UNIT FIVE:

IT'S A GIANT LEAP FOR MANKIND

Topic: **Astronomy and the Solar System**

(pp.135-164)

SEQUENCE ONE : **LISTEN AND CONSIDER** **(pp.136-141)**

Listening Script: **(About satellites , p.206)**

A- Getting started: p 136

1) Pictures 1and 2 represent satellites.

2) The represented objects are similar in the sense that they both orbit the Earth. .

3) They are different in a way that one of them is a natural satellite and the other is an artificial satellite.

4) Satellites are used for a variety of things**,** depending on their basic categories. *Astronomical* satellites are used as a platform to view other planets while *communications satellites* are used for telecommunications.
Other uses include navigation and weather. *Fixed satellite* services handle hundreds of millions of voice, data, and video transmission tasks across all continents between fixed points on the earth's surface. *Mobile satellite* systems help connect remote regions, vehicles, ships and aircraft to other parts of the world and/or other mobile or stationary communications units, in addition to serving as navigation systems. *Scientific research satellites* provide us with meteorological information, land survey data (e.g., remote sensing), and other different scientific research applications such as earth science, marine science, and atmospheric research.

5) Yes, Algeria has a satellite of its own. It is called "**Alsat**" .

B- Let's hear it: p.137

Exercise 1, p.137 : **(Reordering Sentences)**

Order	1	2	3	4	5	6
Sentences	C	E	B	A	F	D

Exercise 2, p.137 : **(Comprehension Questions)**

A. The Hubble Telescope is 610 kms away from the Earth.
B. The satellite which carries the Hubble Telescope is roughly cylindrical in shape.
C. The satellite is 13 m long.
D. It weighs more than 11 tons.

C- Around the text: (pp.137-14)

Grammar Explorer I (p.137)

What is it for? / used for../ used to..

(See Grammar refrence , p.222)

Examples : 1) What are satellites ***used for***?

2) They are ***used for*** sending computer data.

3) The are ***used to*** survey the earth and make weather forecasts.

A. "***Used to***" and "***Used for***" express purpose / function of objects.

B. The verbs which follow them either are in the **infinitive** or have the **–ing** form.

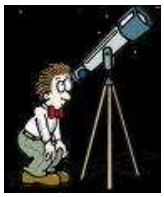
- … used **for** sending … (-ing form)
- …used **to** survey … (infinitive)

C. In the interrogative form (question) we use only the preposition "**for"**.

Exercise 1, p.138: (Matching)

Questions	1	2	3	4	5	6
Phrases/Answers	B	C	D	A	F	E

1) What is it ? → Optical instrument.
2) What does it do ? → Magnifies pictures of faint and distant objects.
3) What is its shape ? → Cylindrical.
4) What does it consist of ? → Case / eyepiece lens / object lens.
5) What is it made of ? → Metal and glass.
6) What is it used for ? → Observing the stars.



Exercise 2, p.138: (Describing a telescope)

A telescope is an optical instrument which magnifies pictures of faint and distant objects. It is cylindrical in shape and (it) consists of case, eyepiece lens and object lens. It is made of metal and glass and used for observing the stars.

Grammar Explorer II (p.138)

Measurements - Dimensions – Size – Distance – Weight…

Exercise 1, p.138 :

A) The question word (interrogative pronoun) used to ask about dimensions, size, distance … is "***How***" : (How far ? - How long ? - How much ?)

B) Position of the agjectives:

1) It is roughly ***cylindrical*** in shape. ► (before a preposition phrase)
2) It is 13 m ***long***. ► (after a noun/ measurement)

Other possibilities: **a)** It has a ***cylindrica***l shape.
b) Its shape is ***cylindrica***l.

Exercise 2, p.138 : **(Asking questions using "how")**

A) ***How much*** does ***Sputnik I/Sputnik 2*** weigh? ► (*Adverb*)
B) ***How far*** is the moon from the Earth? ► (*Adjective*)
C) ***How long*** does it take our planet to make one revolution round the sun? ► (*Adverb*)
D) ***How high*** is Mount Everest? ► (*Adjective*)
E) ***How tall*** was Yuri Garin? ► (*Adjective*)
F) ***How long*** are the valleys… ***How wide*** are they… ***How deep*** are they…? ► (*Adjectives*)
G) ***How fast*** does light travel? ► (*Adverb*)

N.B. Some of the words in the box can function both as adjectives and adverbs.
- ***How long*** does it take our planet to …? ► (*Adverb*)
- ***How long*** are the valleys…? ► (*Adjective*)

RUBRIC :

Vocabulary Explorer (pp. 139-140)

Exercise 1, p.139 :

Verbs	Nouns	Adjectives
weigh takes travel	height – weight – length – depth - distance – speed -kilometres – metres – hours – minutes - seconds	high – tall – heavy – long – wide - deep

Exercise 2, p.139 : **(Matching Categories)**

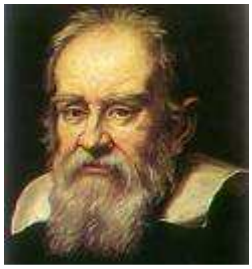
Category	1	2	3	4	5
Associated Words	B	A	C	E	D

1) Temperature = hot - heat - high - low - cold - warm - Celsius scale - Fahrenheit scale
2) Distance = miles - kilometres - knots (nautical miles)
3) Area = square - foot - square metre - square kilometre - acre
4) Volume = litres - centilitres - millilitres - cubic litres - cubic metres
5) Measurements / Size (humans) = feet - inches - metres - centimetres - tall - short

Exercise 3, p.140: (Gap-filling)

Verb	Noun
prove	proof(s)
believe	belief (s)

Paragraph :



Galileo

In olden times, people ***believed*** that the sun revolved round the Earth.This ***belief*** came from the fact that they saw the sun rise in the east every morning and set in the west every evening. And until now, many people suppose that it was Galileo who ***proved*** that it was the Earth that revolved round the sun though Copernicus had published the theory 20 years before Galileo's birth. The real ***proof*** of the Earth's orbiting the sun came from the Danish astronomer Tycho Brahe (1546 – 1601).

Tycho Brahe

Copernicus

RUBRIC : **Pronunciation and Spelling** **(pp 140-141)**

Exercises 1 + 2, p.140 : (Phonetic Transcription and Stress)

Verb	*Transcription*	*Verb*	*Transcription*
1) rotate	/ rəʊ'**teɪt** /	**4)** begin	/ bɪ'**gɪn** /
2) believe	/ bɪ'**liːv** /	**5)** occur	/ ə'**kɜː** /
3) transmit	/ trænz'**mɪt** /	**6)** revolve	/ rɪ'**vɒlv** /

► **Stress** usually falls on the second syllable for verbs and on the first syllable for nouns.

Exercise 3, 140: (Stress Shift)

Verb	Noun
inc**REASE**	**INC**rease
re**CORD**	**RE**cord
pre**SENT**	**PRE**sent
pro**JECT**	**PRO**ject
pro**DUCE**	**PRO**duce

►***Stress shift***: The stress pattern of the verbs and nouns are different. In ***verbs***, it falls on the ***second syllable*** whereas in ***nouns*** it falls on the ***first syllable***. In addition, the letter **n** is pronounced differently.

Exercise 4, p.140-141: (Corrective Stress)

Yuri Gagarin

Dialogue 1:

A: Is the Earth round and red when seen from the sky ?
B: Well … Actually, it is round and **blue.**

Dialogue 2:

A: So it was the American astronault Neil Alden Armstrong who was the first to orbit the Earth.
B: Well … In actual fact, it was the **Russian** astronault Yuri Gagarin who did it.

- Blue (corrective stress)
- Russian (corrective stress)

RUBRIC: **Think, pair, share** **(p 141)**

Task: **(Expository Writing)**

Topic: Class presentation about the moon.

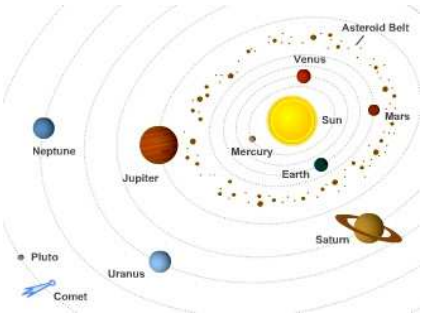
Sample:

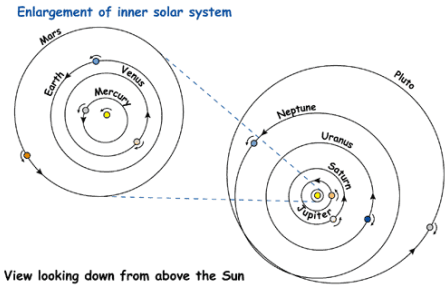
The Moon

The Moon is an earth satellite orbiting our planet from a distance of 384,000kms on average, and its orbit is in a west-to-east direction. Its surface gravity is only 0.16 that of the Earth (one sixth), and it does not seem to have life on it, since it has neither atmosphere nor water. Minimum and maximum temperatures on it are wide apart, with +110˚C on the sunlit side and –170˚C in lunar nights. The geology of this satellite is rock only, and its age is about 4,6 billion years.

Plans to reach the Moon on space crafts have been on scientists' minds since early 20th century. But they became more concrete when the Russians launched space crafts Sputnik 1 and Sputnik 2 in 1957, the second one carrying dog Laika. In 1961, Yuri Gagarin orbited the Earth, followed by the American astronaut John Glenn in 1962. Finally, America won the honour of reaching the Moon before Russia, when Neil Armstrong set foot on it on July 21st 1969.

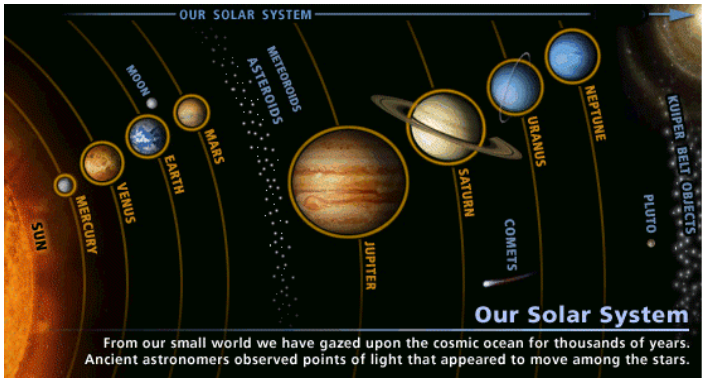
There are at present plans to build a space base on the Moon, to set a giant telescope and launch space ships from there to distant planets, and perhaps to other solar systems.





SEQUENCE ONE: **READ AND CONSIDER** **(p.142)**

Passage: The Solar System , pp.143-144.



A- Getting sarted: p 142

1) ***Pluto*** is no longer considered a planet. According to experts, it's just a member of an asteroid belt beyond Neptune, along with 12 newly discovered mini-worlds.

2) It takes the Earth ***One year (365 and 1/4 days)*** to make one complete revolution around the sun.

3) *Astronomy* is a science whereas *astrology* is a pseudo-science. The former studies the sun, the moon, stars and planets to get information about them whereas the latter observes them with the belief that their positions will tell about man's destiny.

B- Taking a closer look: p.142

Exercise 1, p 142: (Names of the Planets - Starting from bottom to left)

Sun ►1.Mercury, 2.Venus, 3. Earth (Moon in the black box) , 4.Mars, 5. Jupiter, 6. Saturn , 7. Uranus, 8. Neptune 9. Pluto is no longer considered a planet.

Exercise 2, p 142: (Comprehension Questions)

A. The various heavenly bodies that constitute the solar system are : meteors- comets- asteriods- satellites/moons- planets and stars .
B. The moon orbits the earth whereas the planets orbits the sun.
C. The heavenly bodies' speed is 12 miles per second.
D. The heat energy and light energy make life possible on Earth.
E. The planets are likened to huge mirrors because they reflect the light from the sun.

Exercise 3, p 142: (Converting temperatures from Fahrenheit into Celsius)

The Scales :

Celsius	Fahrenheit
C=(F-32)x5/9	F=(Cx9/5)+32

1) 10,000 –32 X 5/9 = ……°C **2)** 27,000,000 –32 X 5/9 = ……°F

C- Around the text: pp. 145-148

Grammar Explorer I (p.145)

Comparatives of Adjectives

(Revise 2AS book, pp. 193-195)

1) Comparatives of equality: (=) ► (… as + adj + as …)

- Your house is *as* big *as* your neighbour's.
  (short adjective)
- Your house is *as* expensive *as* your neighbour's.
  (long adjective)

► No difference in structure : (***as*** + short / long adj. + ***as***)

2) Comparatives of superiority: (>) ► (… adj + er + than …) / (more + adj + than)

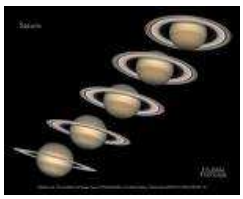
- They are far ***more*** remote from us ***than*** any other heavenly bodies.
  (long adjective)
- ***More*** distant planets have larg***er*** orbits.
  (long adjective) (short adjective)

► Short Adjectives : (adj. + ***er*** + ***than***)
► Lond Adjectives : (***more*** + adj. + ***than***)

3) Comparatives of inferiority: (<) ► (… adj + er + than …) / (less + adj + than)

- Moving around some of the planets are small*er* balls … → (short adj.)
- You might also catch a glimpse of swarms of even small*er* particles… → (short adj.)
- Their light is *less* intense *than* that of the sun. → (long adj.)

4) Comparatives of adverbs:



- ***More*** distant planets have larg***er*** orbits and travel far **more slowly**.

Other examples:

- ***More*** distant planets have larg***er*** orbits and travel **less quickly**.
- ***More*** distant planets have larger orbits and don't travel **as quickly as** the ones which are close to the sun.

Task 2 (p.145): (Commenting Figures From Table)

1) The Earth is **more remote/distant** from the sun **than** Mercury.
2) Mercury is **closer/nearer** to the sun **than** the Earth.
3) Neptune travels more slowly **than** Venus.

4) Mercury travels **more fast than** the Earth.
5) Neptune travels **less quickly than** Venus.

Reminder: (COMPARISONS)

A) Equality: (As + Adj + As)

a) Ahmed is 1.80. b) Youcef is 1.80. → (They have the ***same*** height)
► Ahmed is **as *tall* as** Youcef .
a) Ahmed is intelligent b) Youcef is intelligent. → (They are ***equal*** in intelligence)
► Ahmed is **as *intelligent* as** Youcef.

B) Comparatives: (… **er than**) → Short adjectives / (… **more**… **than**) → Long adj.

a) Ahmed is 1.80. b) Ali is 1.60. 

► Ahmed is ***taller*** **than** Ali. → (Short Adjective = 1 or 2 syllables)
► Ali is ***smaller*** **than** Ahmed. → (Short Adjective = 1 or 2 syllables)

a) The car costs 400.000 AD. b) The bicycle costs 8000 AD.  

► The car is **more** ***expensive*** **than** the bicycle. → (Long Adjective = + than 2 syllables)
► The bicycle is **less** ***expensive*** **than** the car.

C) Superlatives:

a) Ahmed is 1.80. b) Ali is 1.60. c) Kaddour is 1.50.
► Ahmed is **the *tallest***. → (Short Adjective)
► Kaddour is **the *smallest***. → (Short Adjective)

a) The car costs 400.000 AD. b) The bicycle costs 8000 AD. c) The toy costs 400 AD.
► The car is the most expensive. → (Long Adj.)
► The toy is the least expensive. → (Long Adj.)

Exceptions: (Irregular Adjectives)

These adjectives have completely irregular comparative and superlative forms:

Adjective	Comparative	Superlative
good	better than	the best
bad	worse than	the worst
little	less than	the least
much	more than	the most
far	farther/further than	the farthest/furthest

Guinness World Records

► *Bao Xishun, left,7'9"and Leonid Stadnik ,righ t ,8'5", (Podoliantsi, Ukrain)*

► ***The longest nails in the world, 35 inches, Lee Redmond – USA***

Grammar Explorer II (p.146)

Expressing Similarities and Differences

(See Grammar Reference , pp. 226-227)

Task 1 (p.146): **(Comparison / Contrast)**

A) Similarities:

- … (the other planets) all travelling in the ***same*** direction … (P 1)
- … millions of stars in our galaxy ; ***like*** the rest … (P 4)

B) Differences:

- ***Compared with*** the other stars, the sun is of average size, but it is a giant in comparison with even the largest planets. (P4)
- The planets of the solar system are different from the distant stars. (P6)
- *Unlike* stars, which shine with their own light, the planets give off no light of their own.(P6)
- Jupiter, for example, takes more than eleventh Earth years to make one complete revolution around the sun ***while*** Earth makes its path around the just in just 365 ¼ days…. (P6)

Task 2, p. 146:

A) Comparing/contrasting terms to use within a clause :

1) A and B are the ***same / alike / similar / comparable.***
2) ***Both*** A ***and*** B are … /***Neither*** A ***nor*** B is …
3) A and B are *different / unlike / disimilar.*
4) A is ***the same as / similar to / like / resembles*** B.
5) A is ***as*** … ***as*** B.
6) A ***differs / is different from*** B.

B) Link words to use between clauses, sentences and paragraphs:

Category	Coordinators	Subordinators	Transition words
Similarity	and		likewise, similarly, also, too
Difference	but, yet	while, whereas,	however, in contrast, conversely on the other hand, contrary to …

Grammar Explorer III (p.146)

Expressing Condition and Supposition/Hypothesis

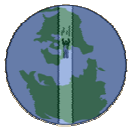
- ***If*** you were out in space … , you would see the Earth as a tiny ball … (P1)
- Now ***suppose*** you were still in space, … what would you see? (P2)
- ***If*** you continued to view them, … you would see that they were moving together … (P3)

A) The sentences express ***supposition/hypothesis***.

B) The tenses used in these sentences are : past simple + would+verb because the author is just supposing/imagining things.

C) Individual examples :

- ***Suppose/Supposing (that)*** the Earth got farther from the sun or nearer, we would die either from cold or from heat
- ***Suppose*** we lived on the moon, how would life be like there?
- ***Supposing*** you could drill a hole through the Earth and then drop into it. How long would it take you to pop up on the other side of the Earth?



Suppose you had these nails…

Suppose you had this face …

Grammar Explorer IV (p.146)

Stative Verbs and Action/Dynamic Verbs

(See Grammar Reference , p.223)

Verbs	Category	Descriptions
travel - come - bring - buy - get - learn - listen – watch – eat –drink – go – type – read – write – speak –say – grow – work – sleep – cook - talk	**Action** verbs (Dynamic verbs)	▶ There is an ***action*** (movement) within a period of time. ▶ They can be ***simple*** and ***continuous*** (-ing form).
Know – are – see … **Sub-categories:** **a)** Feelings: like – love – hate – detest **b)** Thinking/Believing: think – understand – remember – know … **c)** Perception: see – hear – smell – touch – taste … **d)** Wants: want – prefer … **e)** Being/Having: seem – own – be – belong – appear – possess – have …	**Stative** verbs	▶ There is no action and dynamism. They describe a ***state***. ▶ They are usually used in the ***simple*** form only.

***Task (p.147)* : (Correcting Grammatical Mistakes in a Dialogue)**

Mistake	Correction	Explanation
1) … now I am understanding …	1) …I understand …	
2) I don't …what you are meaning.	2) … what you mean.	
3) Oh, I am seeing that …	3) … I see …	Stative verbs
4) You are knowing…	4) You know…	▶(no –ing form)
5) … it is belonging to me.	5) … it belongs to me .	
6) I am still remembering the day...	6) I still remember the day …	

RUBRIC: **Vocabulary Explorer** **(p.147)**

Exercise 1, p.147: **(Definitions)**

A) tiny (P1)= very small.
B) recognize (P1)= identify again somebody or something that one has seen before.
C) streaming (P2) = move continuously and smoothly in one direction.
D) catch a glimpse (P2)= have a quick, imperfect view of somebody or something.
E) radiating (P4) = giving out light when heated.
F) twinkling (P5 = shining with a light that gleams unsteadily.
G) give off (P6) = send, emit.
H) huge(P6) = very big.
I) speeding (P6) = moving very quickly.

Exercise 2, p.148: **(Suffixes: *ist* and *er*)**

Word	New Word	Word	New Word
Astrology (n)	Astrologist (n)	Observe (v)	Observers (n)
Astronomy (n)	Astronomer (n)	Science (n)	Scientist (n)
Astrophysics (n)	Astrophysicist (n)	Psychology (n)	Psychologist (n)

RUBRIC : **Pronunciation and Spelling** **(p.148)**

A) Formation of Plurals:

Exercise 1, p.148 : **(Rules / Examples)**

N°	Rule	Singular	Plural
1	Singular + **s**	cat	cats
		seed	seeds
		camera	cameras

2	Nouns ending in (o – s – x – ch – sh) + **es**	potat**o** bu**s** bo**x** mat**ch** bu**sh**	potat**oes** bu**ses** bo**xes** mat**ches** bu**shes**
3	A change in some vowels	m**a**n wom**a**n f**oo**t cris**i**s emphas**i**s bas**i**s dat**um** stimul**us**	m**e**n wom**e**n f**ee**t cris**e**s emphas**e**s bas**e**s dat**a** stimul**i**
4	Final " **f** " of some nouns becomes " **v** " + **es**	li**f**e wi**f**e lea**f** shea**f** loa**f**	li**ves** wi**ves** lea**ves** shea**ves** loa**ves**
5	Final " **f** " of some nouns does not change + **s**	chie**f** belie**f** proo**f**	chie**fs** belie**fs** proo**fs**

Exercise 2, p.148:

Singular	Plual	Singular	Plural
Theor**y**	Theor**ies**	Belief	Belief**s**
Categor**y**	Categor**ies**	Myster**y**	Myster**ies**
Thes**i**s	Thes**e**s	Fact	Fact**s**
M**a**n	M**e**n	Origin	Origin**s**
Wom**a**n	wom**e**n	hypothes**i**s	hypothes**e**s

B) Pronunciation of The Final " S " :

/ S /	/ Z /	/ IZ /
Facts Astrophysicists Beliefs	Astronomers Theories mysteries	Theses Hypotheses

RUBRIC : **Think, pair, share** **(p.149)**

Topic: **Consequences of a comet collision with the Earth.**

Expanding notes:

Impact on the Earth – cause crater – volcanic eruption– climate change – flooding – Tsunami – earthquake – alteration of the Earth orbit – great freeze – extinction of human kind …

Sample Writing:

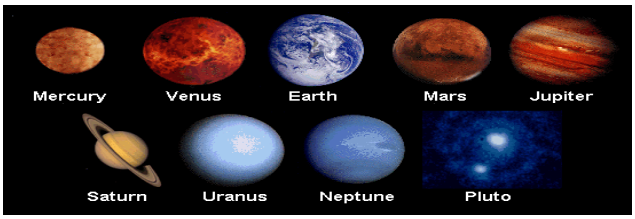
I sometimes think with awe about the possible consequences for life on earth if a comet collided with our planet. I can imagine it hurtling through the atmosphere before it makes its terrible impact on some part of a continent. Scientists do say that a similar incident took place many thousand years ago, and provoked the extinction of many giant animal species, including dinosaurs.

An enormous crater would form, and possibly cause a volcanic eruption which would send a heavy layer of particles and ash high up in the sky to stop the sun rays from reaching the Earth. Our planet would then be in the dark for many years, and consequently the temperatures would drop considerably.

A change in the climate could indeed occur, rainfalls and snowfalls would be frequent, heavy and long lasting, and floods would result from them; the sea level would probably rise, and cause some flat regions of the Earth to be totally immersed.

Another possible consequence of the impact would be a gigantic earthquake which would destroy many inhabited areas and kill a huge number of people. If the impact were near an ocean, a tsunami could develop and flood vast areas of flat land, causing many people to die or become homeless.

Facts in the past have shown that a disaster like an impact of a heavenly body on Earth could destroy life, or at least alter living conditions dramatically. The same could be repeated if another collision occured. This is why scientists are thinking up space programmes to find ways of preventing another accident of this kind.



RUBRIC:

TAKE A BREAK (p.150)

Idiomatic Expressions

Task 1 , p150: **(Gap-filling / Correct Tense)**

A) Paragraph:

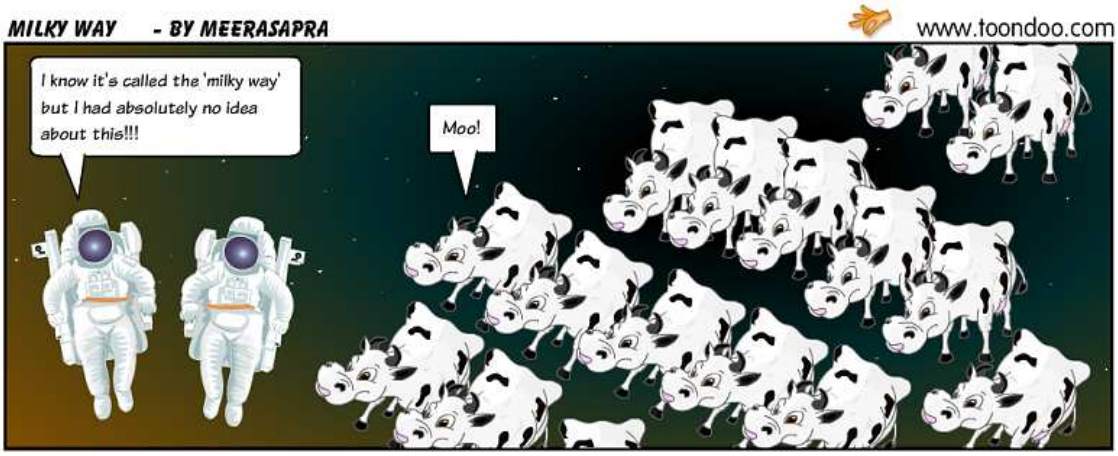
As a result of being hit on the head by a ball, the footballer **saw stars** and cried for pain. He thought that he was **born under an unlucky star** . But the referee came to comfort him and advised him to **thank his lucky star** for having escaped from a worse accident.

B) Sentences:

1- Now that you've passed you exam , you should be **over the moon** , I suppose.
2- Stop **mooning over** me and find youself something else to do !
3- I go to the theatre only **once in a blue moon**. I've got no time anymore.
4- You're a very lazy student. You can't get your baccalaureate exam. That's **crying for the moon** !

► If you are **crying for the moon** you are longing for what is beyond your reach.

► To be **over the moon** = to be extremely happy



RUBRIC: 

RESEARCH AND REPORT (p.151)

Assignment 1, p.151: **(The Identity Card of Al-Battani)**

Name = Abū Abd Allāh Muḥammad ibn Jābir ibn Sinān al-Raqqī al-Ḥarrānī al–Ṣābi al-Battānī
Latinized Name = Albategnius, Albategni or Albatenius.
Date and Place of Birth = 853, Harran near Urfa, Mesopotamia ,which is now in Turkey .
Date and Place of Death = 929, Qasr al-Jiss, near Samarra, Iraq.
Race = Arab
Religion = His epithet as-Sabi suggests that among his ancestry were members of the Sabian sect who worshipped the stars; however, his full name affirms that he was Muslim.
Field of Interest = Astronomy - Astrology - Mathematics

Achievements

Astronomy :

- the determination of the solar year as being 365 days, 5 hours, 46 minutes and 24 seconds.
- was able to correct some of Ptolemy's results and compiled new tables of the Sun and Moon
- discovered the movement of the Sun's apogee
- treated the division of the celestial sphere
- introduced the 5th century Indian astronomer Aryabhata
- the use of sines in calculation, and partially that of tangents
- formed the basis of modern trigonometry
- calculated the values for the precession of the equinoxes (54.5" per year, or 1° in 66 years) and the inclination of Earth's axis (23° 35')

- used a uniform rate for precession in his tables, choosing not to adopt the theory of trepidation attributed to his colleague Thabit ibn Qurra.
- set of astronomical tables, known as *al-Zīj al-Sābī* with 57 chapters, which by way of Latin translation as *De Motu Stellarum* by Plato Tiburtinus (Plato of Tivoli) in 1116 , had great influence on European astronomy. The zij is based on Ptolemy's theory, showing little Indian influence. A reprint appeared at Bologna in 1645. Plato's original manuscript is preserved at the Vatican; and the Escorial Library possesses in manuscript a treatise by Al Battani on astronomical chronology.

- discovered that the direction of the Sun's eccentric was changing, which in modern astronomy is equivalent to the Earth moving in an elliptical orbit around the Sun.

Mathematics :

$$\tan a = \frac{\sin a}{\cos a}$$

$$\sec a = \sqrt{1 + \tan^2 a}$$

- produced a number of trigonometrical relationships:
- solved the equation sin *x* = *a* cos *x* discovering the formula:

$$\sin x = \frac{a}{\sqrt{1 + a^2}}$$

- used al-Marwazi's idea of tangents ("shadows") to develop equations for calculating tangents and cotangents, compiling tables of them.
- discovered the reciprocal functions of secant and cosecant, and produced the first table of cosecants, which he referred to as a "table of shadows" (in reference to the shadow of a gnomon), for each degree from 1° to 90°.[1]

Honours:

- The crater Albategnius on the Moon is named after him.
- In the fictional Star Trek universe, the Excelsior-class starship *USS Al-Batani NCC -42995*, mentioned on *Star Trek: Voyager* as Kathryn Janeway's first deep space assignment, was named for him.

Assignment 2, p.151:

Solar and Lunar Eclipse

Eclipse: passage of an astronomical body through the shadow of another. The term is usually used for solar and lunar eclipses, which may be either partial or total, but may also refer to other bodies, for example, to an eclipse of Jupiter's satellites by Jupiter itself. An eclipse of a star by a body in the Solar System is also called an occultation.

A solar eclipse occurs when the Moon passes in front of the Sun as seen from Earth, and can happen only at new Moon. During a total eclipse the Sun's corona can be seen. A total solar eclipse can last up to 7.5 minutes. When the Moon is at its farthest from the Earth it does not completely cover the face of the Sun, leaving a ring of sunlight visible. This is an annular eclipse. Between two and five solar eclipses occur each year but each is visible only from a specific area. A lunar eclipse occurs when the Moon passes into the shadow of the Earth, becoming dim until emerging from the shadow. Lunar eclipses may be partial or total, and they can happen only at full Moon. Total lunar eclipses last up to 100 minutes; the maximum number each year is three.

A total solar eclipse visible from southwestern England took place on 11 August 1999 and lasted for two minutes. This was the first total solar eclipse to be visible from the UK since 1927, the next will be in 2090.

(From the ***Huchinson Encylopedia***, 2001 Edition)

SEQUENCE THREE : LISTENING AND SPEAKING (p.152)

Listening Script: Dialogue About Search for Extra-Terrestrial Intelligence (SETI) , p.207

A) Before listening : (p.152)



1) ET stands for **E**xtra-**T**errestrial.
2) UFO stands for **U**nidentified **F**lying **O**bjects
4) Science-fiction movies (films) = Close Encounters Of The Third Kind / Independence Day / Predator / Ghosts of Mars / Alien / Terminator / ET /
5) Science And Science-Fiction:

The former (***science***) deals with reality and tries to explain it through experimentation and analyses whereas the latter (***science-fiction***) tries to imagine and predict what would this present reality be in the future.
Science-fiction describes an imaginary invention or discovery in the natural sciences. The most serious pieces of this fiction arise from speculation about what may happen if science makes an extraordinary discovery. The romance is an attempt to anticipate this discovery and its impact upon society, and to foresee how mankind may adjust to the new condition.

B) As you listen: (p.153)

Exercise 1, p.153: **(Deducing / Inferring From Speech)**

A) Inference Statements	B) Clues
a) Mr Henshaw and his colleagues believe in the probable existance of intelligent beings in outer space	1) They work for the S.E.T.I(Search for Extra-terrestrial Intelligence) laboratory.
b) The Milky Way is a galaxy which is situated farther than the sun.	2) Beyond the solar system perhaps even beyond the Milky Way .
c) Before 1492, people in the Old World thought that there were no human beings beyond the Atlantic Ocean.	3) For many centuries we were ignorant of what we call the New World today.
d) The SETI (Search for Extraterrestrial Intelligence) researchers are cool-headed.	4) The S.E.T.I researchers are determined to distance themselves from science fiction and fantasy.

Exercise 2, p.153: **(Expressing Opinion = Agreement / Disagreement)**

Talking about the importance of man's eventual contact with extra-terrestrials Mr Henshaw says, " That would shed light on the origin, the nature and the future of the universe as a whole."

- ► I agree totally with Mr Henshaw because ....
- ► I totally disagree with him because …



C) After listening: (p.154)

Exercise 1, p.154: **(Expressing Agreement / Disagreement)**

Stative Verbs:

Coping :

►Stative (Non- conclusive) Verbs are used when we agree or disagree with what is said to us.
►Stative Verbs are : think - believe - hope - guess - suppose ...

- **Example:** a) Idea/Suggestion/Question : Will man live on the moon some day ?

b) Agreement : I (think / believe / hope / guess / suppose ...) + **so**.
c) Disagreement :
1) Negative form of the verb : I don't (think / believe / suppose ...) + **so** .
2) Affirmative form of the verb : I (think / believe / suppose ...) + **not** .
3) " Suppose " can be either way : (I don't suppose **so**)–(I suppose **not**)

Dialogue 1: **(Agreement)**

A: Is what they are telling us about space laboratories true?
B: I ***guess so***.
A: Why?
B: Because Reuters has recently reported about the largest of the International Space Station's laboratories which will be Japan's "Kibo" , which means "hope." It is about the size of a double-decker bus. Its areas of research include materials sciences, fluid physics and biomedicine. it will host cultural activities, such as art and orbital dance, in addition to serving as a workplace for science. Japan spent 20 years and more than $2.4 billion developing the complex.

Dialogue 2 : **(Disagreement)**

A: Are we really capable of settling permanently on another planet ?
B: I ***don't think so*** (I guess not) .

A: Why ?
B: I think because there is no Oxygen in the outer-space.

Exercise 1, p.154: **(Recycling " if " and " suppose " + simple past)**

Dialogue 1 : (Martian Invasion)

A: ***Suppose (Supposing – Imagine***) that we ***were invaded*** by Martians, what ***would*** you ***do*** then ?
B: Well, ***if*** the Earth ***were attacked*** by Martian invaders, I ***would be*** the "interpreter", ha, ha ...

Dialogue 2 : (Settling on another planet)

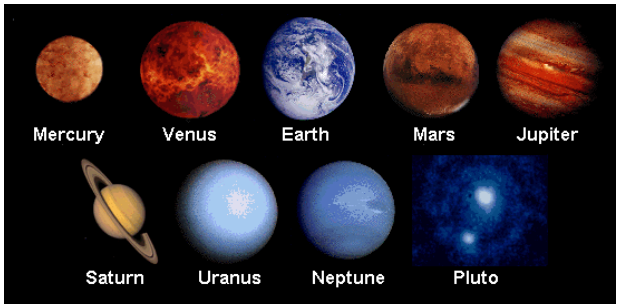
A: ***Suppose (Supposing – Imagine***) that we ***were*** about to move to settle on another planet, what ***would*** you ***take*** with you?
B: Well, ***if I were*** to choose , I ***would take*** my " MP3 " , ha , ha , ha ..

RUBRIC: **Saying it in Writing** **(p.155)**

Topic: To make a speech in defence of the usefulness of astronomy.

Type of discourse: Argumentative / Persuasive

Notes to expand:
- Importance of astronomy:
  - predicting catastrophes ..
  - weather forecasting
  - solving misteries of universe ..
  - improving telecommunication ..
  - keeping time ..



Sample Speech :

Ladies and gentlemen,
I think that astronomy is one of the most useful sciences today. For one thing, it's thanks to astronomy that we can predict such catastrophes as tsunamis and hurricanes. Right now , as I 'm speaking to you , there are satellites hovering above us in the skies watching for any hurricane that may hit us so that we would be able to take the necessary measures to reduce its effect at least. Now, and thanks to astronomy , we can predict any volcanic eruption and any earthquake. Today , and through the immense services the satellites are offering us , we can know in advance the weather changes days and weeks before this day.Astronomy is solving misteries of the universe. It becomes a common knowledge that the Big Bang is the very beginning of the creation of the universe and Pluto is no more a planet as it has been thought over centuries. Through satellites, the whole world has become a tiny village because astronomical technology has improved telecommunication in a way that we can reach any point in the world at any moment we

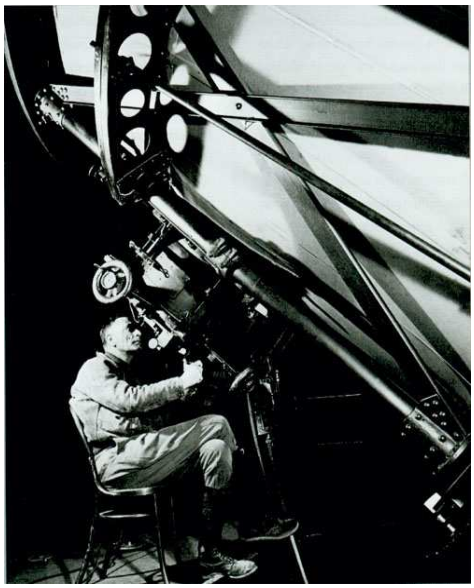
want. And by mentioning moment , I don’t forget to mention also that astronomy helps us in keeping time and knowing its exact changes throughout the globe.

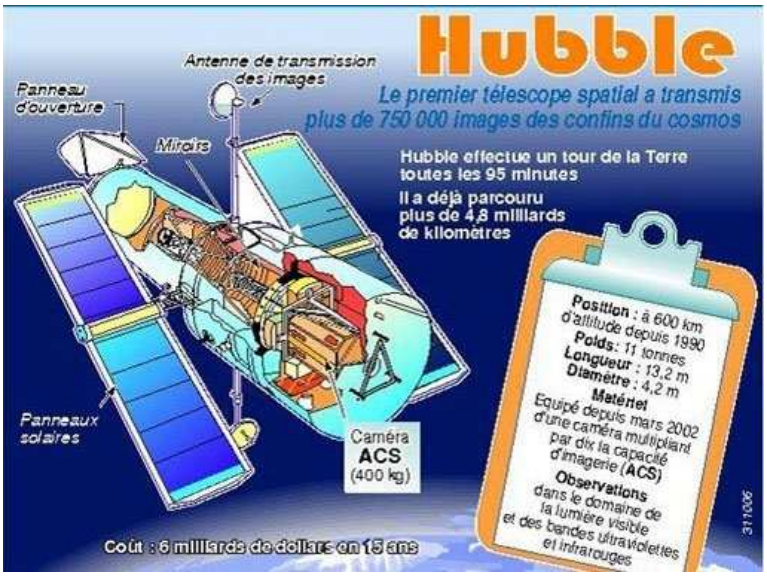
Ladies and gentlemen,

The benefits of astronomical research are immense and numerous in our everyday life. Astronomy helps us find out about the Universe and our place within it. We also train people in modern technology; many who don't eventually become astronomers go out into the "real world" and contribute to mainstream industry and the economy. Astronomical research also has important implications for other branches of science. For instance, we use stars as remote "laboratories" in which we can study matter under conditions that we just couldn't achieve on Earth. This helps us refine our knowledge of fields such as atomic physics, which is vital in many fields with practical applications in everyday life. We have developed sensitive x-ray detectors for astronomical research, and these detectors are currently being adapted for use in medical applications.

Ladies and gentlemen,

Astronomy is deeply rooted in the history of almost every culture, as a result of its practical applications, and its philosophical implications. It still has everyday applications to timekeeping, seasons, navigation, and climate, and long-term applications to climate change and biological extinctions. It not only contributes to the advancement of physics and the other sciences, but it is an exciting and rapidly-changing science in its own right. It deals with the origin of stars, planets, and life itself. It shows our place in time and space, and our kinship with other peoples and species on Earth --- and perhaps elsewhere. It promotes environmental wareness, through images of the earth from space, and through the realization that we may be alone in the
universe. It reveals a universe which is vast, varied, and beautiful, and promotes curiosity, imagination, and a sense of shared exploration and discovery. It provides an enjoyable hobby for millions of people. It can attract young people to the sciences, and promote public interest and awareness in science - important considerations in an age when science is so important to our economy and our everyday life... Thank you for your attention .





SEQUENCE FOUR : READING AND WRITING (p.156)

Reading Passage: (Deep Impact , pp.156-157-158)

A) Before reading : (p.156)

Exercise 1, p.156 : **(Predicting source of paragraph)**

- The paragraph in taken from :

A	a science-fiction book	
B	a scientific report	
C	a newspaper article	**X**
D	a letter of complaint.	

► Because the paragraph in question is a lead-in. Its purpose is to entice the reader to read the whole article or news story. It is signed by a journalist by the name David Grinspoon.

Exercise 2, p156 : **(Predicting position of paragraph)**

- The paragraph fits in the beginning of the text because "why" indicates that a rhetorical question is asked and we expect that it will be answered in what comes next.

B) As you read: (p.157)

Exercise 2, p158: **(Comprehension Questions)**

A) The NASA fired a copper explosive barrel in the path of Tempel 1 in order to learn about the impact that a collision with comets might have on our planet.

Or : ... in order to learn about the life secrets that lie within the hole of the comet.

B) The name given to the NASA mission is "Deep Impact".

C) Paragraph 5 indicates that the author believes that the origin of life on Earth can be explained through a better knowledge of space.

D) According to the author, the dinosaurs would not have disappeared if they had known how to divert the course of comets. The space programme is vital because it can help avoid the kind of collision that caused the disappearance of dinosaurs.

Exercises 3+4, pp.158-159: **(Deducing meanings of difficult words from context)**

Coping:

Without refering to a dictionary, we can guess (deduce , infer) the meaning of a difficult word in a text through:

1) its class and category : (verb , noun , adj , adv)
2) synonyms , antonyms (opposites)
3) paraphrasing (explaining)
4) affixes (suffixes , prefixes)
5) link words that help identify relationships (however , besides , finally , ...)

Paragraph	Word	Deducing / Infering
1	crater	hole (relation of synonymy)
2	Mixed reactions	not complelety positive/good. The three sentences give clues in three different ways: not really fine (not good); analogy and a rhetorical question.
3	Hurt	(word coming in topic sentence) = doing harm (idiomatic expression in the concluding sentence) The parallel that the author draws between the mission and digging for sand specimens in a beach provides another clue for understanding the meaning of the word.
4	Demolish	destroy (relation of synonymy)
5	Ice crust	frozen rock (synonymy)
6	Lacked	The meaning of lack can be guessed either from the context of the sentence "The dinosaurs disappeared because they lacked a space programme." It can also be guessed from the concluding sentence of the paragraph " … because we have knowledge….").

C) After reading: (p.159)

Exercise 1, p. 159 : **(Infering Through Context)**

1) The decision to shoot at the comet is unreasonable/too quick and can have bad consequences.

2) There is no need to be worried about the shooting at the comet because it is as harmless as picking up a few sand specimen for study.

Or: the mission is totally harmless because …

3) Human life can't be destroyed by the collision of our planet with a comet because we know how to divert their course.

Exercise 2, p. 159 : **(Features of argumentative texts)**

Coping:

(Argumentative Texts)

1) They defend ideas (points of view) .
2) They have two functions :
   a) polemical function : dismissing someone's viewpoint,
   b) persuasive function : changing someone's viewpoint .
3) They are classified under three categories of reasoning :
   a) deductive reasoning : drawing conclusions with every new idea,
   b) concessive reasoning : criticizing others' arguments,
   c) analogous reasoning : consolidating your argument by comparing situations.

A) Type of discourse: Argumentative.
B) Function: Persuading the reader about the importance of a space programme.
C) Category of reasoning: It is mainly a reasoning based on analogy.

RUBRIC: **Writing Development** **(pp.160 –161)**

Topic : Importance of space programme.
Type of discourse : Argumentative / Persuasive.
Notes to expand : (See skeleton on page 160)

Modal Newspaper Article:

You often hear people say, 'The budget devoted to space programmes is wasted money.' Many people support this statement by saying that these huge amounts can be invested in projects to combat diseases. Likewise, many other people consider that space exploration is a wild dream and that the money spent on these explorations is needed to relieve poverty in Africa. Though I understand that there is an urgency to fight diseases and relieve poverty in our continent, I don't think it is right to abandon investment in space explorations. Why?

In the first place, many of the advances made in medicine are indirectly the result of space exploration. For instance, image processing used in CAT Scanners and MRI technology in hospitals worldwide came from technology developed to computer-enhanced pictures of the Moon for the Apollo programs. CAT scanner searches the human body for tumors or other abnormalities. Kidney dialysis machines were developed as a result of a NASA-developed chemical process that could remove toxic waste from used dialysis fluid., and insulin pumps were based on technology used on the Mars Viking spacecraft. Surgical probes used to treat brain tumors in children resulted from special lighting technology developed for plant growth experiments on Space Shuttle missions. A cardiovascular conditioner developed for astronauts in space led to the development of a physical therapy and athletic development machine used by football teams, sports clinics and medical rehabilitation centers. A hospital food service

system employs a cook/chill concept for serving food. The system allows staff to prepare food well in advance, maintain heat, visual appeal and nutritional value while reducing operating costs.

The above examples are only a drop in an ocean. Every day, in a variety of ways, people's lives are touched by space technology. Since 1976, about 1,400 documented NASA inventions have benefited the world's industry, improved the quality of life and created jobs for folks. The Apollo program has helped change the way of life in the whole world , especially in health care , and the budget spent for such a noble purpose is actually minimun compared with the one spent by women for their make-up.

Assessment (p.163)

Text 5: The Martians are coming, p. 36

A) COMPREHENSION

I. Read the text carefully and answer with True or False: (3 pts)

a) The radio programme was broadcast on Halloween day.
b) The news announcers were real actors.
c) An announcement was made before the show began that the programme was unreal.
d) Everybody was trying to leave the town by car.
e) The Americans killed the Martians with poisonous gas.
f) The programme was about London in the 1890s.

(**Answers:** aF,bT,cT, dF,eF,fF)

II. What is the main idea of this text? Justify your choice. (1.5pts)

a) Halloween eve is a good night to scare people.
b) People are ready to believe anything that seems realistic to them.
c) A Martian invasion could cause much panic among people.

(**Answer:** b). a and c are also acceptable provided the choice is justified.

III. What do these words refer to in the text? (2 pts)

a) One (a good one) §1
b) it (seem) §1
c) their (suitcases) §3
d) others (tried) §3

(**Answers:** a: story, b: the show, c: people, d: people)

B) USE OF ENGLISH:

A/ Find in the text a synonym for each of the following words: (3pts)

a) scenery §1
b) frightening §1
c) tried § 3
d) intruders (from outer space) § 3

(**Answers:** a:setting, b:scary/terrifying, c: attempted, d: aliens)

B/ Complete these sentences with words or expressions from the box below. Use each word or expression at least once : (3,5pts)

Should ; don't have to ; didn't have to; must ; have to ; had to; mustn't

a) You……..do your homework now if you don't want to.
b) I really ……remember to send my brother a birthday card.
c) My parents say I ……..be home by 8 o'clock at the latest.
d) You……buy a monolingual dictionary. You can refer to it every time you are unsure of what a word means.
e) You…….come into my room without knocking.
f) I didn't come to your birthday because I ……stay at home with my mother who was ill.

(**Answers:** a: don't have to, b: must, c: have to, d: should, e: mustn't, f: had to)

C/ Complete the second sentence so that it has the same meaning as the first sentence. Use the passive voice. You must use between two and five words: (1pt)

a) Welles made some changes in the original story
► Some changes…….by Welles in the original story
b) Somebody had eaten all the food by the time we arrives
► All the food……..by the time we arrived
c) Our teacher gave us some good advice to help us pass the *Baccalauréat* exam
► We……some good advice by our teacher to help us pass the *Baccalauréat* exam
d) When we woke up, we discovered that the wind had blown down a large tree during the Night.
► When we woke up, we discovered that a large tree…….

(**Answers:** a: were made, b: had been eaten, c: were given, d: had been blown down)

D/ Find the corresponding verb or noun to the following words: (1 pt)

NOUN	VERB	ADJECTIVE
Adaptation	?	
Invasion	?	
?	decided	
	?	scary
?	smell	
?	interrupted	
?		fictional
?	described	

(**Answers:** a: adapt, b: invade, c: decision, d: scare, e: smell f: interruption, g: fiction, h: description)

C) Writing:

Write a twenty-line essay on ONE of the following topics: (5 pts)

A/ Imagine the Martians invaded the planet Earth. What do you think would surprise them about our lives, and what would they change?

B/ Some people say that reading science fiction stories helps to imagine new worlds and create new ways of life. Do you agree with this statement?

School = Said Messaoud , Ouled-Mimoun, Tlemcen
Teacher = Mr. Z. Lakmèche