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91414



914140



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Level 3 Earth and Space Science 2022

91414 Demonstrate understanding of processes in the atmosphere system

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of processes in the atmosphere system.	Demonstrate in-depth understanding of processes in the atmosphere system.	Demonstrate comprehensive understanding of processes in the atmosphere system.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–16 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (▨). This area may be cut off when the booklet is marked.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

Achievement

TOTAL

09

QUESTION ONE: THE WATER CYCLE

The water cycle is the movement of water through the environment. While the atmosphere contains only a small amount of water, it enables water to cycle and heat energy to flow around the globe.

Explain the role of the atmosphere in transporting water and heat energy around the Earth.

In your answer, you should:

- add detailed annotations to the following diagram of the water cycle, showing water and energy entering and leaving the atmosphere during the water cycle
- explain, in detail, the processes that add water to the atmosphere
- explain, in detail, the processes that remove water from the atmosphere
- explain, in detail, the role of latent heat and sensible heat in transporting energy through the atmosphere.

Source: www.sutori.com/en/story/the-water-cycle--RD4v8GKWCwg6FpiUAHpb1KWc

The process that adds water into the atmosphere is ^{evaporation} ~~precipitation~~. This happens when the water is heated enough the particles will vibrate more and more pushing each other further apart from each other till a gas is formed (water vapour). The water then condenses as it is colder higher up & forms a cloud.

When ~~adding~~ water is removed from the atmosphere it is due to the precipitation. precipitation occurs after the condensed water vapour in clouds becomes too heavy. The water then goes back to the ocean or land.

There is more space for
your answer to this question
on the following pages.

QUESTION TWO: AUSTRALIAN BUSHFIRES AND CLIMATE

Source: www.theage.com.au/national/victoria/victoria-bushfires-live-homes-lost-as-town-s-defence-breached-20191231-p53ns1.html

The 2019–20 bushfires in Australia injected huge amounts of carbon dioxide and dark-coloured carbon aerosols into the atmosphere. Scientists have recently been studying the effect of these bushfires on the atmosphere.

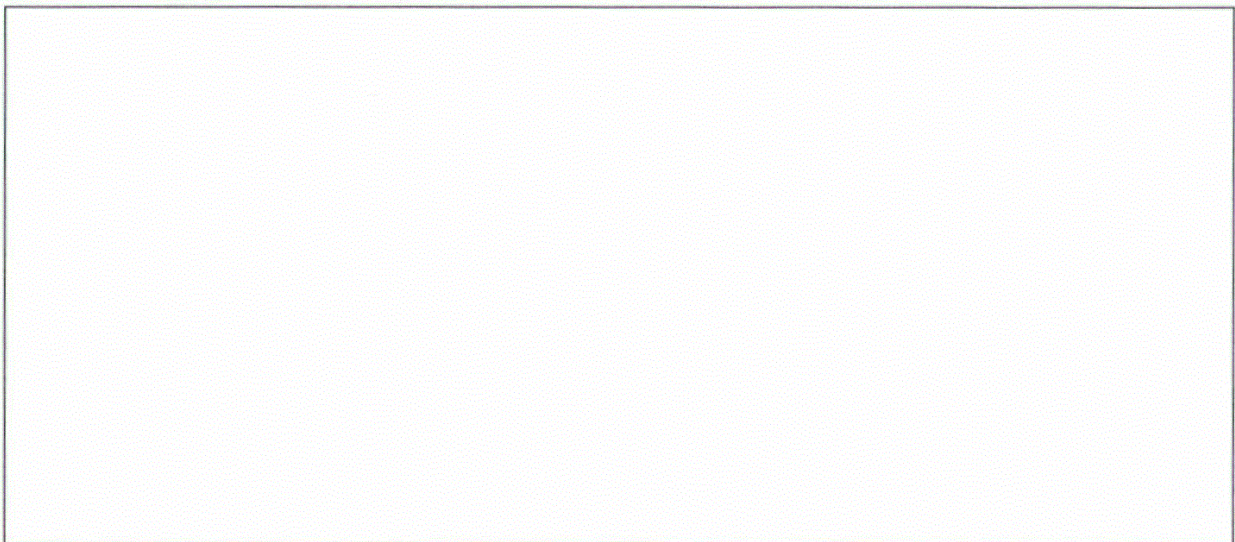
Discuss the effects that both carbon dioxide and dark-coloured carbon aerosols could have on the troposphere.

Your answer should focus on processes within the troposphere only.

In your answer, you should:

- explain what an aerosol is
- explain, in detail, two possible effects that dark-coloured carbon aerosols could have on the troposphere
- explain the effect of excessive amounts of carbon dioxide being released into the troposphere
- explain, comprehensively, the relative length of time that the effects of carbon dioxide and aerosols are likely to last.

An annotated diagram may assist your answer.



An ~~air~~ aerosol is air/liquid particle that is suspended in the air. Some are bigger than others and the bigger ones usually get ~~roughly~~ pulled down by gravity. The smaller ones can stay up a lot longer and are usually ~~to~~ come down from rain. There ~~also~~ are aerosols that are made by humans and some are natural. The dark coloured aerosols could damage the troposphere as it could bring more heat into the atmosphere because clouds are made up of aerosols and the darker colour could hold the heat instead of reflecting long wave radiation like white clouds do. If brought down to the earth ~~the~~ aerosols could be dangerous ~~to~~ human life & human production. The more carbon dioxide in the troposphere the warmer and warmer it will get due to the vibration from other particles creating more heat energy. Aerosols could stay in the troposphere for months depending on the size of the aerosol but since it is in the troposphere weather and gravity are going to find it easier to bring down rather than if it was in the stratosphere.

There is more space for your answer to this question on the following pages.

QUESTION THREE: ATMOSPHERE LAYERS

The Earth's atmosphere can be divided into distinct layers, shown in the diagram below. Temperature, air pressure, and density all vary within and between these layers.



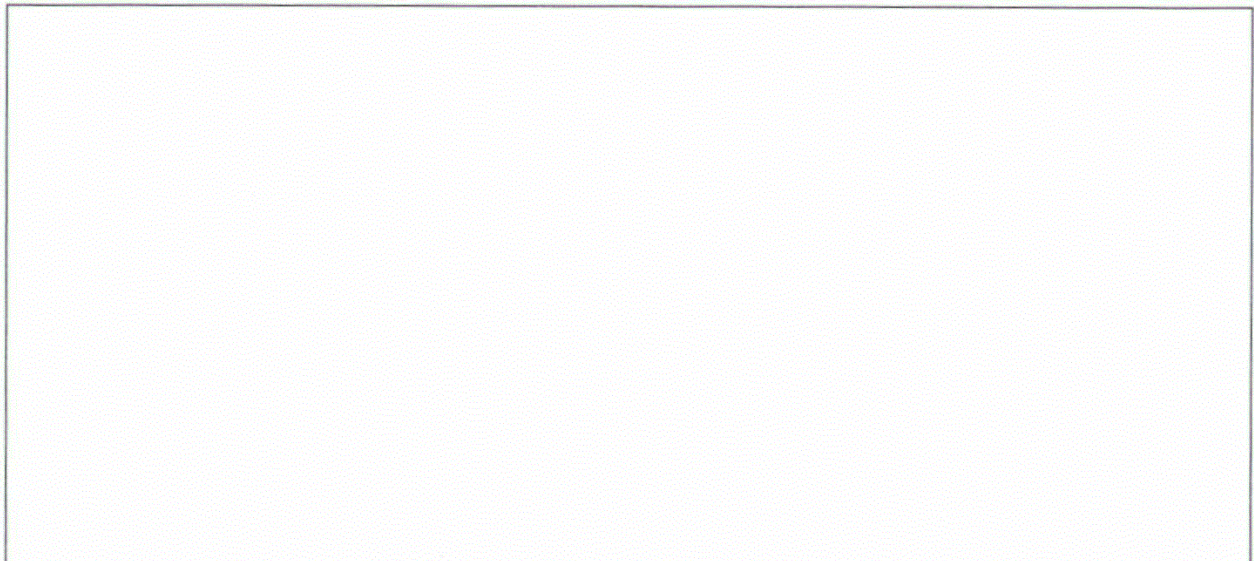
Adapted from: www.visionlearning.com/en/library/Earth-Science/6/Composition-of-Earths-Atmosphere/107

Explain the reasons for the differences in temperature, air pressure, and density between and within the layers of the atmosphere.

In your answer, you should:

- define temperature, air pressure, and density in relation to the layers of the atmosphere
- explain, comprehensively, the reason for the changes in temperature, air pressure, and density with increasing altitude
- compare and contrast the differences within and between the layers of the atmosphere shown in the diagram.

An annotated diagram may assist your answer.



The different layers in the atmosphere have different temperatures, densities & air pressure depending on many different ~~fact~~ factors. The higher the altitude gets the less air pressure there is.

It is the same with density. Temperature is different & changes from lower to higher through each layer. The changes in ~~the~~ temperature depend on the factors around it. The troposphere is warmer near the earth as it contains 75% of the atmosphere's air as well as the earth heating up the troposphere as the soil holds heat. The stratosphere is cold closer to the tropopause but increases when close to the ozone layer. The ozone layer absorbs UV rays that make it warmer.

The mesosphere is the coldest as there is really nothing around there and it isn't close enough to the sun to warm up. The thermosphere is the opposite where it is quite close to the sun so it is heated easily.

The pressure decreases as the altitude increases because there are less particles the higher you get. The gravity from earth pulls the

There is more space for your answer to this question on the following pages.

Molecules closer to the ~~xxx~~ earth which means they are closer together and create heat when bumping into each other. In higher altitudes there is much less air particles so less chance of bumping together and making more. The density gets lower with higher altitude as most of the air particles are in the troposphere ~~xxx~~ So when it gets higher and there ~~xxx~~ is less particles there is more space for the particles to float around.

Extra space if required.
Write the question number(s) if applicable.

QUESTION
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Standard	91414	Display ID		Total score	-9- A
Q	Grade score	Annotation			
1	3	Description of evaporation as phase change from liquid to gas, identification of condensation and precipitation as two more processes in cycle and description of precipitation sufficient for A. Missed merit marks as there is no explanation of causes for or in depth explanation of processes (heat, density, gravity)			
2	3	Definition of aerosol. Statement that dark aerosols will absorb heat, but not explained that this will cause increase in temperature for merit. Mention of light coloured clouds reflecting radiation, but not linked to effect on temperature for merit mark.			
3	3	Statements that links sources of heat to temperature in layers, but no effect related to distance from source (gradient) explained for merit. Higher density in troposphere explained as result of gravity for achieved. Missed explanation linking weight force and pressure for the merit mark. Distance from sun and absence of particles as reason for low temperature in mesosphere a suitable achieved description.			