CHAPTER 1

The Origin of the Universe

In this chapter, you will

- read about the universe and its origin,
- study how to use headings as guides when reading a passage,
- increase your knowledge of nouns in English sentences,
- learn about the essential features of a paragraph, and
- learn some technical and semi/technical vocabulary.

The Origin of the Universe

TUNE IN FOR THE READING

Reading Strategy 1: USING HEADINGS AS GUIDES

Headings in a passage can work as guides, helping us better understand the content and meaning of an essay. A passage may contain one main heading and some subheadings. All the paragraphs under a subheading address the same topic.

In the following text, find the main heading and subheadings; then discuss the focus of each part of the text under each subheading:

- Heading:
- subheadings:

Visual Hints

Look at the following pictures. They illustrate three actions. Try to match each picture with the relevant verb from the box below expressing that action.

Split apart **Pull apart** **Scrape**

a

b

c

READING

Universe, the Earth, and Life

What does 'Universe' Imply?

We use the word 'universe' to mean everything that exists; from the Earth to the most distant parts of space that *astronomers* can possibly see. People used to think that the Earth was the centre of the universe. Although the Earth is important to us, we know now that it is a little planet going round the sun, which is just one of millions of ordinary stars in our *galaxy*. The universe contains countless galaxies of stars. The furthest ones we can see are so distant that their light takes thousands of millions of years to reach us. This delay means that we are seeing them now as they actually were long ago. We can also tell that the galaxies are rushing apart.

/əˈstrɒn.ə.mərz/

/ˈgæl.ək.si/

The most distant galaxies we know about are travelling at $\frac{9}{10}$ of the speed of light. Astronomers keep finding more distant ones, but there is a limit to how far we could ever see, even with *incredibly* powerful telescopes. If there is anything beyond our universe, we can never know what it is. Astronomers have found out that the universe we know started thousands of millions of years ago. It is changing and getting bigger all the time as the galaxies rush apart. Thousands of millions of years in the future, the stars may stop shining and the universe might *shrink*.

/ɪnˈkred.ə.bli/

/ʃrɪŋk/

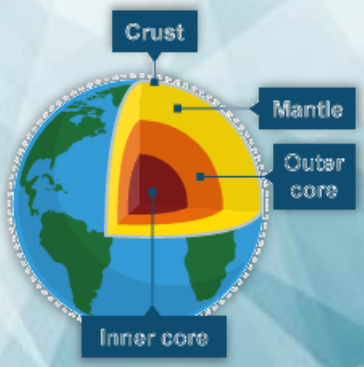
The Big Bang Theory

Most scientists believe that the universe started thousands of millions of years ago with an event that they call the 'Big Bang'. It was some kind of *explosion* in which all the matter and energy in the universe was created. At first, the universe was incredibly dense and hot. Later, as it expanded outwards, the galaxies and the stars formed. The whole universe has continued expanding since the Big Bang. Scientists are fairly sure that the theory is right since they found a faint radio signal that seems to fill all of space. The only explanation for the radio signal is that it is the energy left over from the Big Bang.

/ɪkˈsploʊ.ʒən/

Plate Tectonics and Continents Formation

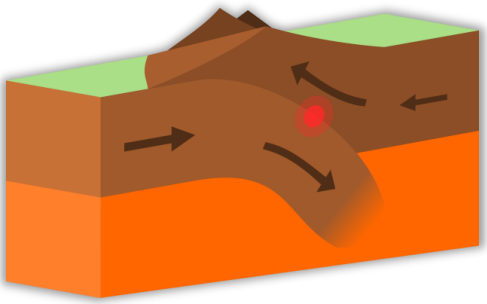
The *explanation* of what has happened to the surface of the Earth is known as 'Plate Tectonics'. The skin or 'crust' of the Earth is about 70 km thick and is divided into plates that *float* on the *slushy* part of the second layer or the 'mantle'. Plates move slowly (a few centimeters each year) over the Earth's surface. Over millions of years this has caused continents to split apart and collide.

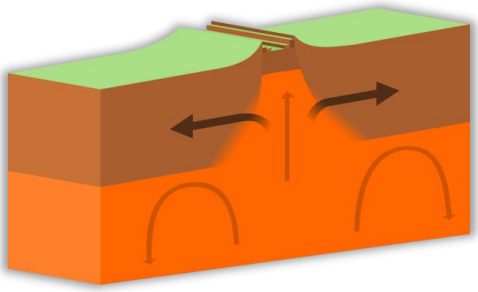


/ˌek.splәˈneɪ.ʃən/

/floʊt/

/ˈslʌʃ.i/





/ˈbaʊn.dər.iz/ /skreɪp/ On some parts of the ocean floor, plates pull apart. New crust is formed when molten material from undersea *volcanoes* rises to fill the gaps. There are other plate *boundaries* where one plate is pushed under another. These areas also have volcanoes and earthquakes. In other places plates *scrape* sideways, splitting the crust.

Similar fossils of ferns and reptiles have been found in South America, Africa, India, and Antarctica. These could not have crossed the oceans, so they must have lived on the same land at some time in the past. If you cut out the continents on a world *geological* map and put them together like a 'jigsaw puzzle', you can match rock formations. This is not a *coincidence.* The rocks were formed when the land was a single continent. This continent, which geologists call *Pangaea*, split and the separate parts moved to their present positions.

/ˌdʒi.əˈlɑː.dʒɪ.kəl/ /koʊˈɪn.sɪ.dəns/ /pænˈdʒiː.ə/

Life Formation on the Earth

When the Earth was first formed, there was no life at all. The surface of the Earth was very hot then, and nothing could have lived. It took about 1,000 million years for the Earth to become suitable for life. It is very hard to imagine how life could arise from non-living things. For years, *biologists* could not understand how the very complicated plants and animals, including ourselves, could have come from simple chemicals.

/baɪˈɑː.lə.dʒɪst/

Scientists think that life arose from chemicals that entered the atmosphere from volcanoes, thousands of millions of years ago. Geologists can tell from ancient rocks that these chemicals included hydrogen, methane, ammonia, and water. Experiments have shown that these chemicals will form into molecules called amino acids quite easily. Amino acids are the building blocks of proteins, and proteins are the main substances of living things. Experiments in laboratories have suggested that *lightning* and radiation from the Sun triggered the formation of amino acids. These dissolved in the oceans where, over millions of years, they formed proteins and then simple cells.

/ˈlaɪt.nɪŋ/

These simple cells were like small bags of protein with an outer *membrane* which could take in (feed) other chemicals and divide to form new cells (reproduce). The oldest fossils that have been discovered are 3,500 million years old.

/ˈmem.breɪn/

TECHNICAL CHECK

A. Recalling Information. Choose the best option for the following items.

1. The main substance of living things is …… .

a) cells b) amino acids c) proteins d) water

2. According to the text, ……
a) everything on the Earth is universe.
b) the center of the universe is not known.
c) everything that exists is universe.
d) the Sun is a galaxy in the universe.

3. The movement of the skin of the earth is …… .
a) sharp and splitting
b) slow and constant
c) rapid and damaging
d) fast and floating

4. The reason accounting for the Big Bang Theory comes from …… .
a) continuous expansion of the universe
b) the energy existing around us
c) faint radio signals filling the space
d) highly dense and hot gases

5. Identical fossils …… in the past.
a) have lived in different places of the world
b) must have lived on the same land
c) have crossed the oceans
d) must have cut out the continents

6. What was the main push behind formation of amino acids?
a) Experimental laboratories
b) Protein absorption
c) Lighting and sun rays
d) Living things around us

B. Statement Accuracy. Decide if the following statements are True (T), False (F), or Not Given (NG).

1. The theory of Plate Tectonics describes the history of the Earth surface. ……..
2. Fossils of reptiles found in Africa have crossed the oceans. ……..
3. Life originated in living things at about 1000 million years ago. ……..
4. Hydrogen, methane, ammonia, and water form amino acids and theses, in turn, form proteins and these, in turn, make simple cells. ……..
5. There is a great number of stars in the whole universe. ……..
6. Biologists very easily found that human beings are made of molecules. ……..

Source: www.neistadscience.com

LOOK IT UP

The following semi/technical vocabularies are taken out of the reading selection in this chapter. Check your vocabulary knowledge by choosing the best definition or meaning for each word:

1. Rush apart: .....
2. Collide: .....
3. Shrink: .....
4. Left over: .....
5. Dissolve: .....
6. Scrape: .....
7. Identical: .....

LANGUAGE FUNCTION: NOUNS IN A NUTSHELL

A noun is a word that identifies a person, place, thing, emotion, or idea. The things, places, and people that you can see, touch, hear, smell, and taste are called *concrete nouns*:

Person	**Place**	**Thing**
Teacher	University	Book
The principal	Shiraz	Locomotive

The emotions and ideas or concepts that cannot be seen, touched, heard, smelled, or tasted with your five senses are called ***abstract nouns***:

Idea	**Emotion**
Religion	Happiness
Time	Surprise

When common or concrete nouns refer to a specific or unique name, the initial letter of the word is capitalized and they are called *proper nouns*:

- *I am flying first-class on **Iran Air**.*
- ***Takht-e Jamshid** is a world heritage site located in **Fars** province.*

Nouns made up of two or more words that refer to one thing, place, person, or idea are called *compound nouns*:

Bedroom	Swimming pool	Dry-cleaning

Nouns that refer to a collection or group of things or people are called *collective nouns*:

- *Our **class** took a trip to the National Museum.*
- *He has decided to join the **navy** after graduation.*

Nouns that are formed by adding an –ing to a verb root are called *gerunds*. The difference between a gerund and an –ing verb is that gerunds do not have *tobe* (am, is, are, was, and were) immediately before them while –ing verbs have:

- *Gerund: **Skiing** has been her passion since she was five years old.*
- *-ing verb: She **is skiing** in the snow-covered mountains.*

Gerunds that are followed by other words like objects and modifiers are called *gerund phrase*:

- *Gerund: **Speaking** is one of the main four language skills.*
- *Gerund phrase: **Speaking English fluently and with correct accent** is the goal of many language learners.*

Nouns that can be counted and can take –s plural are called *countable nouns*:

Courses Children Engines

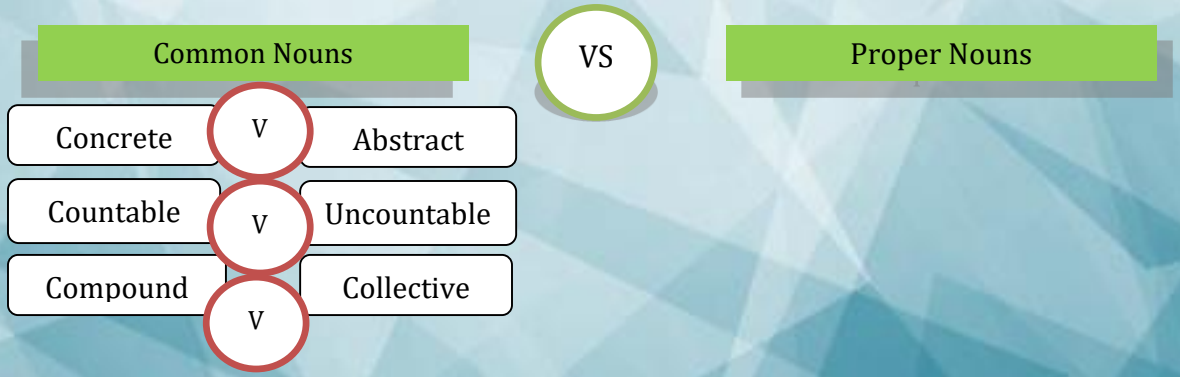
Nouns that cannot be counted or do not take –s plural are called *uncountable nouns*:

Information Intelligence Equipment

Singular verb form is always used for uncountable nouns:

- *Further information about this device **is** provided in the manual.*
- *It is the intelligence of her writing that **impresses** me.*

All of the noun types specified above, except proper nouns, belong to one main category which is called *common nouns*. Common nouns; in other words, include: concrete, abstract, countable, uncountable, collective, and compound nouns. The figure on the next page



LANGUAGE FUNCTION: NOUNS IN A NUTSHELL

Depending on the role that a noun plays in a sentence, its position may change. Two main roles of a noun in an English sentence are:

Noun as the Subject

Noun as the Object

Direct Objects

Indirect Objects

While every sentence needs a subject, the objects (whether direct or indirect) might be present or absent depending on the type of the verb. For a detailed discussion, see chapter three.

Nouns can be positioned in an statement like what follows:

Subject	+	Verb	+	Direct Object	+	(Preposition)	+	Indirect Object
Sophia		gave		him		___		the letter.
John		swung		the baseball bat		at		Creg.

LANGUAGE FUNCTION

Practice A. In the following sentences, some of the nouns are **boldfaced**. Read the sentences and decide about the noun type:

1. Kaveh had hoped for an easy ***teacher*** (.....) for his algebra class, but he got ***Mr. Mirzaee*** (.....), whose short temper made the semester unbearable.
2. Everyone in the ***audience*** (.....) clapped loudly when he appeared on the ***stage*** (.....).
3. I love watching ***fireflies*** *(.....)* on warm summer nights.
4. Do you think ***the Eagles*** (.....) will win the game?
5. I need to find some ***information*** **(.....)** about ***Pulitzer Prize*** (.....).
6. The teachers and administrators held a meeting in the ***faculty*** (.....).
7. When Sarah jumped into the ***lake*** (.....) to rescue a drowning cat, her ***bravery*** *(.....)* surprised everyone.
8. ***Blowing bubbles on a windy day*** (.....) is a fun activity for children.

Practice B. Underline the requested noun type in each of the following sentences:

1. *Gerund Phrase*: Ethan narrowly avoided driving off the cliff.
2. *Abstract Noun*: Fear is the main source of superstition, and one of the main sources of cruelty.
3. *Compound Noun*: While you are at the store, please pick up some toothpaste, a six-pack of mineral water, and some egg rolls.
4. *Collective Noun:* The committee agreed that people are misusing their cell phones, so ordered that phones must not be used during working hours.
5. *Gerund Phrase*: Eating strawberries without washing them might make you sick.
6. *Proper Noun*: We went to Smith's Furniture and bought a new couch to replace our old one.

NOUN CONSTRUCTION

To form a noun, you can use a *suffix* which is a letter or group of letters added at the end of a word to change the grammatical function (or part of speech) of the original word and make a new word. For example, the verb *read* is made into the noun *reader* by adding the suffix *-er.* Understanding the meanings of the common suffixes can help you figure out the meanings of new words you encounter. Look at the table of the most common noun-making suffixes on the next page.

Noun-Making Suffixes and Examples			
-ship	*friendship, membership*	**-ic/tic**	*characteristic, critic*
-ment	*sediment, movement*	**-dom**	*boredom, freedom*
-tion/sion	*mission, production*	**-er/or/ar (agent)**	*user, conveyor, cylinder*
-ity/-ty	*necessity, cruelty*	**-ee**	*employee, trainee*
-ness	*Readiness, usefulness*	**-hood**	*childhood, neighborhood*
-al/ial	*arrival, burial*	**-ism**	*socialism, tourism*
-ance/ence	*reliance, defense*	**-th**	*depth, growth*
-acy	*accuracy, bureaucracy*	**-tude**	*altitude, magnitude*
-ate	*candidate, graduate*	**-ing**	*building, feeling*
-ant/ent	*assistant, component*	**-ist (person)**	*socialist, analyst*
-ary/ery/ory	*sedimentary, fishery, memory*	**-ice**	*notice, practice*
-ancy/ency	*redundancy, efficiency*	**-ics**	*ethics, physics, plastics*
-age	*baggage, postage*	**-y**	*history, economy*

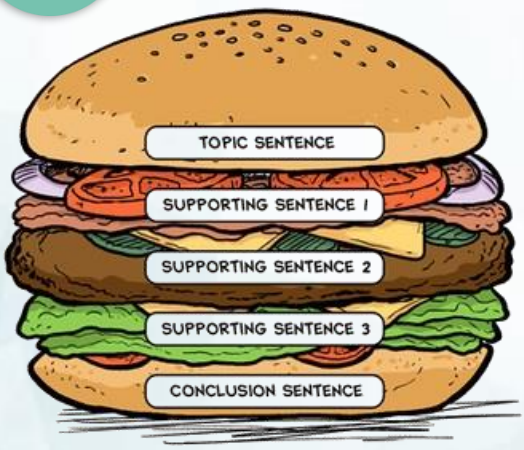
NOUN CONSTRUCTION

Add appropriate suffixes to the words listed to make nouns. Then use the nouns to complete the sentences below.

Word	Noun	Word	Noun
expand	……	**geology**	(person)……
necessary	……	**major**	……
convey	……	**bury**	……
combust	……	**coincide**	……

1. It is generally believed that the Indo-Iranians followed the practice of …… for their dead.
2. Rapid …… of software industry in recent years is amazing.
3. The complete …… of carbon and hydrocarbons rarely occurs in nature.
4. You chose exactly the same wallpaper as us - what a ……!
5. …… have discovered rocks which contain fossilized single-celled organisms.
6. The …… to have access to larger markets is really important.
7. The …… of employees have university degrees.
8. The traditional way to moving products in North American plants was using heavy …… .

WRITING ESSENTIALS

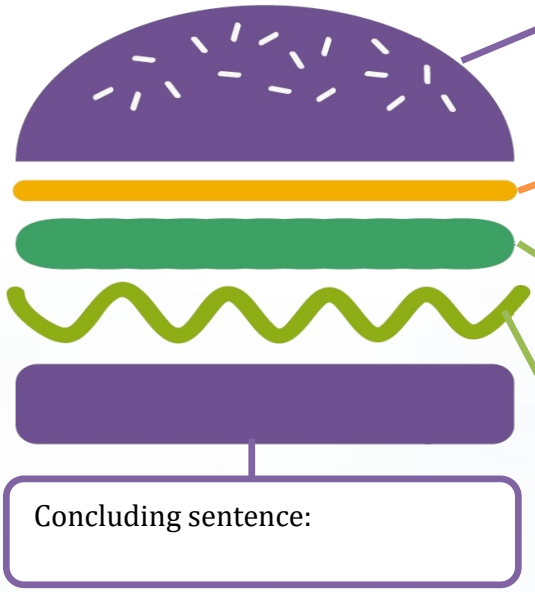


A basic paragraph is just like a hamburger, as both have several layers. For the top layer, or top bun, usually a *topic sentence* that provides the main idea is placed. The layers are filled with details in sentences which are called *supporting sentences*. The bottom layer, or the bottom bun, holds everything together in a *concluding* or *conclusion sentence*. Therefore, as you can see in the picture on the next page, a basic paragraph structure usually consists of five sentences: the topic sentence, three supporting sentences, and a concluding sentence. Of course, it is possible that the number of supporting sentences in a paragraph increases or even sometimes becomes less than three; but this largely depends on the topic and the writer.

You will learn more about each of these elements in the next chapters. Just keep in mind that understanding what role each sentence plays in a paragraph not only helps you better comprehend the overall focus on the paragraph but also assists you design your own writing.

WRITE IT UP (SELF PRACTICE)

Look at paragraph two in the reading. Find the essential elements of a paragraph and complete the following figure:



Topic sentence:

Supporting sentence 1:

Supporting sentence 2:

Supporting sentence 3:

Concluding sentence:

Chapter 1 Word List. The main words in this chapter are listed here. You can check your vocabulary knowledge by providing relevant meaning(s) or synonyms for each.

Ancient: .....
Antarctica: .....
Astronomer: .....
Biologist: .....
Boundary: .....
Building block: .....
Chemical: .....
Coincidence: .....
Collide: .....
Continent: .....
Crust: .....
Dense: .....
Distant: .....
Dissolve: .....
Drift: .....
Explanation: .....
Explosion: .....
Fern: .....
Faint: .....
Fairly: .....
Float: .....
Galaxy: .....
Gap: .....
Geological: .....
Identical: .....
Incredibly: .....
Imply: .....
Laboratories: .....
Lightning: .....
Membrane: .....
Molten: .....
Pangaea: .....
Plate tectonics: .....
Plug: .....

Raft: .....
Rush apart: .....
Reproduce: .....
Reptile: .....
Scientist: .....
Scrape: .....
Shrink: .....
Slushy: .....
Substance: .....
Surface: .....
Universe: .....
Trigger: .....
Volcano: .....