

Passage 1

### The Layers of the Sun

Consider the earth, the moon, and all the other planets in our solar system. Think about the mass that all those objects must have when they are all added together. Counter-intuitively, added all together they account for only 0.2% of the total mass of the solar system. The sun makes up the remaining 99.8% of all the mass in the solar system! The sun is the center of the solar system and the largest object in the solar system. Our sun is a star that provides light and heat and supports almost all life on Earth.

The sun is a sphere, but unlike the earth and the moon, it is not solid. Most atoms in the sun exist as plasma, or a fourth state of matter made up of superheated gas with an electrical charge. Our sun consists almost entirely of the elements hydrogen and helium, and because the sun is not solid, it does not have a defined outer boundary. It does, however, have a definite internal structure. There are several identifiable layers of the sun:

The core is the innermost or central layer of the sun. The core is plasma, but moves similarly to a gas. Its temperature is around 27 million degrees Celsius. In the core, nuclear reactions combine hydrogen atoms to form helium, releasing vast amounts of energy in the process. The energy released then begins to move outward, towards the outer layers of the sun.

Just outside the core is the radiative zone, which has a temperature of about 7 million degrees Celsius. The energy released in the core travels extremely slowly through the radiative zone. Particles of light called photons can only travel a few millimeters before they hit another particle in the sun, are absorbed and then released again. It can take a photon as long as 50 million years to travel all the way through the radiative zone.

Surrounding the radiative zone is the convection zone. Here, hot material from near the sun's center rises, cools at the surface, and then plunges back downward to receive more heat from the radiative zone. This movement helps to create solar flares and sunspots. These first three layers make up what we would actually call "the sun". The next three layers make up the sun's atmosphere. Of course, there are no solid layers to any part of the sun, so these boundaries are fuzzy and indistinct.

The visible surface of the sun is known as the photosphere. This is the region of the sun that emits sunlight. It's also one of the coolest layers of the sun—only about 6700°C. Looking at a photograph of the sun's surface, you can see that it has several different colors: oranges, yellow and reds, giving it a grainy appearance. We cannot see this when we glance quickly at the sun as our eyes can't focus that quickly and the sun is too bright for us to look at for more than a brief moment. Looking at the sun for any length of time can cause blindness, so don't try it! Sunlight is emitted from the sun's photosphere. A fraction of the light that travels from the sun reaches Earth. It travels as light in a range of wavelengths, including visible light, ultraviolet, and infrared radiation. Visible light is all the light we can see with our eyes. We can't see ultraviolet or infrared radiation, but their effects can



still be detected. For example, sunburn is caused by ultraviolet radiation when you spend too much time in the sun.

The chromosphere is the zone about 2,000 kilometers thick that lies directly above the photosphere. The chromosphere is a thin region of the sun's atmosphere that glows red as it is heated by energy from the photosphere. Temperatures in the chromosphere range from about 4000°C to about 10,000°C. Jets of gas fire up through the chromosphere at speeds up to 72,000 kilometers per hour, reaching heights as high as 10,000 kilometers.

The outermost layer of the sun, and the outermost part of its atmosphere, is called the corona. It is the sun's halo or "crown". It has a temperature of 2 to 5 million degrees Celsius and is much hotter than the visible surface of the sun, or photosphere. The corona extends millions of kilometers into space. If you ever have the chance to see a total solar eclipse, you will be able to see the sun's corona, shining out into space.

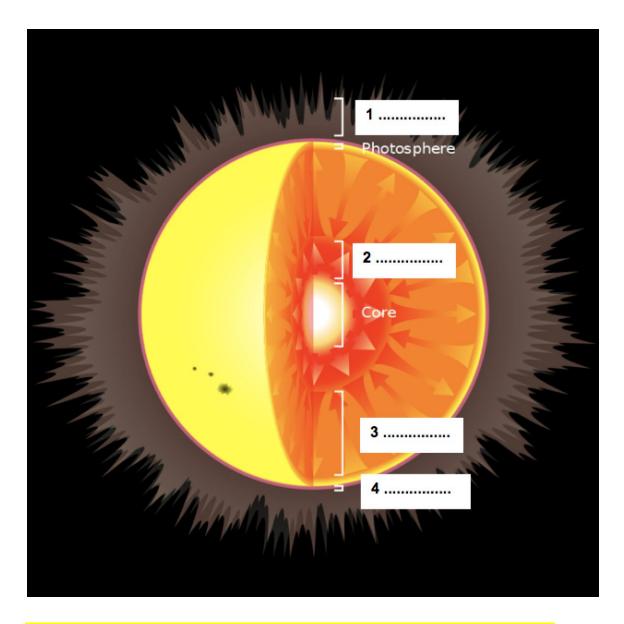
To conclude, in the sun's core, nuclear fusion reactions generate energy by converting hydrogen to helium, and the rest of the sun is heated by the movement of this energy outward from the core. Light energy from the sun is emitted from the photosphere, and it travels through space, and some of it reaches the earth. The sun is the source of almost all the energy on Earth and sunlight powers photosynthesis, as well as warming and illuminating our Earth.

Adapted from: <u>https://en.wikibooks.org/wiki/High\_School\_Earth\_Science/The\_Sun</u>



### **Questions 1-4**

Label the diagram below with the names of the layers of the sun. Choose **NO MORE THAN TWO WORDS** from the reading passage for each answer.



After you've tried these questions, check your answers with the following <u>video</u>.



### **Questions 5-9**

Complete each sentence with the correct ending A - I from the box below. Write the correct letter A - I in boxes 5-9 on your answer sheet. NB not all letters will be used.

- 5. The vast majority of the total mass of the solar system is accounted for by...
- 6. There is no fixed outer edge ...
- 7. The core produces energy which...
- 8. Our planet only receives...
- 9. One kind of light emitted by the sun, which...
- A. can be seen in the photosphere, is a form of superheated gas.
- **B**. is extremely hot and used to create hydrogen.
- C. is invisible to humans, can damage our skin.
- **D**. moves at a very slow pace through the area surrounding it.
- **E**. a small proportion of the light which the sun emits.
- **F**. sunspots, which are the third layer of the sun's atmosphere.
- ${\bf G}.$  the biggest single object in the solar system, which is the sun.
- H. the planets and their moons.
- I. to the sun due to the fact that it is mostly made of gas or plasma.

After you've tried these questions, check your answers with the following <u>video</u>.

### Questions 10-14

Do the following statements agree with the information provided in passage 1?

True	if the statement agrees with the information
False	if the statement contradicts the information
Not Given	if there is no information on this

- **10.** The interior of the sun is composed of a mixture of only two elements.
- **11.** The movement of matter back and forth between the radiative zone and the area that surrounds it gives rise to surface features like solar flares.
- **12.** If a person were to stare at the sun for a long time (while using equipment to protect the eyes), they would be able to see that most of the surface of the sun is not yellow.
- **13.** Light travels faster through the chromosphere than it does through the radiative zone.
- **14.** Nearly all the energy on our planet is produced originally by means of a nuclear reaction.

After you've tried these questions, check your answers with the following <u>video.</u>



Passage 2

### The Changing Landscape of Oceania

**Section A** - The human settlement of Oceania, from the earliest migrations to European colonization, has reshaped the physical landscape of this region. Environmental degradation – disturbances to resources like air, land, and water – is a serious concern as economic growth often comes at the expense of environmental sustainability. In Australia, for example, wide stretches of previously sparsely inhabited Outback have become grazing lands. In Papua New Guinea illegal logging has contributed to significant deforestation. Pollution from dairying in New Zealand has led to high levels of water pollution.

**Section B** - Invasive species have also had significant environmental impacts in a region that has been otherwise relatively isolated. Australia has adopted a system of strict quarantine in an attempt to limit damage from non-native plants and animals. The country currently spends around \$4 billion yearly in invasive weed management alone. Cats have been banned in parts of New Zealand where they pose a threat to local bird species. Rats brought by early European ships have presented a significant problem for many islands of the Pacific, where they kill other plants and animals and also spread disease. Offshore, invasive fish and algae species have damaged fragile ocean ecosystems.

**Section C** - In addition to local pollution concerns, human settlement of other world regions has contributed to pollution in the Pacific Ocean. Worldwide, there are five main ocean gyres, large systems of rotating ocean currents. In the northern Pacific Ocean, one gyre has very high concentrations of trash and plastics carried to the area by ocean currents. It has been termed the Great Pacific garbage patch. When you throw something "away" improperly, these gyres are really where "away" is. A water bottle improperly disposed of on the western coast of North America will make its way to the Great Pacific garbage patch in around six years.

**Section D** - One issue with plastics is that they don't biodegrade, and instead keep breaking down into smaller pieces while still remaining plastic. Fish and other marine life eat these tiny bits of plastic, which can disrupt a number of biological systems. Some of these fish species are then consumed by humans. Because the Great Pacific garbage patch contains such small pieces of plastic, and most of the plastic is below the surface of the ocean, it is not easily visible with the naked eye and it is difficult to estimate its size. Some have theorized the patch is as big as or bigger than the US state of Texas, while others note that the idea of a "patch" of garbage is really a misnomer as there are concentrations of trash throughout the world's oceans.

**Section E** - Trash from other world regions also washes up along the shores of the Pacific islands. Kamilo Beach in Hawaii is the site of a significant amount of plastic that has washed ashore from the Great Pacific garbage patch, so much so that the area has been nicknamed "Plastic Beach". Though the shoreline looks sandy, 90 percent of it is actually bits of plastic and you would have to dig down at least one foot to reach grains of sand. Plastic trash litters many of the shorelines of the Pacific islands, presenting a hazard for marine life and a management and cleanup challenge since debris often comes from thousands of miles away.



**Section F** - It is changes in global climate, however, that pose the most severe environmental threat to Oceania. For many of the world's regions, changes in climate are viewed as hypothetical. Hurricanes might increase in intensity. The risk of fire might increase. Changes in bird migrations in Europe and North America to shifts in global fish stocks have already been linked to increases in global temperature but with little direct effect on the human populations of these regions. In Oceania, though, small increases in temperature and ocean levels could have disastrous effects on already fragile ecosystems and economies. The Great Barrier Reef is currently experiencing periods of coral bleaching due to increasing ocean temperatures. When waters get too warm, coral experience "stress" and expel the colorful, algae-like organisms that live within them. Mass coral bleaching has occurred several times since the late 1990s and is expected to become a regular occurrence as ocean temperatures continue to rise. Coral bleaching has also been documented in other reefs, including ones in Hawaii.

Some of the leaders of the Pacific islands have been among the most vocal champions for global climate regulations. Speaking in 2015, the prime minister of Fiji, Frank Bainimarama did not mince words: "Unless the world acts decisively in the coming weeks to begin addressing the greatest challenge of our age, then the Pacific, as we know it, is doomed." Fiji has already experienced an increase in infectious diseases related to higher temperatures, record-breaking high tides, and has had to relocate citizens due to rising ocean levels. The rising oceans in the Pacific and the concentrations of pollution found in this region are stark reminders of our interconnected world. In many ways, the future of Oceania will be decided by the actions of global citizens and leaders.

### Source:

<u>https://socialsci.libretexts.org/Bookshelves/Geography (Human)/Book%3A\_World\_Regional\_Geography (Finlayson)/10%3A\_Oceania/10.05%3A\_The\_Changing\_Landscape\_of\_Oceania</u>

#### **Questions 15-19**

Choose **NO MORE THAN TWO WORDS AND/OR A NUMBER** from the passage to answer the questions below.

- **15.** According to the article, what environmental problem has been caused by the dairy industry in New Zealand?
- **16.** What measure has been introduced in Australia to reduce problems caused by foreign animals and vegetation?
- **17.** Approximately how long does it take for a piece of plastic rubbish to reach the Great Pacific garbage patch from the west coast of the USA?
- **18.** What proportion of Kamilo Beach is comprised of plastic?
- 19. What problem is affecting coral reefs in Hawaii?

After you've tried these questions, check your answers with the following <u>video</u>.



### Questions 20-24

Passage 2 has six sections labelled A-F

Choose the correct headings for Sections **B-F**.

List of Headings				
i. Beach garbage from far away				
ii. Fish consumption				
iii. How pollution from outside Oceania reaches the region				
iv. Hypothesizing change				
v. The effect of human migration on the region				
vi. The extent of the plastic problem				
vii. The impact of foreign wildlife on Oceania				
viii. The serious danger posed by climate change				
ix. The spread of Texan pollution				

E.g. Section A - v

20. Section B
21. Section C
22. Section D
23. Section E
24. Section F

After you've tried these questions, check your answers with the following <u>video</u>.



### **Questions 25-27**

Choose the appropriate letters A, B, C or D

Write your answers in boxes **25-27** on your answer sheet.

- **25.** According to the text, the Great Pacific garbage patch
  - A. can be seen to consist mostly of plastic.
  - **B.** is known to be nearly as large as Texas.
  - **C.** is of an unknown size.
  - **D.** is believed by some to stretch to all the world's oceans.
- 26. Coral
  - A. change their behaviour as a result of exposure to a certain amount of heat.
  - **B.** experienced mass bleaching regularly prior to the 1990s.
  - C. have undergone the most severe damage in Hawaii.
  - **D.** exist in the Great Barrier Reef due to increasing temperatures.

### 27. In Fiji,

- A. diseases have meant that many people have needed to relocate.
- **B.** higher sea levels have led to food shortages.
- C. some citizens have been moved to other locations due to increasing sea levels.
- **D.** most diseases involve fever as a principal symptom.

After you've tried these questions, check your answers with the following <u>video.</u>



Passage 3

### **Spanish Exploration and Conquest**

**A** - The Spanish established the first European settlements in the Americas, beginning in the Caribbean and, by 1600, extending throughout Central and South America. Thousands of people flocked from Spain to the Americas seeking wealth and status. The most famous of these adventurers are Christopher Columbus (who, though Italian himself, explored on behalf of the Spanish monarchs), Hernán Cortés, and Francisco Pizarro.

**B** - The history of Spanish exploration begins with the history of Spain itself. During the fifteenth century, Spain hoped to gain advantage over its rival, Portugal. The marriage of Ferdinand of Aragon and Isabella of Castile in 1469 unified Catholic Spain and began the process of building a nation that could compete for worldwide power. In 1492, they completed the Reconquista: the centuries-long Christian conquest of the Iberian Peninsula. The Reconquista marked another step forward in the process of making Spain an imperial power, and Ferdinand and Isabella were now ready to look further afield.

**C** - Their goals were to expand Catholicism and to gain a commercial advantage over Portugal. To those ends, Ferdinand and Isabella sponsored extensive Atlantic exploration. Spain's most famous explorer, Christopher Columbus, was actually from Genoa, Italy. He believed that, using calculations based on other mariners' journeys, he could chart a westward route to India, which could be used to expand European trade and spread Christianity. Starting in 1485, he approached Genoese, Venetian, Portuguese, English, and Spanish monarchs, asking for ships and funding to explore this westward route. All those he petitioned—including Ferdinand and Isabella at first—rebuffed him; their nautical experts all concurred that Columbus's estimates of the width of the Atlantic Ocean were far too low. However, after three years of entreaties, and, more importantly, the completion of the Reconquista, Ferdinand and Isabella agreed to finance Columbus's expedition in 1492, supplying him with three ships: the *Nina*, the *Pinta*, and the *Santa Maria*. The Spanish monarchs knew that Portuguese mariners had reached the southern tip of Africa and sailed the Indian Ocean. They understood that the Portuguese would soon reach Asia and, in this competitive race to reach the Far East, the Spanish rulers decided to act.

**D** - Columbus held erroneous views that shaped his thinking about what he would encounter as he sailed west. He believed the earth to be much smaller than its actual size and, since he did not know of the existence of the Americas, he fully expected to land in Asia. On October 12, 1492, however, he made landfall on an island in the Bahamas. He then sailed to an island he named Hispaniola (present-day Dominican Republic and Haiti). Believing he had landed in the East Indies, Columbus called the native Taínos he found there "Indios," giving rise to the term "Indian" for any native people of the New World. Upon Columbus's return to Spain, the Spanish crown bestowed on him the title of Admiral of the Ocean Sea and named him governor and viceroy of the lands he had discovered.



**E** - Columbus's 1493 letter—or *probanza de mérito* (proof of merit)—describing his "discovery" of a New World did much to inspire excitement in Europe. *Probanzas de méritos* were reports and letters written by Spaniards in the New World to the Spanish crown, designed to win royal patronage. Today they highlight the difficult task of historical work; while the letters are primary sources, historians need to understand the context and the culture in which the conquistadors, as the Spanish adventurers came to be called, wrote them and distinguish their bias and subjective nature. While they are filled with distortions and fabrications, *probanzas de méritos* are still useful in illustrating the expectation of wealth among the explorers as well as their view that native peoples would not pose a serious obstacle to colonization.

**F** - In 1493, Columbus sent two copies of a *probanza de mérito* to the Spanish king and queen and their minister of finance, Luis de Santángel. Santángel had supported Columbus's voyage, helping him to obtain funding from Ferdinand and Isabella. Copies of the letter were soon circulating all over Europe, spreading news of the wondrous new land that Columbus had "discovered." Columbus would make three more voyages over the next decade, establishing Spain's first settlement in the New World on the island of Hispaniola. Many other Europeans followed in Columbus's footsteps, drawn by dreams of winning wealth by sailing west. Another Italian, Amerigo Vespucci, sailing for the Portuguese crown, explored the South American coastline between 1499 and 1502. Unlike Columbus, he realized that the Americas were not part of Asia but lands unknown to Europeans. Vespucci's widely published accounts of his voyages fueled speculation and intense interest in the New World among Europeans. Among those who read Vespucci's reports was the German mapmaker Martin Waldseemuller. Using the explorer's first name as a label for the new landmass, Waldseemuller attached "America" to his map of the New World in 1507, and the name stuck.

### Source:

https://openstax.org/books/us-history/pages/2-1-portuguese-exploration-and-spanish-conquest



### Questions 28-31

*Complete the table below.* 

Choose **NO MORE THAN TWO WORDS AND/OR A NUMBER** from reading passage 3 for each answer.

Date	Event	People involved
28	the unification of Catholic	the marriage of
	Spain	Ferdinand and Isabella
October 12, 1492	arrival in <b>29</b>	Christopher Columbus
1493	Columbus sends two	sent to the king,
	copies of a report	<b>30</b> and Luis
		de Santangel
from 1499 to 1502	the exploration of the	Amerigo Vespucci
	South American coast	
1507	the naming of	Martin Waldseemuller
	31	

After you've tried these questions, check your answers with the following <u>video</u>.

### **Questions 32-36**

Passage 3 has six paragraphs labelled A-F.

Which paragraphs contain the following information?

- **32.** Why Ferdinand and Isabella at first refused to fund Columbus's expedition
- **33.** How Spain's imperialist ambitions began
- 34. The difficulty of analysing the letters written to the Spanish king and queen
- **35.** Columbus's first discoveries
- **36.** The number of journeys undertaken by Columbus to the New World

After you've tried these questions, check your answers with the following <u>video</u>.



### **Questions 37-40**

Look at the information below (Questions **37-40**) and the list of people below.

Match each piece of information with the correct person A-E.

**NB** answers **A-E** can be used more than once.

- **37.** Assisted Columbus in getting money for his voyage.
- 38. An Italian explorer.
- **39.** Created a map based on the reports of a famous explorer.
- **40.** Finally conquered the Iberian Peninsula.

#### List of people

- A. Christopher Columbus
- B. Francisco Pizarro
- C. Ferdinand and Isabella
- **D.** Luis de Santangel
- E. Martin Waldseemuller

After you've tried these questions, check your answers with the following <u>video</u>.



### Answers

1. (The) corona

2.	Radiative zone				
3.	Convection zone				
4.	(The) chro	omosphere			
5.	G				
6.	I				
7.	D				
8.	E				
9.	С				
10.	F	Extra info- para 2: almos	<b>st</b> entirely, not <b>entirely</b>		
11.	т	Extra info- para 5			
12.	NG	Extra info- para 6			
13.	NG	Extra info- para 7 + 4			
14.	т	Extra info- para 9			
15.	water pol	lution	Extra info- para 1		
16.	(strict) quarantine		Extra info- para 2		
17.	(around) six/6 years		Extra info-para 3		
18.	ninety/90 percent/per cent/%		Extra info- para 5		
19.	coral blea	ching	Extra info- para 7		
20.	vii				
21.	iii				
22.	vi				
23.	i				
24.	viii				
25.	C Ex	xtra info- para 4			
26.	A Ex	xtra info- para 6			
27.	C Ex	xtra info- para 7			
28.	1469				
29.	(the) Bahamas				
30.	(the) queen / Isabella				
31.	America				
32.					
33.					
34.					
35.					
36.					
37.					
38.					
39.					
40.	С				