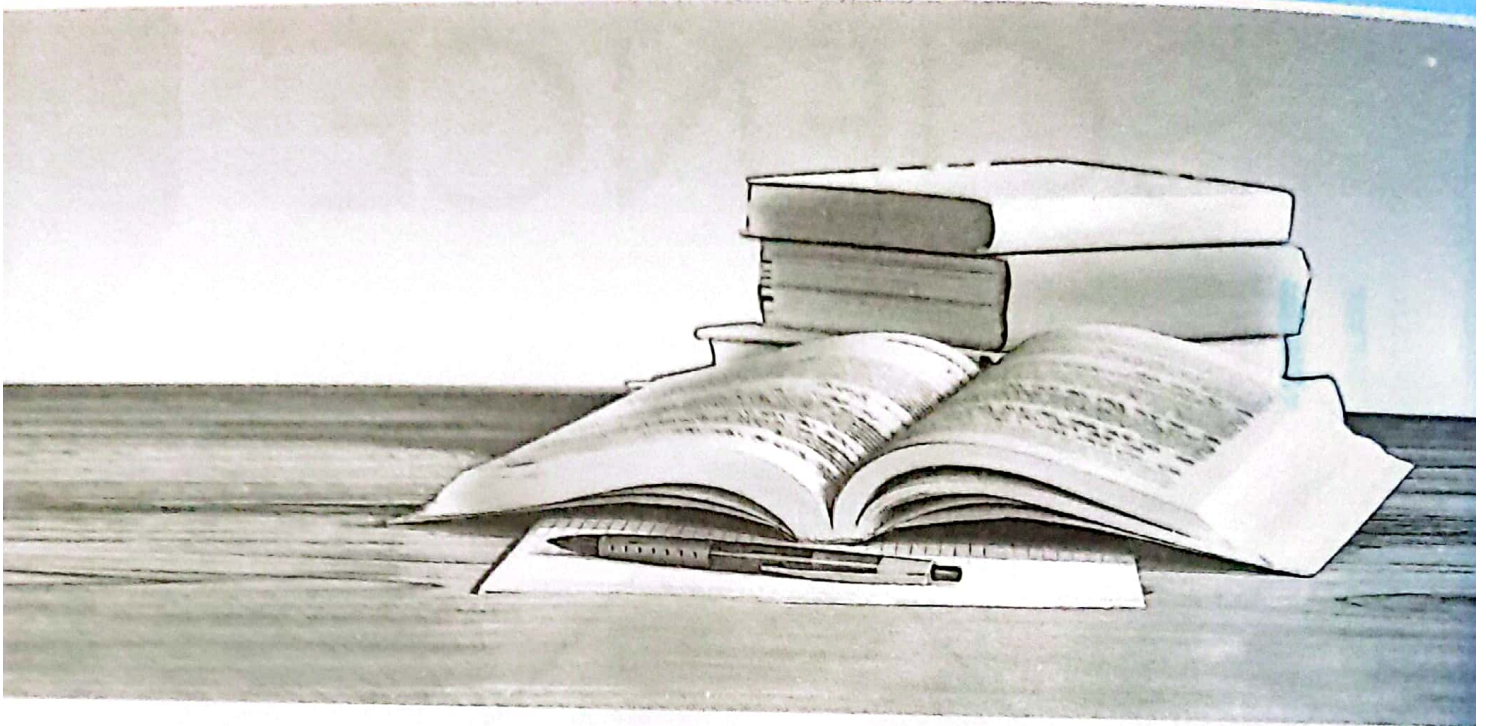
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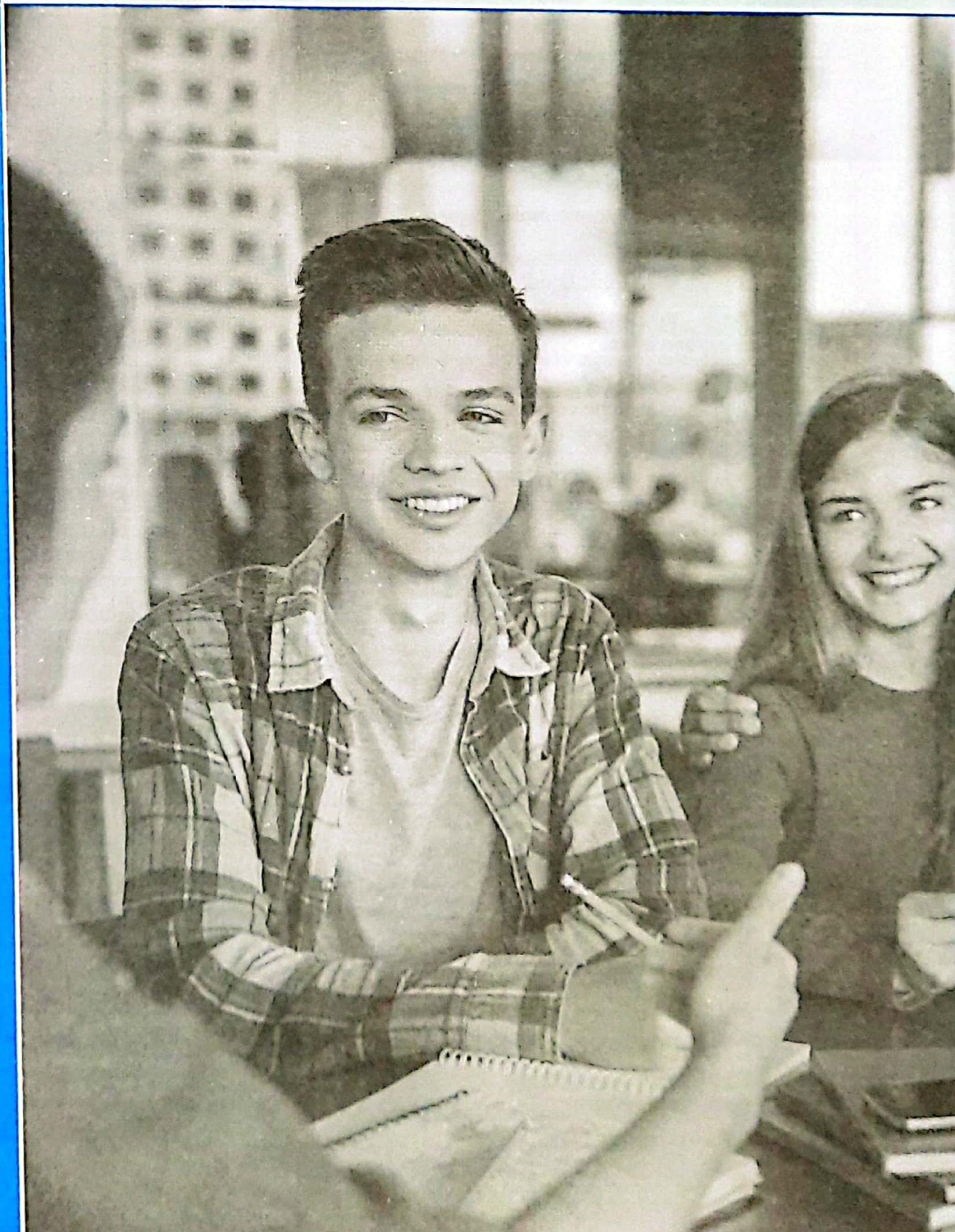
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PART **1**

# Guide Answers of The Main Book



# Unit One

## Lesson 1

1. b      2. c      3. d      4. b      5. d  
6. a      7. b      8. b      9. d      10. a  
11. c      12. d      13. c      14. a      15. c  
16. a      17. d      18. c      19. c      20. c  
21. a      22. c      23. b      24. b      25. b  
26. d      27. d      28. b      29. c      30. c  
31. b      32. b      33. d

2. 1. (✓)  
2. (✗) ..... into positive ions.      3. (✓)  
4. (✗) ..... is less than .....      5. (✓)      6. (✓)  
7. (✗) ..... has 8 electrons.      8. (✓)  
9. (✗) ..... monoatomic molecules.  
10. (✗) Covalent bond .....  
11. (✗) ..... is an ionic bond.  
12. (✗) ..... magnesium atom gives two electrons to oxygen atom.  
13. (✓)      14. (✓)  
15. (✗) ..... is a single covalent bond.  
16. (✓)      17. (✓)      18. (✓)  
19. (✗) ..... is a single covalent bond.

3. 1. Metals.      2. Mercury.  
3. Nonmetals.      4. Bromine.  
5. Graphite (carbon).      6. Positive ion.  
7. Negative ion.      8. Ion.  
9. Noble gas.      10. Noble gases.  
11. Ionic bond.      12. Ionic bond.  
13. Covalent bond.      14. Single covalent bond.  
15. Double covalent bond.  
16. Triple covalent bond.

4. 1. 118  
2. metals – nonmetals – noble gases.  
3. four      4. solids – mercury  
5. Metallic      6. metals – positive  
7. Sodium – magnesium  
8. loses – positive      9. two – eight.  
10. more      11. nitrogen – carbon.  
12. bad – graphite – a good  
13. metals – nonmetals  
14. metals – nonmetals

15. Mercury – bromine      16. seven – ten  
17.  $(O^{2-}) - (Na^+)$   
18. a nonmetallic – a metallic  
19. noble gas  
20. Noble gases – electrons.  
21. metallic – nonmetallic  
22. a positive ion – a negative ion.  
23. gains – negative  
24. magnesium – two – oxygen  
25. Sodium chloride – magnesium oxide  
26. nonmetallic      27. covalent  
28. ionic – double covalent  
29. ionic – single covalent  
30. gains – shares with  
31. single – double – triple.  
32. single covalent – triple covalent

5

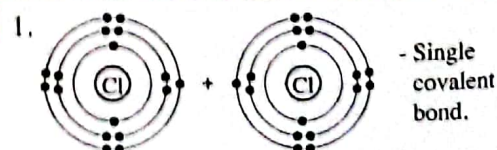
(A)

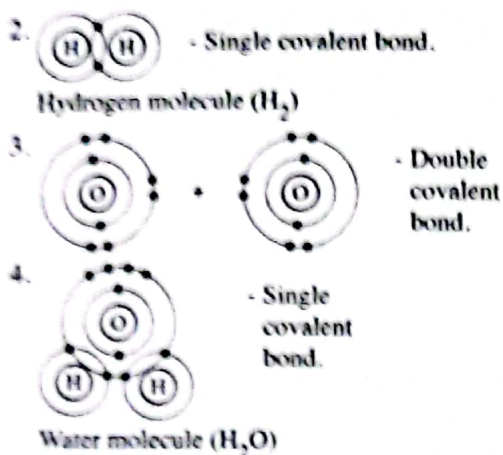
Element	Its electronic configuration				No. of protons	Its type	No. of electrons in ion	Type of ion	Symbol of its ion
	K	L	M	N					
1. $_{12}\text{Mg}$	2	8	2	-	12	Metal	10	Positive	$\text{Mg}^{+2}$
2. $_{15}\text{P}$	2	8	5	-	15	Nonmetal	18	Negative	$\text{P}^{-3}$
3. $_{18}\text{Ar}$	2	8	8	-	18	Inert gas	No ion	No ion	No ion
4. $_{17}\text{Cl}$	2	8	7	-	17	Nonmetal	18	Negative	$\text{Cl}^-$
5. $_{19}\text{K}$	2	8	8	1	19	Metal	18	Positive	$\text{K}^+$

(B)

Atom	Electronic configuration			Molecule	Type of bond
	K	L	M		
1. $_{11}\text{Na}$	2	8	1	NaCl	Ionic
$_{17}\text{Cl}$	2	8	7		
2. $_{12}\text{Mg}$	2	8	2	MgO	Ionic
$_{8}\text{O}$	2	6	-		
3. $_{7}\text{N}$	2	5	-	$\text{N}_2$	Triple covalent
4. $_{8}\text{O}$	2	6	-	$\text{O}_2$	Double covalent

6





- 7**
1. Because the number of electrons in ion is less than or more than its number in the same atom by the number of lost or gained electrons.
  2. Because the number of negative electrons becomes less than the number of Positive protons.
  3. Because the number of negative electrons becomes more than the number of positive protons.
  4. Because the atom of a metallic element loses the outermost electrons forming a positive ion.
  5. Because sodium atom loses its outermost electron and changes into a positive ion, while oxygen atom gains two electrons to complete its outermost energy level and changes into a negative ion.
  6. Due to the completeness of their outermost energy levels with electrons.
  7. Because sodium ion is formed when sodium atom loses one electron and changes into ( $Na^+$ ) which contains 10 electrons, while oxygen ion is formed when oxygen atom gains two electrons and changes into ( $O^{2-}$ ) which contains 10 electrons too.
  8. Because magnesium loses two electrons and changes into a positive ion, while oxygen gains the two electrons (which are lost by magnesium) and changes into a negative ion, then electric attraction occurs between positive and negative ions.
  9. Because each of them is a metal and their atoms tend to lose the outermost electrons during chemical reactions.
  10. Because ionic bond arises between two different atoms (metal and nonmetal) as a result of the electric attraction between

a positive ion of an atom of a metallic element and a negative ion of an atom of a nonmetallic element, while covalent bond arises between two similar or different nonmetal atoms.

11. Because chlorine atom (nonmetal) gains the electron which is lost by sodium atom, so an electric attraction occurs between positive sodium ion and negative chloride ion, while each of the two chlorine atoms share with one electron to complete its outermost shell.
12. Because it arises by sharing each hydrogen atom with only one electron to complete its outermost shell with two electrons and becomes more stable.
13. Because it arises by sharing each oxygen atom with two electrons to complete its outermost shell with 8 electrons and becomes more stable.
14. Because oxygen atom shares each of the two hydrogen atoms with one electron.
15. Because it arises by sharing each nitrogen atom with three electrons to complete its outermost shell with 8 electrons and becomes more stable.

- 8**
1. They are elements which contain 1 or 2 or 3 electrons in the outermost energy level.
  2. They are elements which contain 4 or 5 or 6 electrons in the outermost energy level.
  3. It is an atom of a metallic element which loses an electron or more during the chemical reaction.
  4. It is an atom of a nonmetallic element which gains an electron or more during the chemical reaction.
  5. It is the atom of an element which loses or gains an electron or more during the chemical reaction.
  6. They are elements which don't participate in any chemical reaction in ordinary conditions due to the completeness of their outermost energy levels with electrons.
  7. It is a chemical bond resulted from the electric attraction between a positive ion and a negative ion.

8. It is a chemical bond formed between the atoms of nonmetals through sharing of each atom with a number of electrons to complete the outer electron shell of each atom.
9. It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with one electron.
10. It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with two electrons.
11. It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with three electrons.

- 9**
1. It will be fragmented easily, because carbon is from nonmetals which are not malleable.
  2. It changes into a positive ion carries a number of positive charges equals to the number of given electrons.
  3. It changes into a negative ion carries a number of negative charges equals to the number of gained electrons.
  4. Magnesium loses two electrons and changes into a positive ion and oxygen gains the two electrons (which are lost by magnesium) and changes into a negative ion, then electric attraction occurs between positive and negative ions to form a molecule of magnesium oxide.
  5. Each atom shares with one electron to become the outermost shell of each of them completed with electrons.
  6. Each oxygen atom shares with two electrons to complete its outermost shell with 8 electrons and becomes more stable.

**10**

Odd word (or symbol)	Scientific name
1- Mercury	Solid metals.
2- $_{17}\text{Cl}$	Metals.
3- $_{11}\text{Na}$	Elements, their ions carry two positive charges.
4- Graphite	Nonmetals are bad conductors of electricity.
5- Sodium	Nonmetals.
6- $_{5}\text{B}$	Nonmetals.
7- $_{11}\text{Na}$	Noble (inert) gases.
8- Table salt molecule	Covalent molecules.

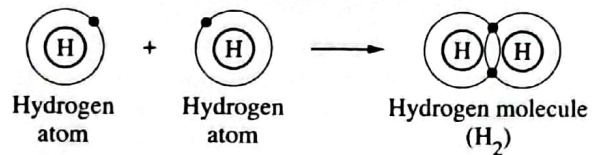
**11**

Element	Electronic configuration			1. Its type	2. The type of its ion
	K	L	M		
$_{18}\text{Ar}$	2	8	8	Noble gas	No ion
$_{12}\text{Mg}$	2	8	2	Metal	Positive ( $\text{Mg}^{+2}$ )
$_{16}\text{S}$	2	8	6	Nonmetal	Negative ( $\text{S}^{-2}$ )

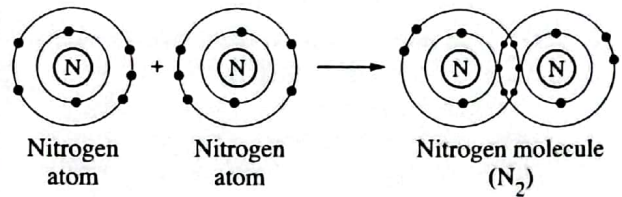
**12**

Element	Electronic configuration				1. Its type	2. The type of its ion
	K	L	M	N		
$_{1}\text{H}$	1	-	-	-	Nonmetal	Negative
$_{11}\text{Na}$	2	8	1	-	Metal	Positive
$_{7}\text{N}$	2	5	-	-	Nonmetal	Negative
$_{10}\text{Ne}$	2	8	-	-	Noble gas	No ion
$_{8}\text{O}$	2	6	-	-	Nonmetal	Negative
$_{17}\text{Cl}$	2	8	7	-	Nonmetal	Negative
$_{19}\text{K}$	2	8	8	1	Metal	Positive

3. a. By sharing of each atom by one electron to form single covalent bond ( $\text{H} - \text{H}$ ).



- b. By sharing of each atom by three electrons to form triple covalent bond ( $\text{N} \equiv \text{N}$ ).



4. Neon (Ne).

**13**

1. Look at the main book on page (15).
2. Look at the main book on page (16).

3.

P.O.C.	Mercury	Bromine
- Type of element :	Metal	Nonmetal
- Physical state :	Liquid	Liquid
- Luster :	It has a metallic luster	It hasn't a metallic luster

P.O.C.	Aluminium	Graphite
- Electric conduction :	Good	Good
- Heat conduction :	Good	Bad
- Ability to malleable and ductile :	It is malleable and ductile.	It isn't malleable or ductile.

5. Look at the main book on page (16).

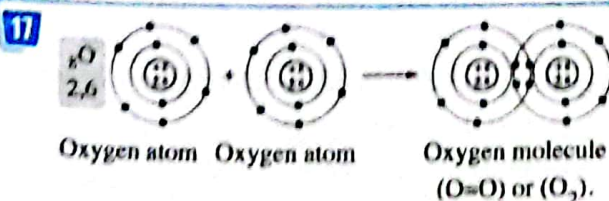
6. Look at the main book on page (24).

Single covalent bond (–)	Double covalent bond (=)	Triple covalent bond (≡)
- It is a chemical bond which arises between two nonmetal atoms by sharing of one pair of electrons, where each atom shares by one electron. Ex.: - Hydrogen molecule (H – H).	- It is a chemical bond which arises between two nonmetal atoms by sharing of two pairs of electrons, where each atom shares by two electrons. Ex.: - Oxygen molecule (O = O).	- It is a chemical bond which arises between two nonmetal atoms by sharing of three pairs of electrons, where each atom shares by three electrons. Ex.: - Nitrogen molecule (N ≡ N).

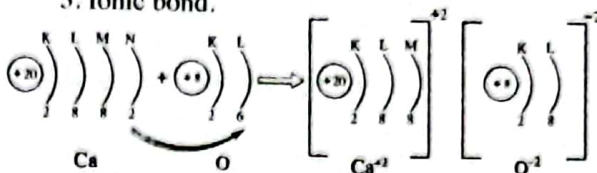
- 14
- Graphite : It is a good conductor of electricity.  
Oxygen : It is a bad conductor of electricity.
  - (Na) : It is sodium atom that has neutral charge.  
(Na<sup>+</sup>) : It is sodium ion that carries one positive charge.
  - Oxygen molecule (O<sub>2</sub>) : There is a double covalent bond between the two oxygen atoms.  
Two oxygen atoms (2O) : There isn't bond between the two atoms.

- 15
- Look at the main book on page (9).
  - Look at the main book on page (12).

16 Because iron is a metallic element which is malleable so, it will be not broken, while coal is a nonmetal element which is not malleable so, it will be broken.



- 18
- Look at the main book on page (22).
  - Look at the main book on page (20).
  - Ionic bond.



- 4, 5 & 6. Look at the main book on pages (20, 22 & 23).

19

	1. Type of element & ion	2. No. of electrons which lost or gained
Fig. (a)	Nonmetal – Negative ion	Gains one electron
Fig. (b)	Nonmetal – Negative ion	Gains three electrons
Fig. (c)	Metal – Positive ion	loses two electrons
Fig. (d)	Inert gas – No ion	Zero
Fig. (e)	Metal – Positive ion	loses one electron

3. Fig. (c) and Fig. (e)

- 20
- Fig. (b)
  - Fig. (a)
  - Fig. (c)

- 21
- Look at the main book on page (20).
  - Ionic bond.

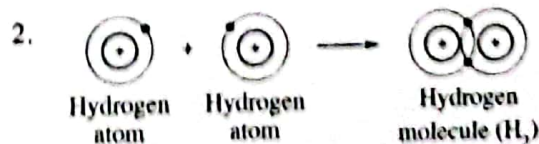
### Thinking Skills Questions

- 1
- c
  - c
  - a
  - d
  - c
  - c

- 2
- (S) & (P)
  - (P)
  - Negative ion, because it is a nonmetal that gains 3 electrons during the chemical reaction.
  - (S), because its atomic number = 2 + 8 + 1 = 11

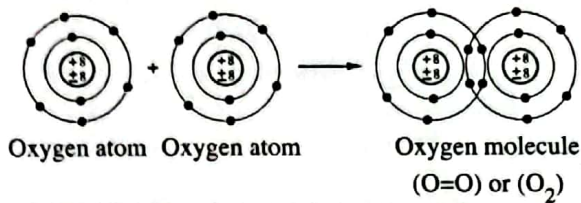
- 3
- Because they are malleable and ductile and they have metallic luster.
  - Because they are good conductors of heat.

- 4
- Element (A) is a nonmetal.  
Element (B) is a metal.  
Element (C) is a noble gas.  
Element (D) is a nonmetal.



- Ionic bond.
- Single covalent bond.
- Because its outermost energy level is completely filled with 8 electrons.

- 5 1. Element (A) is a nonmetal.  
Element (B) is a metal.  
2. Double covalent bond.



3. Look at the main book on page (20).

Atomic number	Type of element	Electronic configuration
1. 8	Nonmetal	$\begin{matrix} \text{K} & \text{L} \\ (+8) & \\ 2 & 6 \end{matrix}$
2. 19	Metal	$\begin{matrix} \text{K} & \text{L} & \text{M} & \text{N} \\ (+19) & & & \\ 2 & 8 & 8 & 1 \end{matrix}$
3. 15	Nonmetal	$\begin{matrix} \text{K} & \text{L} & \text{M} \\ (+15) & & \\ 2 & 8 & 5 \end{matrix}$
4. 20	Metal	$\begin{matrix} \text{K} & \text{L} & \text{M} & \text{N} \\ (+20) & & & \\ 2 & 8 & 8 & 2 \end{matrix}$

## Lesson 2

- 1 1. c    2. b    3. c    4. b    5. a  
6. b    7. a    8. a    9. d    10. a  
11. d    12. a    13. d    14. b    15. c  
16. a    17. d    18. c    19. d    20. c  
21. c    22. b    23. a    24. c    25. c  
26. b    27. c    28. b    29. d    30. c  
31. b    32. c    33. a    34. d    35. b  
36. d    37. d    38. b    39. d    40. b  
41. c    42. c

- 2 1. g    2. h    3. e    4. a  
5. d    6. b    7. c    8. f

- 3 ① 1. b - C    2. c - A    3. d - D    4. a - B  
② 1. a - B    2. c - A    3. b - C

- 4 1. (✓)  
2. (✗) ..... two positive charges.

3. (✗) ..... three atoms .....  
4. (✗) ..... is zero.  
5. (✗) ..... as one atom .....  
6. (✓)                      7. (✓)  
8. (✗) ..... is (CO<sub>3</sub>)<sup>-2</sup>  
9. (✗) ..... (Y) is monovalent and (X) is divalent.  
10. (✗) ..... is trivalent.  
11. (✓)                      12. (✓)                      13. (✓)  
14. (✗) ..... is Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>  
15. (✗) (Na<sub>2</sub>O) is .....                      16. (✓)  
17. (✗) The valency of sodium in (NaCl) and (Na<sub>2</sub>CO<sub>3</sub>) is monovalent.  
18. (✗) ..... two monovalent elements.  
19. (✗) ..... is Ca(OH)<sub>2</sub>  
20. (✗) ..... of sulphuric acid is (H<sub>2</sub>SO<sub>4</sub>).  
21. (✗) ..... is hexavalent.  
22. (✗) Acids .....  
23. (✗) ..... into blue.  
24. (✗) ..... except hydroxide group.  
25. (✗) ..... it produces (Z<sub>2</sub>O) oxide .....  
26. (✓)                      27. (✓)  
28. (✗) ..... form salts.  
29. (✗) ..... a salt.  
30. (✗) ..... is water insoluble, while sodium chloride is water soluble.

- 5 1. Valency.                      2. Inert (noble) gases.  
3. Atomic group.                      4. Chemical formula.  
5. Acids.                      6. Bases.  
7. Oxides.                      8. Metal oxides.  
9. Nonmetal oxides.                      10. Salts.

- 6 1. monovalent - divalent  
2. trivalent - divalent.  
3. iron - copper.                      4. divalent - trivalent.  
5. nitrogen - sulphur - phosphorus.  
6. divalent - tetravalent - hexavalent.  
7. trivalent - pentavalent.  
8. zero - completely filled  
9. monovalent - divalent.  
10. Hydroxide - nitrate - carbonate - sulphate  
11. divalent - monovalent.  
12. (PO<sub>4</sub>)<sup>-3</sup> - trivalent.

13.  $(\text{SO}_4)^{2-}$  - five - two      14. oxygen  
 15.  $(\text{Na}_2\text{CO}_3)$  - six - three  
 16. trivalent - divalent.  
 17.  $\text{MgSO}_4 - \text{Ca}(\text{NO}_3)_2$   
 18.  $\text{HCl} - \text{NaOH}$       19.  $\text{H}_2\text{O} - \text{H}_2\text{SO}_4$   
 20. tetravalent.  
 21. divalent -  $\text{Ca}_3(\text{PO}_4)_2$   
 22. sodium oxide -  $\text{MgCO}_3$   
 23. monovalent - monovalent.  
 24. acids - oxides - salts.  
 25. hydrogen - hydroxide  
 26. sour - red - bitter - blue.  
 27.  $\text{NaOH} - \text{Mg}(\text{OH})_2$   
 28. Sulphuric acid - hydrochloric acid  
 29. an acid - a base.  
 30. hydrogen - hydroxide  
 31. Sodium oxide - carbon dioxide  
 32. soluble - insoluble

Compound	Chemical formula	No. of atoms in the molecule	No. of elements forming the molecule	Its type
1. Sodium carbonate	$\text{Na}_2\text{CO}_3$	6	3	Salt
2. Copper carbonate	$\text{CuCO}_3$	5	3	Salt
3. Sodium hydroxide	$\text{NaOH}$	3	3	Base
4. Aluminium sulphate	$\text{Al}_2(\text{SO}_4)_3$	17	3	Salt
5. Calcium oxide	$\text{CaO}$	2	2	Oxide
6. Magnesium nitrate	$\text{Mg}(\text{NO}_3)_2$	9	3	Salt
7. Copper nitrate	$\text{Cu}(\text{NO}_3)_2$	7	3	Salt
8. Aluminium hydroxide	$\text{Al}(\text{OH})_3$	7	3	Base
9. Calcium carbonate	$\text{CaCO}_3$	5	3	Salt
10. Sulphuric acid	$\text{H}_2\text{SO}_4$	7	3	Acid
11. Magnesium oxide	$\text{MgO}$	2	2	Oxide
12. Sodium phosphate	$\text{Na}_3\text{PO}_4$	8	3	Salt

1. Because during chemical reactions, potassium atom loses one electron, while oxygen gains or shares with two electrons to complete their outermost shell.
2. Because during chemical reactions, sodium atom loses one electron, while chlorine atom gains or shares with one electron to complete their outermost shell.
3. Because their outermost energy levels are completely filled with electrons, so they don't lose, gain or share with any electrons.
4. Because during chemical reactions, magnesium atom loses two electrons, while aluminium atom loses three electrons.
5. Because oxygen is divalent, while sodium is monovalent.
6. Because sodium is monovalent, while carbonate is divalent group, so two atoms of sodium combine with one atom of carbonate group.
7. Because oxygen is divalent, while hydrogen is monovalent, so two atoms of hydrogen combine with one atom of oxygen.
8. Because acids change the colour of litmus paper into red, while bases change the colour of litmus paper into blue.
9. Because acids produce positive hydrogen ions  $\text{H}^+$  Which responsible for their properties, while bases produce negative hydroxide ions  $(\text{OH})^-$  Which responsible for their properties.
10. Because sodium chloride is water soluble salt, while silver chloride is water insoluble salt.
11. Because caustic soda contains negative hydroxide ion, while lead bromide is formed from combination of positive metal ion with negative nonmetal ion.

1. It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.
2. This means that magnesium loses two electrons during a chemical reaction and changes into  $\text{Mg}^{+2}$

- This means that iron atom loses three electrons forming positive ion.
- This means that this element during the chemical reaction, its atom gains or shares with three electrons.
- It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, having its own valency and it isn't existed solely.
- It is a formula that represents the number and the type of the atoms in a molecule.
- They are substances which dissociate in water producing positive hydrogen ions  $H^+$ .
- They are substances which dissociate in water producing negative hydroxide ions  $(OH)^-$ .
- They are compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.
- They are compounds produced from the combination of oxygen with a metal.
- They are compounds produced from the combination of oxygen with a nonmetal.
- They are compounds resulted from the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).

Odd word (or formula)	The relation between the rest
1. Aluminium	Monovalent metallic elements.
2. Oxygen	They are metals.
3. Chlorine	They have more than one valency.
4. Potassium	Monovalent nonmetallic elements.
5. Aluminium	Divalent metallic elements.
6. Ammonium	They are negative atomic groups.
7. HCl	They are bases.
8. $Al_2O_3$	They are nonmetal oxides.
9. $SO_3$	They are metal oxides.
10. $H_2O$	They are acids.
11. AgCl	They are water soluble salts.

- Sodium (Na).
- Hydrogen (H).
- Oxygen (O).
- Nitrogen (N).
- Argon (Ar).
- Nitrate group  $(NO_3)^-$ .

- Phosphate group  $(PO_4)^{-3}$ .
- Sulphate group  $(SO_4)^{-2}$ .
- Sodium hydroxide (NaOH).
- Hydrochloric acid (HCl).
- Aluminium oxide  $(Al_2O_3)$ .
- Sulphuric acid  $(H_2SO_4)$ .
- Silver chloride (AgCl).
- Sodium chloride (NaCl).
- Sodium hydroxide (NaOH).

- Calcium sulphate (6 atoms).
- Lithium bicarbonate (6 atoms).
- Magnesium hydroxide (5 atoms).
- Sulphuric acid (7 atoms).
- Sodium phosphate (8 atoms).
- Potassium nitrate (5 atoms).
- Magnesium phosphate (13 atoms).
- Carbon dioxide (3 atoms).
- Aluminium sulphate (17 atoms).
- Sodium nitrate (5 atoms).
- Calcium hydroxide (5 atoms).
- Calcium phosphate (13 atoms).
- Calcium carbonate (5 atoms).
- Hydrochloric acid (2 atoms).

- |                 |               |                  |
|-----------------|---------------|------------------|
| 1. NaOH         | 2. $NaHCO_3$  | 3. $Na_2SO_4$    |
| 4. $Cu(NO_3)_2$ | 5. MgO        | 6. $HNO_3$       |
| 7. $H_2SO_4$    | 8. $Ca(OH)_2$ | 9. $Ca(HCO_3)_2$ |
| 10. $CaSO_4$    | 11. FeO       | 12. KCl          |
| 13. $CuSO_4$    | 14. $Al_2O_3$ | 15. $Ca(NO_3)_2$ |
| 16. $AgNO_3$    | 17. AgCl      | 18. HCl          |
| 19. NaCl        | 20. $CaCl_2$  | 21. $Al(OH)_3$   |
| 22. $NH_4Cl$    | 23. $K_2SO_4$ | 24. $Na_2CO_3$   |
| 25. $Na_2O$     | 26. $K_2CO_3$ | 27. $SO_3$       |
| 28. $H_2O$      |               |                  |

- Look at the main book on page (48).
- Look at the main book on page (49).

- |                      |             |
|----------------------|-------------|
| 1. A base.           | 2. A salt.  |
| 3. A metal oxide.    | 4. An acid. |
| 5. A nonmetal oxide. | 6. A salt.  |
| 7. An acid.          | 8. A base.  |
| 9. A nonmetal oxide. | 10. A salt. |
| 11. An acid.         | 12. A salt. |

16 1. Look at the main book on page (50).

P.O.C.	Carbonate group	Bicarbonate group
- Chemical formula :	$(\text{CO}_3)^{-2}$	$(\text{HCO}_3)^{-}$
- Valency :	Divalent	Monovalent
- Number of atoms :	4 atoms	5 atoms

P.O.C.	Potassium sulphate	Lead sulphate
- Chemical formula :	$\text{K}_2\text{SO}_4$	$\text{PbSO}_4$
- Solubility in water :	Soluble in water	Insoluble in water

4. Look at the main book on page (50).

17 Because rain water is dissolved in it acidic compounds, while the sea water is dissolved in it alkaline compounds.

18 1.  $\text{H}_2\text{SO}_4$                       2. KOH                      3.  $\text{K}_2\text{SO}_4$

19 1. Hexavalent (Nonmetal oxide).  
2. Tetravalent (Nonmetal oxide).  
3. Divalent (Salt).              4. Divalent (Acid).

20 1. It is a metal, because it contains one electron in its outermost energy level.  
2. It is monovalent, because during chemical reaction, it loses one electron.  
3.  $\text{X}_2\text{O}$                                       4.  $\text{X}_2\text{SO}_4$

21 1. Element (X) : 2, 8, 1  
Element (Y) : 2, 8, 7  
2. Element (X) is monovalent, because during chemical reaction, it loses one electron.  
Element (Y) is monovalent, because during chemical reaction, it gains or shares with one electron.  
3. Ionic compound (Salt).

22 1.

Element	Electronic configuration				Its type	Valency
	K	L	M	N		
${}_9\text{X}$	2	7	-	-	Nonmetal	Monovalent
${}_{13}\text{Y}$	2	8	3	-	Metal	Trivalent
${}_7\text{Z}$	2	5	-	-	Nonmetal	Trivalent
${}_{20}\text{Q}$	2	8	8	2	Metal	Divalent

2. a) Salt.                                      b) Metal oxide,  $\text{Y}_2\text{O}_3$   
3. Ionic combination,  $\text{QX}_2$

23 1. Monovalent.                      2. Metal oxide.

24 ① 1. Element (A) is trivalent, because during chemical reaction, it loses three electrons.  
Element (B) is divalent, because during chemical reaction, it gains or shares with two electrons.

2. Aluminium oxide ( $\text{Al}_2\text{O}_3$ )

② 1. (C)    2. (B)    3. (D)    4. (E)    5. (A)

③ 1. (1)  $\text{Ca}(\text{NO}_3)_2$                       (2) NaOH  
(3)  $\text{H}_2\text{SO}_4$                                       (4) AgCl  
2. (1) A salt                                      (2) A base  
(3) An acid                                      (4) A salt

3. • In tube (2), the paper doesn't change.

• In tube (3), the paper changes into red.

4. The salt dissolves in water.

5. Ionic bond.

### Thinking Skills Questions

1 1. a                      2. a                      3. b                      4. b  
5. c                      6. c                      7. d

2 1. divalent - 4                      2.  $\text{M}(\text{NO}_3)_2 - \text{M}_3(\text{PO}_4)_2$

3 1. a. 12                      b. 24                      c. divalent.  
2. XO

4 1. 12 - Divalent.  
2. Positive ion - It carries two positive charges.  
3. Ionic bond.  
4. (1) d                      (2) c

5 1. 13 - Trivalent.                      2. Ionic bond.  
3. Salt.                                      4.  $\text{X}(\text{OH})_3$

### Lesson 3

1 1. c                      2. b                      3. c                      4. d  
5. c                      6. d                      7. d                      8. c  
9. c                      10. d                      11. b                      12. c  
13. a                      14. d                      15. c                      16. c

2 ① 1. b                      2. d                      3. a                      4. c  
② 1. d                      2. a                      3. b                      4. c

- 3 1. (x) ..... a white powder .....  
 2. (✓) 3. (✓)  
 4. (x) ..... between metal and nonmetal .....  
 5. (✓) 6. (✓)  
 7. (x) Carbon dioxide .....  
 8. (x) ..... increases.  
 9. (x) Nitrogen oxides .....  
 10. (✓) 11. (✓)  
 12. (✓) 13. (x) ..... lightning.

- 4 1. Chemical reaction. 2. Chemical equation.  
 3. Law of conservation of matter.  
 4. Law of constant ratios.  
 5. Direct combination reactions.  
 6. Ammonium chloride. 7. Carbon dioxide.  
 8. Sulphur oxides. 9. Nitrogen oxides.

- 5 1. breaking – forming  
 2. (a) double covalent – two oxygen atoms.  
 (b) oxygen – magnesium oxide  
 3. symbols – chemical formulae – products  
 4. balanced – conservation of matter.  
 5. 80 – magnesium oxide.  
 6. constant ratios.  
 7. carbon dioxide – direct combination  
 8. white – ammonium chloride  
 9. medicines – fertilizers – plastics.  
 10. Carbon oxides – sulphur oxides – nitrogen oxides  
 11. carbon dioxide  
 12. headache – stomach-aches – fainting.  
 13. sulphur dioxide – sulphur trioxide – corrosion.  
 14. carbon monoxide – carbon dioxide  
 15. air – lung cancer.  
 16. Nitrogen – sulphur  
 17. Nitrogen – acidic

- 6 1.  $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$   
 (Direct combination between a metal and a nonmetal).  
 2.  $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$   
 (Direct combination between two nonmetals).  
 3.  $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc.}} \text{NH}_4\text{Cl}$   
 (Direct combination between two compounds).

4.  $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} 2\text{CO}_2$   
 (Direct combination between an element and a compound).  
 5.  $2\text{NO} + \text{O}_2 \longrightarrow 2\text{NO}_2$   
 (Direct combination between an element and a compound).

- 7 1. Due to the formation of magnesium oxide (white powder) as a result of combination of oxygen with magnesium.  
 2. To achieve the law of conservation of matter (mass).  
 3. Because it combines with oxygen forming magnesium oxide.  $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$   
 4. Due to the formation of ammonium chloride as white clouds.  $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc.}} \text{NH}_4\text{Cl}$   
 5. Because through which, it is possible to :  
 - Obtain electric and heat energies used in some industries.  
 - Obtain more useful substances from less used substances.  
 - Prepare thousands of compounds are commonly used in many industries such as : manufacture of medicines, fertilizers, fuel, plastics, car batteries and food industries.  
 6. Because some of them play a vital role in our life, while others have negative effects on both human beings and environment.  
 7. Because it produces a lot of harmful gases that affect on humans and environment such as carbon, sulphur and nitrogen oxides.  
 8. Because it prevents the penetration of thermal rays produced from the Earth to outer space.  
 9. Because it causes lung cancer.  
 10. Because its burning causes air pollution with poisonous substances that infect humans with lung cancer.  
 11. Because it causes air pollution and lung cancer.  
 12. Because it causes headache, fainting, severe stomach-aches and may lead to death.  
 13. Because they are acidic gases.  
 14. Because they are poisonous acidic gases.

- 8 1.  $2\text{Al} + 3\text{Cl}_2 \longrightarrow 2\text{AlCl}_3$   
 2.  $2\text{H}_2 + 2\text{NO} \longrightarrow 2\text{H}_2\text{O} + \text{N}_2$   
 3.  $2\text{Na} + \text{Cl}_2 \longrightarrow 2\text{NaCl}$   
 4.  $2\text{KI} + \text{Cl}_2 \longrightarrow 2\text{KCl} + \text{I}_2$   
 5.  $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} 2\text{CO}_2$

- 9** 1. It is the breaking of the existing bonds between the atoms of the molecules in reactants and forming new bonds between the atoms of the molecules in the products.
2. It is a set of symbols and chemical formulae representing the reactants and products molecules in the chemical reaction and it represents the conditions of the reaction as well.
3. It is an equation in which the number of atoms entering a reaction equals the number of atoms resulting from this reaction.
4. The sum of reactants masses in any chemical reaction equals the sum of products masses.
5. The chemical compound is formed from combination of its elements by constant weight ratios.
6. They are the reactions which involve a combination of two or more substances to form a new compound.

- 10** 1. The produced substances from burning of coal and cellulose fibres.
2. Carbon monoxide.                      3. Sulphur oxides.
4. Nitrogen oxides.

- 11** 1.  $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$   
(Direct combination between two elements a metal and a nonmetal).
2.  $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$   
(Direct combination between two nonmetals).
3.  $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc.}} \text{NH}_4\text{Cl}$   
(Direct combination between two compounds).
4.  $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} 2\text{CO}_2$   
(Direct combination between an element and a compound)

- 12** 1. A white powder of magnesium oxide is formed.  
 $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$  (White powder)
2. White clouds of ammonium chloride are formed.  
 $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc.}} \text{NH}_4\text{Cl}$  (White clouds)
3. Carbon dioxide compound is formed.  
 $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$
4. The temperature of air increases as  $(\text{CO}_2)$  causes the greenhouse effect.
5. It causes air pollution and lung cancer.

- 13** Look at the main book on pages (80 & 81).

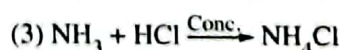
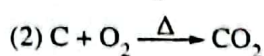
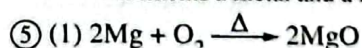
- 14** Answer by yourself.

- 15** ① Look at the main book on page (80).
- ② - Mass of reactants =  $12 + (2 \times 16) = 44$  gm.  
- Mass of products =  $12 + (2 \times 16) = 44$  gm.
- ③ (1) Mass of reactants =  $1 + 35.5 + 23 + 16 + 1 = 76.5$  gm.  
Mass of products =  $23 + 35.5 + (2 \times 1) + 16 = 76.5$  gm.
- (2) Mass of reactants =  $32 + (2 \times 16) = 64$  gm.  
Mass of products =  $32 + (2 \times 16) = 64$  gm.
- ④ (1)  $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$   
 $12 + (2 \times 16) \qquad 12 + (2 \times 16)$
- \* The sum of reactants masses =  $12 + 32 = 44$  gm.
- \* The sum of products masses =  $12 + 32 = 44$  gm.
- $\therefore$  The sum of reactants masses = The sum of products masses which achieves the law of conservation of matter.

Law of conservation of matter : The sum of reactants masses in any chemical reaction equals the sum of products masses.

- (2) Look at the main book on page (81).

- (3) a. Nonmetal oxide.  
b. Covalent bond.  
c. Direct combination reaction (between two elements a metal and a nonmetal).

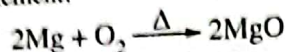


- ⑥ Look at the main book on pages (79 , 80 & 81).

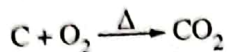
- ⑦ According to the law of conservation of matter :
- The mass of [Calcium hydroxide + Nitric acid] = The mass of [Calcium nitrate + Water]
- $\therefore$  The mass of calcium nitrate = The mass of [Calcium hydroxide + Nitric acid] - The mass of water.
- =  $[74 + 126] - 36$   
=  $200 - 36$   
=  $164$  gm.

## Unit Two

- 16 a - Fig. (1) : Direct combination reaction between a metal element with a nonmetal element.



- Fig. (2) : Direct combination reaction between two nonmetal elements.



- b - Fig. (1) : Metal oxide.  
• Fig. (2) : Nonmetal oxide.

Properties of magnesium ribbon	Properties of coal
- It has metallic luster.	- It has no luster.
- It is malleable and ductile.	- It is not malleable or ductile.

- 2 a - White clouds are formed at the mouth of the tube.  
b - Direct combination between a compound with another compound.

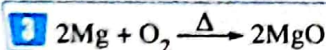


- c - Ammonium chloride - Salt.

## Thinking Skills Questions

- 1 1. b      2. c      3. a

- 2 1. Because they affected by acidic sulphur oxides produced from fuel burning.  
2. To prevent corrosion of monuments by acidic sulphur oxides produced from fuel burning.  
3. Due to increase the ratio of carbon monoxide in air from the burning of the fuel of car.



$$48 \text{ gm} \longrightarrow 80 \text{ gm}$$

$$? \text{ gm} \longrightarrow 10 \text{ gm}$$

$$\therefore \text{Mass of magnesium reactant} = \frac{10 \times 48}{80} = 6 \text{ gm}$$

- 4 1. a



$$(23 + 16 + 1) \longrightarrow (23 + 35.5)$$

$$40 \text{ gm} \longrightarrow 58.5 \text{ gm}$$

$$80 \text{ gm} \longrightarrow ? \text{ gm}$$

$$\therefore \text{Mass of produced sodium chloride}$$

$$= \frac{58.5 \times 80}{40} = 117 \text{ gm.}$$

## Project On UNIT One Answer by Yourself

## Lesson 1

- 1 1. b      2. d      3. d      4. b  
5. b      6. b      7. b      8. b  
9. b      10. c      11. c      12. d  
13. c      14. c      15. c      16. b  
17. b      18. c      19. b      20. c  
21. c      22. c      23. b      24. b  
25. d      26. c

- 2 1. (✓)  
2. (✓)      3. (✗) ..... into three main kinds.  
4. (✗) Weight is .....  
5. (✗) ..... increases by .....  
6. (✓)  
7. (✗) ..... decreases .....  
8. (✗) The scientist Newton .....  
9. (✓)  
10. (✗) ..... is equal to .....  
11. (✓)      12. (✓)  
13. (✗) ..... = its mass × gravity acceleration.  
14. (✗) ..... is more than .....  
15. (✓)      16. (✓)  
17. (✗) ..... of wrought iron.  
18. (✗) ..... changes the mechanical (kinetic) energy into electric energy.  
19. (✗) Electric motor .....  
20. (✗) ..... in generating electric energy.  
21. (✗) ..... in producing electricity.

- 3 1. Force.      2. Object's weight.  
3. Centre of gravity.  
4. Newton.      5. Object's weight.  
6. Electromagnet.  
7. Electric generator (Dynamo).  
8. Electric motor.      9. Weak nuclear forces.

- 4 1. force      2. force - motion.  
3. direction      4. motion - direction  
5. gravitational - electromagnetic - nuclear  
6. increases  
7. centre - weight.  
8. weight - centre of gravity.

9. its weight – its mass
10. Object mass – Earth's gravity acceleration
11. Kilogram – newton.
12. mass – changes
13. Object's mass.                      14. newton
15. decreases.                          16. 30 newton.
17. copper – wrought iron.
18. electric – magnetic
19. electric winches – electric bells.
20. mechanical – electric
21. electric – mechanical
22. nucleus.
23. medicine – scientific researches
24. electric energy – military
25. strong nuclear

- 5**
1. Because there is no force acts on it.
  2. Because the object changes its state when a proper force acts on it.
  3. Because the force acting on the wall is improper.
  4. Because the mass of the object is the amount of matter that the object contains, and it doesn't change by changing the position.
  5. Because the amount of 1 kg represents the mass of a bag of sugar and not its weight.
  6. Because the weight equals multiplying the mass of the object by Earth's gravitational acceleration.
  7. Because Earth's gravitational acceleration changes from one place to another.
  8. Because the distance between the Earth's surface and the centre of the Earth changes from one place to another due to the non-spherical shape of the Earth.
  9. Because the Earth's gravitational acceleration at the south pole is greater than the Earth's gravitational acceleration at the equator.
  10. Because it is changed into a temporary magnet.
  11. Because it is used in generating of electric energy from mechanical energy.
  12. Because it changes electric energy into mechanical energy.
  13. Because it is used in medicine, industry and producing electricity.

- 6**
1. It is an effect attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.

2. It is the ability of the Earth to attract that object to its centre.
3. This means that the amount of Earth's gravitational to this object is 60 newton.
4. This means that the Earth's gravitational acceleration in this region is  $9.8 \text{ m/sec}^2$ .

- 7**
1. Gravitational forces.
  2. Electromagnetic force.
  3. Electromagnetic force.
  4. Weak nuclear forces.
  5. Strong nuclear forces.

- 8**
1. It changes the electric energy into magnetic energy.
  2. It changes the mechanical (kinetic) energy into electric energy.
  3. It changes the electric energy into mechanical (kinetic) energy.

- 9**
1. It is used in making of electric bells and electric winches.
  2. They are used to lift scrap iron and cars in ports.
  3. It converts the electric energy into mechanical energy.
  4. It is used to get radioactive elements and radiations used in medicine.
  5. It is used in producing electricity.

- 10**
1. It will move, because there is a force acting on it.
  2. It will change its direction, because the force acting on it can change the ball direction.
  3. It doesn't move, because the force acting on it is improper.
  4. The object's weight increases, because object's weight = object's mass  $\times$  Earth's gravitational acceleration and there is a direct relation between them.
  5. The mass of the bird remains fixed, while the weight of the bird decreases, because the value of Earth's gravitational acceleration at the equator is less than that at the south pole.
  6. The Earth's gravitational acceleration increases, because Earth's gravitational acceleration increases by approaching to the Earth's centre.
  7. The weight of the object decreases, while its mass remains constant, because the mass doesn't change from a place to another, while the weight changes by changing the gravity.

8. The mass of the astronaut remains constant, while his weight is changed, because the mass doesn't change from a place to another, while the weight changes by changing the gravity.
9. The iron bar will attract the iron filings, because the iron bar is changed into a temporary magnet.
10. Falling the pieces of iron, because the electromagnet loses its magnetic force.

Odd word	Scientific name of the rest
1. Friction forces	Fundamental forces in nature.
2. Work	Weight = Mass × Earth's gravitational acceleration.
3. Handbell	Applications on electromagnetic forces.

Mass	Weight
It is the amount of matter that the body contains.	It is the amount of Earth's gravitational to an object.
It is a fixed value.	It changes from a place to another on the Earth's surface.
Its measuring unit is (kg).	Its measuring unit is (newton).
Mass = $\frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$	Weight = Mass × Earth's gravitational acceleration.

Electric generator	Electric motor
It changes mechanical energy into electric energy.	It changes electric energy into mechanical energy.

Strong nuclear forces	Weak nuclear forces
They are used in producing electricity and in military purposes.	They are used in : • medicine, • scientific researches, • industry.

1. The weight of the object  
= Object's mass × Earth's gravitational acceleration
- a. The weight of the ball  
=  $0.3 \times 9.8 = 2.94$  newton.
  - b. The weight of the boy  
=  $50 \times 9.8 = 490$  newton.

$$2. \text{ Mass} = \frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$$

$$= \frac{980}{9.8} = 100 \text{ kg.}$$

3. a. Object's weight is equal to the Earth's gravitational force to this object  
= 34.3 newton.

b. Object's mass  
=  $\frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$   
=  $\frac{34.3}{9.8} = 3.5 \text{ kg.}$

4. Object's mass =  $\frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$   
=  $\frac{80}{10} = 8 \text{ kg.}$

Gravitational acceleration on Mars =  $\frac{\text{Weight}}{\text{Mass}} = \frac{32}{8}$   
=  $4 \text{ m/sec}^2$

- 14
- ① • Lightning and thunder. • Wind motion.  
• The gravitational of objects to Earth.
  - ② • Gravitational forces.  
• Electromagnetic forces. • Nuclear forces.
  - ③ • Object's mass.  
• Earth's gravitational acceleration.
  - ④ Weight = Mass × Earth's gravitational acceleration.
  - ⑤ (1) The mass of the object at the south pole is equal to its mass at the equator.  
(2) The value of Earth's gravitational acceleration at the equator is less than that its value at the south pole.
  - ⑥ • The electromagnet is made up of an isolated copper wire coiling around a bar of wrought iron.  
• It is used in making of electric winches and electric bells.
  - ⑦ Electromagnet.
  - ⑧ • Weak nuclear forces are used in medicine, scientific researches and industry.  
• Strong nuclear forces are used in producing electricity and in military purposes.
  - ⑨ The iron nail is changed into a temporary magnet due to flowing of an electric current through the wire.

Input energy	Output energy
(1) Electric energy.	(1) Mechanical energy.
(2) Mechanical energy.	(2) Electric energy.



9. Because friction with grass is more than friction with ice, so the motion is more controlled.
10. To increase friction between tyres and the road to help car in starting and stopping motion.
11. To decrease friction between moving parts of machines and prevent their erosion.
12. Because friction forces generate heat energy that leads to ignition of match.
13. Because the oil stains decrease the friction forces, so the driver can't control the vehicle.
14. Because friction forces have benefits and also they have harms.
15. Due to heart muscle contraction and relaxation.

- 1**
1. It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.
  2. It is a resistant force (against motion) originated between the object in motion and the medium touching it.
  3. They are forces that enable living organisms to do their different biological operations.

- 0**
1. Forces of inertia.
  2. Friction forces.
  3. Forces inside living systems.
  4. Forces inside living systems.

- 0**
1. The driver and passengers will be rushed forward.
  2. The driver and passengers will be rushed backward.
  3. The coin will fall in the cup.
  4. The passengers may be injured.
  5. The bike slows down due to the friction force between the brakes and the tyres of the bike.
  6. Parts of machines getting hot and erosion occurs.
  7. Their temperature will increase.
  8. Movement of all body organs.
  9. Stopping the pulse.

- 0**
- (1) Look at the main book on page (116).
  - (2) Look at the main book on page (115).
  - (3) Look at the main book on page (118).
  - (4) Answer by yourself.
  - (5) • When the land is wet, the friction between my shoes and ground is small and this causes slipping of feet on roads.

- When the land is dry, the friction increases and this prevents feet from slipping on roads during walking.

- (6) Look at the main book on page (119).
- (7) Because the force of inertia makes the coin resists the sudden movement of the paper to maintain the state of rest.

We conclude that the force of inertia makes objects resist the change of their state unless an external force acted on them.

- (8) (1) Adel's car.  
 (2) Due to the friction forces.  
 (3) It will move more slowly on the plane covered with sand because friction will increase.

- (9) (1) less (2) less (3) decreases

- 11**
1. Because the friction force > the pulling force.
  2. Because friction force doesn't cause motion, but it originates due to motion.

### Thinking Skills Questions

- 1** 1. a 2. c

- 2**
1. Because friction force between the boat and the sand is more than friction force between the boat and water.
  2. Due to friction force between the outer surface of the spaceship body and the air of the atmosphere.
  3. To absorb the heat energy produced due to friction even the tire of lathe toothed doesn't expand.

- 3**
1. a
  2. • Solution (A), its concentration 40 %  
 • Solution (B), its concentration 10 %  
 Because liquids transport from lower concentration to higher one.
  3. The intestine is shrinking because the liquid transports from the intestine to the solution.
  4. Forces inside living systems.

### Lesson 3

- 1** 1. c 2. a 3. c 4. b 5. b  
 6. a 7. b 8. c 9. d 10. b



12. Because they detect the bone fractures.
13. To show errors, pores and cracks in these minerals.
14. Because they are used to treat and discover some swellings (tumors).
15. To be sterilized before reuse.

- 7**
1. It is the distance covered by an object in a unit time.
  2. It is the change in an object's position or direction as the time passes relative to another object or a fixed point known as frame of reference.
  3. They are waves that need a medium to transfer through.
  4. They are waves accompanied by electromagnetic forces and they don't need a medium to travel through.
  5. It is a motion which is regularly repeated in equal periods of time.
  6. It is the motion in which the object's position is changed relative to a fixed point from time to time between initial and final positions.

- 8**
1. Both of them seem to be at rest to each other.
  2. You will imagine that your car moves forward.
  3. You will imagine that your car moves backward.

- 9**
1. A car moves relative to a tree.
  2. The motion of a bicycle or a car or a train.
  3. The vibration of a pendulum.
  4. The movement of the Moon around the Earth.
  5. Water waves.
  6. Sound waves or water waves.
  7. Visible light.
  8. Infrared or ultraviolet rays.
  9. Lute or guitar.                      10. Flute or reed pipe.
  11. Infrared rays.

- 10**
1. A simple pendulum motion.  
All are transitional motion except this is a periodic motion.
  2. The movement of a piece of cork on the surface of shaking water.  
All others are examples of circular motion.
  3. Transitional motion.  
All others are periodic motion.

4. Water waves.  
All are electromagnetic waves except water waves which are mechanical waves.
5. Light waves.  
All are mechanical waves except light waves which are electromagnetic waves.

- 11**
- |                          |                      |
|--------------------------|----------------------|
| 1. Gamma rays or X-rays. | 2. Ultrasonic waves. |
| 3. Infrared rays.        | 4. Infrared rays.    |
| 5. Infrared rays.        | 6. Ultraviolet rays. |
| 7. X-rays.               | 8. X-rays.           |
| 9. Gamma rays.           | 10. Visible light.   |
| 11. Visible light.       |                      |

- 12**
1. Examining and curing sets for human body.
  2. Cooking food.
  3. Sterilizing the sets of surgical operations rooms.
  4. Photographing bones.
  5. In medical purposes, as the treatment and discovering of some swellings.
  6. In photographic cameras.

- 13**
1. Look at the main book on page (130).
  2. Look at the main book on page (131).

3.	<b>Train motion</b>	<b>Fan arms motion</b>
	A transitional motion.	A circular periodic motion.
4.	<b>Simple pendulum motion</b>	<b>Water waves motion</b>
	A vibrating periodic motion.	A wave periodic motion.

- 14**
- ① • Motion of a bicycle.                      • Motion of a car.  
• Motion of a train.
  - ② • Motion of vibrating pendulum.  
• Movement of the Moon around the Earth.  
• Motion of water waves.
  - ③ Mechanical waves :  
• Sound waves.                                      • Water waves.  
Electromagnetic waves :  
• Visible light.                                      • Gamma rays.
  - ④ Infrared rays – X-rays – Visible light.

- 15**
- (1) , (5) & (7) : Circular periodic motion.
  - (2) , (4) & (8) : Transitional motion.
  - (3) & (9) : Vibrating periodic motion.
  - (6) : Wave periodic motion.

### Thinking Skills Questions

- 1** a. Transitional motion, because it has initial and final points.  
 b. Periodic motion, because it repeats its motion in equal periods of time.
- 2** Because the speed of radio waves (electromagnetic waves) is greater than the speed of sound waves (mechanical waves).
- 3** 1. The car seems to be static.  
 2. The static car seems to be moving at the same speed, but in the opposite direction.  
 3. The other car seems to be moving at a high speed.  
 4. The train moves a transitional motion.  
 5. The sunflower plant moves in a periodic motion.

### Project On UNIT Two Answer by Yourself

## Unit Three

### Lesson 1

- 1** 1. a      2. d      3. b      4. c      5. c  
 6. d      7. b      8. b      9. c      10. d  
 11. b      12. c      13. b      14. b      15. a  
 16. b      17. a      18. c      19. c      20. d  
 21. a      22. a      23. b      24. b      25. b  
 26. d      27. c      28. d      29. b      30. b  
 31. d      32. c      33. b      34. b      35. a  
 36. b      37. c      38. b      39. d      40. d  
 41. b      42. b

- 2** (A) ① 1. b      2. a      3. d      4. c  
 ② 1. e      2. f      3. b      4. g  
 5. a      6. d  
 (B) 1. b - A      2. a - D      3. c - E      4. d - C

- 3** 1. (✓)      2. (✓)  
 3. (✗) ..... spiral arms.  
 4. (✗) ..... telescopes .....  
 5. (✗) ..... our star .....  
 6. (✗) ..... spherical opaque .....  
 7. (✓)      8. (✗) ..... and Mars.  
 9. (✗) ..... between 3.3 to 5.5 gm/cm<sup>3</sup>.  
 10. (✓)      11. (✓)      12. (✓)      13. (✓)

14. (✗) ..... the second .....  
 15. (✓)      16. (✗) The inner planets .....  
 17. (✓)      18. (✗) ..... is 11.00 m/sec<sup>2</sup>  
 19. (✓)      20. (✗) ..... on Jupiter .....  
 21. (✗) ..... and Mars.  
 22. (✗) Meteors .....  
 23. (✗) ..... in elongated elliptical orbits.  
 24. (✗) Comets .....  
 25. (✗) ..... 76 years.      26. (✓)

- 4** 1. Celestial body.      2. Stars.  
 3. Light year.      4. Galaxy.  
 5. Milky Way galaxy.      6. Planets.  
 7. The Sun.      8. Inner planets.  
 9. Outer (giant) planets.      10. Mercury.  
 11. Mercury and Venus.      12. Earth.  
 13. Jupiter.      14. Mars.  
 15. Moons.      16. Asteroids.  
 17. Asteroids' belt.      18. Meteors.  
 19. Meteorites.      20. Comets.  
 21. Halley's comet.

- 5** 1. celestial body.      2. Stars      3. light year.  
 4. Milky Way - Chopped Hay.  
 5. reflecting - refracting  
 6. celestial bodies.      7. Sun.  
 8. the Sun - planets - asteroids - meteorites  
 9. eight.  
 10. elliptical (oval) - perpendicular  
 11. inner - outer  
 12. Mercury - Venus - Mars - Uranus  
 13. Mercury - Neptune.      14. Jupiter - Earth.  
 15. Venus - Mars - Uranus  
 16. small - giant      17. Venus - Earth  
 18. Mercury - Venus      19. Mercury  
 20. hydrogen - helium  
 21. mass of each object - distance between them.  
 22. Jupiter - Mars      23. Uranus - Neptune  
 24. 62 - 2      25. Earth.  
 26. rocky masses - Sun      27. Mars - Jupiter  
 28. meteors - meteorites.      29. head - tail.  
 30. nitrogen - methane  
 31. more elongated elliptical  
 32. Halley - 76

- 6** 1. Because they are far from us.  
 2. Because these distances are too huge to be measured by kilometres.  
 3. Due to the attraction force of the Sun to the planets.

4. Because they are the nearest four planets to the Sun.
5. Because they consist of solid bodies.
6. Because they are the farthest four planets from the Sun.
7. Because they consist mainly of gaseous bodies.
8. Due to the high pressure and extreme coldness on the surfaces of these planets.
9. Because the mass of the Earth planet is larger than that of Mars planet and the force of gravity is directly proportional to the mass.
10. Due to the difference in the gravity acceleration from a planet to another.
11. Because they rotate around the planets and they are affected by their gravity.
12. Due to the burning of small rocky masses when they penetrate the Earth's atmosphere as a result of heat produced from their friction with air forming meteors.
13. Because it completes its revolution around the Sun every 76 years.

7

Odd word	Scientific name
1. Mercury.	Inner planets surrounded by an atmosphere.
2. The Sun.	Planets.
3. Saturn.	Inner planets.
4. Venus.	Outer planets.
5. Halley.	Planets.
6. Earthquakes	Celestial bodies.

8

1. Light year.
2. Number of planets in the solar system.
3. Number of inner or outer planets.
4. The range of densities of inner planets.
5. The range of densities of outer planets.
6. Number of moons rotating around Saturn planet.
7. The moon which rotates around the Earth.
8. Number of moons of inner planets group.
9. Number of moons rotating around Uranus planet.
10. Number of moons rotating around Jupiter planet.
11. Acceleration due to gravity on the Earth.
12. Acceleration due to gravity on Jupiter.
13. The mass of the biggest meteorite.

14. The time of revolution of Halley's comet around the Sun.

9

1. Any body swims in the space such as stars, planets, moons and rocky or gaseous bodies.
2. They are big-sized bodies that emit enormous amounts of heat and light.
3. It is the distance covered by light in one year and it equals  $9.467 \times 10^{12}$  km.
4. This means that the distance between two stars  $= 2 \times 9.467 \times 10^{12} = 18.934 \times 10^{12}$  km.
5. They are the greatest units that form the universe.
6. They are eight spherical opaque bodies revolve around the Sun in elliptical paths.
7. They are four small rocky planets nearest to the Sun.
8. They are four giant gaseous planets farthest from the Sun.
9. They are followers that are affected by the gravity of the planets that rotate around them.
10. They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids.
11. It is a region that separates the group of the inner planets from the group of the outer planets.
12. They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
13. They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface.
14. They are masses of rocks, ice and solidified gases that revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.

10

1. Stars will be seen as light small points.
2. We can't discover the celestial bodies.
3. It becomes hotter.
4. The effect of gravity force decreases.
5. They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.



## Lesson 2

1. b   2. a   3. a   4. b   5. d   6. d  
7. c   8. d   9. b   10. c   11. d   12. d  
13. c   14. b   15. d   16. b   17. b   18. c  
19. c   20. c   21. a   22. c   23. c   24. c  
25. b   26. a

- 2 (A) 1. c   2. a   3. d   4. b  
(B) 1. d   2. c   3. a   4. e  
(C) 1. d   2. e   3. a   4. c

- 3 1. (✓)  
2. (✗) ..... at the equator is ..... between the two poles.  
3. (✓)   4. (✓)   5. (✓)  
6. (✗) ..... is a mixture of ..... with different ratios.  
7. (✗) ..... of carbon dioxide .....  
8. (✗) Nitrogen gas ..... of oxygen gas .....  
9. (✗) ..... decreases .....  
10. (✗) ..... is less than the percentage of nitrogen gas and is more than .....  
11. (✓)   12. (✗) Nitrogen gas .....  
13. (✗) ..... ultraviolet rays.  
14. (✗) ..... 71 % of .....  
15. (✗) The green colour .....  
16. (✗) ..... 97 % .....  
17. (✗) The water of rivers is .....   18. (✓)  
19. (✗) ..... due to the gravity.   20. (✓)  
21. (✓)   22. (✗) ..... the Earth's crust.  
23. (✓)   24. (✗) ..... the Earth's crust.  
25. (✓)   26. (✓)

- 4 1. The Earth.   2. Atmosphere.  
3. Oxygen.   4. Nitrogen.  
5. Carbon dioxide.  
6. Photosynthesis process.  
7. Ozone layer.   8. Ground water.  
9. Water.   10. Earth's crust.  
11. Mantle.   12. Inner core.  
13. Outer core.

- 5 1. gravity - 365.25   2. third - 150 million  
3. a slight flattening - indented outward  
4. tropical - polar   5. inner  
6. 6386 km -  $5.9 \times 10^{24}$  kg.  
7. Earth's atmosphere - Earth's hydrosphere  
8. white   9. 0.03 % - 21 %  
10. nitrogen - 78 %   11. carbon dioxide  
12. Oxygen - nitrogen   13. Nitrogen

14. ozone  
15. Wind movement - clouds formation  
16. burning millions of small falling meteors - reducing the high speed of large meteorites.  
17. 71 % - salty - fresh  
18. Rivers - lakes - seas - oceans  
19. pores and cracks  
20. Water - temperature.   21. 76 cm.Hg.  
22. mantle - core.   23. crust - mantle.  
24. Earth's crust - Earth's core.  
25. 8 - 60 km.   26. outer - inner  
27. Iron - nickel

- 6 1. Because the Earth is slightly flattened at its poles and indented outward at the equator.  
2. Because it is the biggest inner planet and it is smaller than any planet from the outer planets.  
3. Due to the presence of the atmosphere that appears as a white colour around the Earth.  
4. Because the expansion of atmosphere in space helps in burning millions of small falling meteors completely before reaching the Earth's surface.  
5. Because it protects living organisms from the harmful ultraviolet radiations.  
6. Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun.  
7. Due to the gravitational force of the Earth.  
8. Due to the gravitational force of the Earth.  
9. Due to :  
- The presence of hydrosphere.  
- The presence of the atmospheric envelope containing oxygen gas which is needed for life.  
- Its temperature is suitable during both day and night.  
- Its atmospheric pressure and its gravitational force are suitable.  
10. The Earth has a force of gravity that makes the life possible through :  
- Constancy and steadfastness of objects and living organisms on its surface.  
- Steadfastness of the hydrosphere position on its surface.  
- Keeping the Earth surrounded by the atmosphere.  
11. As a result of the revolution of the Earth around its centre, the heavy metals descended towards the centre of the Earth and the light components in density ascended upwards, this led to the formation of a number of Earth's layers.

13. (✓) 14. (✗) ..... Increases by .....  
 15. (✗) The lower .....  
 16. (✗) ..... in sandstone rock. 17. (✓)  
 18. (✗) ..... calcium carbonate .....  
 19. (✗) Carbon dioxide gas ..... 20. (✓)  
 21. (✗) Marble is an example of metamorphic rocks.  
 22. (✗) The white .....

- 5**
- |                            |                           |
|----------------------------|---------------------------|
| 1. Soil.                   | 2. Rock.                  |
| 3. Magma.                  | 4. Lava.                  |
| 5. Igneous rocks.          | 6. Volcanic igneous rock. |
| 7. Plutonic igneous rocks. |                           |
| 8. Granite.                | 9. Basalt.                |
| 10. Sedimentary rocks.     |                           |
| 11. Sandstone.             | 12. Limestone.            |
| 13. Metamorphic rocks.     |                           |

- 6**
1. soil – solid basis.
  2. Soil – non-compacted
  3. mineralogical substances – water – organic
  4. igneous – sedimentary – metamorphic
  5. the Earth's crust – magma – volcanic flows – lava.
  6. plutonic rocks – volcanic rocks.
  7. large – small
  8. Granite – basalt
  9. plutonic – volcanic
  10. Granite – basalt
  11. quartz – feldspar – mica – olivine – pyroxene – feldspar
  12. 75% – 5%
  13. erosion – transportation – deposition.
  14. aqueous – aerial
  15. Sandstone – limestone
  16. white – smooth – yellow – coarse.
  17. quartz
  18. calcium carbonate – lime
  19. Sandstone – 2 mm
  20. hydrochloric
  21. Calcite –  $\text{CaCO}_3$
  22. carbon dioxide
  23. igneous – sedimentary – metamorphic
  24. mass – rock
  25. limestone.

- 7**
1. Because the upper part is fragmented and loosened layer but the lower part is a solid material that consists of different types of rocks.
  2. Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize so, their crystals are large-sized.
  3. Because the minerals that form it don't take the time required for crystallization, where lava cools quickly on the surface, therefore their crystals become small-sized.
  4. Due to the extruding of gases from volcanic flows during their cooling and formation of rock.

5. Because the size of crystals of minerals forming granite is large, while the size of crystals of minerals forming basalt is small.
6. Because it is a plutonic rock which has large crystals.
7. Because it is a volcanic rock which has very small crystals.
8. Due to the precipitation of calcium carbonate in lime solutions.
9. Due to evolving of carbon dioxide gas.
10. Because the sediments exist in the lower layers are exposed to high pressure resulted from the weights of the deposits above them, this causes a decrease in the ratio of water existing between the grains.
11. Because sandstone is yellow in colour and its texture is coarse, while limestone is white in colour and its texture is smooth.
12. Because if it contains impurities, it is coloured and if it is pure, it is white.

- 8**
1. It is extruded in the form of volcanic flows and it is called lava.
  2. Volcanic igneous rocks are formed.
  3. Plutonic igneous rocks are formed.
  4. Their crystals become large-sized.
  5. Their crystals become small-sized.
  6. Small circular holes are formed inside the rocks.
  7. Water takes the smooth sand in its way and the sand deposits at the lower part, while shingle and gravel remain at the upper part.
  8. The grains become solid and appear as layers above each other, the layers in the bottom are older and the above ones are more recent.
  9. An effervescence takes place due to evolving of carbon dioxide gas.
  10. They are converted into metamorphic rocks.
  11. Marble is formed.
  12. Limestone is formed.

- 9**
1. It is a thin non-compacted layer, which covers the Earth's crust.
  2. It is a natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.
  3. It is a very hot thick (viscous) liquid underneath the Earth's crust.
  4. It is the magma when it reaches the Earth's surface.
  5. They are rocks formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.
  6. They are rocks formed from the fragmentation and sedimentation of old rocks.

7. They are rocks originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature.

10

Odd word	Scientific name of the rest
1. Basalt	Minerals forming granite.
2. Mica	Minerals forming basalt.
3. Calcite	Minerals forming granite.
4. Solidification	Stages of formation of sedimentary rocks.

- 11
1. Look at the main book on page (190).
  2. Look at the main book on page (192).
  - 3.

P.O.C.	Magma	Lava
• Definition :	It is a very hot thick liquid underneath the Earth's crust.	It is the magma when it reaches the Earth's surface.
• The resulting rocks :	Plutonic igneous rocks.	Volcanic igneous rocks.
• Place of formation :	The depth of the Earth's crust.	The Earth's surface.

4. Look at the main book on page (193).
5. Look at the main book on page (196).
6. Look at the main book on page (198).

- 12
1. Granite.
  2. Basalt.
  3. Sandstone.
  4. Limestone.
  5. Marble.

- 13
- ① • Igneous rocks. • Sedimentary rocks.  
• Metamorphic rocks.
  - ② • Plutonic rocks. • Volcanic rocks.
  - ③ • Erosion • Transportation,  
• Sedimentation.
  - ④ 1. Metamorphic rock.  
2. & 5. - Igneous rocks.  
3. & 4. - Sedimentary rocks.
  - ⑤ 1. Quartz, feldspar and mica.  
2. Olivine, pyroxene and feldspar.  
3. Calcite.

⑥

Characteristics	Plutonic igneous rocks	Volcanic igneous rocks
• Size of crystals :	Large	Small
• Texture :	Coarse	Smooth
• Holes :	Absent	Present

- ⑦ Pressure and high temperature.
- ⑧ By adding hydrochloric acid :

Sandstone	Limestone
No reaction takes place.	An effervescence takes place when hydrochloric acid is added to limestone due to evolving of carbon dioxide gas.

- ⑨ 1. Granite. 2. Sandstone.  
3. Marble.
- ⑩ 1. Rock (A) : Plutonic igneous rock.  
Rock (B) : Volcanic igneous rock.  
2. The difference between the size of crystals of minerals in the two samples.  
3. Rock (A) : Granite.  
Rock (B) : Basalt.
- ⑪ Marble is originated as a result of exposing limestone to the factors of pressure and high temperature so that it has more solidity and cohesive than the limestone.

### Thinking Skills Questions

- 1 1. d 2. b 3. d

- 2
1. (1) Limestone.  
(2) Pressure and high temperature.
  2. Answer by yourself.
  3. Marble is from metamorphic rocks, while limestone is from sedimentary rocks.

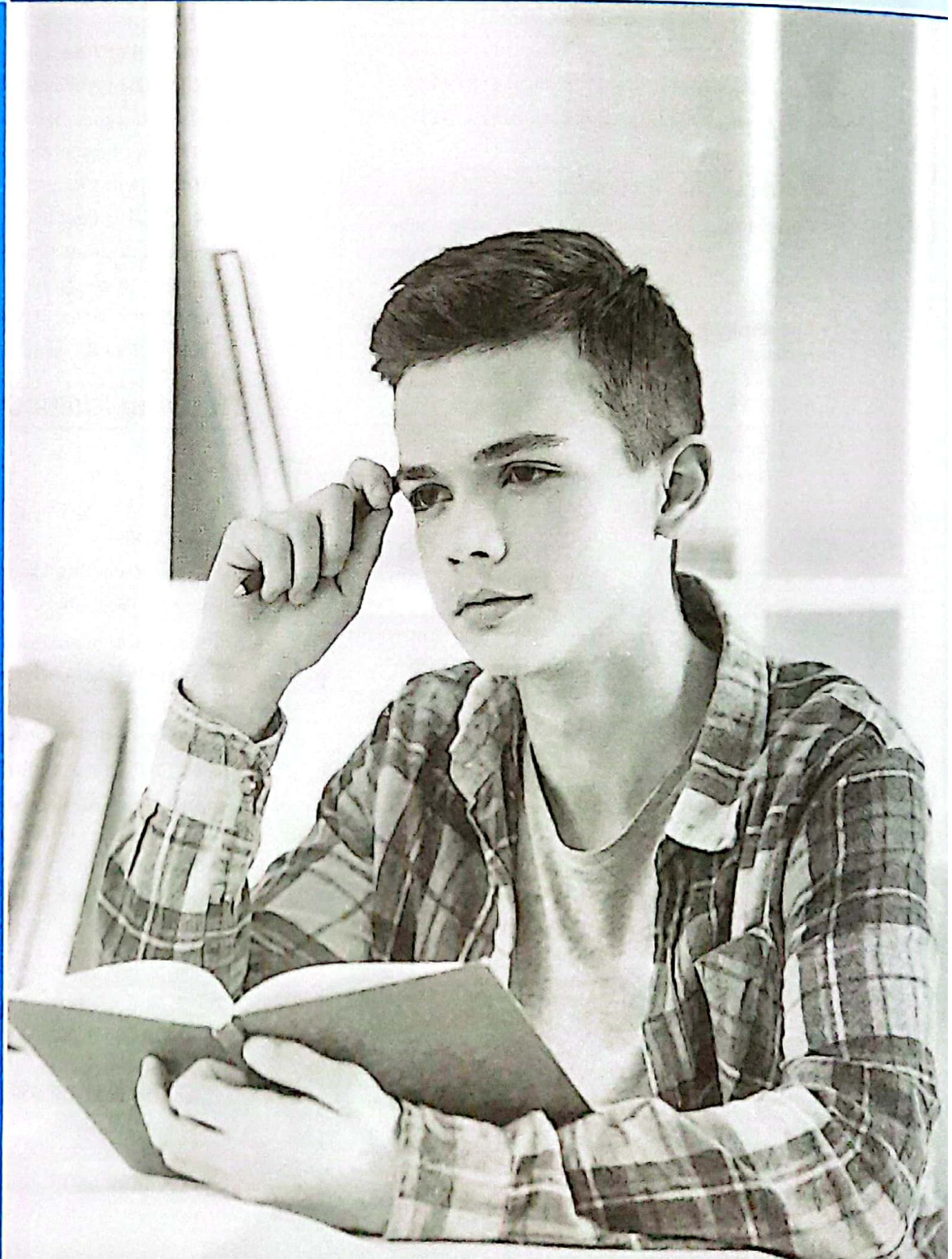
- 3
1. • Rock (X) : Igneous volcanic rock - Basalt.  
• Rock (Y) : Metamorphic rock - Marble.
  2. Plutonic igneous rocks are formed.

- 4
1. Basalt, because the crystals of minerals forming it are small and can't be seen by the naked eye.
  2. Smooth.
  3. Effervescence happens due to evolving of carbon dioxide gas.

### Project On UNIT Three Answer by Yourself

PART **2**

# Guide Answers of Worksheets



**Worksheet 1**

- 1** 1. Bromine – mercury    2. loses – positive ion.  
3. 7 – 8                      4. bad – graphite  
5. metals – nonmetals – noble gases.

- 2** 1. d    2. a    3. b    4. c    5. a

- 3** A. 1. Negative ion.    2. Positive ion.  
3. Noble gases.

- B. 1. (x) ..... is less than .....  
2. (x) ..... one electron .....  
3. (x) ..... of nonmetals .....

- 4** A. 1. Because the number of electrons becomes more than the number of protons.  
2. Because aluminium ion is formed when aluminium atom loses three electrons and changes into ( $Al^{+3}$ ) which contains 10 electrons, while nitrogen ion is formed when nitrogen atom gains three electrons and changes into ( $N^{-3}$ ) which contains 10 electrons too.  
3. Because sulphur atom ( $_{16}S$ ) gains two electrons during the chemical reaction, while calcium atom ( $_{20}Ca$ ) loses two electrons, so the number of energy levels in each of them becomes three.

- B. – They are solids except [mercury (Hg)] which is the only liquid metallic element.  
– They have metallic luster.  
– They are good conductors of heat and electricity.  
– They are malleable and ductile.

**Worksheet 2**

- 1** 1. Metal – II                      2. II  
3. Ionic bond.

- 2** A. 1. It is a chemical bond resulting from the electric attraction between a positive ion and a negative ion.  
2. It is a chemical bond originated between the atoms of nonmetals through sharing of each atom with a number of electrons to complete the outer electron shell of each atom.

- B. 1. Because it arises by sharing each hydrogen atom with only one electron to complete its outermost shell with two electrons and becomes more stable.  
2. Because potassium atom ( $_{19}K$ ) tends to lose the outermost electron and changes into positive ion, while chlorine atom ( $_{17}Cl$ ) gains the electron which is lost by potassium atom and changes into negative ion, then electric attraction occurs between positive and negative ions (ionic bond).

- 3** 1. sodium (Na) – chlorine (Cl)  
2. ionic – triple covalent  
3. positive – negative

**Worksheet 3**

- 1** 1. trivalent – divalent.    2.  $NaOH - H_2SO_4$   
3. gain – share with    4.  $(HCO_3)^-$  – monovalent.  
5. sodium – chloride

- 2** A. 1. It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.  
2. This means that this molecule consists of one atom of silver element and one atom of chlorine element.

- B. 1.  $Al_2(CO_3)_3$                       2.  $Na_2SO_4$   
3.  $Mg(OH)_2$                       4.  $(NH_4)_2CO_3$   
5.  $Ca_3(PO_4)_2$

- 3** A. 1. c                                      2. b  
B. 1. Atomic group (radical).  
2. Chemical formula.

- 4** A. 1. .... of three atoms of two different elements.  
2. .... is tetravalent.  
3. .... is zero.  
B. 1. Because during the chemical reaction, sodium atom loses one electron, while calcium atom loses two electrons to complete their outermost shell.  
2. Because aluminium is trivalent and oxygen is divalent.

## Worksheet 4

- 1 A. 1. Bases. 2. Salts.
- B. 1. Because acids when dissolved in water produce positive hydrogen ions ( $H^+$ ) which responsible for their properties.
2. Because limewater contains negative hydroxide ion, while lead sulphate is formed from combination of positive metal ion with negative atomic group.

- 2 A. 1. blue - negative hydroxide  
2. soluble - insoluble
- B. By using litmus paper in each tube :
- If it is changed to red, the substance is an acid.
  - If it is changed to blue, the substance is a base.

- 3 1. b 2. c 3. d

- 4 A. 1. Carbon dioxide. 2. Lead sulphate.  
3. Hydrochloric acid. 4. Calcium oxide.

B.

Sodium hydroxide	Sulphuric acid
- It is a base.	- It is an acid.
- It gives on dissociation in water hydroxide ions ( $OH^-$ ).	- It gives on dissociation in water hydrogen ions ( $H^+$ ).
- It has a bitter taste.	- It has a sour taste.
- It changes the colour of litmus paper into blue.	- It changes the colour of litmus paper into red.

## Worksheet 5

- 1 1. ferrous - ferric.  
2. positive - negative  
3. lost - gained - shared with.  
4. negative - electrons
- 2 1. Due to the completeness of its outermost energy level with electrons.  
2. Because acids change the colour of litmus paper into red, while bases change the colour of litmus paper into blue.

- 3 A. Answer by yourself.  
B. 1. c 2. d 3. c

- 4 A. 1.  $Na_2O$  2.  $CuSO_4$   
3.  $Na_2CO_3$  4.  $HCl$
- B. 1. It is the atom which loses or gains an electron or more during the chemical reaction.
2. It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, having its own valency and it is not existed solely.

## Worksheet 6

- 1 A. 1. double covalent - two active oxygen  
2. oxygen - magnesium oxide
3.  $2Mg + O_2 \xrightarrow{\Delta} 2MgO$   
The mass of the products =  $2(24 + 16)$   
 $= 2 \times 40$   
 $= 80 \text{ gm.}$
- B. 1.  $N_2 + 3H_2 \longrightarrow 2NH_3$   
2.  $2Ca + O_2 \longrightarrow 2CaO$   
3.  $2KI + Cl_2 \longrightarrow 2KCl + I_2$

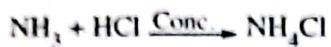
- 2 1. Due to the formation of magnesium oxide (white powder) as a result of combination of oxygen with magnesium.  
 $2Mg + O_2 \xrightarrow{\Delta} 2MgO$
2. To achieve the conservation law of matter.

- 3 1. It is the breaking of the existing bonds between the atoms of the molecules in the reactant and forming of new bonds between the atoms of the molecules in products.
2. The chemical compound is produced from combination of its elements by constant weight ratios.

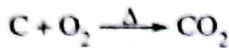
- 4 Word equation : Hydrogen + Oxygen  $\longrightarrow$  Water  
Symbolic equation :
- $$2H_2 + O_2 \longrightarrow 2H_2O$$
- $$2(2 \times 1) + (2 \times 16) \longrightarrow 2[(2 \times 1) + 16]$$
- The sum of reactants masses =  $2(2 \times 1) + (2 \times 16)$   
 $= 4 + 32 = 36 \text{ gm.}$
- The sum of products masses =  $2(2 + 16) = 36 \text{ gm.}$
- $\therefore$  The sum of reactants masses = The sum of products masses which achieves the law of conservation of matter.

## Worksheet 7

1. White clouds of ammonium chloride are formed.



2. Carbon dioxide is produced.



2 A. 1. Direct combination reactions.  
2. Sulphur oxides.  
3. Carbon dioxide gas.

B. Answer by yourself.

3 1. Because during lightning nitrogen oxides are produced.  
2. Because they poisonous acidic gases that affect the nervous system and the eye.

4

P. O. C.	Carbon oxides	Sulphur oxides
1. Examples :	- Carbon monoxide (CO). - Carbon dioxide (CO <sub>2</sub> ).	- Sulphur dioxide (SO <sub>2</sub> ). - Sulphur trioxide (SO <sub>3</sub> ).
2. The negative effect :	- Carbon monoxide causes headache, fainting, severe stomach-aches and may lead to death. - Increasing the ratio of carbon dioxide gas in air leads to increasing the air temperature.	They cause respiratory system malfunction, because they are acidic gases and cause building corrosion.

### General Exercise of the School Book on Unit One

1 1. Valency, 2. Ionic bond.  
3. Acids, 4. Chemical reaction  
5. Atomic group, 6. Chemical equation.  
7. Bases.

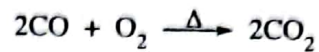
2 A. Answer by yourself.

B. 1, 2 & 3. Look at the main book on pages (15, 24 & 16).

4. Look at the main book on page (50).

3 A. 1. Carbon + Oxygen  $\xrightarrow{\Delta}$  Carbon dioxide  
 $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$

2. Carbon monoxide + Oxygen  
 $\xrightarrow{\Delta}$  Carbon dioxide



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



B. 1. Ca(NO<sub>3</sub>)<sub>2</sub> 2. CuSO<sub>4</sub>  
3. Na<sub>2</sub>CO<sub>3</sub> 4. Al<sub>2</sub>O<sub>3</sub>

C. Answer by yourself.

## Model Exam 1 on Unit One

1 A. 1. (✓)  
2. (✗) ..... nitrate group is (NO<sub>3</sub>)<sup>-</sup>, while that of nitrite group is (NO<sub>2</sub>)<sup>-</sup>.  
3. (✗) ..... 6 atoms for three .....  
4. (✗) ..... two positive charges.

B. 1. Sodium nitrate.  
2. Calcium hydroxide.  
3. Sulphuric acid.  
4. Sodium oxide.

C. It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.

2 A. 1. Nitrogen oxides  
2. Bases 3. graphite.  
4. white  
B.

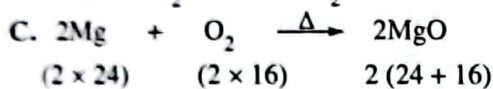
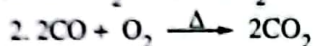
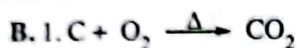
Element	Electronic configuration			(1) Its type	(2) Type of its ion	(3) Valency
	K	L	M			
<sup>18</sup> Ar	2	8	8	Noble gas	No ion	Zero
<sup>12</sup> Mg	2	8	2	Metal	Positive	Divalent
<sup>16</sup> S	2	8	6	Nonmetal	Negative	Divalent
<sup>8</sup> O	2	6	-	Nonmetal	Negative	Divalent
<sup>11</sup> Na	2	8	1	Metal	Positive	Monovalent

C. To achieve the law of conservation of matter (mass).

3 A. 1. two - one  
2. air - lung cancer.  
3. Al(OH)<sub>3</sub> - CaCO<sub>3</sub> - H<sub>2</sub>SO<sub>4</sub>  
4. ionic bond - single covalent bond.

- B. 1. By putting litmus paper, if the litmus paper changes into :  
 - Red so, it is  $H_2SO_4$   
 - Blue so, it is  $Ca(OH)_2$
2. By adding water with shaking :  
 - If it is soluble in water so, it is (NaCl).  
 - If it is insoluble in water so, it is (AgCl).
- C. It changes into a positive ion carries a number of positive charges equals to the number of given electrons.

4 A. 1. c      2. d      3. a      4. d



(2 × 24)      (2 × 16)      2(24 + 16)

48      +      32           2 × 40

80 gm                80 gm

- The sum of reactants masses = 80 gm.
- The sum of products masses = 80 gm.

## Model Exam 2 on Unit One

- 1 A. 1. Chemical reaction.  
 2. Triple covalent bond.  
 3. Valency.  
 4. Atomic group.

- B. 1.  $Fe(OH)_3$   
 2.  $Al_2(SO_4)_3$   
 3.  $Ca(NO_3)_2$   
 4.  $Na_2CO_3$

C. Because acids when dissolved in water produce positive hydrogen ions  $H^+$  which responsible for their properties, while bases when dissolved in water produce negative hydroxide ions  $(OH)^-$  which responsible for their properties.

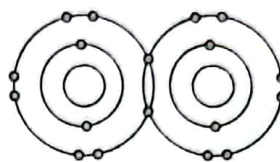
- 2 A. 1. Sodium  $\longrightarrow$  The rest are nonmetal elements.  
 2. HCl  $\longrightarrow$  The rest are salts.  
 3.  $H_2O$   $\longrightarrow$  The rest are acids.  
 4. Respiratory system malfunction  $\longrightarrow$  The rest are the negative effects of carbon monoxide.

- B. 1. A base,      2. A metal oxide,  
 3. An acid,      4. A salt.

- C. 1. A nonmetallic element.  
 2. divalent – tetravalent – hexavalent.

- 3 A. 1. Calcium oxide – sodium oxide – carbon dioxide – sulphur trioxide  
 2. carbon dioxide      3. metals – nonmetals  
 4. Nitrogen – sulphur

B. 1.



2, 3, 4 : Answer by yourself.

C.

The atom	The ion
1. It is electrically neutral in its ordinary state.	1. It is positive or negative electric charge.
2. The number of electrons equals the number of protons.	2. The number of electrons is more or less than the number of protons.
3. Its outermost energy level is not completely filled with electrons except atoms of noble gases.	3. Its outermost energy level is completely filled with electrons.

- 4 A. 1. Argon.      2. Hydroxide group.  
 3. Copper.      4. Sodium sulphide.
- B. 1. b      2. d      3. a      4. c
- C. Increasing the air temperature.

## Worksheet 8

- 1 A. 1. It is an effect attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.  
 2. It is the ability of the Earth to attract that object to its centre.
- B. 1. force – direction.  
 2. Gravitational forces – nuclear forces

2 A. 1. c      2. a      3. c

- B. 1. Because Earth's gravitational acceleration changes from one place to another.

2. Because the force acting on the wall is improper.

3 A. 1. Weight = Mass  $\times$  Earth's gravitational acceleration  
 $= 5 \times 10 = 50$  newton.

2. Mass =  $\frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$   
 $= \frac{392}{9.8} = 40$  kg.

B. 1. (✗)      2. (✓)      3. (✗)

- 4 1. Its weight will increase.  
 2. It will move from its position.

### Worksheet 9

1 1. b      2. c      3. a

- 2 A. 1. strong nuclear  
 2. weak nuclear forces – strong nuclear forces.  
 3. nucleus.      4. electric – mechanical

- B. 1. They are used in producing electric energy from the nuclear energy and in military purposes.  
 2. They are used to get radioactive elements and radiations which are used in :  
 • Medicine.      • Scientific researches.  
 • Industry.

- 3 1. Gravitational forces.  
 2. Electromagnetic forces.  
 3. Strong nuclear forces.  
 4. Weak nuclear forces.

### Worksheet 10

- 1 A. 1. Force of inertia – friction force  
 2. rushed back – inertia

B. 1. a      2. b

- 2 - Fig. (1) : The bus stops suddenly, because the passenger is rushed forward due to inertia as he tries to maintain his state of motion.  
 - Fig. (2) : The bus moves suddenly, because the passenger is rushed backward due to inertia as he tries to maintain his state of rest.

- 3 A. It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.

B. 1. (✓)      2. (✗) Inertia is .....

- 4 1. Due to inertia, as they try to maintain their state of motion.  
 2. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.  
 3. Due to inertia, as he tries to maintain his state of motion.

### Worksheet 11

- 1 A. It is the resistant force (against motion) originated between the object in motion and the medium touching it.

- B. 1. (✓)  
 2. (✗) ..... from the lower concentration to the higher one.  
 3. (✗) ..... to increase friction forces.

- 2 1. • It prevents feet from slipping on roads during walking.  
 • It helps to stop and start car motion.  
 • It helps in burning of match.

2. Look at the main book on page (119).

- 3 1. To decrease friction between moving parts of machines and prevent their erosion.  
 2. To increase friction between tyres and the road to help car in starting and stopping motion.

### Worksheet 12

- 1 1. friction force.      2. the electric bell.  
 3. forces inside living systems.  
 4. nuclear energy      5. friction

2 Answer by yourself.

- 3 A. 1. Object's weight.      2. Friction forces.  
 3. Electric generator.  
 B. • The weight of the person on Earth's surface  
 $= m \times g = 75 \times 9.8 = 735$  N  
 • The weight of the person at a height of 200 km  
 $= 75 \times 9.2 = 690$  N  
 • The amount of decrease in weight  
 $= 735 - 690 = 45$  N

- 4 A. 1. safety belts – inertia.  
 2. electric – magnetic  
 3. lower – higher  
 B. 1. The mass of the bird remains fixed, while the weight of the bird decreases.  
 2. The driver and the passengers will be rushed forward.

### Worksheet 13

- 1 A. 1. The movement of the Moon around the Earth.  
 2. The motion produced after throwing a stone in water.  
 3. The motion of the simple pendulum.  
 B. 1. b                      2. c

- 2 1. It is a motion which is regularly repeated at equal periods of time.  
 2. It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference.  
 3. It is the motion in which the object's position is changed relative to a fixed point (or a fixed frame of reference) from time to time between initial and final positions.

- 3 1. Car motion – train motion  
 2. backward.  
 3. transitional – periodic

- 4 Fig. (1) & (3) : Transitional motion.  
 Fig. (2) & (4) : Periodic motion.

### Worksheet 14

1

Mechanical waves	Electromagnetic waves
1. They are produced by the vibration of the medium particles.	1. They are accompanied by electromagnetic forces.
2. They need a medium to transfer through.	2. They spread in all media and free space.
3. Their speed is relatively low.	3. Their speed is extremely high equals 300 millions m/sec.
Examples : • Sound waves. • Water waves.	Examples : • Light waves. • X-rays. • Radio waves.

- 2 A. 1. Ultraviolet – infrared  
 2. mechanical waves – electromagnetic waves.  
 B. 1. (✗)                      2. (✓)

- 3 1. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.  
 2. Because the sunlight is electromagnetic waves which can travel through free space, while the sound of solar explosions is mechanical waves which can't travel through free space.  
 3. Because sound is mechanical waves which can't travel through free space.

- 4 A. Answer by yourself.

- B. 1. • X-rays.  
 • They are used in studying the inner structure of minerals crystals.  
 2. Answer by yourself.

### General Exercise of the School Book on Unit Two

- 1 1. d      2. b      3. b      4. c      5. a  
 6. c      7. c      8. c

- 2 A. 1. It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference.  
 2. It is a motion which is regularly repeated at equal periods of time.  
 3. This means that the amount of Earth's gravitational to this object is 60 newton.  
 4. It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.  
 B. 1. Because the distance between the Earth's surface and the centre of the Earth changes from one place to another due to non-spherical shape of the Earth.  
 2. Because Earth's gravitational acceleration changes from one place to another.  
 3. Due to inertia, as they try to maintain their state of motion.  
 C. 1. Transitional motion.  
 2. Weight.

## Model Exam 1 on Unit Two

1 A. 1. d 2. d 3. a 4. d

- B. 1. Electromagnet.  
 2. Electric energy changes into magnetic energy.  
 3. The pins will fall – The electric current has a magnetic effect.

C. It helps in stopping and starting cars motion.

2 A. 1. the object in motion – the medium touching it.  
 2. its weight – its mass  
 3. stringed – pneumatic  
 4. electricity – military

B. The pen doesn't fall on the ground on pulling the paper quickly, due to inertia which makes objects resist the change of their rest state.

C. Object's mass  

$$= \frac{\text{object's weight}}{\text{Earth's gravitational acceleration}}$$

$$= \frac{98}{9.8} = 10 \text{ kg.}$$

3 A. 1. Force. 2. Mechanical waves.  
 3. Periodic motion. 4. Weight.

- B. 1. They are used in :  
 – photographing bones to detect the sites of bone fractures.  
 – examining mineral raws in industry and showing errors, pores and cracks in these minerals.

2. – It prevents feet from slipping on roads during walking.

– It helps in stopping and starting cars motion.

– It helps in burning match.

3. They are used in :

– night vision systems used by modern military forces.

– remote sensing instrument to photographing the Earth's surface using satellites.

– cooking food.

– making remote sets.

4. It is used to get radioactive elements and radiations which are used in :

- Medicine.
- Scientific researches.
- Industry.

C. Because they have heat effect property.

4 A. 1. d 2. c 3. a

B. 1. (✗) 2. (✗) 3. (✓) 4. (✓)

C. Light waves : from electromagnetic waves.  
 Sound waves : from mechanical waves.

## Model Exam 2 on Unit Two

1 A. 1. electric. 2. stopping.  
 3. mechanical 4. vibrating

B. 1. They are used to lift scrap iron and cars in ports.

2. It is used to get radioactive elements and radiations which are used in medicine, scientific researches and industry.

3. They are used in medical purposes as the treatment and discovering of some swellings.

4. It is used in light shows.

C. They are waves that need a medium to transfer through.

2 A. 1. c 2. b 3. c 4. b

B. 1. less 2. less 3. decreases.

C. The iron bar is changed into a temporary magnet.

3 A. 1. (✗) ..... is equal to .....  
 2. (✗) Contraction and relaxation of muscles .....  
 3. (✗) ..... = its mass × gravitational acceleration.  
 4. (✗) ..... mechanical

B. 1. Forces of inertia.

2. Friction forces.

3. Forces inside living systems.

4. Forces inside living systems.

C. Because sound is from mechanical waves, while light is from electromagnetic waves.

4 A. 1. Nuclear force. 2. Inertia.

3. Force

4. Transitional motion.

B. 1. Sound waves – Electromagnetic waves.

2. Friction force – Fundamental forces in nature.

3. Light waves – mechanical waves.

4. Handbell – Applications of electromagnetic forces.

C.

Transitional motion	Periodic motion
1. It is a motion in which the object's position is changed from time to time relative to a fixed point.	1. It is a motion which is regularly repeated at equal periods of time.
2. It has initial and final positions. <b>Examples :</b> - A bicycle motion. - A train motion. - A car motion.	- It doesn't have initial or final positions. <b>Examples :</b> - A vibrating motion : As the motion of the simple pendulum. - A circular motion : As the movement of the Moon around the Earth. - A wave motion : As the motion of water waves.

### Worksheet 15

- 1 A. 1. the mass of the two objects – the distance between them.  
2. Mercury – Neptune.  
3. Milky Way galaxy – Chopped Hay galaxy.
- B. 1. They are the greatest units that form the universe.  
2. It is any body swims in the space such as stars, planets, moons and rocky or gaseous bodies.

2

Points of comparison	The inner planets	The outer planets
• Definition :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
• Their arrangement from the Sun :	Mercury – Venus – Earth and Mars.	Jupiter – Saturn – Uranus and Neptune.
• Structure :	Rocky bodies.	Gaseous bodies.
• Size :	Small in size.	Big in size.
• Density :	High.	Low.
• No. of moons rotating around them :	A few number of moons except Mercury and Venus have no moons.	Large number of moons.
• Atmosphere :	All of them have an atmosphere except Mercury.	All of them have an atmosphere.

- 3 A. 1. Because they consist mainly of gaseous bodies.  
2. Because these distances are too huge to be measured by kilometres.

B. 1. b                      2. d                      3. b

4 A. Distance in light year =  $\frac{\text{Distance in km}}{9.467 \times 10^{12}}$   

$$= \frac{75.736 \times 10^{12}}{9.467 \times 10^{12}}$$

$$= 8 \text{ light years.}$$

- B. 1. Light year.                      2. The Sun.  
C. – They are used for identifying the celestial bodies.  
– Reflecting telescope and refracting telescope.

### Worksheet 16

- 1 1. Meteors.                      2. Moons.  
3. The belt of the wanderer asteroids.  
4. Halley's comet.

- 2 A. 1. (✓)                      2. (✗) ..... Mars and Jupiter.
- B. – They are masses of rocks, ice and solidified gases which revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.  
– They consist of two parts, which are :
- The head : It contains icy spheres which are a mixture of :
    - Solidified gases [carbon dioxide, nitrogen and methane gases].
    - Rocky parts.
    - Dust and water molecules.
  - The tail : It consists of a gaseous cloud.  
– The most famous comet is Halley's comet which completes its revolution around the Sun each 76 years.

3 1. b                      2. c                      3. d                      4. b

- 4 1. Because the gravity of planet increases by increasing its mass and Jupiter is the biggest planet in mass.  
2. Due to the difference in the gravity acceleration from a planet to another.



## Worksheet 20

- 1 A. 1. Soil. 2. Magma. 3. Rock.

B.

Points of comparison	Granite	Basalt
1. Colour :	Pink or grey.	Dark.
2. Minerals forming it :	Quartz, feldspar and mica.	Olivine, pyroxene and feldspar.
3. Found in :	The Eastern Desert and Sinai Peninsula.	Abou-Zaabal, near Abou Rawash and El-Fayoum.

- 2 1. igneous – sedimentary – metamorphic  
2. plutonic – volcanic 3. small-sized.  
4. volcanic flows – lava.  
5. Granite – basalt

- 3 1. Because the upper part is fragmented and loosened layer.  
2. Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize, so their crystals are large-sized.  
3. Because minerals that form them don't take the time required for crystallization, where lava cools quickly on the surface, therefore their crystals become small-sized.  
4. Due to the extruding of gases from volcanic flows during their cooling and formation of rock.

- 4 1. Igneous rocks are .....  
2. Soil is formed .....  
3. Plutonic rocks are formed .....  
4. Granite .....

## Worksheet 21

- 1 1. An effervescence takes place due to evolving of carbon dioxide gas,  
2. They convert into metamorphic rocks,  
3. Limestone is formed.

- 2 1. Limestone – sandstone – marble  
2. erosion – transportation – sedimentation,  
3. white – smooth – yellow – coarse  
4. older – recent.

- 3 A. 1. Sedimentary rocks. 2. Marble,  
3. Sandstone.

- B. 1. (x) Marble has .....  
2. (x) ..... that forms sandstone .....

- 4 (1) Pressure and high temperature.  
(2) Erosion, transportation and sedimentation  
- Marble is an example of metamorphic rocks.

## General Exercise of the School Book on Unit Three

- 1 1. Magma. 2. Volcanic igneous rock.  
3. Meteorites.

- 2 1. elliptical – one plane perpendicular  
2. quartz – feldspar – mica – olivine – pyroxene – feldspar

- 3 1. Because the expansion of atmosphere in space helps in burning millions of small falling meteors completely before reaching the Earth's surface.  
2. Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize, so their crystals are large-sized.  
3. Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.

- 4 1. b 2. d 3. c

- 5 1. Look at the main book on page (178).  
2. Look at the main book on page (196).  
3. Look at the main book on pages (157 & 158).

- 6 Answer by yourself.

## Model Exam 1 on Unit Three

- 1 A. 1. (✓) 2. (x) 3. (x) 4. (x)

- B. 1. Light year, 2. Comets.  
3. Marble. 4. Moons.

- C. Because the size of crystals of minerals forming plutonic rocks is large, while the size of crystals of minerals forming volcanic rocks is small.

- 2 A.

Odd word	Scientific name
1. Jupiter.	Inner planets.
2. Halley.	Planets.
3. The Sun.	Planets.
4. Earthquakes.	Celestial bodies.

- B. (1) Earth's crust. (2) Mantle.  
 (3) Outer core. (4) Inner core.  
 C. It protects living organisms from the harmful ultraviolet rays.

- 3 A. 1. (150 million km). 2. (76 cm.Hg).  
 3. (Ranging from 0.7 to 1.3 gm/cm<sup>3</sup>).  
 4. (3 Moons).  
 B. 1. c 2. b 3. b 4. b

C. The temperature on Earth's surface will increase, so it is not suitable for the continuity of life of living organisms.

- 4 A. 1. Ocean - river  
 2. elliptical - perpendicular  
 3. Magma - volcanic flows - lava.  
 4. white - water bodies.  
 B. 1. g - F 2. c - D 3. a - B  
 4. d - C 5. e - E  
 C.

Points of comparison	Inner planets	Outer planets
1. Definition :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
2. Their arrangement from the Sun :	Mercury - Venus - Earth and Mars.	Jupiter - Saturn - Uranus and Neptune.

### Model Exam 2 on Unit Three

- 1 A. 1. d 2. c 3. a 4. e  
 B. 1. carbon dioxide 2. limestone  
 3. Galaxies 4. Volcanic  
 C. They are rocks formed from the cohesion of sediments.

- 2 A. 1. Quartz - Feldspar - Mica.  
 2. Olivine - Pyroxene - Feldspar.  
 3. Mineral calcite. 4. Quartz.  
 B. 1. Outer core. 2. The Earth.  
 3. The belt of wanderer asteroids.  
 4. Milky way galaxy.

C. Look at the main book on page (157).

- 3 A. 1. erosion - transportation - sedimentation.  
 2. Nitrogen - 78  
 3. Ozone - ultraviolet  
 4. Sedimentary - metamorphic

- B. 1. Layer No. (2)  
 2. Layer No. (1)  
 3. Layer No. (4)

C. Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun.

- 4 A. 1. (x) ..... is smaller .....  
 2. (x) ..... is 97%.  
 3. (✓).  
 4. (x) ..... is 76 cm. Hg.

- B. 1. Metamorphic rock.  
 2. Igneous rock.  
 3. Sedimentary rock.  
 4. Igneous rock.

C. pressure and high temperature.

## March Tests

### Model 1

- 1 A. 1. d    2. c    3. d    4. d

B. Due to the formation of ammonium chloride as white clouds.  $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc.}} \text{NH}_4\text{Cl}$

- 2 A. 1. (✓)

2. (✗)

3. (✗)

4. (✗)

B. It doesn't move, because the force acting on it is improper.

### Model 2

- 1 A. 1. Positive ion.    2. Chemical formula.  
3. Object's weight.    4. Sulphur oxides.

B. To achieve the law of conservation of matter (mass).

- 2 A. 1. (✓)    2. (✗)

3. (✓)    4. (✗)

B.  $\text{Mass} = \frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$   
 $= \frac{80}{10} = 8 \text{ kg.}$

Gravitational acceleration on Mars =  $\frac{\text{Weight}}{\text{Mass}}$   
 $= \frac{32}{8} = 4 \text{ m/sec}^2.$

## April Tests

### Model 1

- 1 A. 1. (✗)    2. (✓)    3. (✗)    4. (✓)

B. Because they consist mainly of gaseous bodies.

- 2 A. 1. c    2. b    3. d    4. a

B. They are rushed forward.

### Model 2

- 1 A. 1. Friction forces.    2. Transitional motion.  
3. Galaxy.    4. Nitrogen.

B. Distance in light year =  $\frac{28.401 \times 10^{12}}{9.467 \times 10^{12}}$   
 $= 3 \text{ light years.}$

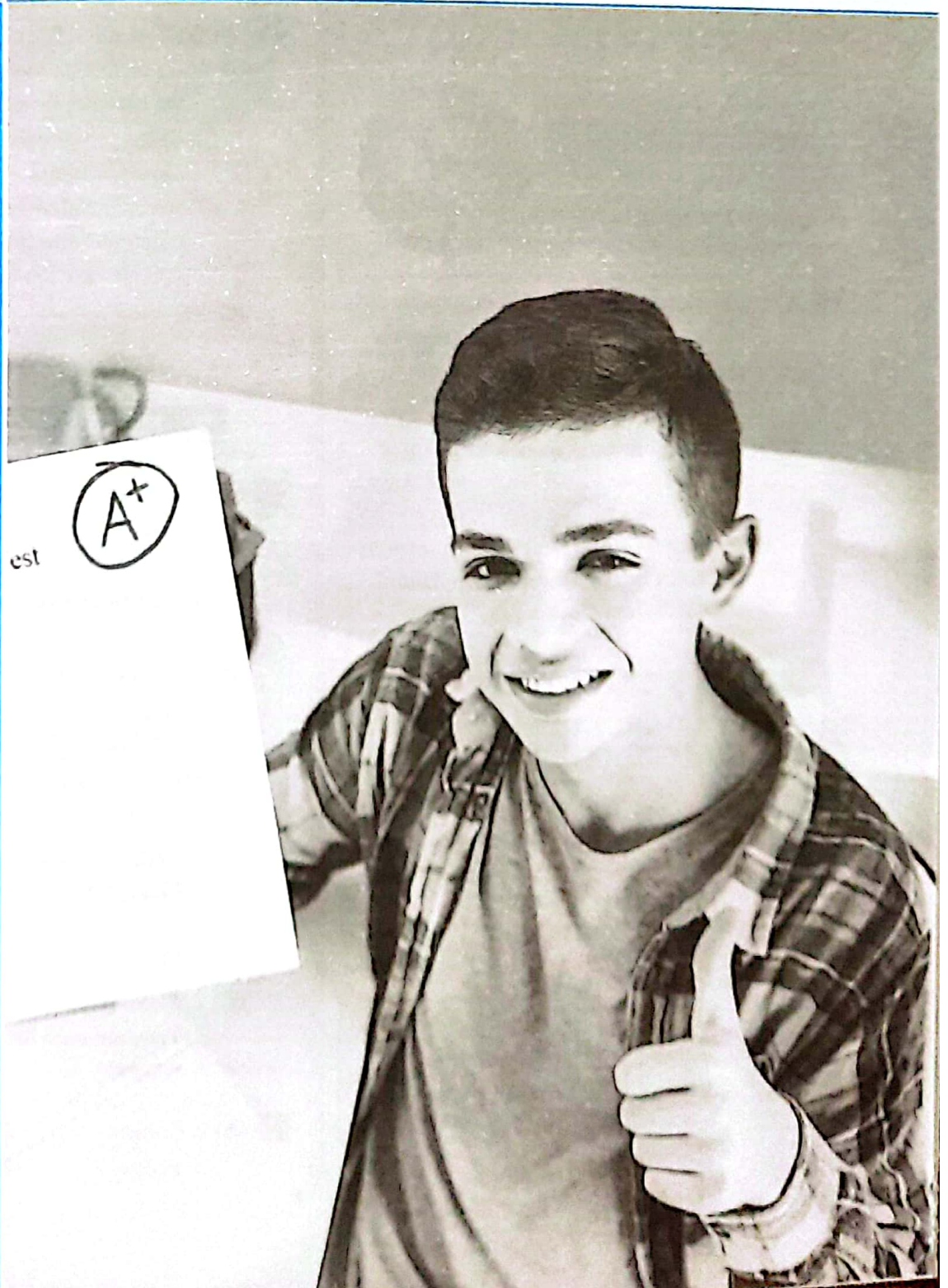
- 2 A. 1. mechanical    2. electromagnetic  
3. Earth    4. salty

B. Because they have heat effect property.

PART

# 3

## Guide Answers of Final Examinations



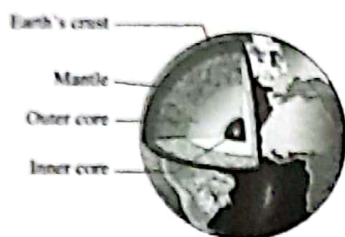
## Cairo Governorate

### 1 St. Joseph's School

1 (A) 1. c    2. c    3. a    4. a

- (B) 1. It changes into a negative ion.  
 2. A white powder of magnesium oxide is formed.  
 $[2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO} \text{ (white powder)}]$   
 3. It will increase the speed of moving object.

(C)

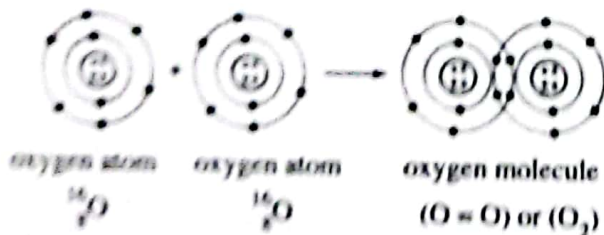


2 (A) 1. Electric motor.    2. Nitrogen gas.  
 3. Force.    4. chemical reaction.

(B) 1.  $2\text{Mg} + \text{O}_2$   
 2.  $2\text{NO} + \text{O}_2$

- (C) 1. It is a region that separates the group of the inner planets from the group of outer planets.  
 2. They are resistant forces (against motion) originated between the object in motion and the medium touching it.

(D)



3 (A) 1. Oxygen.    2. moon  
 3. gravitational force.    4. four

(B)

Points of comparison	Granite rock	Basalt rock
1. Colour :	Pink or grey	Dark.
2. Kind :	Plutonic igneous rock.	Volcanic igneous rock

- (C) 1. This means that the element doesn't participate in any chemical reaction in ordinary conditions due to the completeness of its outermost energy level with electrons.  
 2. This means that the ability of the Earth to attract this object equals 30 newton.  
 3. This means that the marble originated as a result of exposing limestone to the factors of pressure and high temperature.

4 (A) 1. (✓)    2. (✗)    3. (✗)    4. (✓)

- (B) 1. Because it protects living organisms from the harmful ultraviolet radiations.  
 2. Because the upper part is fragmented and loosened layer.  
 3. Because Aluminium atom loses its outermost three electrons and changes into positive ion in chemical reaction.

(C)  $\text{Mass} = \frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$   
 $= \frac{280}{10} = 28 \text{ kg.}$

### 2 Maadi Educational Zone

- 1 (A) 1. Mercury – Neptune.  
 2. mass of each object – distance between them.  
 3. periodic – transitional.  
 4. igneous – metamorphic

- (B) 1.  $2\text{MgO}$   
 2. Direct combination of a metal with nonmetal  
 3. Heat energy has broken the double covalent bond in an oxygen molecule ( $\text{O}_2$ ) to give two active oxygen atoms.  
 4. Mass of reactants =  $(2 \times 24) + (2 \times 16) = 80 \text{ gm.}$

Mass of products =  $2(24 + 16) = 80 \text{ gm.}$

- (C) 1. Making remote sets  
 2. They are used for identifying the celestial bodies.

2 (A) 1. Comets.    2. Electric generator.  
 3. Rocks.    4. Magma.

(B)

Points of comparison	Inner planets	Outer planets
1. Definition	They are the nearest four planets to the Sun.	They are the farthest four planets to the Sun.
2. Size	Small in size.	Big in size.

- (C) 1. To decrease friction between moving parts of machines and prevent their erosion.  
 2. Due to the presence of the atmosphere that appears as a white colour around the Earth.

- 3 (A) 1. a    2. b    3. c    4. b  
 (B) 1. (x)    2. (✓)    3. (✓)    4. (✓)

- (C) 1. It is an effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.  
 2. The chemical compound is formed from combination of its elements by constant weight ratios.

- 4 (A) 1. X-rays.    2. Nitrogen oxides.  
 3. The inner core    4. The electromagnet  
 (B) 1. a - 4    2. b - 3  
 3. c - 2    4. d - 1

- (C) Distance in kilometre  
 = Distance in light year  $\times 9.467 \times 10^{12}$   
 =  $3 \times 9.467 \times 10^{12}$   
 =  $28.401 \times 10^{12}$  km

**3 Ethelmia official Language School**

- 1 (A) 1.  $NH_4Cl$   
 2. ionic - double covalent bond.  
 3. electric - mechanical  
 4. forward - inertia  
 (B) 1. c    2. e    3. b    4. a  
 (C)  $MgO$

- 2 (A) 1. Light year.    2. Mechanical waves.  
 3. valency.    4. Force.  
 (B) 1.  $(OH)^-$     2. third  
 3. bases    4. heat

- (C) Because acids when dissolved in water produce positive hydrogen ions  $H^+$  which is responsible for their properties.

- 3 (A) 1. (✓)    2. (✓)    3. (x)    4. (✓)  
 (B) 1. non-metal.    2. Monovalent.  
 3. gains    4. negative ion.  
 (C) It changes into a positive ion.

- 4 (A) 1. c    2. b    3. a    4. a  
 (B) 1. Oxide.    2. Base.  
 3. Acid.    4. Salt.  
 (C) Weight of object  
 = Mass  $\times$  Earth's gravitational acceleration  
 =  $10 \times 9.8 = 98$  Newton

**4 Rod El-farag Educational Zone**

- 1 (A) 1. periodic - transitional  
 2. ionic - single covalent  
 3. sedimentary - metamorphic  
 4. electric - magnetic.  
 (B) 1.

Points of comparison	Granite	Basalt
1. kind	Plutonic igneous rock	Volcanic igneous rock
2. Minerals forming it	Quartz, feldspar and mica.	Olivine, feldspar and pyroxine

2.

Points of comparison	Mechanical waves	Electromagnetic waves
1. Definition	They are produced by the vibration of medium particles	They are accompanied by electromagnetic forces
2. Speed	Their speed is relatively low.	Their speed is extremely high equals 300 millions m/sec.

(C)  $Mass = \frac{\text{Object's Weight}}{\text{Earth's gravitational acceleration}}$   
 =  $\frac{980}{9.8} = 100$  kg.

- 2 (A) 1. a. 2. a. 3. d 4. d
- (B) 1. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.
2. Because their outermost energy levels are completely filled with electrons so they don't lose, gain or share with any electrons.
3. Because they consist mainly of gaseous bodies.
4. Because the light of lightening is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

(C) 1.  $\text{NH}_4\text{Cl}$ . 2.  $2\text{HCl}$

- 3 (A) 1. Valency. 2. Magma.  
3. Base. 4. Periodic motion.

- (B) 1. Sound wave.  
2. Hydrochloric acid. (HCl)  
3. Mercury.  
4. Sodium chloride. (NaCl)

- (C) 1. Making remote sets.  
2. producing electricity

- 4 (A) 1. (x) 2. (x) 3. (✓) 4. (✓)

- (B) 1.  $\text{Cu}(\text{NO}_3)_2$  2.  $\text{H}_2\text{SO}_4$   
3. NaOH 4.  $\text{CaSO}_4$

- (C) 1. It causes air pollution and lung cancer.  
2. The driver will be rushed forward.

**5 St. Joseph Maronite Language School**

- 1 (A) 1. reflecting telescope – refracting telescope.  
2. positive hydrogen ( $\text{H}^+$ ) – negative hydroxide ( $\text{OH}^-$ )  
3. Mercury – Jupiter  
4. Plutonic igneous – sedimentary

- (B) 1. It converts the electric energy into mechanical energy.  
2. They are used in :  
• Night vision systems used by modern military forces.  
• Remote sensing instrument to photographing the Earth's surface using satellites.  
• Cooking food.  
• Making remote sets.

3. They are used in :  
• photographing bones to detect the sites of bone fractures.  
• Examining mineral raws in industry and showing errors, pores and cracks in these minerals.

4. It is used in :  
• Photographic cameras.  
• Television cameras.  
• Light shows.

$$\begin{aligned} \text{(C) Mass} &= \frac{\text{Object's Weight}}{\text{Earth's gravitational acceleration}} \\ &= \frac{98}{9.8} = 10 \text{ kg.} \end{aligned}$$

- 2 (A) 1. Because their outermost energy levels are completely filled with electrons so they don't lose, gain or share with any electrons.

2. Because the light of lightening is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

3. Because there is no force acts on it.

4. Due to the presence of the atmosphere that appears as a white colour around the Earth.

- (B) 1. Mercury. 2. third  
3. elliptical (oveal) 4. strong nuclear

- (C) - Mass of reactants =  $12 + (2 \times 16) = 44 \text{ gm.}$   
- Mass of products =  $12 + (2 \times 16) = 44 \text{ gm.}$

- 3 (A) 1. Ionic bond.  
2. Electromagnetic waves.  
3. Relative motion.  
4. Electric generator (dynamo).

(B) 1.

Point of comparison	Transitional motion	Periodic motion
Definition :	It is a motion in which the object's position is changed from time to time between initial and final positions.	It is motion which is repeated at equal periods of time.

2.

Point of comparison	Metals	Non-metals
No. of electrons in outer shell :	They have less than 4 electrons in outermost energy level	They have more than 4 electrons in outermost energy level

- (C) 1. It is the distance covered by light in one year and it equals  $9.467 \times 10^{12}$  km.  
 2. They are bodies swim in space such as stars, planets, moons and rocky or gaseous bodies.

1 (A) 1. b      2. c      3. b      4. b

- (B) 1. The driver and passengers will be rushed forward.  
 2. The combustion processes will be fast, and proceed without any control.  
 (C) 1. NaOH.                      2.  $H_2SO_4$ .

### 6 Helwan Educational Zone

1 (A) 1. Chemical reaction.      2. Relative motion.  
 3. Meteors.                      4. Negative ion.

- (B) 1. It is used for identifying the celestial bodies.  
 2.  $NH_3 + HCl \xrightarrow{\text{conc.}} NH_4Cl$  (white clouds)  
 3. Periodic motion (vibrating) motion  
 4. Iron and Nickel

(C) Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves

2 (A) 1.  $H_2SO_4$

2. Erosion of machine parts.

3. Mercury.                      4.  ${}_{12}Mg$

- (B) 1.  $CaSO_4$                       2. strong nuclear  
 3. Halley                          4. zero.

(C) • Properties of Granite rock :

- It is heavy.
- It has rough texture.
- It is solid, cohesive and it isn't easily broken.

• Minerals forming it :

It consists of 3 main minerals which are Quartz, Mica and Feldspar.

3 (A) 1. a      2. d      3. b      4. c

(B) 1. e      2. d      3. a      4. c

(C) The weight of the object decreases, while its mass remains constant.

4 (A) 1. (✓)

2. (✗) ..... inertia force.

3. (✓)

4. (✗) ..... the mechanical energy into electric energy.

- (B) 1. Metals.                      2. Mars  
 3. Infrared (IR)                      4. doesn't dissolve

(C) Burning of coal and cellulose fibers such as paper and cigarettes is bad behavior cause air pollution and lung cancer.

### Giza Governorate

#### 7 North Giza Educational Zone

1 (A) 1. (✗) ..... rushed forward .....

2. (✗) ..... about 71 % of .....

3. (✓)                                      4. (✓)

(B) 1. e      2. c      3. a      4. d

(C) 1.  ${}_{12}^{24}Mg$   $\left( \begin{array}{c} \text{K} \text{ L} \text{ M} \\ \text{+12} \\ \text{2} \text{ 8} \text{ 2} \end{array} \right)$  valency = 2

2.  ${}_{17}^{35}Cl$   $\left( \begin{array}{c} \text{K} \text{ L} \text{ M} \\ \text{+17} \\ \text{2} \text{ 8} \text{ 7} \end{array} \right)$  valency = 1

2 (A) 1. Chemical equation.

2. Periodic motion.

3. Carbon dioxide gas ( $CO_2$ )

4. Galaxy

- (B) 1. HCl.                                      2. Sodium.  
 3. Sound waves                                      4. Jupiter

(C) Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

- 3 (A) 1. mercury – bromine.  
 2. mechanical – electromagnetic.  
 3.  $\text{NH}_4\text{Cl}$ .  
 4. Mercury – Neptune.
- (B) 1. Making remote sets.  
 2. Identifying celestial bodies.  
 3. photographing bones to detect the sites of bone fractures.  
 4. Plants use it to form proteins.

(C) 
$$\text{Mass} = \frac{\text{Object's Weight}}{\text{Earth's gravitational acceleration}}$$

$$= \frac{980}{9.8} = 100 \text{ kg.}$$

- 4 (A) 1. c    2. a    3. a    4. a  
 (B) 1.

Point of comparison	Crust	Mantle
Thickness :	Ranges between 8 – 60 km approximately	About 2885 km approximately

2.

Point of comparison	Acids	Bases
Colour of litmus paper :	They change the colour of litmus paper into red due to the presence of hydrogen ions $\text{H}^+$	They change the colour of litmus paper into blue due to the presence of hydroxide ions $(\text{OH})^-$

3.

Point of comparison	Weak nuclear force	Strong nuclear force
Use	It is used to get radioactive elements and radiations which are used in medicine.	It is used in producing electricity.

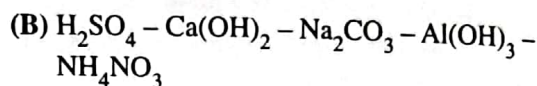
4.

Point of comparison	Electric generator	Electric motor
Conservation of energy :	It converts the mechanical energy into electric energy.	It converts the electric energy into mechanical energy.

(C) It changes into a positive ion.

## 8 Science Inspectorate

- 1 (A) 1. ionic bond – single covalent bond.  
 2. decreases.  
 3. mechanical wave – electromagnetic wave.  
 4. Plutonic – volcanic.  
 5. Jupiter – Earth.  
 6. electric – mechanical  
 7. Zero – divalent.



(C) 
$$\text{Weight} = \text{Mass} \times \text{Earth's gravitational acceleration}$$

$$= 700 \times 9.8 = 6860 \text{ Newton}$$

- 2 (A) 1. Periodic motion.    2. Nobel gas.  
 3. Comet.    4. Chemical reaction.  
 5. Sulphur oxides.    6. Transitional motion.
- (B) Sodium chloride ( $\text{NaCl}$ ) – Sulphuric acid – ( $\text{H}_2\text{SO}_4$ )  
 Carbon dioxide ( $\text{CO}_2$ ) – Heart muscle contraction and relaxation.

(C) 1.

Point of comparison	Meteors	Meteorites
Definition :	They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.	They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface

2.

Point of comparison	Acids	Bases
Definition :	They are substances which dissociate in water producing hydrogen ions $\text{H}^+$	They are substances which dissociate in water producing hydroxide ions $(\text{OH})^-$

- 3 (A) - Mass of reactants =  $2 \times (1 \times 2) + (2 \times 16)$   
 = 36gm.  
 - Mass of products =  $2(2 \times 1 + 16) = 36$  gm.  
 (B) 1. b    2. b    3. b    4. a    5. b  
 (C) 1. White clouds of ammonium chloride are formed.  
 $[\text{NH}_3 + \text{HCl} \xrightarrow{\text{conc}} \text{NH}_4\text{Cl} \text{ (white clouds)}]$   
 2. The mass of the bird remains fixed, while the weight of the bird decreases.  
 3. They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.  
 4. A white powder of magnesium oxide is formed.  
 $[2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO} \text{ (white powder)}]$

- 4 (A) 1. Weight                      2. carbon dioxide  
 3. third                              4. vibrating.  
 (B) 1. Because the number of electrons becomes less than the number of protons.  
 2. To increase friction between tyres and the road to help car in starting and stopping motion.  
 3. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.  
 4. Due to :  
 • The presence of hydrosphere.  
 • The presence of the atmospheric envelope containing oxygen gas which is needed for life.  
 • Its temperature is suitable during both day and night.  
 • Its atmospheric pressure and its gravitational force are suitable.  
 (C) 1. It helps in burning match.  
 2. Identifying celestial bodies.  
 3. They are used to sterilize the sets of surgical rooms.  
 4. It protects living organisms from the harmful ultraviolet rays.

**9 Giza Experimental directorate**

- 1 (A) 1. ionic – single covalent  
 2. Mercury – Neptune  
 3. periodic – transitional  
 4. igneous – metamorphic  
 (B) 1. (✓)    2. (✓)    3. (✓)    4. (✗)  
 (C) Weight = Mass  $\times$  Earth's gravitational acceleration  
 =  $20 \times 9.8 = 196$  Newton.

- 2 (A) 1. Force.                              2. Valency.  
 3. Infrared rays (IR).                  4. Galaxy.  
 (B) 1. b    2. d    3. a    4. c  
 (C) - Electric generator : It converts the mechanical energy into electric energy.  
 - Electric motor : It converts the electric energy into mechanical energy.

- 3 (A) 1. a    2. c    3. a    4. b  
 (B) 1. Movement of the moon around the Earth.  
 2. Sandstone.  
 3. Silver chloride (AgCl).  
 4. Earth.  
 (C) Due to inertia, as they try to maintain their state of motion.

- 4 (A) 1. Periodic                              2. third  
 3. light year.                              4. air pollution.  
 (B) 1.  $\text{H}_2\text{SO}_4$                                   2.  $\text{Cu}(\text{NO}_3)_2$   
 3.  $\text{NH}_4\text{Cl}$                                       4.  $\text{Na}_2\text{CO}_3$   
 (C) - Mass of reactants =  $(2 \times 24) + (2 \times 16)$   
 = 80 gm.  
 - Mass of products =  $2 \times (24 + 16) = 80$  gm.

**10 Science Inspectorate**

- 1 (A) 1. Ionic – double covalent  
 2.  $\text{H}_2\text{O} - \text{HNO}_3$   
 3. mechanical – electromagnetic  
 (B) 1. Nitrogen oxides  
 2. Ultraviolet (UV) rays  
 3. forces of friction.  
 4. crust.

(C) White clouds of ammonium chloride are formed.  
 $[NH_3 + HCl \xrightarrow{\text{conc.}} NH_4Cl \text{ (white clouds)}]$ .

- 2 (A) 1. Valency. 2. Positive ion.  
 3. Gravitational force. 4. Light year.  
 (B) 1.  $(PO_4)^{-3}$  2. Sulphur (S).  
 3. Weak nuclear force. 4. Marble.  
 (C) Weight = Mass  $\times$  Earth's gravitational acceleration  
 =  $10 \times 9.8 = 98$  Newton.

- 3 (A) 1. b 2. a 3. c 4. c  
 (B) 1. HCl 2. NaCl  
 3. Mercury 4. Pollution  
 (C) - Electric generator : It converts the mechanical energy into electric energy.  
 - Electric motor : It converts the electric energy into mechanical energy.

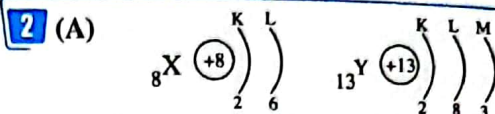
- 4 (A) 1. (x) ..... rushed forward.  
 2. (✓) 3. (✓)  
 4. (x) ..... represents 71%.  
 (B) 1. used in manufacture of medicines.  
 2. stopping the forces of inertia.  
 3. It helps in stopping and starting cars motion.  
 4. It is used by green plants in photosynthesis process to form food for other living organisms including people.  
 (C) To achieve the law of conservation of matter.

**Alexandria Governorate**

**11 Science Inspectorate**

- 1 (A) 1.  $NH_4Cl$ .  
 2. bones.  
 3. The belt of the wanderer asteroids.  
 4. Iron and Nickel.  
 (B) 1. Graphite,  
 2. Sodium hydroxide (NaOH).  
 3. Heart muscle contraction and relaxation.  
 4. Sound waves.

(C) Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.



1.  ${}_{13}Y - {}_8X$   
 2. negative ion – positive ion.  
 3. ionic bond.  
 4. double covalent bond.  
 (B) 1. Chemical reaction.  
 2. Force. 3. Comets.  
 4. Light year.  
 (C) Mass =  $\frac{\text{object's weight}}{\text{Earth's gravitational acceleration}}$   
 =  $\frac{100}{9.8} = 10.2$  k<sub>g</sub>.

- 3 (A) 1. b 2. c 3. a 4. d  
 (B) 1. c 2. a 3. d 4. b  
 (C)

Point of comparison	Strong nuclear force	Weak nuclear force
Uses :	It is used in producing electricity and military purposes.	It is used to get radioactive elements and radiations which are used in medicine, industry and scientific researches.

- 4 (A) 1.  $CaSO_4$  2. 6 atoms.  
 3. 3 elements. 4. Salt.  
 5. Magnesium oxide. 6. 2 atoms.  
 7. 2 elements. 8. metal oxide.  
 (B) 1. low 2. carbon dioxide ( $CO_2$ )  
 3. igneous 4. mantle  
 (C) Parts of machines get hot and erosion occurs.

**12 El-Agamy Educational Zone**

- 1 (A) 1. c 2. a 3. d 4. b  
 5. a 6. d

(B) 1.

Points of comparison	Inner planets	Outer planets
1. Distance from the Sun :	They are the nearest four planets to the Sun.	They are the farthest four from the Sun.
2. Size :	Small in size	Big in size

2.

Points of comparison	Metals	Non-metals
1. Metallic luster :	They have metallic luster.	They have no luster.
2. Number of electrons in outer shell :	They have less than (4) electrons in the outermost energy level	They have more than (4) electrons in the outermost energy level.

- 2 (A) 1. Meteors.  
 2. Electric generator (Dynamo).  
 3. Valency. 4. Jupiter.  
 5. Carbon dioxide (CO<sub>2</sub>) 6. Igneous rocks.

- (B) 1. Acid. 2. Oxide  
 3. Salt. 4. Base.

- (C) 1. Due to :
- The presence of hydrosphere.
  - The presence of the atmospheric envelope containing oxygen gas which is needed for life.
  - Its temperature is suitable during both day and night.
  - Its atmospheric pressure and its gravitational force are suitable.
2. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

- 3 (A) 1. (✓) 2. (✗) 3. (✗)  
 4. (✓) 5. (✓) 6. (✗)

- (B) 1. Making remote sets.  
 2. It is used to get radioactive elements and radiations which are used in medicine.  
 3. It is used in making electric bells.  
 4. They are used in medical purposes as the treatment and discovering of some swellings.

- (C) 1.  ${}^8\text{O} \rightarrow$  non-metal  ${}_{12}\text{Mg} \rightarrow$  metal  
 2. double covalent  
 3. ionic  
 4. divalent.

- 4 (A) 1. Marble. 2. (NH<sub>4</sub>)<sup>+</sup>  
 3. Sound waves. 4. Nitrogen gas.  
 5. Carbon dioxide (CO<sub>2</sub>). 6. Lute.

- (B) 1. CaCO<sub>3</sub> 2. Al<sub>2</sub>O<sub>3</sub>

- (C) 1. It changes into a positive ion.  
 2. The passengers will be rushed backward.

### 13 Al-Montazah Educational Zone

- 1 (A) 1. (✓)  
 2. (✗) ..... is a stringed .....  
 3. (✗) ..... Earth's crust.  
 4. (✓)  
 5. (✗) ..... measured by light year.

- (B) 1.  ${}^8\text{O} \rightarrow$  non-metal  ${}_{12}\text{Mg} \rightarrow$  metal  
 (Oxygen atom) (magnesium atom)  
 2. ionic

- 2 (A) 1. a 2. a 3. d 4. d 5. b  
 (B)

Points of comparison	Inner planets	Outer planets
1. The distance from the Sun :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
2. Size :	Small in size	Big in size

(C) Weight = Mass × Earth's gravitational acceleration  
 = 98 × 10 = 980 Newton

- 3 (A) 1. Marble. 2. Sound wave.  
 3. Carbon dioxide (CO<sub>2</sub>)  
 4. (NH<sub>4</sub>)<sup>+</sup> 5. Nitrogen gas.  
 6. Halley's comet.

- (B) 1. CaCO<sub>3</sub> 2. NaOH

- (C) 1. It changes into a positive ion.  
 2. The passengers will be rushed backward.

- 4 (A) 1. Meteors.  
 2. Electric generator (dynamo).  
 3. Valency. 4. Sulphur oxides.  
 5. Igneous rocks.

(B) 1. Acid. 2. Metal oxide.

(C) Due to :

- The presence of hydrosphere.
- The presence of the atmospheric envelope containing oxygen gas which is needed for life.

**Al Qalyoubia Governorate**

**14 Shoubra El-khima Educational Zone**

- 1 (A) 1. Electric generator (dynamo).  
 2. zero – completely filled.  
 3. Basalt – granite  
 4. Magnesium – two – Oxygen  
 5. reflecting telescope – refracting telescope.  
 6. Infrared (IR) – X-rays.

(B) 1.  $Al_2O_3$  2.  $K_2CO_3$   
 3.  $H_2SO_4$  4. NaOH

(C) 1.  $H_2 + Cl_2 \rightarrow 2HCl$   
 2.  $2NO + O_2 \rightarrow 2NO_2$

- 2 (A) 1. b 2. c 3. a 4. c 5. a  
 (B)

Points of comparison	Acids	Bases
1. Dissociation in water :	Dissociate in water producing hydrogen ions ( $H^+$ )	Dissociate in water producing hydroxide ions ( $OH^-$ )
2. Effect on litmus paper :	They change the colour of litmus paper into red.	They change the colour of litmus paper into blue.

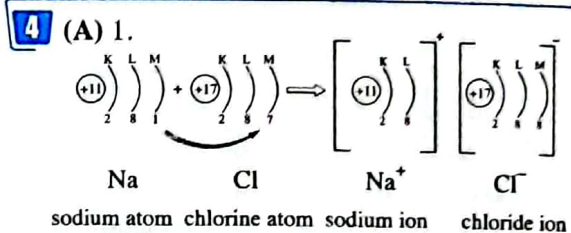
(C)  $Mass = \frac{\text{object's weight on Earth}}{\text{Earth's gravitational acceleration}}$   
 $= \frac{80}{10} = 8 \text{ kg.}$

Gravity acceleration on mars  
 $= \frac{\text{object's weight on mars}}{\text{mass}} = \frac{32}{8} = 4 \text{ m/s}^2$

- 3 (A) 1. Valency.  
 2. Direct combination reactions.  
 3. Force. 4. Igneous rocks.  
 5. The belt of the wanderer asteroids.  
 6. Friction forces.

- (B) 1. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.  
 2. Because they consist mainly of gaseous bodies.  
 3. Because it arises by sharing each oxygen atom with two electrons to complete its outermost shell with 8 electrons and becomes more stable.

(C) - Mass of reactants =  $12 + (16 \times 2) = 44 \text{ gm.}$   
 - Mass of products =  $12 + (16 + 2) = 44 \text{ gm.}$



2. Ionic bond.  
 (B) 1. White clouds of ammonium chloride are formed.  
 $[NH_3 + HCl \xrightarrow{\text{conc.}} NH_4Cl \text{ (white clouds)}]$   
 2. The passengers may be injured.  
 (C) 1. Newton 2. chloride  
 3. monoatomic. 4. Basalt  
 5. periodic 6. equal to

**Sharkia Governorate**

**15 Minya Al-Qamh Educational Zone**

- 1 (A) 1. Positive ion.  
 2. Gravitational force.  
 3. Covalent bond.  
 4. Force.  
 (B) 1.  $Na_2SO_4$  2. inertia force.  
 3. friction force. 4.  $Ca(NO_3)_2$   
 (C) - Mass of reactants =  $12 + (2 \times 16) = 44 \text{ gm.}$   
 - Mass of products =  $12 + (2 \times 16) = 44 \text{ gm.}$

- 2 (A) 1. triple covalent bond – ionic bond.  
 2. electric winches – electric bells.  
 3. Mercury – Neptune.  
 4. nervous – respiratory.

- (B) 1. The average radius of the Earth.  
 2. The number of electrons that fill the outermost shell in noble gases.  
 3. The normal atmospheric pressure on the Earth.  
 4. The number of the well known elements up till now.
- (C) 1. Because the sunlight is electromagnetic waves which can travel through free space, while the sound of solar explosions is mechanical waves which can't travel through free space.  
 2. Due to inertia, as they try to maintain their state of motion.

- 3 (A) 1. a    2. c    3. b    4. b  
 (B) 1. biological force.    2.  $MgCl_2$   
 3. Sound waves    4. Sodium.  
 (C) 1. It protects living organisms from the harmful ultraviolet rays.  
 2. Plants use it to form proteins.

- 4 (A) 1. (x) ..... into red.  
 2. (✓)  
 3. (x) ..... is divalent.  
 4. (✓)  
 (B) 1. d    2. a    3. b    4. c  
 (C)

Points of comparison	Inner planets	Outer planets
1. Definition :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
2. Size :	Small in size.	Big in size

### Menofeya Governorate

#### 16 Ashmoun Educational Zone

- 1 (A) 1. Oxygen – element,  
 2. Mercury – Neptune,  
 3. ionic bond – double covalent bond.  
 4. mercury – bromine.

- (B) 1. Sulphuric acid.  
 2. Calcium carbonate.  
 3. Ammonium hydroxide.

- 2 (A) 1. Because it makes the life possible through :  
 • constancy and steadfastness of objects and living organisms on its surface.  
 • steadfastness of the hydrosphere position on its surface.  
 • keeping the Earth surrounded by the atmosphere.  
 2. Because they consist mainly of gaseous bodies.  
 3. Because acids when dissolved in water produce positive hydrogen ions  $H^+$  which responsible for their properties.  
 4. To decrease friction between moving parts of machines and prevent their erosion.

- (B) 1. equal to    2. moons  
 3. Basalt    4. The electromagnet.  
 (C) 1. positive ion    2. monovalent.

- 3 (A) 1. (✓)    2. (✓)    3. (x)  
 4. (x)    5. (✓)    6. (x)  
 (B) 1. The driver and passengers will be rushed forward.  
 2. They convert into metamorphic rocks.  
 3. The temperature of air increases as  $CO_2$  causes the green house effect.  
 4. A white powder of magnesium oxide is formed.  $[2Mg + O_2 \xrightarrow{\Delta} 2MgO \text{ (white powder)}]$

- 4 (A) 1. Ion.    2. Light year.  
 3. Force.    4. Atomic group.  
 5. Igneous rocks.    6. Mechanical waves.  
 (B) 1. They are used in medical purposes as the treatment and discovering of some swellings.  
 2. They are used in examining and curing equipments for the human body.  
 3. It is used in producing electricity.  
 4. They are used in many industries such as manufacture of medicines.



(C) Because safety belts work on stopping forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

- 1 (A) 1. Igneous rocks. 2. Oxides.  
3. Force. 4. Chemical reaction.

- (B) 1. Carbon monoxide (CO)  
2. Halley's comet.  
3. Marble  
4. Silver chloride (AgCl).

(C)

Points of comparison	Electromagnetic waves	Mechanical waves
1. Density :	Their speed is extremely high equals 300 million m/sec.	Their speed is relatively low.
2. Transferring through space :	They spread in all media and free space.	They need medium to transfer through and not transfer through space.

- 1 (A) 1. (✓)  
2. (✗) \_\_\_\_\_ is galaxies  
3. (✗) weak nuclear .....  
4. (✗) Ozone layer protects .....
- (B) 1. d 2. f 3. e 4. b
- (C) 1. Monovalent.  
2.  $\text{NaNO}_3$

### Port Said Governorate

### 19 Science Inspectorate

- 1 (A) 1.  $\text{X}_2\text{O}$   
2. Plutonic - volcanic  
3. mechanical - electromagnetic  
4.  $2\text{Mg} - \text{O}_2$   
5. Earth's crust.
- (B) 1. white 2. inertia  
3. Strong nuclear forces.  
4. sound waves
- (C) 1.  $\text{Fe}(\text{OH})_3$  2.  $\text{Al}_2\text{O}_3$

- 2 (A) 1. b 2. d 3. b 4. b  
5. a 6. d 7. a 8. b

- (B) 1.  $\text{H}_2\text{SO}_4$   
2. 7 atoms. 3. 3 elements.  
4. Copper carbonate.  
5. 5 atoms. 6. 3 elements.

- 3 (A) 1. (✓) 2. (✗) 3. (✗) 4. (✓)  
5. (✓) 6. (✗) 7. (✓) 8. (✓)

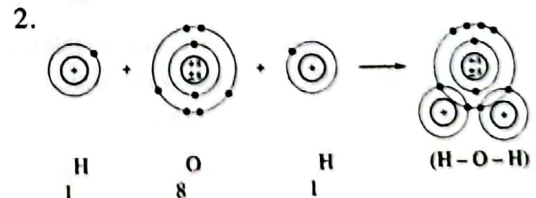
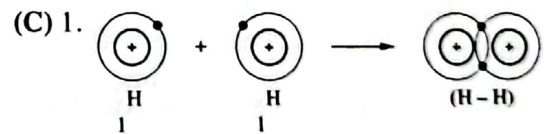
- (B) 1. Acid 2. Oxide  
3. Salt 4. Base

- (C) 1. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.  
2. Because they consist mainly of gaseous bodies.

- 4 (A) 1. Sodium 2. HCl.  
3. Friction force. 4. Jupiter.

(B) 
$$\text{Mass} = \frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$$

$$= \frac{460}{10} = 46 \text{ kg.}$$



Name :

Thickness :

- (d) 1. Earth's crust Ranges between 8-60 km  
2. The mantle about 2885 km.  
3. Inner core its radius about 1350 km.

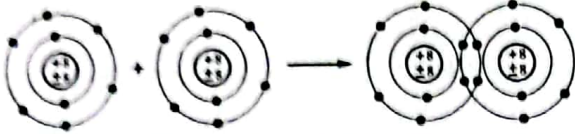
### Beheira Governorate

### 20 Science Inspectorate

- 1 (A) 1. transitional - periodic  
2.  $2\text{Mg} - \text{O}_2$   
3. acids - bases.  
4. quartz - mica

- (B) 1. (✗)      2. (✓)      3. (✗)      4. (✗)

(C)



- 2 (A) 1. Periodic motion.      2. Rocks.  
3. Chemical reaction.      4. Valency.

(B) 1. They are used in medical purposes as the treatment and discovering of some swellings.

2. It helps in burning match.  
3. They are used in making remote sets.  
4. They are used in many industries such as manufacture of medicines.

(C) 1. Because Earth's gravitational acceleration changes from one place to another.  
2. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

- 3 (A) 1.  $\text{CaCO}_3$ .      2. larger than  
3. respiratory system.  
4. Motion

(B) 1. b      2. b      3. c      4. d

(C) 1. This means that the ability of the Earth to attract this object equals 60 N.  
2. It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference

- 4 (A) 1. Newton  $\Rightarrow$  planets  
2. rivers  $\Rightarrow$  salty water  
3. Soil  $\Rightarrow$  Earth's layers  
4. Water waves  $\Rightarrow$  Electromagnetic waves.

(B) 1. c      2. a      3. d      4. b

(C) - Mass of reactants =  $12 + (2 \times 16) = 44 \text{ gm}$   
- Mass of products =  $12 + (2 \times 16) = 44 \text{ gm}$ .

### El-Menia Governorate

#### 21 Deirmwas official School for Languages

- 1 (A) 1. c      2. a      3. c      4. a

- (B) 1. Bases      2. third  
3. periodic      4. double  
(C) 1.  $\text{Al}(\text{OH})_3$       2.  $\text{Na}_2\text{SO}_4$

- 2 (A) 1. The wonderer belt of asteroids.  
2. Atomic group.  
3. Object weight.      4. Bromine.

(B) 1. (✗)      2. (✓)      3. (✓)      4. (✓)

(C) - Mass of reactants =  $12 + (2 \times 16) = 44 \text{ gm}$ .  
- Mass of products =  $12 + (2 \times 16) = 44 \text{ gm}$ .

- 3 (A) 1. forward - inertia  
2. Silver chloride ( $\text{AgCl}$ ) - lead iodide ( $\text{PbI}_2$ )  
3. head - tail.  
4. plutonic - volcanic

(B) 1. Water waves      2. Halley  
3. Mercury      4. HCl

(C) 1. They are used to sterilize the sets of surgical operations rooms.  
2. It is used in producing electricity.

- 4 (A) 1. d      2. c      3. a      4. b  
(B) 1. Earth's layers.      2. Earth's crust.  
3. Mantle.      4. Inner core.

(C) 1. To achieve the law of conservation of matter (mass).  
2. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic is much greater than that of mechanical waves.

### Assiut Governorate

#### 22 Science Inspectorate

- 1 (A) 1. red.      2. limestone.  
3. Infrared (IR)      4.  $\text{NH}_4\text{Cl}$

(B) 1. e      2. d      3. c      4. b

(C) object's weight = Mass  $\times$  Earth's gravitational acceleration  
 $= 10 \times 28 = 280 \text{ Newton}$ .

- 2 (A) 1. d      2. c      3. a      4. a  
(B) 1. (a) 17 atoms      (b) 3 elements.  
2. (a) (✓)      (b) (✗)

(C)

Point of comparison	Electromagnetic waves	Mechanical waves
Speed	Their speed is extremely high equals 300 millions m/sec	Their speed is relatively low.

- 1 (A) 1.  $\text{Na}_2\text{CO}_3$ , 2. electricity.  
3. Salty 4. graphite.



- 1- (c) double covalent bond.  
2- (d) Earth's crust.  
3- (e) Mantle  
(C) Due to inertia, as they try to maintain their state of motion.

- 4 (A) 1. Inner Core.  
2. Volcanic igneous rocks  
3. Object's weight. 4. Moons.  
(B) 1.  $\text{H}_2\text{O}$  2. Sound waves  
3. Saturn. 4. Work.  
(C) Sodium chloride ( $\text{NaCl}$ ).

**Sohag Governorate**

**23 Sabry Abou Hussien Language School**

- 1 (A) 1. double covalent – triple covalent.  
2. electric – mechanical.  
3. red – blue. 4. Mercury – Neptune.  
(B) 1. Acid. 2 Metal oxide.  
3. Salt. 4. Base.  
(C) Object's weight = Mass  $\times$  Earth's gravitational acceleration  
=  $100 \times 9.8 = 980$  Newton

- 2 (A) 1. Galaxy. 2. Periodic motion.  
3. Chemical reaction. 4. Object's weight.  
5. Light year. 6. Noble gas.  
7. Meteors.

- (B) 1.  $\text{Al}(\text{OH})_3$  2.  $\text{Na}_2\text{O}$   
3.  $\text{CO}_2$  4.  $\text{H}_2\text{O}$   
(C) 1. It changes into a positive ion.  
2. A white powder of magnesium oxide is formed. [ $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$  (white powder)]  
3. The temperature of air increases as  $\text{CO}_2$  causes the green house effect.

- 3 (A) 1. a 2. c 3. a  
4. a 5. a 6. c

- (B) 1. To achieve the law of conservation of matter.  
2. Because the light of lightning is from electromagnetic waves, while sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.  
3. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

- (C) 1. - It is used in respiration process of living organisms.  
- It helps in combustion (burning) process of fuels.  
2. It is used by green plants in photosynthesis process to form food for other living organisms.

- 4 (A) 1. Vibrating 2. mechanical  
3. ionic bond. 4. three  
5. celestial bodies. 6. Chemical  
7. graphite.

- (B) - Mass of reactants =  $12 + (2 \times 16) = 44$  gm.  
- Mass of products =  $12 + (2 \times 16) = 44$  gm.

(C) 1.

Point of comparison	Inner planets	Outer planets
Size :	Small in size.	Big in size.

2.

Point of comparison	Metals	Non-metals
Number of electrons :	They have less than an (4) electrons in the outermost energy level	They have more than (4) electrons in the outer most energy level.

**Qena Governorate**

**24 Science Inspectorate**

- 1 (A) 1. ionic bond. 2. mechanical  
3. fourth 4. quartz  
(B) 1. H<sub>2</sub>SO<sub>4</sub> 2. NaOH  
3. Al<sub>2</sub>O<sub>3</sub> 4. CaCO<sub>3</sub>  
(C) Because the sunlight is electromagnetic waves which can travel through free space, while the sound of solar explosions is mechanical waves which can't travel through free space.

- 2 (A) 1. Positive ion. 2. Meteorites.  
3. Force. 4. Granite.  
(B) 1. Sodium. 2. Jupiter.  
3. Sound waves. 4. Silver chloride.  
(C) It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

- 3 (A) 1. c 2. b 3. b 4. a  
(B) 1. White 2. inner core  
3. inertia 4. X-rays  
(C) Object's weight = Mass × Earth's gravitational acceleration  
= 0.5 × 9.8 = 4.9 Newton

- 4 (A) 1. (✓) 2. (✗) 3. (✓) 4. (✗)  
(B) 1. d 2. c 3. a 4. b  
(C) White clouds of ammonium chloride are formed.  
[NH<sub>3</sub> + HCl  $\xrightarrow{\text{conc.}}$  NH<sub>4</sub>Cl (white clouds)]

**Aswan Governorate**

**25 El-Qahmury Formal Language School**

- 1 (A) 1. Light year. 2. Periodic motion.  
3. Chemical reaction. 4. Jupiter.  
5. Valency.  
(B) 1. They are used in making remote sets.  
2. They are used in photographing bones to detect the sites of bone fractures.  
3. It is used in making electric bells.  
4. They are used to sterilize the sets of surgical operations rooms.

- (C) 1. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.  
2. Due to inertia, as they try to maintain their state of motion.

- 2 (A) 1. Granite – sandstone.  
2. electric – mechanical  
3. ionic – double covalent bond.  
4. Carbon dioxide (CO<sub>2</sub>)  
5. Iron – Nickel  
(B) 1. Ca(NO<sub>3</sub>)<sub>2</sub> 2. Al<sub>2</sub>O<sub>3</sub>  
(C) 1. The normal atmospheric pressure.  
2. The periodic time for rotation the Earth around the Sun.  
3. The mass of the Earth.

- 3 (A) 1. spiral 2. rivers  
3. 21% 4. lightning.  
(B) 1. Base 2. Metal oxide  
3. Acid. 4. Salt.  
(C) object's weight = Mass × Earth's gravitational acceleration  
= 100 × 9.8 = 980 Newton

- 4 (A) 1. a 2. c 3. c 4. c  
(B) 1. NH<sub>4</sub>Cl 2. 2MgO 3. O<sub>2</sub>  
(C) 1.

Acids	Bases
They are substances which dissociate in water producing hydrogen ions H <sup>+</sup> .	They are substances, which dissociate in water producing hydroxide ions (OH) <sup>-</sup>

2.

Inner planets	Outer planets
They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.

3.

Metals	Non-metals
They have less than (4) electrons in the outermost energy level	have more than (4) electrons in the outermost energy level.