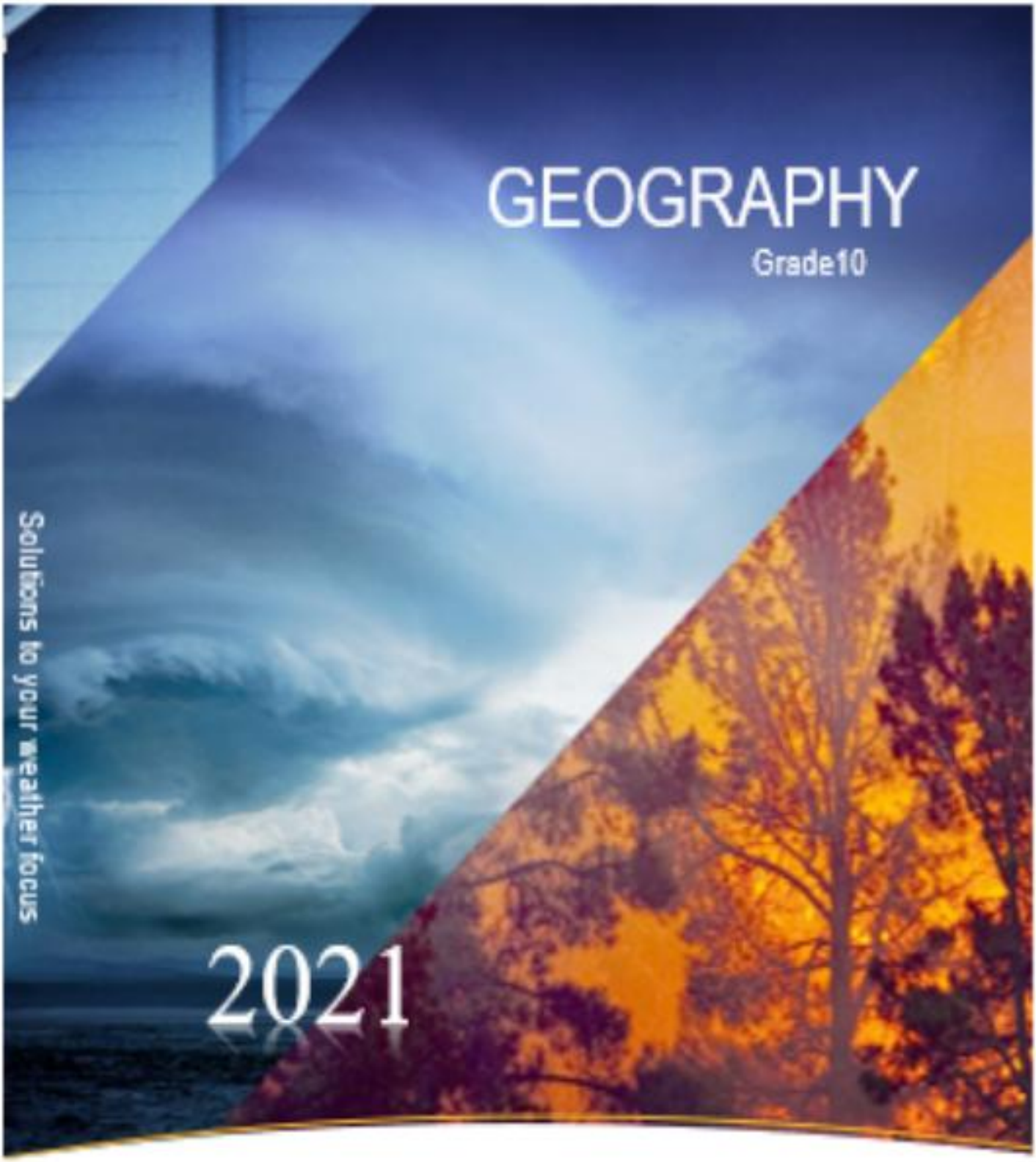


GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

A. INTRODUCTION AND PURPOSE OF THE RELAB (REMOTE LEARNING ACTIVITY BOOKLET)

The pandemic has forced schools to resort to the implementation of rotational timetables-where learners who are at home during normal schooling must continue learning. Hence RELAB as a strategy towards the deployment of remote learning.

The RELAB is underpinned by the following Legislative demands:

a) Responding to GDE Strategic goal 2 promoting quality education across all classrooms and schools
b) **DBE Circular S13 of 2020** the requires the GDE to support the implementation of the Recovery Annual Teaching Plan (RATP)
c) **GDE Circular 11 of 2020** requiring districts to issue Learning Activity Packs to support schools for lockdown learning. Understanding learning constraints at home as majority of learners do not have access to devices or data to use for online learning. Many households are depending on schools to provide them with learning resources packs

RELAB is designed in a study guide format, where the content is briefly explained with related concepts as revision, in the form of e.g. notes, mind-maps, concept progression from the previous grade/s followed by exemplar exercises then practice exercises/problems . The exercises are pitched at different cognitive levels to expose learners at Grade 10 & 11 to these different cognitive levels of questioning. The NSC diagnostic reports in different subjects have revealed that learners fail to analyse questions and as a result fail to respond accordingly.

The RELAB is intended to ensure that learners work on exercises as per topics taught while at school. These exercises must be completed at home, fully and learners will receive feedback as groups or individually at school. It is therefore of paramount importance that teachers mark the work with learners in class, as a way of providing feedback. Educators must diagnose learner responses, remediate where necessary and plan further intervention.

Educators are encouraged to create WhatsApp groups to remind learners on what is expected of them in a particular week/ day(s). There shouldn't be a backlog on curriculum coverage as content will be covered simultaneously. Feedback from learners at home will confirm usage of the RELAB material.

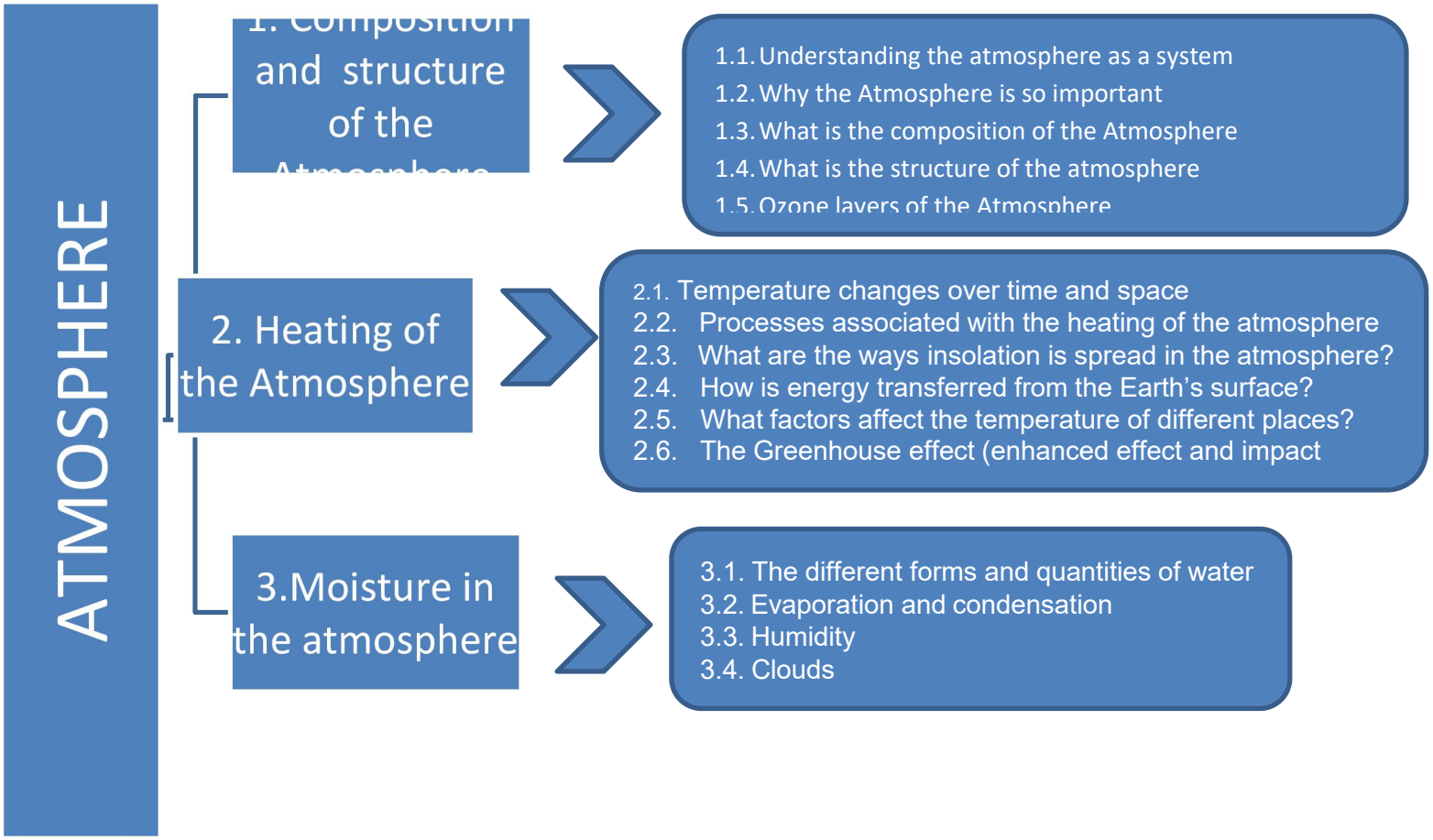
RELAB further prepares learners for formal assessment.

TABLE OF CONTENTS

CLIMATE

GRADE 10: TERM 1

WEEK 1



TERMINOLOGY

Atmosphere	The gaseous layer surrounding the Earth
Atmospheric pressure	It is the force exerted on a surface by the air above it as gravity pulls it to Earth
Latitude	
Ozone	Is a highly reactive gas composed of three oxygen atoms.
Ozone depletion	
Albedo	
CFK	Chlorofluorocarbons – various compounds consisting of carbon, hydrogen, chlorine, and fluorine, once used in aerosol propellants and refrigerators
Temperature	
Permanent gasses	Gasses that do not change in proportion
Variable gasses	The percentage of these gasses in the atmosphere changes from time to time and place to place
Climate	The average conditions in the atmosphere for an area over a log period of time
Weather	The average conditions in the atmosphere for a specific place and time
Greenhouse gasses	Gasses which trap heat radiation from the earth causing temperatures to rise on the earth's surface
Inversion	A condition in the atmosphere where temperature increase with height
Terrestrial radiation	Radiation from the earth
Ultraviolet light	Electromagnetic radiation with a wavelength shorter than that of visible light
Greenhouse effect	The greenhouse effect is the process by which radiation from a planet's atmosphere warms the planet's surface to a temperature above what it would be without this atmosphere
Phytoplankton	Are the autotrophic components of the plankton community and a key part of ocean and freshwater ecosystems
Albedo	The amount of radiation reflected from a surface
Insolation	Incoming solar radiation
Global warming	The rise in global temperatures which has led to climate change
Continental climate	It includes temperature extremes, large diurnal and seasonal ranges of temperature, small annual precipitation totals, and low relative humidity
Maritime climate	Marine climate is the classification of climate typical of west coasts in higher middle latitudes of continents, and generally features mild summers
Temperature range	Maximum temperature minus the minimum temperature
Deforestation	The removal of trees
Desertification	The process by which fertile land becomes desert, typically as a result of drought, deforestation, or inappropriate agriculture.

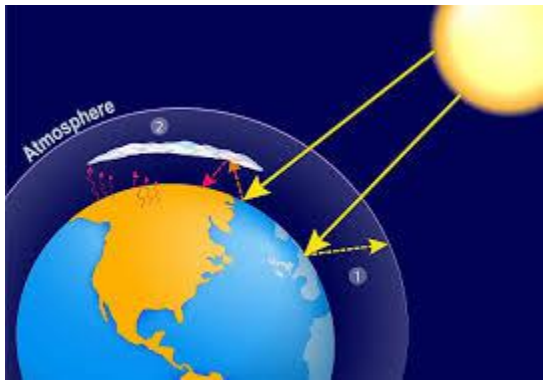
Soil erosion	The removal of fertile topsoil by wind and water
Condensation	When water vapour changes to liquid state
Evaporation	When liquid change to gaseous state
Sublimation	When water vapour change to a solid state
Water vapour	The gaseous state of water
Latent heat	Heat associated with a phase change in water
Clouds	Masses of suspended water or ice particles in the atmosphere
Dew point	The atmospheric temperature (varying according to pressure and humidity) below which water droplets begin to condense and dew can form.
Humidity	The amount of water vapour in the atmosphere
Relative humidity	The amount of water vapour present in air expressed as a percentage of the amount needed for saturation at the same temperature.
Saturate	Holding as much water or moisture as can be absorbed
Advection fog	This type of fog forms from surface contact of horizontal winds
Fog	A thick cloud of tiny water droplets suspended in the atmosphere at or near the earth's surface which obscures or restricts visibility
Radiation fog	It forms overnight as the air near the ground cools and stabilizes
Convection	The movement caused within a fluid by the tendency of hotter and therefore less dense material to rise, and colder, denser material to sink under the influence of gravity, which consequently results in transfer of heat.
Front	The meeting place of warm and cold air masses
Leeward	Also shadow area. The leeward side is the side protected by the elevation of the island from the prevailing wind and is typically the drier side of an island.
Windward side	Windward is the direction upwind from the point of reference, alternatively the direction from which the wind is coming.

WEEK: 1 COMPOSITION OF THE ATMOSPHERE

STUDY WITH THESE QUESTIONS IN MIND

WHAT IS THE ATMOSPHERE

- The layer of gases surrounding the Earth's surface
- The density of gases decreases with height as one move away from the earth's surface.



COMPOSITION OF THE ATMOSPHERE

- **solid particles (**ice, salt, smoke, carbon, and dust),
- **liquid** (water) and
- **gas** (permanent and variable)

IMPORTANCE OF THE ATMOSPHERE

- Contains oxygen which is essential for respiration in humans
- Contain carbon dioxide for plants to grow
- Acts as blanket around the earth
- Protects life on earth

GASSES IN THE ATMOSPHERE

PERMANENT GASES

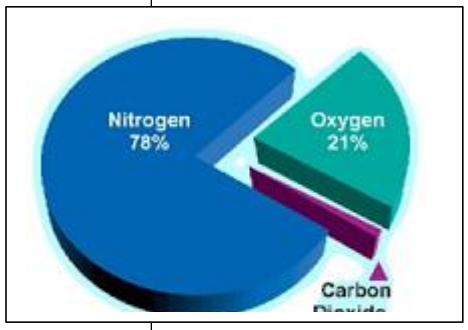
These gases occur in a fixed percentage in the atmosphere

- Nitrogen has a fixed quantity of 78%
- Oxygen – 21%
- Argon – 0.9%

VARABLE GASES

These are gases that do not occur in the fixed % in the atmosphere

- Water vapour
- Carbon dioxide



SIGNIFICANCE

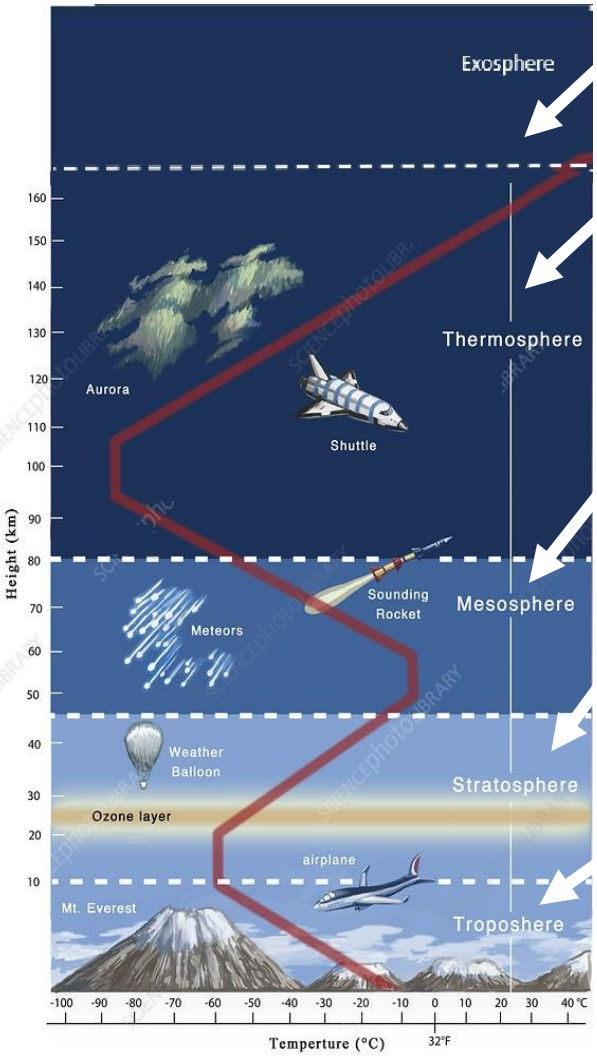
- **Nitrogen** is important for **plant growth**
- **Oxygen –** is important for cell respiration and for combustion(burning**)**
- **Argon** – used mainly for industrial purposes such as welding and manufacture of electrical bulbs. Also known as a noble gas**.**

- **Water vapour-** Important for climatic processes such as rainfall
- **Carbon dioxide** varies because of number of people, combustion, amount of vegetation etc.

STRUCTURE OF THE ATMOSPHERE

STUDY WITH THESE QUESTIONS IN MIND

WHAT IS IT : The atmosphere consists of four distinct layers Troposphere, Stratosphere, Mesosphere, Thermosphere

HOW DOES IT LOOK LIKE	LAYERS OF THE ATMOSPHERE	IMPORTANCE
	**EXOSPHERE** • Outer layer of the thermosphere • From 550km to thousands of kilometers into space **THERMOSPHERE** • Outer layer of atmosphere • Extend from 80km to merge the space • Temperature increases with altitude. • Air particles reach temperature of about 500°C-1800°C **MESOSPHERE** • From about 50km to 80 km above the stratosphere • Temperature decreases with altitude • Temperature can -80°C. • Upper limit **is mesopause** **STRATOSPHERE** • Located above the troposphere • Contains Ozone layer • Temperature increases with altitude **(negative lapse rate)** **TROPOSPHERE** • Closest to the Earth's surface • Height of 10km (poles) and about 17km (equator) • Air densest in the layer • Highest amount of oxygen and water vapor • Temperature decreases with altitude • Separated from stratosphere by Tropopause	**EXOSPHERE** • It is here that satellite orbits the earth **THERMOSPHERE** • Absorbs high energy radiation from the sun • Prevents rocks from space entering the lower atmosphere **MESOSPHERE** • Prevents rocks from space entering the lower atmosphere **STRATOSPHERE** • Contains ozone which supplements our oxygen • Airplanes are flown in this layer • Airplanes uses winds in this layer to pick up speed **TROPOSHERE** • Produces weather • We breath oxygen in from this layer • Has gases such as oxygen and water vapor that are essential for life on earth. • Produce water through rain • Produce food to eat

THE OZONE LAYER

OZONE LAYER

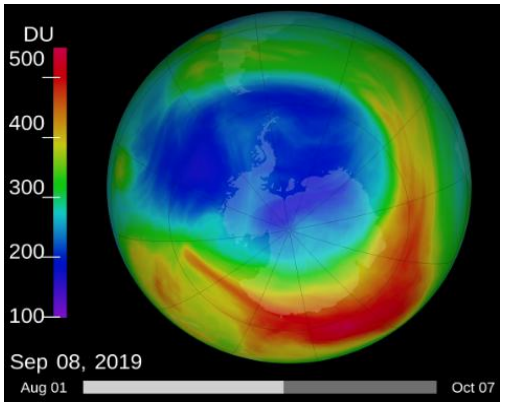
- Gas made up of 3 oxygen atoms
- Located in the Stratosphere

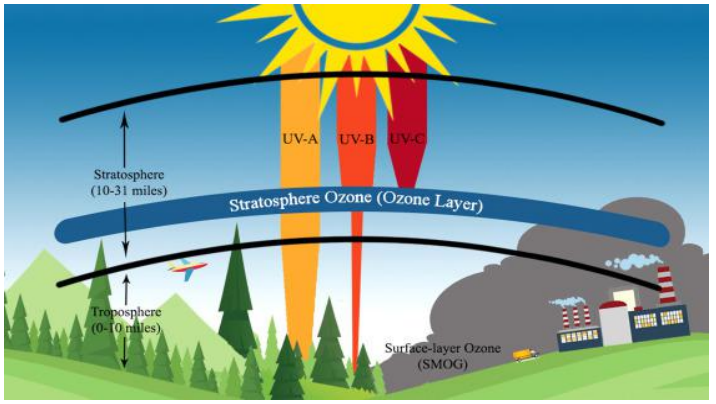
IMPORTANCE:

- Absorbs 99% of the ultraviolet rays of the sun
- The thickness varies from latitude to latitude and season to season

OZONE DEPLETION:

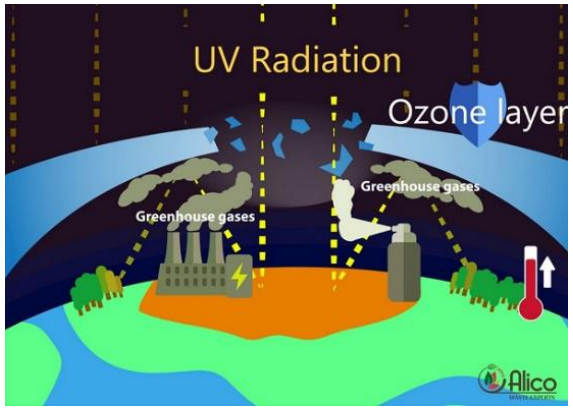
The gradual thinning of Earth's **ozone layer** in the upper atmosphere





WHAT CAUSE THE DEPLETION

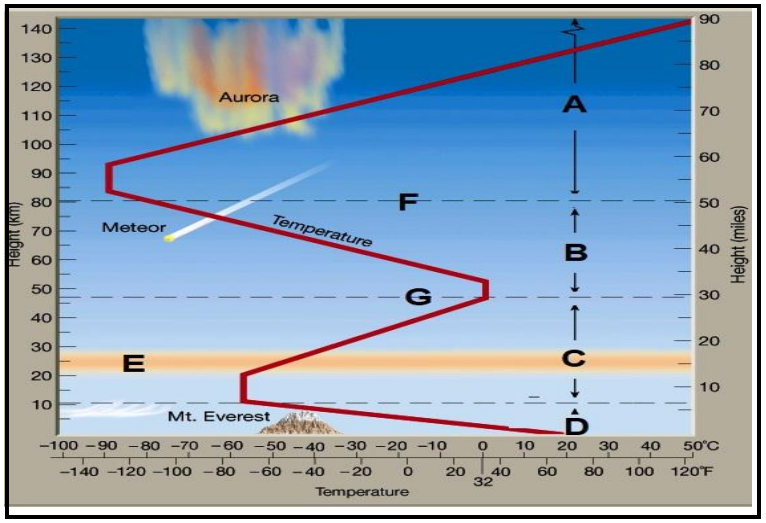
The thinning is most pronounced in the polar regions, especially over Antarctica.



CAUSES	EFFECTS	STRATEGIES TO REDUCE OZONE DEPLETION
• the release of chemical compounds from industry and other human activities. • Supersonic jet flights release ozone attacking gases in the stratosphere • Spraying aerosol cans that are not ozone friendly • Using nitrogen fertilizers • Release of Chlorofluorocarbons • Propellants in aerosol cans • Coolants in refrigerators and air conditioning	• Less absorption of UV rays • Cause skin cancer • Cataracts in human and animal eyes • Lowering the immune system • Increased incidence of malaria • Kill phytoplankton in ocean • Disrupt marine food web • Reduce growth in plants	• Use of ozone friendly products • Reduce the production of CFK • Plant more trees to release oxygen through photosynthesis • Strict regulations to reduce the emissions of cars and • Regulations against the burn of fossil fuels • Use of solar and wind energy to reduce the emissions of the burning of coal

ACTIVITIES: STRUCTURE OF THE ATMOSPHERE

1.1 Refer to FIGURE 1.1 showing the layers of the atmosphere.



1.1.1 Name layer **D** which supports people, plants and animals.

1.1.2 Layer **G** is called the …

1.1.3 **E** indicates the location of the … layer.

1.1.4 The temperature decreases with altitude in layer **D** and …

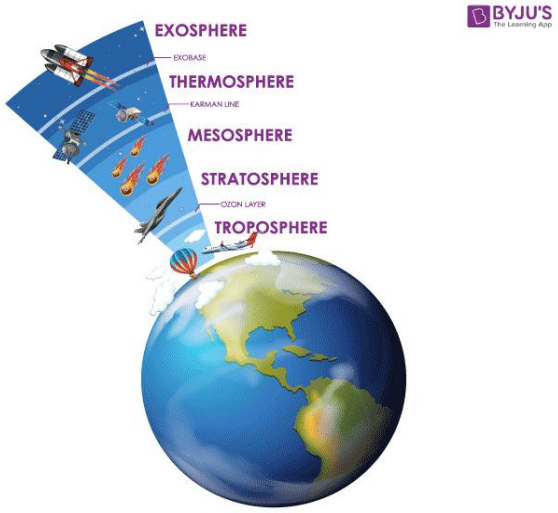
1.1.5 Temperature increases with altitude in these two layers.

1.1.6 Give the name of the layer where meteors burn up when entering the earth's atmosphere.

1.1.7 Commercial airliners cruise in layer … to avoid turbulence of clouds.

1.1.8 Name the layer where weather processes occur. (8 x 1)(8)

1.2 Refer to **Figure 1.2** showing the **structure of the atmosphere**



Atmosphere Layers Diagram

1.2.1 Define the atmosphere. (1 x 1) (1)

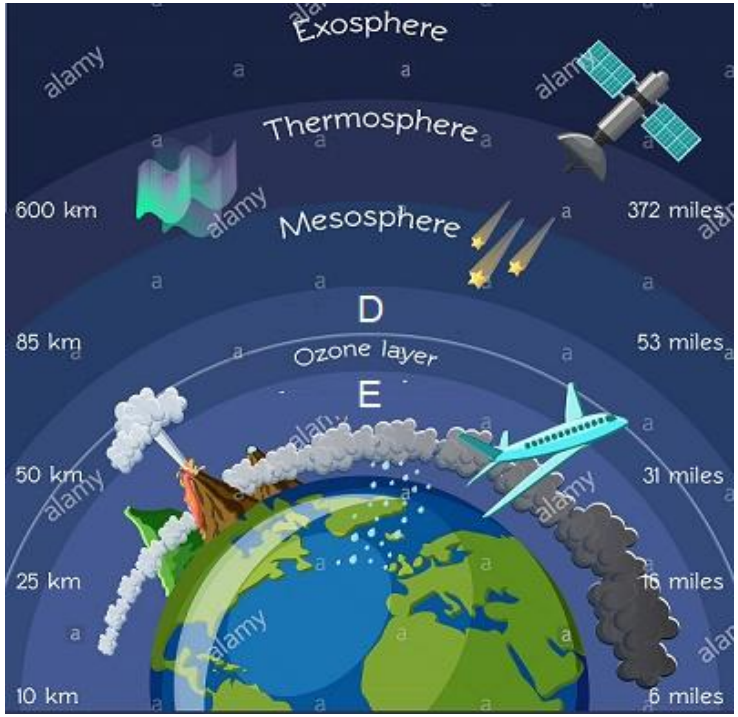
1.2.2 What gas makes up most of the atmosphere? (1 x 1) (1)

1.2.3 **Why** do long-distance aircraft choose to fly in the lower part of the Stratosphere? (1 x 2) (2)

1.2.4 **Discuss** the relationship between altitude and air pressure. (1 x 2) (2)

1.2.5 "Write a **paragraph of at least EIGHT lines** in which you **discuss** reasons why the Troposphere is important. (4 x 2) (8)

1.3 FIGURE 1.3 is a sketch depicting the Structure of the Atmosphere



1.3.1	Identify Layers D and E in FIGURE 1.3.	(2 x 1)	(2)
1.3.2	Define the term ozone.	(1 x 2)	(2)
1.3.3	Name the layer in which the ozone layer occurs.	(1 x 1)	(1)
1.3.4	State the importance of the ozone layer for life on Earth.	(1 x 2)	(2)

1.4 Study FIGURE 1.4, a cartoon on the ozone layer.

1.4.1	What is ozone?	(1 x 2)	(2)
1.4.2	How does ozone form?	(1 x 2)	(2)
1.4.3	In what unit is ozone measured?	(1 x 1)	(1)
1.4.4	When is an area considered to be ozone depleted?	(1 x 2)	(2)
1.4.5	The 'so called hole is over the Antarctica? How would you answer the question – 'if it is a hole, why is heat not escaping?'	(1 x 2)	(2)

1.3.5 You are chosen as a spokesperson for the annual ozone depletion summit. In a paragraph of approximately EIGHT lines summaries your speech explaining the socio-environmental effects of ozone depletion and the possible preventative measures? (4 x 2) (8)

1.4.6 The father is stressed about the hole in the ozone layer. Suggest THREE effects on humans if this 'so-called hole' gets larger. (3 x 2) (6)

1.5 Study the following statement.

"What does it mean to redefine one's relationship to the sky? What will it do to our children's outlook on life if we have to teach them to be afraid to look up?"

US Senator, Al Gore. Earth in the Balance, 1993

1.5.1 Define the term, "Ozone depletion" (1 x 2) (2)

1.5.2 Identify **TWO** greenhouse gasses that causes ozone depletion. (2 x 1) (2)

1,5,3 Give **THREE** ways in which humans can decrease ozone depletion (3)

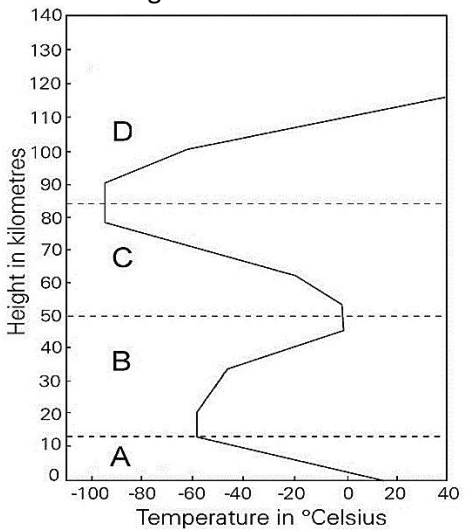
(3 x 1).

1.5.4 (2)

Defend Senator Al Gore's statement in **EXTRACT 1.5**, using the knowledge you accumulated about Ozone depletion. (1 x 2)

1.5.5 Ozone depletion increases the earth's exposure to Ultraviolet rays. (8)
In a paragraph of about EIGHT lines discuss the consequences of ozone depletion on the humans and the environment. (4 x 2)

1.6 Refer to the diagram below.



1.6.1 Define the term atmosphere. (1 x 2) (2)

1.6.2 List the constant gases which are present in the troposphere. (3 x 1) (3)

1.6.3 Name the variable gas that is responsible for rainfall. (1 x 1) (1)

1.6.4 Explain why the gas mentioned in 1.6.2 is variable. (1 x 2) (2)

1.6.5 Name the densest layer of the atmosphere. Give evidence from the diagram to prove your answer. (1 + 2) (3)

1.6.6 Explain why the atmosphere can only be found around the earth. (1 x 2) (2)

1.6.7 How does the temperature change with altitude in the

		Stratosphere?	(1 x 2)	(2)
	1.6.8	Which geographic term is used to describe the above-mentioned change in temperature with an increase in altitude?	(1 x 2)	(2)

	COLUMN A		COLUMN B
1.7.1	When ozone layer is destroyed	A	Stratosphere
1.7.2	Unit that ozone is measured in.	B	Skin cancer
1.7.3	The layer of the atmosphere in which the ozone layer is located	C	Ozone depletion
		D	Chlorofluorocarbons
1.7.4	The main cause that destroys ozone	E	Chemical compounds
1.7.5	A negative effect of the absence of ozone on the physical environment.	F	Reducing plant growth
1.7.6	Compounds used in refrigerators and air conditioners that damage the ozone layer.	G	CO3
		H	Cataracts
1.7.7	A negative effect of the absence of ozone on human eyes.	I	CO2
1.7.8	High levels of sunburn can result in.	J	Excess
			(8 x 1) (8)

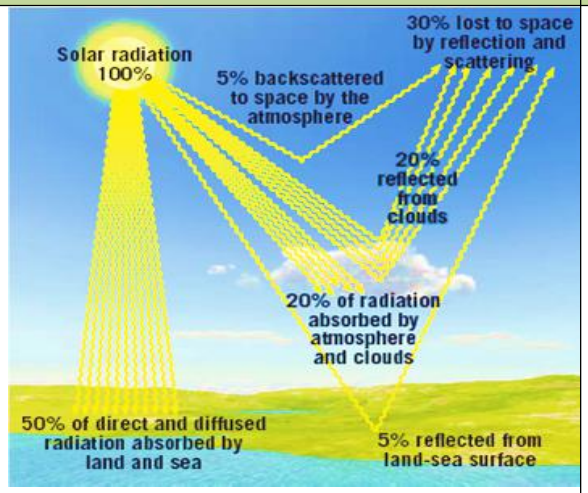
WEEK 2: HEATING OF THE ATMOSPHERE and TRANSFER OF HEAT IN THE ATMOSPHERE

STUDY WITH THE FOLLOWING QUESTIONS IN MIND

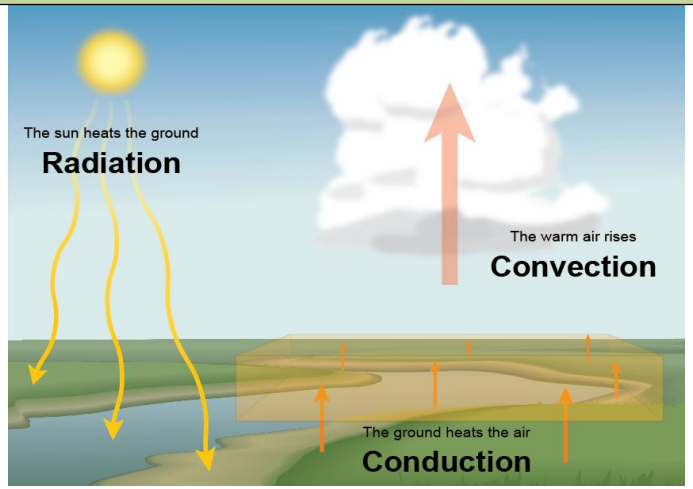
HEATING OF THE ATMOSPHERE

SOLAR RADIATION:

- The amount of sun's energy/heat given off by the sun.
- Only 46% of the sun's energy reaches the Earth's surface because it moves in short waves
- 54% is lost by scattering, absorption and reflection.



TRANSFER OF HEAT IN THE ATMOSPHERE



PROCESSES HEATING THE ATMOSPHERE

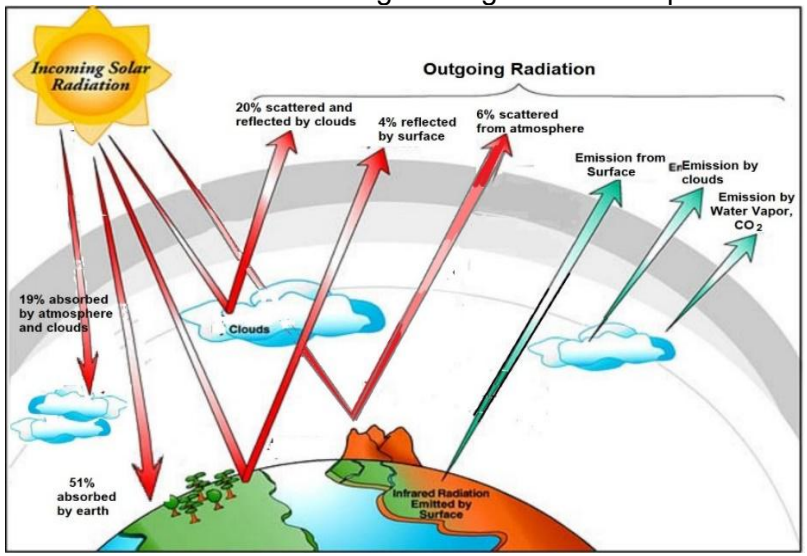
SCATTERING	REFLECTION:	ABSORPTION:
• Occurs when small particles and gases diffuse (split up) the sun's rays in random directions without altering the wavelength at all. • About 8% of heat is scattered by dust, smoke, and air particles before the sun's heat reaches the surface.	• The act of sending the sun's energy back in the direction it came from without much absorption. • Clouds appear white because they reflect a lot of light.	• The process whereby clouds, and solid matter absorb energy • About 24% is absorbed by water vapor, carbon dioxide, smoke and dust particles

PROCESSES TRANSFERING HEAT

CONVECTION	CONDUCTION	TERRESTRIAL RADIATION
• Earth's surface warms up, expands, gets lighter and rises. • As air rise it cools and sinks again to earth's surface	• The transfer of heat between substances that are in direct contact. • When air touch the warm surface of the Earth.	• The earth's surface is heated by means of radiation from the sun. • This radiation is in the form of short waves. • The atmosphere in turn is heated by radiation from the earth • Long wave radiation from the sun is called **Terrestrial Radiation**

ACTIVITIES: HEATING OF THE ATMOSPHERE

2.1 Refer to FIGURE 2.1 showing heating of the atmosphere



2.1.1 Define the term *insolation.* (1 x 1) (1)

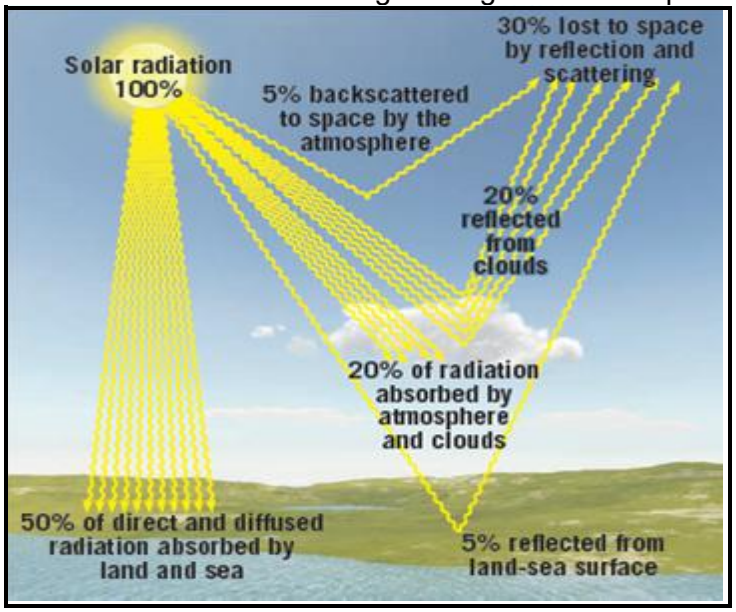
2.1.2 Name the main source of insolation for the earth as seen in FIGURE 1.3. (1 x 1) (1)

2.1.3 Explain the term *terrestrial radiation*. (1 x 2) (2)

2.1.4 Mention THREE factors in the atmosphere with has the greatest effect on the amount of solar radiation reaching the Earth's surface. (3 x 2) (6)

2.1.5 Explain how a cloudy day will influence the percentage insolation received by the earth. (2 x 2) (4)

2.2 Refer to FIGURE 2.2 showing heating of the atmosphere



2.2.1 What is the difference between insolation and terrestrial radiation? (2 x 1) (2)

2.2.2 What causes the scattering of 5% of the sun's rays? (1 x 2) (2)

2.2.3 What process prevents approximately 20% of the sun's energy from reaching the surface of the earth? (2 x 1) (2)

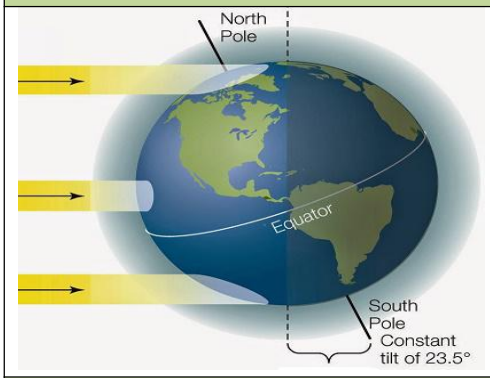
2.2.4 What is the total amount of heat available for absorption by the earth? (1 x 2) (2)

2.2.5 Name and describe FOUR ways how the earth heats the atmosphere. (4 x 2) (8)

WEEK 2: HORIZONTAL VARIATION IN TEMPERATURE ON THE EARTH'S SURFACE

FACTORS AFFECTING TEMPERATURE

1. LATITUDE



EQUATOR

- Experience high temperature throughout the year
- The further you move away from equator the lower the temperature

POLES

- Experience low temperature throughout the year
- The further you move away from the poles the higher the temperature.

2. ALTITUDE

THE HIGHER YOU GO THE LOWER THE TEMPERATURE

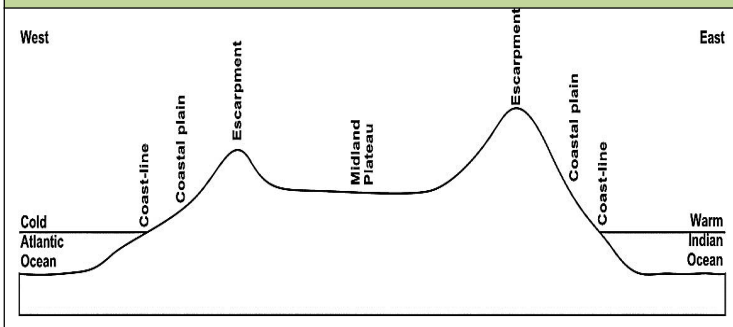
- The sun heats up the surface of the earth and then heat is radiated back into the atmosphere
- The air in the higher atmosphere is less dense and cannot hold heat as easily.
- Additionally, higher altitudes are further away from heat radiating from the earth's surface

As we go from surface of the Earth to higher elevations atmosphere temperature decreases.

3. OCEAN CURRENTS

- The temperature of an ocean current affects temperature of the air mass that passes over it.
- Warm ocean current increases the temperature of the air in coastal area
- Cold ocean current decreases the temperature of the air in coastal area
- NB. Warm currents on the east coast and Cold currents on the west coast

4. DISTANCE FROM THE OCEAN



- The land is heated faster than the sea
- The land loses heat faster than the sea

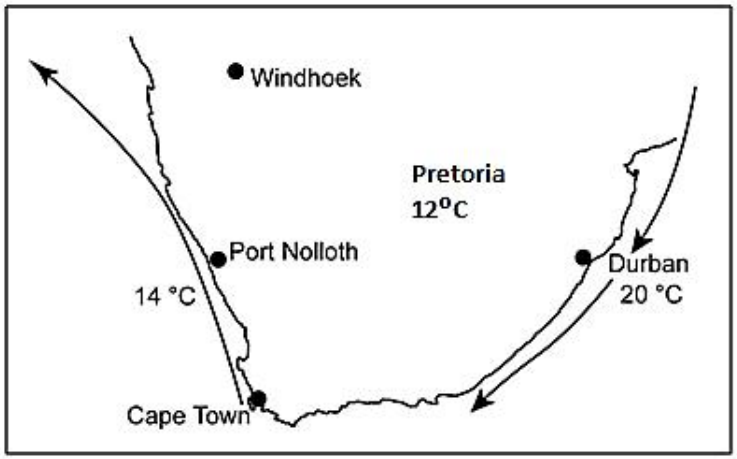
SUMMER

- Coastal areas are cool
- Inland is warm
- The further you move away from the sea the higher the temperature.

WINTER

- Coastal areas are warm
- Inland is cold
- The further you move away from the sea the lower the temperature.

3.1 Use FIGURE 3.1 and answer the questions.



3.1.1 Warm ocean currents flow from the (equatorial/ polar) regions and flow towards the **(equatorial/ polar)** regions.

3.1.2 Cold ocean currents flow from the (equatorial/ polar) regions.

3.1.3 Warm oceans current flow along the (east/ west) coast lines.

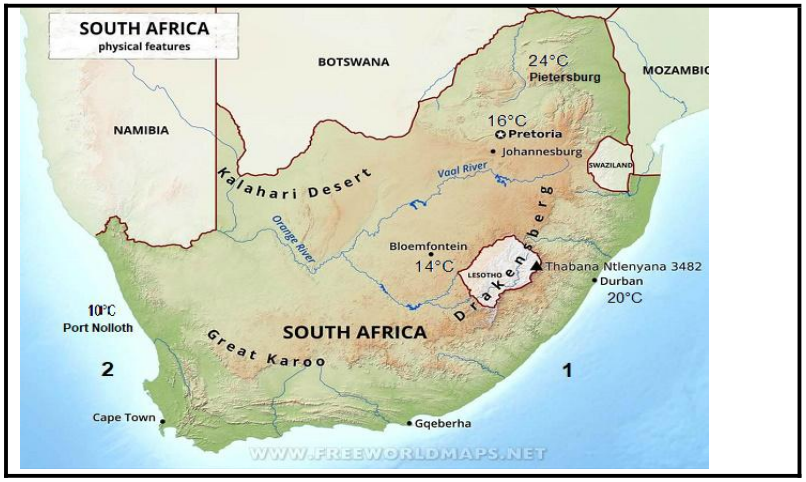
3.1.4 The temperature difference between Port Nolloth and Durban is because of the (**altitude/ocean currents**)
.

3.1.5 Pretoria's temperature is lower than Windhoek's because of the (**altitude/latitude**) it is located on.

3.1.6 The difference between the temperature at Pretoria and Durban is the (**longitude/distance from the ocean**).

3.1.7 Ocean currents result in a (**small/large**) temperature variation of the coastal temperature. (7 x 1) (7)

3.2 Study FIGURE 3.2 below.



3.2.1 Name the ocean currents **1** and **2** respectively. (2 x 1) (2)

3.2.2 Compare the temperature of Cape Town and Durban giving reasons. (2 x 2) (4)

3.2.3 Compare the temperatures of Pietermaritzburg and Port Nolloth giving reasons. (2 x 2) (4)

3.2.4 Account for the difference in rainfall between Durban and Port Nolloth. (2 x 2) (4)

3.3 Refer to **TABLE 3.3** that shows South African annual temperature for 2015.

Place	Latitude	Average temperature (°C)		Annual range °C	Height above sea level in metres
		Hottest month	Coldest month		
Pretoria	25° S	21,1	10,6	10,5	1369
Johannesburg	26° S	20,0	10,0	10,0	1665
Kimberley	29° S	25,0	10,0	15,0	1197
Cape Town	34° S	21,7	12,8	8,9	12
Mafikeng	26° S	23,3	10,6	12,7	1272
Durban	30° S	23,9	16,7	7,2	5

3.3.1 Which town has the smallest annual range? Give the annual range. (2 x 1) (2)

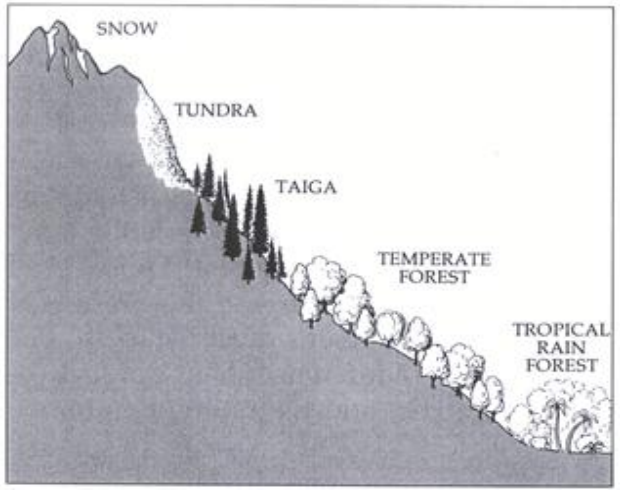
3.3.2 Name the current that plays a role regarding the small annual temperature range of the town in QUESTION 3.3.2. (1 x 1) (1)

3.3.3 Explain the influence that the current mentioned in QUESTION 3.3.3 has on the temperature and rainfall on the area adjacent to it. (2 x 2) (4)

3.3.4 **Define** the term Maritime climate. (1 x 2) (2)

3.3.5 In a paragraph of about EIGHT lines, discuss the difference in temperature between Johannesburg and Durban by referring to latitude and height above sea level. Remember to use the information in TABLE 3.3. (4 x 2) (8)

3.4 Refer to FIGURE 3.4 below.



3.4.1 Identify the factor affecting temperature in FIGURE 3.4. (1 x 2) (2)

3.4.2 Compare the temperature at the tropical rain forest to the tundra? (1 x 2) (2)

3.4.3 Compare the difference in vegetation as altitude increases? Give a reason for your answer? (4 x 2) (8)

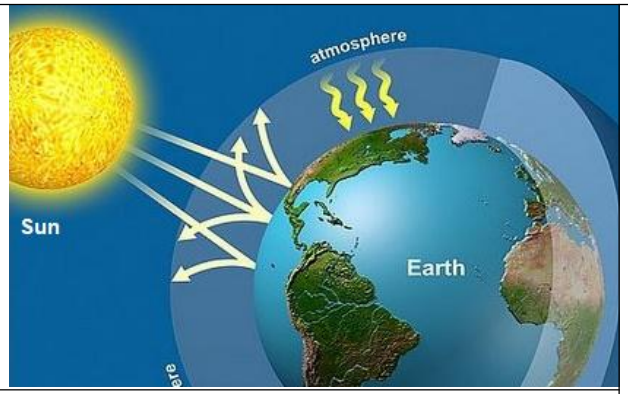
3.4.4 Mention another factor affecting temperature than those depicted alongside. (1 x 2) (2)

WEEK 3: THE GREENHOUSE EFFECT and GLOBAL WARMING

THE GREENHOUSE EFFECT

WHAT IS IT?

- This refers to the way in which the earth is able to trap radiation from a planet's atmosphere and warms the planet's surface heat within its atmosphere.
- The gases in the atmosphere absorb the long wave radiation from the sun.
- The temperature above what it would be without this atmosphere



RESULT OF GREENHOUSE

- The problem however is that over the years more and more heat is being trapped and
- this is making the earth warmer than it should be and we refer to this as global warming
- Warmer atmosphere – **Global warming**

GREENHOUSE GASSES:

These gases have the ability to absorb and retain heat.

GAS	%	What produce the gas
Methane	10%	Cattle, landfills, agriculture
Nitrous oxide	5%	Manure, transport, agriculture
Carbon dioxide	72%	Transport, industries
CFCs	13%	Transport

STRATEGIES TO REDUCE

- Reduce greenhouse gasses
- Plant more trees
- Use of solar and wind energy
- Regulate the release of gasses from industries

GLOBAL WARMING

CAUSES OF THE GLOBAL WARMING	IMPACT ON PEOPLE	IMPACT ON ENVIRONMENT
• Burning of fossil fuels, releases carbon dioxide into the atmosphere • Deforestation: trees convert carbon dioxide into oxygen • Destruction of the ozone layer • Increased pollutants that trap heat. • Greater demand for cattle results in more methane gas. • Use of CFC's in the manufacturing industry. • Use of more cars and human activities that generate heat. • Rapid population growth	• Increase in global warming. • Melting of polar ice – caps • Rising sea levels, which results in the flooding of low-lying areas Climatic changes • Spread of desertification • Increase in drought-stricken areas • Increase in diseases such as malaria Drop in food production due to droughts, extinction of plants, fish and animals • Infectious diseases (Cholera, Malaria), because of warmer temperatures • Migration of people to cooler climates	• Rise of global temperatures • Plants and animals that can't adapt to the higher temperatures become extinct. • Oceans become warmer • Marine organisms become extinct • More extreme weather e.g. storms, droughts, heat waves fires and floods • Melting of snow and ice at the poles • Rising sea levels because of the melting snow • Climate change

4.1 Study the following information on heating of the atmosphere.

"We are now finding malaria in places that we did not expect to find it, particularly the highland regions that used to be too cool for malaria," said Dorothy Memusi, Deputy Director of the Malaria Division in Kenya's Ministry of Health. Malaria has occurred on Kenya's humid coast and swampy lowland regions for many generations, but it has only rarely reached villages on the slopes of Mount Kenya. In recent decades, however, scientists have noted an increase in epidemics in the region. Many medical and environmental experts claim that the spike in malaria is due to climate change, in the form of warmer temperatures and variations in rainfall patterns. Changes in temperature can affect the development and survival of malaria parasites and the mosquitoes that carry them. Rainfall also influences the availability of mosquito habitats and the size of mosquito populations. The best climate conditions for malaria are a long rainy season that is warm and wet, followed by a dry season that is not too hot, followed by a hot and wet short rainy season.

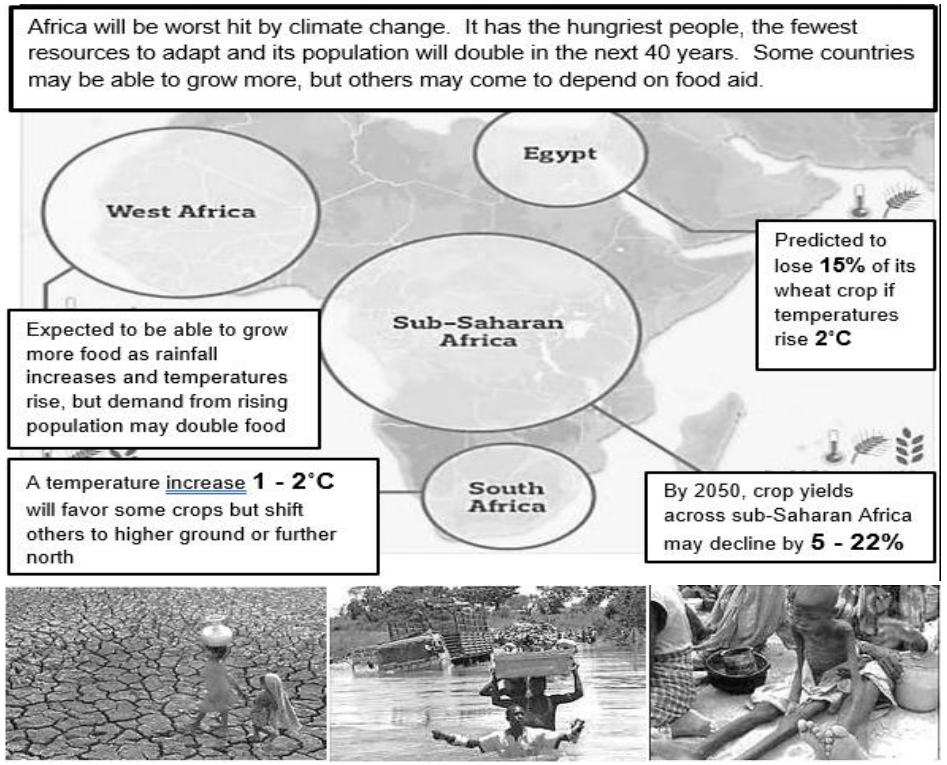
4.1.1 Distinguish between *climate change* and *global warming*. (2 x 2) (4)

4.1.2 Discuss at least TWO ways in which human beings are contributing towards climate change. (2 x 2) (4)

4.1.3 Explain how climate change in Kenya is increasing the spread of malaria. (1 x 2) (2)

4.1.4 Experts blame Climate Change for fuelling Malaria in Kenya. Imagine that you work for the World Health Organization (WHO) and they have asked you to come up with a proposal to help solve the problem of malaria in Kenya. Write a short essay (no longer than EIGHT lines) in which you suggest at least THREE long-term solutions for Global warming that would also curb the spread of the disease in Kenya. (3 x 2) (6)

4.2 Study **FIGURE 4.2** below show in the impact of Global warming on the climate, agriculture and communities of Africa.

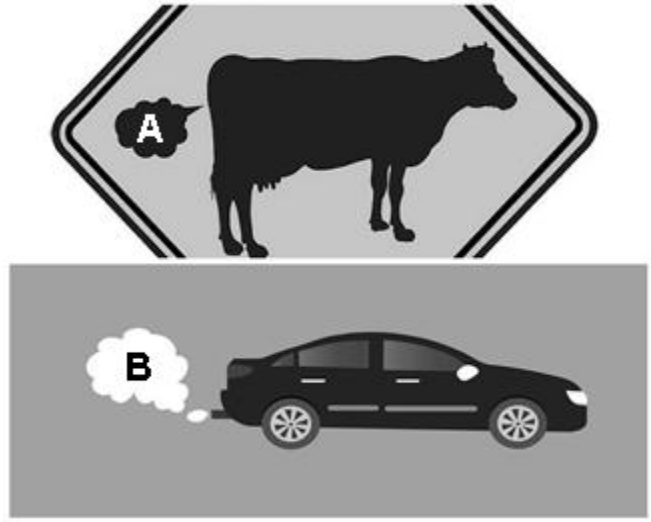


4.2.1 By referring to FIGURE 4.2, list the consequences of Global warming for Africa in terms of ONE social, ONE economic and ONE environmental consequence. (3 x 2) (6)

4.2.2 What is the average temperature in °C expected to increase in Southern Africa? (1 x 2) (2)

4.2.3 In a paragraph of approximately EIGHT lines explain what the *Greenhouse effect* is and its effect on people and the environment. (4 x 2) (8)

4.3 Refer to FIGURE 4.3 below before answering the following questions.



4.3.1 Explain the meaning of the term global warming. (1 x 2) (2)

4.3.2 Identify TWO causes of global warming from FIGURE 3.3. (2 x 2) (4)

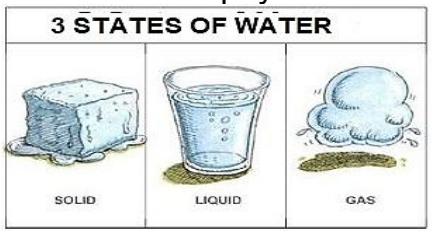
4.3.3 Describe any **TWO** ways in which people and the environment will be influenced as a result of global warming. (2 x 2) (4)

4.3.4 You were tasked by the local Government to come up with proposals (suggestions) to reduce the impact of global warming. Write a short **paragraph** of no more than EIGHT lines in which you highlight your proposals to reduce global warming. (4 x 2) (8)

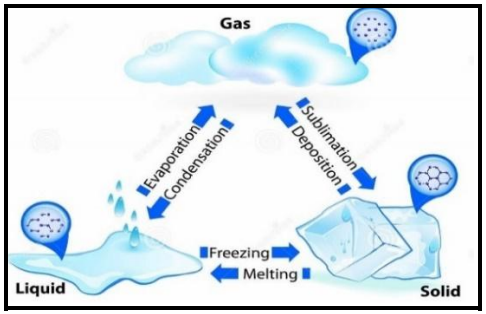
WEEK 4: MOISTURE IN THE ATMOSPHERE

THREE STATES OF WATER

Water exists in the atmosphere in three different physical states



- **Gas** (water vapor in the atmosphere)
- **Liquid** (water that is in tiny water droplets that can be rain or fog)
- **Solid** (ice crystals in the atmosphere can also fall to the ground as hail and snow)



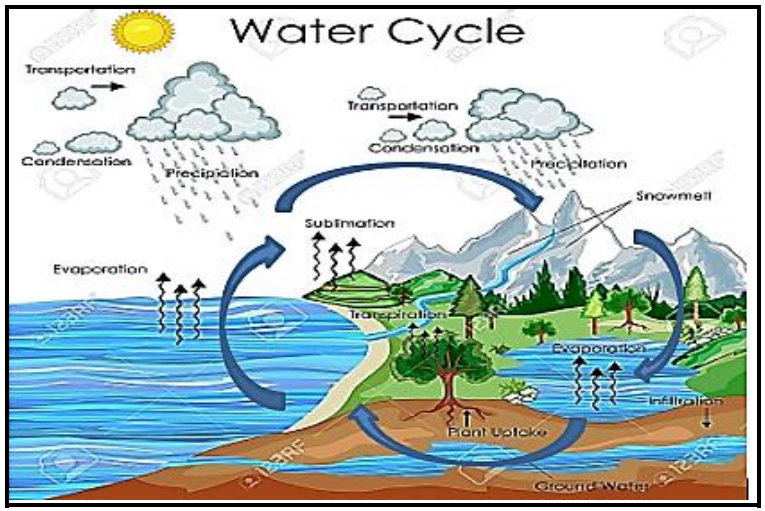
Distribution of water:
in the Ocean. Salt water is 97.5%
Fresh water. Rivers, dams, lakes and underground is 2.5%

PROCESSES ASSOCIATED WITH WATER IN THE ATMOSPHERE

- **Evaporation** occurs when liquid water changes to water vapor (gas).
- **Condensation** is when water vapor changes to water when it cools. If the atmosphere becomes oversaturated, it will lead to precipitation.
- **Freezing** occurs when liquid water changes to ice below the freezing point, and heat energy is released.
- **Melting** takes place when Ice changes to water above the freezing point, and heat energy is absorbed.
- **Sublimation** occurs when ice changes directly into water vapor.
- **Crystallization** takes place when water changes state from gas to solid

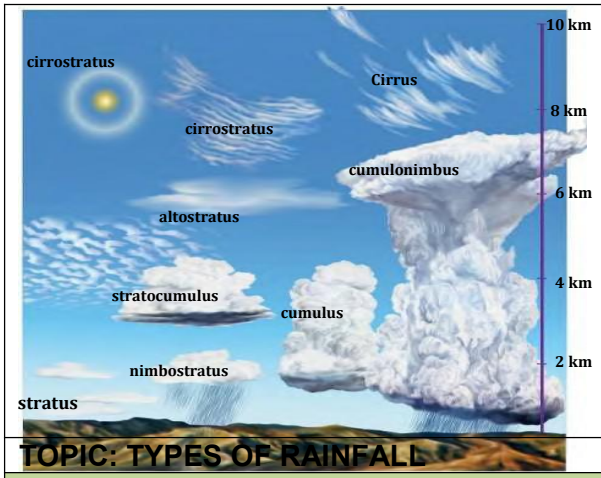
THE HYDROLOGICAL CYCLE

The hydrological cycle/water cycle is the journey of water as water molecules make their way from the Earth's surface to the atmosphere, and back again.
This gigantic system, powered by energy from the Sun, is a continuous exchange of moisture between the oceans, the atmosphere, and the land



- Evaporation and transpiration are the primary source of water vapor,
- Rising air currents carry it upward, into the atmosphere, where the air is cooler.
- In the cool air, water vapor condenses from a gas to a liquid to form cloud droplets.
- Cloud droplets can grow and produce precipitation (including rain, snow, sleet, freezing rain, and hail)
- Then precipitation falls over the land surface
- Some of it evaporates, returning to the atmosphere.
- some seeps into the ground as soil moisture or groundwater; and
- some runs off into rivers and streams.
- Almost all of the water eventually flows into the oceans or other bodies of water, where the cycle continues

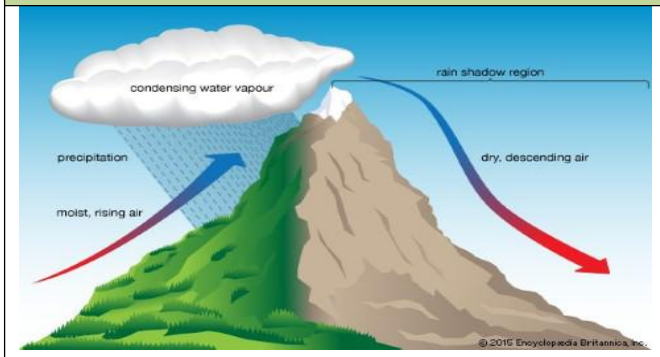
WEEK 5: CLOUD FORMATION



Cloud Type	Characteristics (height)	Weather
Cumulonimbus	Tall (8-10 km), dark grey, strong air currents	Summer rain – thunderstorms
Cirrus	Thin, wispy (thin lines), 8 km and above, point in the direction of the wind blowing	No precipitation, indication of a cold Front
Cumulus	Big cotton wool balls, clear sky in between Can develop into cumulonimbus in summer and spring	Can create rain/hail
Stratus	Flat, hazy, featureless, at low altitudes, vary in color from dark grey to white	May produce drizzle

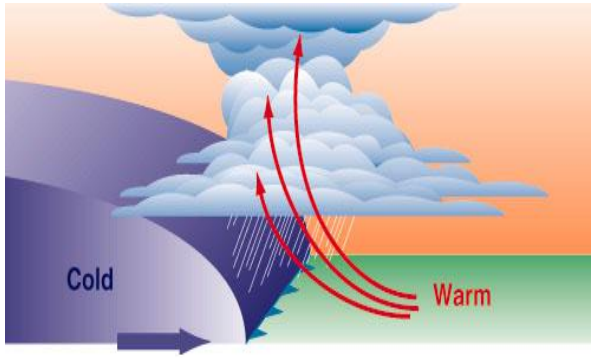
TOPIC: TYPES OF RAINFALL

OROGRAPHIC RAINFALL



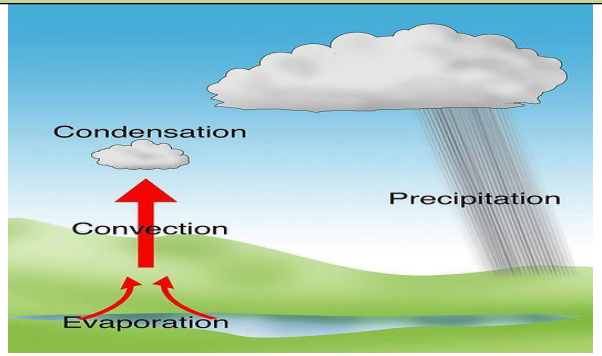
- Occurs in mountainous areas
- Air is pushed up the side of the mountain
- Moist air is forced to rise and cool against the mountain.
- When the air cools to its dew point, condensation occurs.
- Relief rain falls on the sea-facing mountain side – windward side
- The other (lee) side is drier.

FRONTAL RAINFALL



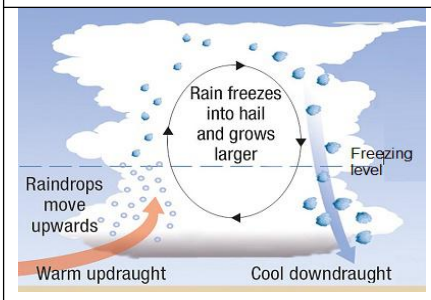
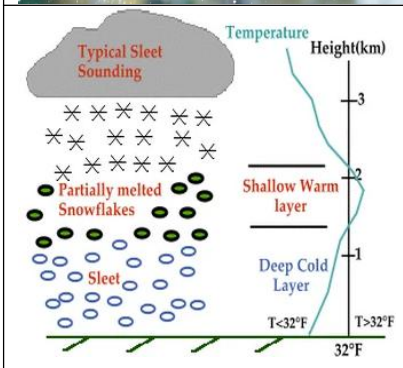
- Cyclonic or Frontal rainfall occurs when moist air from the frontal system rises over colder air.
- Warm air rises, cools and condenses andfrontal rain falls.
- Common over the Western and SouthernCape, especially during

CONVECTION RAINFALL



- Occurs when there is intense heating of the Earth's surface especially during summer.
- Evaporation takes place and moist air rises and cools.
- Convectional rain occurs in areas with high temperatures.
- Common in summer rainfall areas in the South African interior.

WEEK 6: DIFFERENT FORMS OF PRESIPITATION

WHAT DO THEY LOOK LIKE	TYPE	CARACTERISTICS
	**DEW**	• Drops of water that condense on cool surfaces when the air is saturated. • Forms when water vapor condenses onto cool objects • Surface temperature above 0°C
	**FROST**	• When the dew point temperature is below 0°C • Surface loses heat through terrestrial radiation • Coldest temperature is the closest to the surface • Water vapour sublimates(freeze) onto vegetation
	**HAIL** 	• Forms in cumulonimbus clouds. • Water droplets freeze and are taken up into the top of the cloud by strong up-draughts. • The droplets fall when the up draught slows, and they are carried up by further up-draughts. • Eventually they are too heavy to be held aloft and they fall as hail.
	**SNOW** 	• Forms when temperatures are below freezing in clouds. • Water droplets freeze and form tiny ice crystals. These attract other crystals and form snowflakes. • When they are heavy enough, they fall out of the clouds as snow. • If the temperatures are above freezing close to the ground, then the flakes will melt, and rain will fall. • If temperatures remain below freezing, then snow will fall onto the ground.
	**RAIN** 	• Forms when the air is saturated, condensation nuclei are available • The temperature cools to dew point or below. • When clouds are statured water droplets falls to the ground
	**SLEET**	• As snow falls, it crosses from freezing conditions through the zone of above-freezing temperatures and then back into freezing on some distance above the surface. • As a result, the snow will at least partially melt on the way down, forming a drop of water that then partially refreezes before it reaches the surface. • This creates a tiny pellet that bounces on impact with the surface.

5.1 Provide one term for each of the following descriptions of precipitation.

5.1.1 Forms when water vapour condenses onto the ground.

5.1.2 Forms when dew freezes or when the dew point temperature is below zero degree Celsius.

5.1.3 Forms in Cumulonimbus clouds. The water droplets freeze and are taken up into the top of the cloud by strong updraughts, eventually they are too heavy to be held aloft.

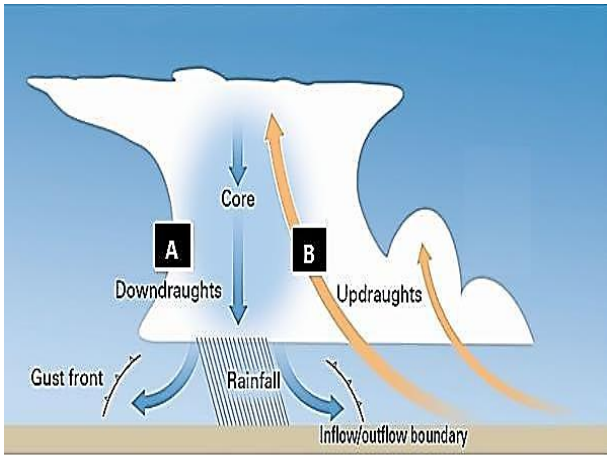
5.1.4 Forms when temperatures are below the freezing point and water droplets freeze and form tiny ice crystals falling to the ground.

5.1.5 Forms when the air is saturated, condensation nuclei are available, and temperature cools to dew point or below.

5.1.6 Forms when snow partially melt on the way down, forming a drop of water that then partially refreezes before it reaches the surface

5.1.7 The cloud type that develops and results in the forming of hail and thunderstorms. (7 x 1) (7)

5.2 Study FIGURE 5.2.



5.2.1 Label A and B on the diagram as warm air and cold air respectively. (2 x 1) (2)

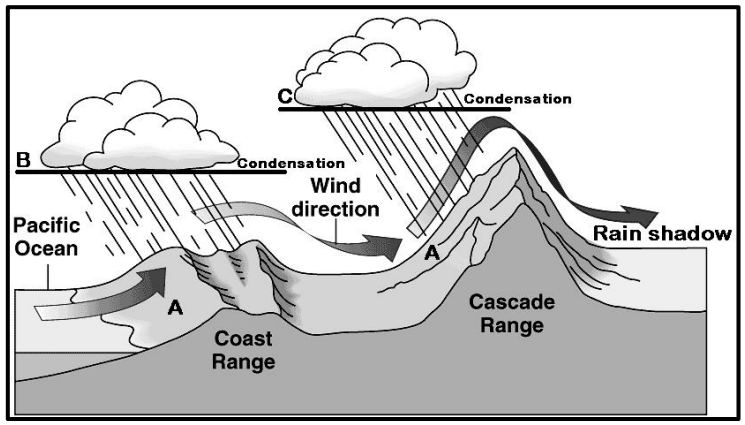
5.2.2 Identify the type of cloud in diagram. (1 x 1) (1)

5.2.3 Is the cloud type associated with snow or lightining. (1 x 1) (1)

5.2.4 Justify your answer in QUESTION 5.2.2, by providing TWO reasons. (2 x 2) (4)

5.2.5 Thunderstorm is another form of precipitation. Discuss TWO positive and TWO negative impacts of thunderstorms on people and the environment. (4 x 2) (8)

5.3 Refer to FIGURE 2.3 showing a type of rainfall that also occurs in South Africa.



5.3.1 (a) Identify the type of rainfall illustrated in the diagram. (1 x 1) (1)

(b) Mention the trigger action that forces air to rise in the diagram. (1 x 1) (1)

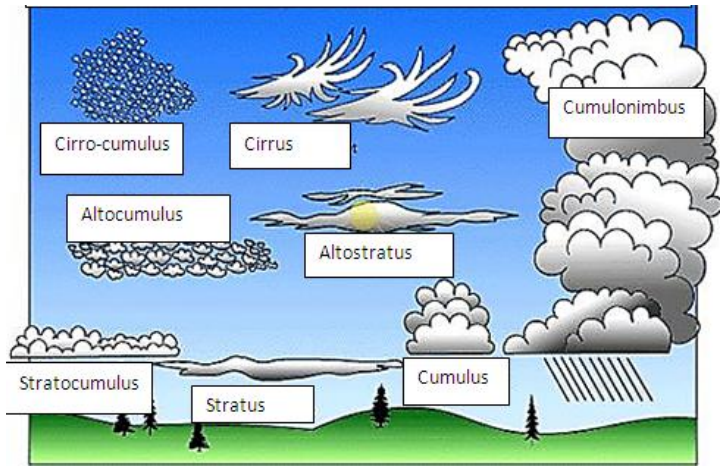
(c) Name the slope labelled **A**. (1 x 1) (1)

5.3.2 Explain why rainfall occurs along slope **A** only. (2 x 2) (4)

5.3.3 Outline the impact on humans living in the rain shadow. (2 x 2) (4)

5.3.4 The altitude at which condensation takes place is higher at the Cascade Range than the Coast Range. Provide an explanation why this is the case. (2 x 2) (4)

5.4 Refer to **FIGURE 1.6** showing the basic cloud types.



5.4.1 Name any **TWO** clouds which produce rain. (2 x 1) (2)

5.4.2 Explain step by step how clouds form. (3 x 2) (6)

5.4.3 Name the type of rain which Cape Town experience because of the cold front. (1 x 2) (2)

5.4.4 Name the type of rain which is usually experienced in Gauteng. (1 x 2) (2)

5.5 Give **ONE** word/term for each of the following

5.6 Match the description below with the terms/processes givenin

statements:

5.5.1 Rain caused by air rising up a mountain.

5.5.2 Side of the mountain which does not get rain.

5.5.3 When heat is transferred from one molecule to another through contact.

5.5.4 The temperature at which condensation begins.

5.5.5 Side of the mountain range facing the sea where the rain will occur.

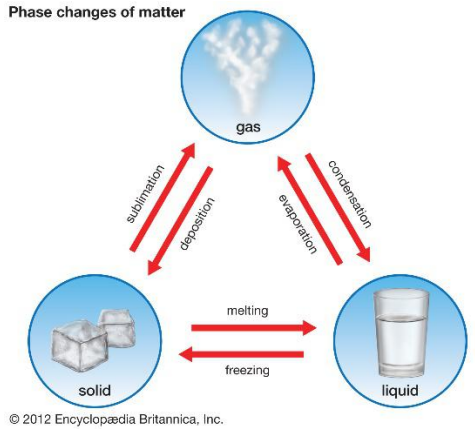
5.5.6 Clouds associated with huge thunderstorm activity.

5.5.7 Winds that blow from the sea to the land.

6.5.8 Name given to the study of weather.

(8 x 1) (8)

the illustration. Write only the correct term/ processes next to the question number;example



5.6.1 The process whereby a liquid change to a gas

5.6.2 The process whereby a liquid change to a solid

5.6.3 The process whereby a gas change to a liquid

5.6.4 The process whereby a solid change to a liquid

5.6.5 The process whereby a gas change into a solid

5.6.6 The process whereby ice change directly into gas.

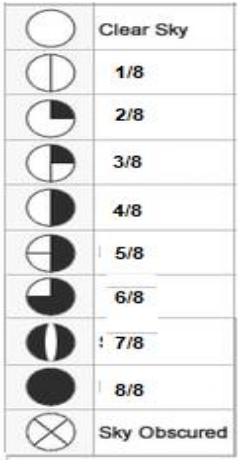
(6 x 1) (6)

WEEK 7: SYNOPTIC WEATHER MAP

WEATHER SYMBOLS

PRESIPITATION

CLOUD COVER

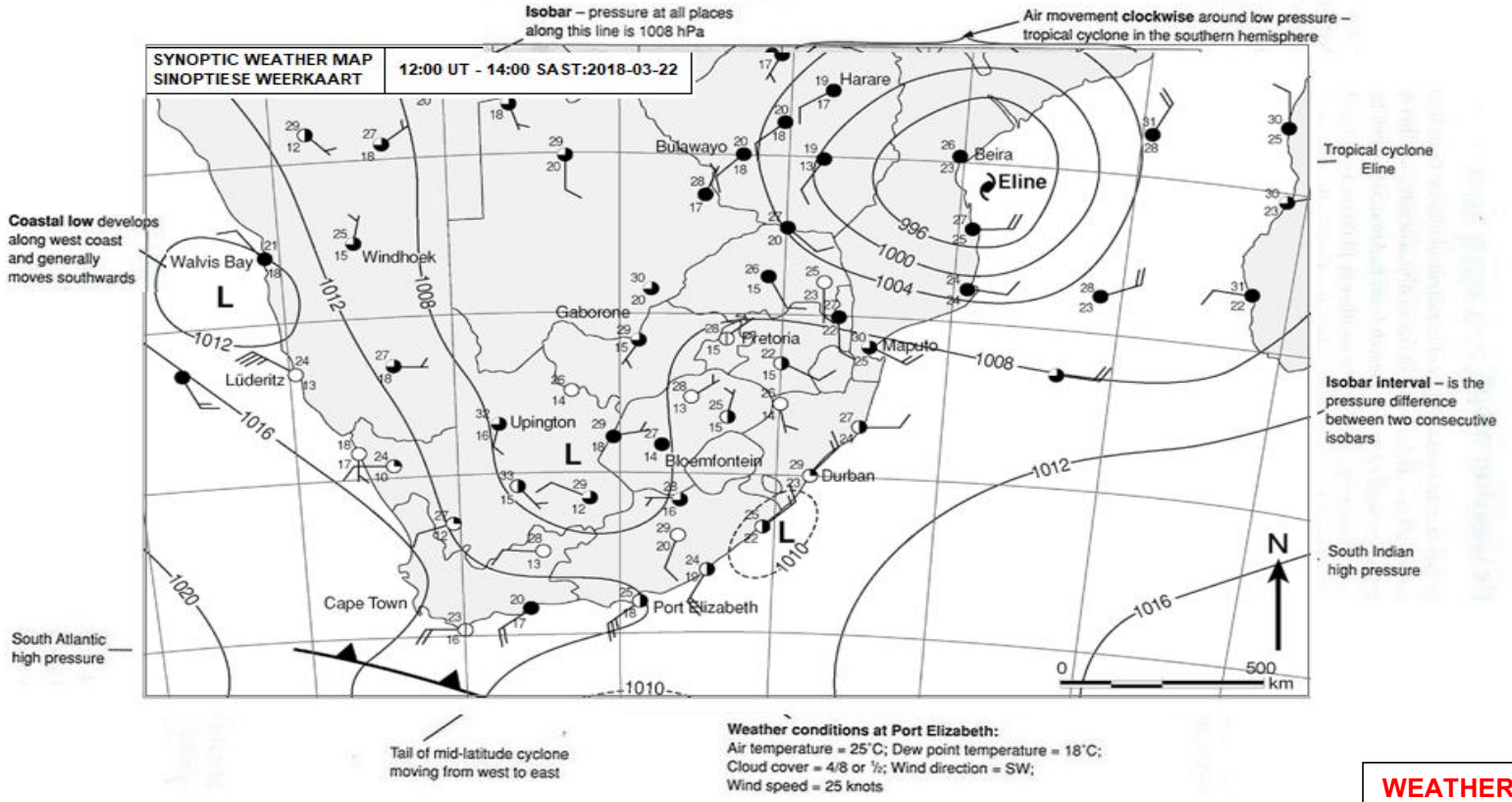


DIAGRAM

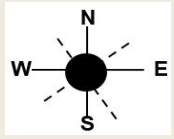
Summer and winter conditions: Identify by looking at the temperature of places on the map and the position of the pressure system

Weather symbols: Represent weather conditions at a particular place.

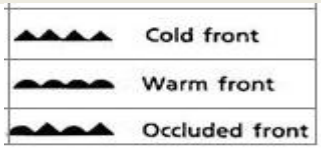
Standard symbols are used to represent information about each of the weather elements



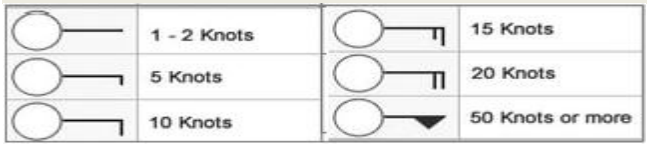
WIND DIRECTION



FRONTS



WIND SPEED

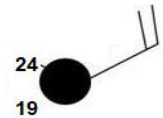


PRESSURE SYSTEMS

H High pressure system

L Low pressure system

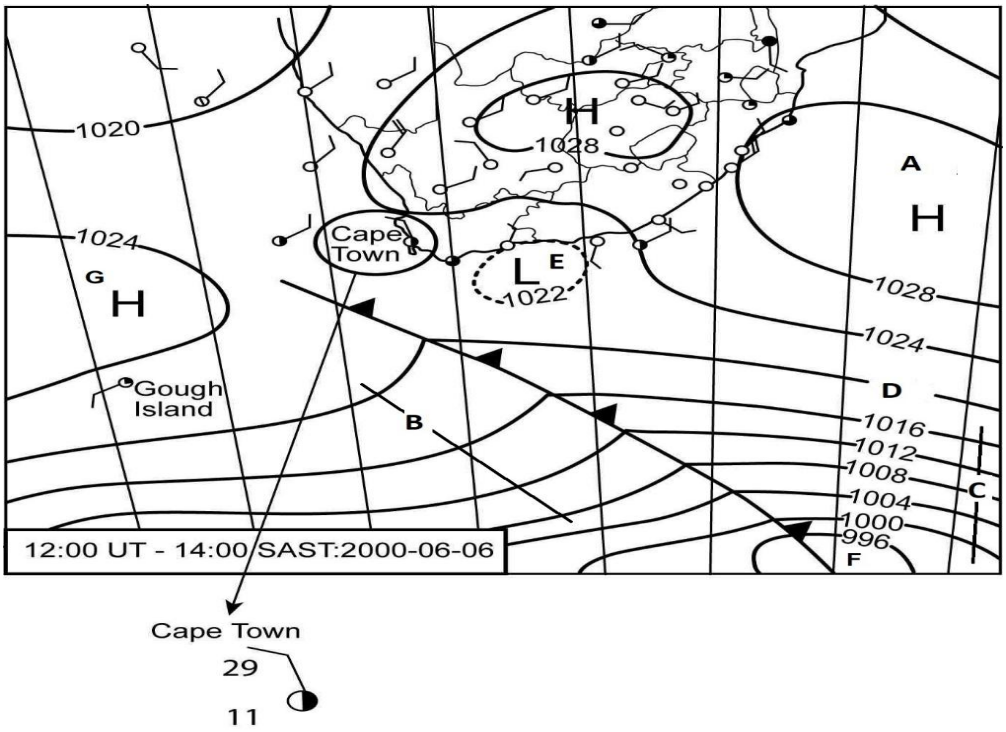
WEATHER STATION



ACTIVITIES: SYNOPTIC WEATER MAP

6.1 Study FIGURE 6.1: SYNOPTIC WEATHER MAP.

6.1.1 Interpret the weather conditions at Cape Town by completing the following information using the weather station given.



6.1.1 a) Air temperature
b) Dew point temperature
c) Cloud cover
d) Present weather
e) Wind direction
f) Air pressure
g) Wind speed (7 x 1) (7)

6.1.2 Name the lines that are used to join places of equal air pressure. (1 x 1) (1)

6.1.3 The season that this chart represents is (**summer/winter**). (Choose the correct answer between brackets). (1 x 1) (1)

6.1.4 Identify the Pressure cell labelled **A**. (1 x 1) (1)

6.1.5 Compare the spacing of these lines (answer of QUESTION 4.2.2) at **B** and **D**. Where is the wind blowing at a greater speed? (1 x 1) (1)

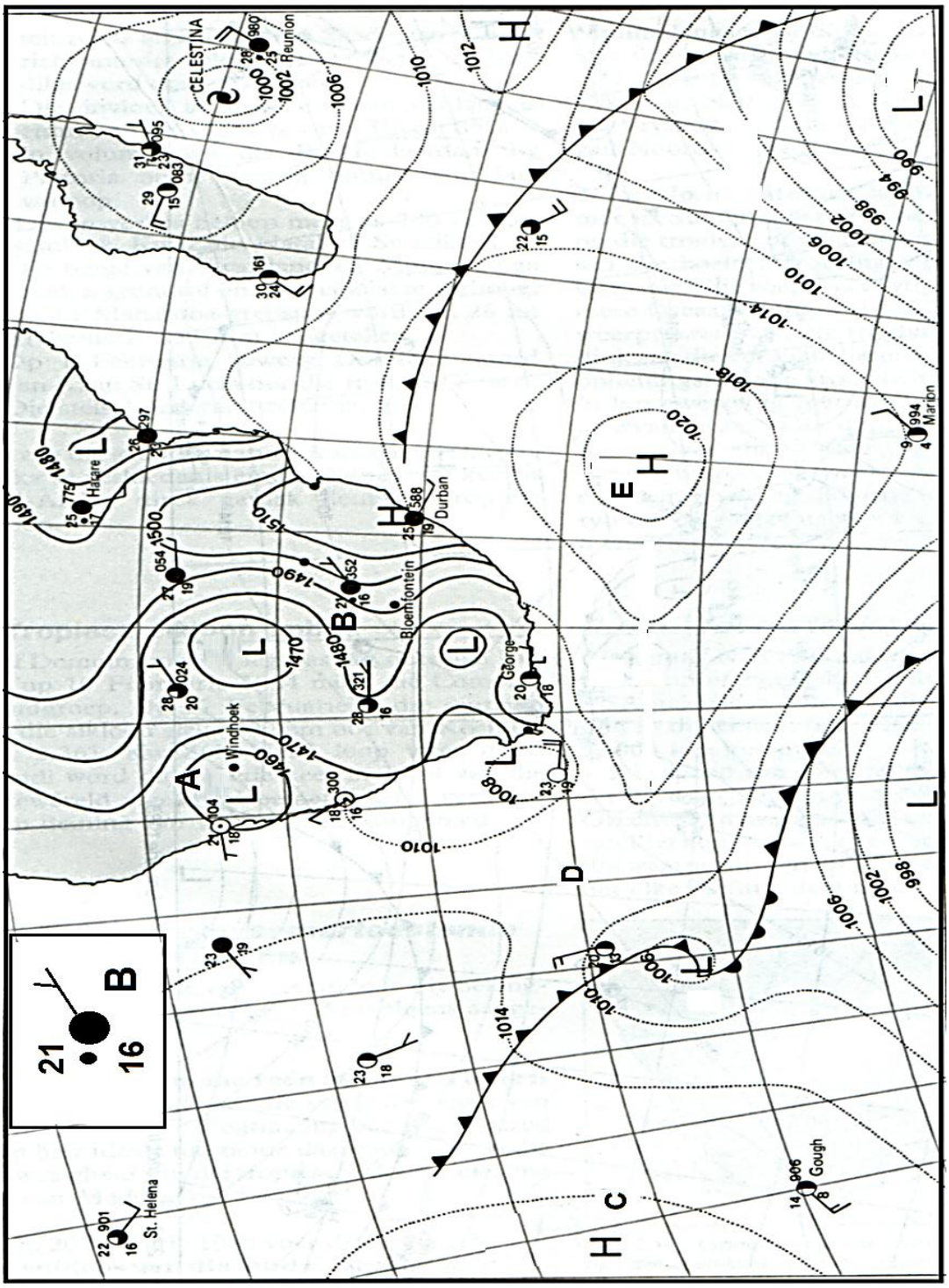
6.1.6 The air pressure reading at **D** is … hPa. (1 x 1) (1)

6.1.7 The pressure cell at **E** is a (**coastal low/heat low**) low pressure. (1 x 1) (1)

6.1.8 The pressure (**increase/decrease**) to the center at **F**. (1 x 1) (1)

6.1.9 Another name for the high pressure at **G** is a (**cyclone/anti-cyclone**). (1 x 1) (1)

6.2 Refer to FIGURE 6.2, a Synoptic Weather Map, Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question numbers (6.2.1 to 6.2.7) in the ANSWER BOOK, e.g. 6.2.8 A.



Source: SA weather service

6.2.1 The line that joins places with the same air pressure above sea level is called an …

A isotherm.
B isobar.
C isohyet.
D isopleth.

6.2.2 Wind speed is measured with a/an …

A Wind sock.
B Thermometer.
C Anemometer.
D Barometer.

6.2.3 **E,** on FIGURE 1.1 represents the … anticyclone.

A South Indian
B Kalahari
C South Atlantic
D Coastal

6.2.4 The isobaric reading at **C is …** hPa.

A 1010
B 1012
C 1016
D 1020

6.2.5 The weather element that represents **21** at weather station **B** indicates the …

A air pressure.
B weather station number.
C dewpoint temperature.
D air temperature.

6.2.6 The precipitation indicated on weather station **B** is …

A rain.
B showers.
C snow.
D hail.

6.2.7 The horizontal lines at **D** on the synoptic weather map represents the … lines.

A longitude
B latitude
C isobar
D contour

6.2.8 A characteristic of the air at pressure cell **A** is …

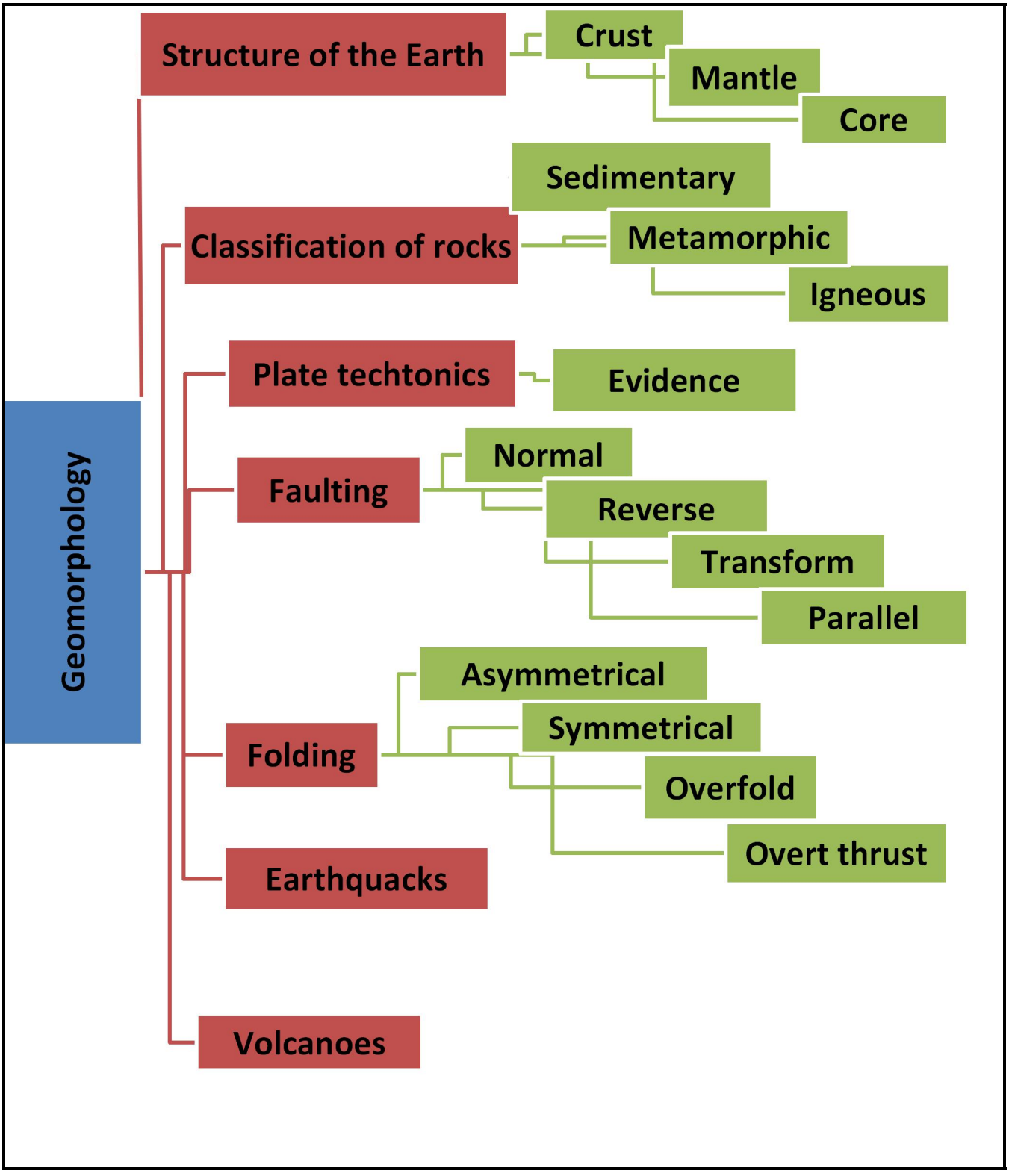
A clockwise descending.
B anticlockwise descending
C clockwise ascending.
D anticlockwise ascending. (8 x 1) (8)

GEOMORPHOLOGY

GRADE 10: TERM 2

WEEK: 1

MINDMAP:



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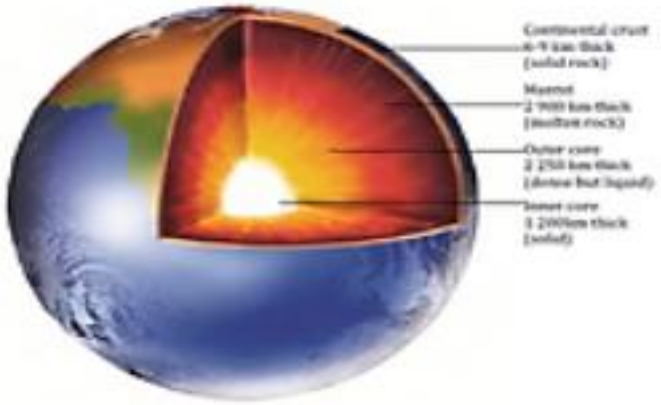
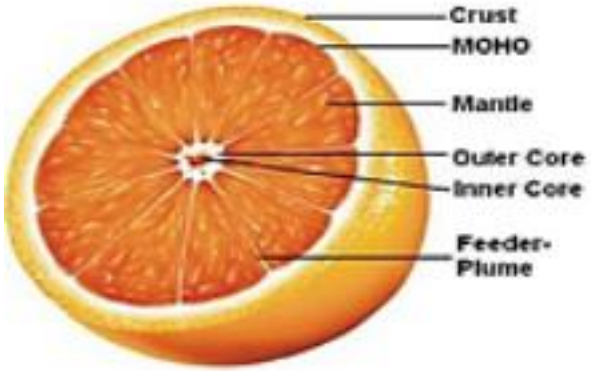
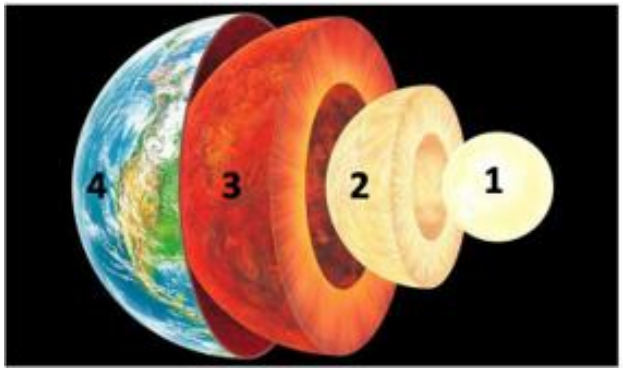
TERMINOLOGY

Active volcano:	Volcano which still erupts.
Anticline:	Downward fold
Batholith:	Very large igneous intrusion which forms deep in the Earth's crust.
Block Mountain/Horst:	Block of land uplifted between two parallel faults.
Butte:	Flat topped hill with a small top, eroded from a mesa
Cinders:	Fine fragments of hardened lava
Continental Drift:	Theory that continents were one landmass but have drifted apart over time.
Continental Plate:	Crust under land mass
Converging Boundaries:	Plates moving towards each other.
Core:	Central extremely hot layer of the Earth.
Crust:	Outer layer of the earth.
Cuesta:	Ridge with a gentle angle of 10 - 25˚
Diverging Boundaries:	Plates are moving apart.
Dormant volcano:	Has not erupted for many years.
Dyke:	Forms when magma intrudes vertically between layers of rock.
Earthquake:	Vibration in earth's crust.
Epicentre:	Point on the Earth's surface immediately above the focus of an earthquake.
Erosion:	The proses of moving weathered material by wind, water, and ice.
Extinct volcano:	Has not erupted in so long, scientists don't expect it to erupt ever again.
Extrusive igneous rock:	Rocks forming from lava on the surface of the Earth
Fault line:	Line along the surface of the earth where a fault occurs.
Faulting:	Cracks in rocks formed due to tension and compression forces.
Focus:	Point in the earth's crust where an earthquake begins.
Folding:	Bending of rocks into folds due to strong compressional forces from the side.
Fossils:	Remains of a dead plant or animal which have been preserved in rock.
Gondwanaland:	Supercontinent.
Hogsback:	Dipping strata of more than 45˚.
Homoclinal Ridge:	Angle of dipping strata 25 - 45˚.
Horizontal Strata:	Sediments laid down in layers.

Igneous Rock:	Forms when magma cools
Inclined Strata:	Landscape tilted at an angle
Intrusive igneous rock:	Rocks forming from magma below the surface of the Earth. (INSIDE the earth)
Laccolith:	Mushroom shaped intrusion which forms when magma forces the overlying strata upwards.
Lava:	Liquid rock that flows on the surface of the Earth.
Lithosphere:	The crust and upper part of the mantle.
Lopolith:	Saucer shaped intrusion.
Magma:	Rock in a liquid form inside the Earth.
Mantle:	A hot plastic layer of the Earth located beneath the crust.
Mesa:	Large, flat topped hill.
Metamorphic Rock:	Rocks changed by heat or/and pressure.
Oceanic Plate:	Crust under sea mass
Plate boundary:	The edge of a tectonic plate.
Plateau:	Flat topped landform made when horizontal strata was uplifted.
Rift Valley/Graben	Block of land which slips down between parallel faults.
Rock cycle:	Process that results in rocks to form, weather and erode, deposition of sediments and formation of new rocks.
Sea Floor spreading:	Along middle of ocean ridges where new crust is being formed due to volcanic activity.
Sedimentary Rock:	Forms from layers of compressed sediments.
Sill:	When magma intrudes horizontally between layers of rock along a bedding plane.
Strata:	The horizontal layers of sedimentary rock.
Syncline:	Upward fold
Tectonic plate:	Section of the Earth's crust that can move on the mantle.
Transforming:	Plates slide past each other.
Tsunami:	Series of huge sea waves caused by an earthquake in the sea floor.
Volcanic pipe:	Deep vent which allows magma to rise to the crater of a volcano.
Weathering:	The proses of breaking down rocks into smaller stones, pebbles, and sand.

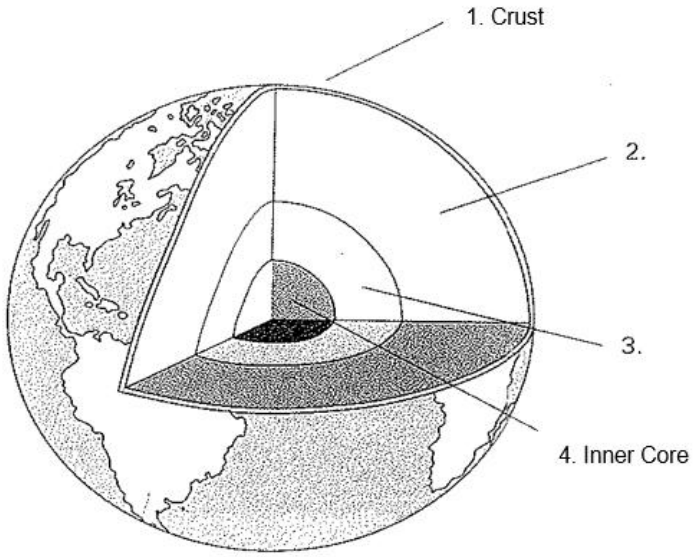
WEEK: 1 STRUCTURE OF THE EARTH

You must study with these questions in mind.

What does it look like?	What is it?	Where is it?
Layers of the Earth   The structure of the Earth resembles the layers of an orange. The Moho is the boundary that separates the crust from the mantle	Earth is made up of four distinct layers: • A solid outer crust • A solid mantle • A liquid outer core • A solid inner core **THE CONTINENTAL CRUST:** • The outermost layer of solid rock, on which we live. • Thicker under the continents and thinner under the oceans. • Broken into smaller segments, called plates, which float on the mantle. • It is 6-90 km thick (solid rock) **THE MANTLE:** • Beneath the crust. • 2 900 km thick, consisting of hot, plastic rock. • Temperatures may reach up to 5 000˚C. **THE OUTER CORE:** • Very dense but liquid due to extremely high temperatures. • 2 250 km thick and consists of nickel (Ni) and iron (Fe) known as NiFe. **THE INNER CORE:** • Is extremely hot. • Solid because of extreme pressure. • 1 200 km thick.	Name the layers of the Earth in the following diagram.  **Scan the QR quodes supplied in the summaries to see videos on the topic.**

ACTIVITIES: INTERNAL STRUCTURE OF THE EARTH

1.1 Study the illustration **FIGURE 1.1** of the internal structure of the earth below, and answer the following questions.



1.1.1 Give the name of the layer at **2**.

1.1.2 Give the name of the layer at **3**.

1.1.3 Name the layer of the earth that consists of sial and sima.

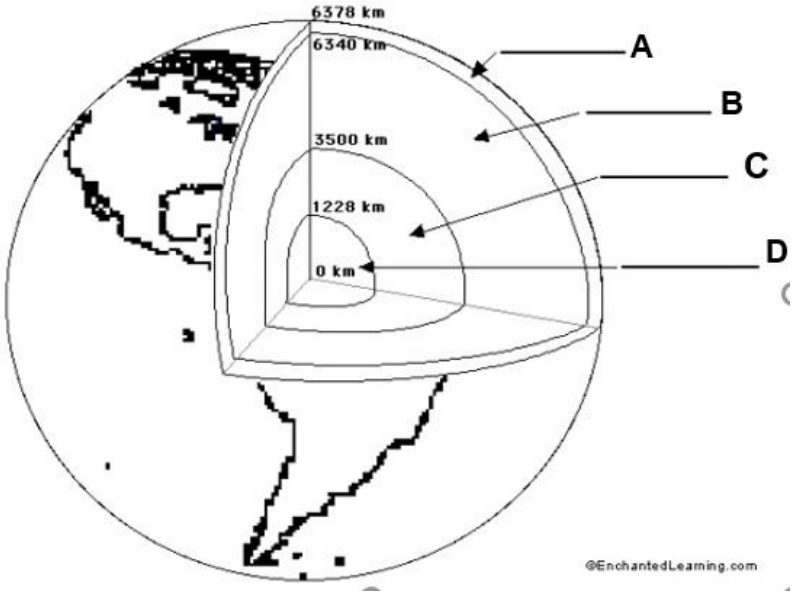
1.1.4 Identify the layer of the earth that is in a semi-molten state.

1.1.5 Which layer experiences the hottest temperature and highest pressure?

1.1.6 Name the layer that we live on.

1.1.7 Identify the boundary that separates layer **1** and **2.** (7 x 1) (7)

1.2 Study **FIGURE 1.2** and answer the following questions on the structure of the Earth.



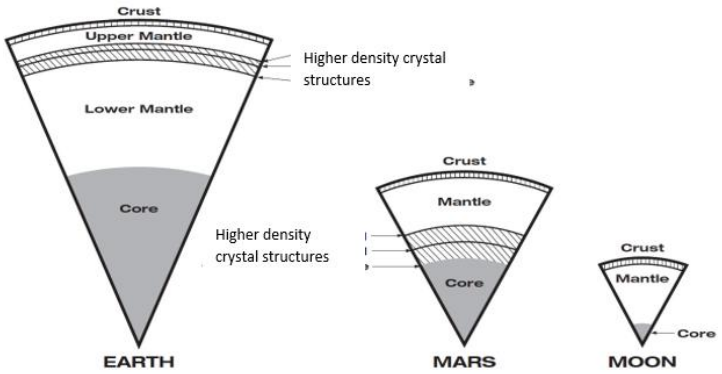
1.2.1 State the layers **A**, **B** and **D** on FIGURE 1.2. (3 x 1) (3)

1.2.2 Name **TWO** layers of the Earth which are in solid form? (2 x 1) (2)

1.2.3 Which layer of the Earth experiences the highest temperature? Motivate your answer. (1 + 2) (3)

1.2.4 Discuss in a paragraph of approximately EIGHT lines the characteristics of layer **A** that are important to sustain life on earth. (4 x 2) (8)

1.3 Refer to FIGURE 1.3, which shows the internal structure of the Earth as compare to Mars and the Moon.



Insight Pie Charts

Mars has the same basic internal structure as the Earth and other terrestrial (rocky) planets. It is large enough to have pressures equivalent to those throughout the Earth's upper mantle, and it has a core with a similar fraction of it's mass. This diagram shows the depths at which high pressures cause certain minerals to transform to higher-density crystal structures. In contrast, the pressure even near the center of the Moon barely reach that just below the Earth's crust and it has a tiny, almost negligible core. The size of Mars indicates that it must have undergone many of the same separation and crystallization processes that formed the Earth's crust and core during early planetary formation.

[Source:www.mars.nasa.gov]

1.3.1 Recall the TWO layers that the Earth's core can be divided into. (2 x 1) (2)

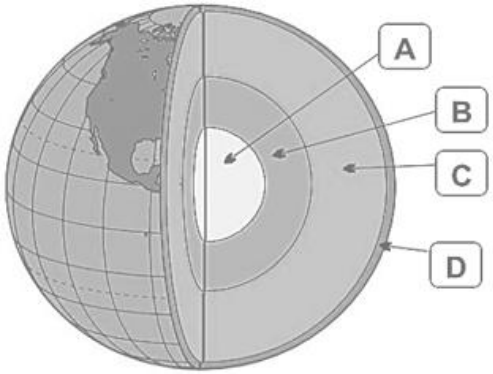
1.3.2 Identify and give the composition of the layer responsible for the Earth's gravity. (1 + 2) (2)

1.3.3 Explain the relationship between the Earth's temperature and density from the crust towards the core. (2 x 2) (4)

1.3.4 State the relationship at which the higher density crystal structures can be found between the Earth and Mars from FIGURE 1.3. (1 x 2) (2)

1.3.5 Predict the effects on the crust of Mars if the mantle reacted the same as the Earth's. (2 x 2) (4)

1.4 Study the following diagram and answer questions that follow



1.4.1 Indicate the state of material in each of the labels **A** to **D** indicated on the diagram. (4 x 1) (4)

1.4.2 Define the following:
a) SIAL
b) SIMA
c) Geoid shape (3 x 1) (3)

1.4.3 Explain the temperature changes from Outer Core to Crust, (2 x 2) (4)

1.4.4 Describe the relationship between state of the material of the structure of the earth and the temperature of the material. (2 x 2) (4)

WEEK: 2 CLASSIFICATION OF ROCKS

You must study with these questions in mind			
Type	**1. IGNEOUS**	**2. SEDIMENTARY**	**3. METAMORPHIC**
What does it look like?			
How do they form?	• From molten minerals • Magma wells up from the mantle • Magma cools below or on top of the Earth's surface • Deep cooling results in the formation of crystals	• From pre-existing rocks and sediments • Contains organic material • Weathered sediments are deposited by wind, ice and water • Material deposited in horizontal layers • Sediments are compressed over time and form sedimentary rocks	• Sedimentary and Igneous rocks that are subjected to high temperatures and/or pressure • Physical and chemical changes take place • Folding and faulting exerts extreme pressure • Molten magma intrusions cause extreme heat and pressure
What are the characteristics ?	• Fine to coarse crystalline rock • Made up of different minerals • Jointed when exposed • colorful	• Layered in appearance • Coarse- or fine-grained texture • Can contain fossils • Each layer is called a stratum • Bedding plane separates different types of rock	• Brittle • Streaky in appearance
Examples	• Basalt layer in the Drakensberg • Dolerite sills and dykes in the Karoo • Granite domes	• Sandstone made from sediments • Shale made from finer sediments • Coal made from plant material • Conglomerate made from larger pebbles cemented together	• Sandstone becomes Quartzite • Granite becomes Gneiss • Shale becomes Hornfel • Limestone turns to Marble
What are they used for?	• Monuments / Tombstones • Counter tops • Floor covering • Valuable minerals and ores • Weathered rock produces fertile soil	• Dolomite for cement • Building blocks • Source of crude oil and coal	• Flooring • Slate for roof tiles • Marble for statues

ACTIVITIES: CLASSIFICATION OF ROCKS

2.1 Match the following statements in **Column A** with the terms or examples in **Column B.** Write down only the question number and correct letter**.** e.g. 2.1.8 P.

Column A		Column B	
2.1.1	Rocks formed when magma solidifies	A	Quartzite
2.1.2	This rock type occurs as layers or strata	B	Fossils
2.1.3	Rocks formed when heat or pressure is added	C	Marble
2.1.4	Recognizable remains of plants and animals preserved in rocks.	D	Metamorphic
2.1.5	Processes that cause rocks to form, break down, change, and reform over time.	E	Gneiss
2.1.6	Sandstone change under heat and pressure to …	F	Igneous
2.1.7	Limestone turns to … under heat and pressure	L	Sedimentary
		M	Shale

(7 x 1) (7)

2.2. Complete the table below by indicating to which rock type, Sedimentary, Igneous or Metamorphic, the statement refers to.

2.2.1	The rocks are made up different minerals. I
2.2.2	Rock formation which are used as flooring. M
2.2.3	There rocks are used for monuments and tombstones. I
2.2.4	Rock formation which is a source of crude oil and coal. S
2.2.5	Statues are created from this rock type. M
2.2.6	The type of rock that is used as counter tops. I
2.2.7	The type of rocks used as building blocks. S
2.2.8	Builders use their rocks for roof tiles. M

(8 x 1) (8)

2.3 Read the case study “Paarl Rock” below and answer the following questions:

Case Study on the Paarl Rock

Paarl Rock or Paarl Mountain in the Western Mountain glistens like a diamond or a pearl in the Sun after the rain. Its three granite domes are part of a huge underground granite intrusion that extends from Saldanha in the north to George in the east. Millions of years ago, Paarl Rock did not exist. Over time, the Berg River, and wind and rain have exposed the rock and layers have peeled off – a bit like the layers of an onion.

As a giant rock outcrop, Paarl Rock is often compared with Uluru (also known as Ayers Rock) in Australia. Uluru means “Island mountain” and it is the largest single rock in the world. But the geology of Paarl Rock and Uluru is very different. Paarl Rock is an igneous intrusion, while Uluru is a sedimentary remnant.

2.3.1 List the THREE major rock types that make up the Earth's crust. (3 x 1) (3)

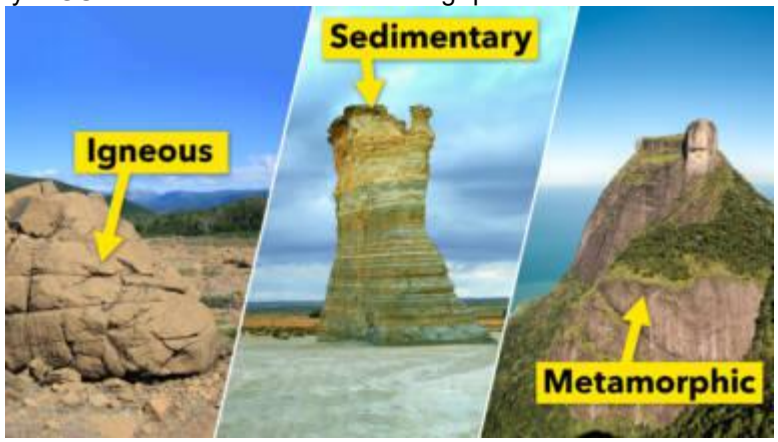
2.3.2 How can one distinguish between igneous rock and sedimentary rock with the naked eye? (2 x 1) (2)

2.3.3 Briefly explain how igneous rock and sedimentary rock can be changed into metamorphic rock. (2 x 2) (4)

2.3.4 Outline how metamorphic rocks can be changed back into sedimentary rock. (2 x 2) (4)

2.3.5 Give ONE way in which humans can make use of metamorphic rock. (1 x 2) (2)

2.4 Study FIGURE 2.4 to answer the following questions.



2.4.1 List the THREE major rock types that make up the Earth's crust. (3 x 1) (3)

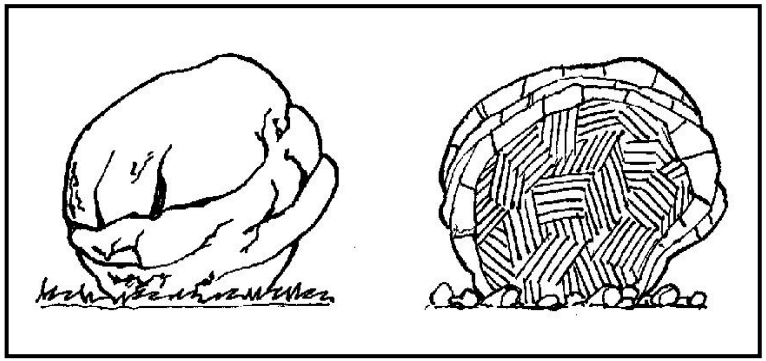
2.4.2 How can one distinguish between igneous rock and sedimentary rock with the naked eye? (2 x 1) (20

2.4.3 Briefly explain how igneous rock and sedimentary rock can be changed into metamorphic rock. (2 x 2) (4)

2.4.4 Outline how erosion of metamorphic rocks can be changed back into sedimentary rock. (2 x 2) (4)

2.4.5 Give ONE way in which humans can make use of metamorphic rock. (1 x 2) (2)

2,5 Study the next diagram, which shows the weathering processes in granite, and then answer the questions that follow.



2.5.1 To which type of rock does granite belong? (1 x 1) (1)

2.5.2 Where would the largest crystals forms, close to the surface or deep under the surface? (1 x 1) (1)

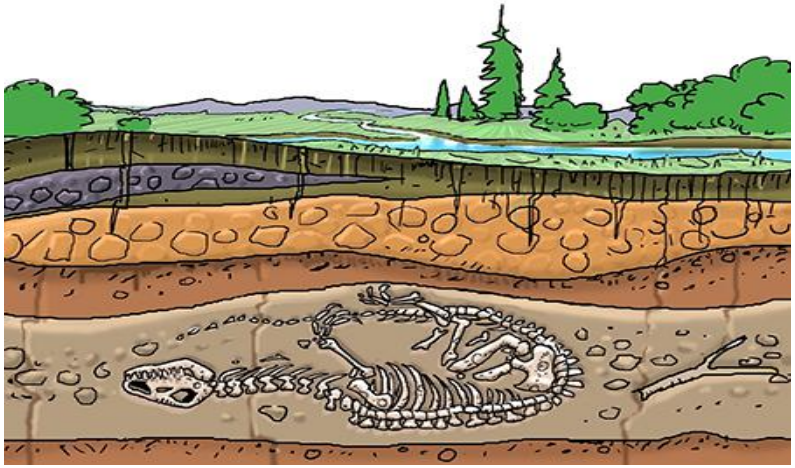
2.5.3 Describe the difference between intrusive and extrusive examples oof this type of rocks. (2 x 1) (2)

2.5.4 Describe **TWO** characteristics of the rock type asked for in QUESTION 2.5.1. (2 x 2) (4)

2.5.5 Briefly explain how this rock type is formed. (6)

2.5.6 What is the value of this type of rocks for mankind? (1 x 2) (2)

2.6 Refer to FIGURE 2.6.



2.6.1 Is the rock type visible in FIGURE 2.6 metamorphic or sedimentary rocks? (1 x 1) (1)

2.6.2 Give evidence from FIGURE 2.6 to support your answer. (1 x 2) (2)

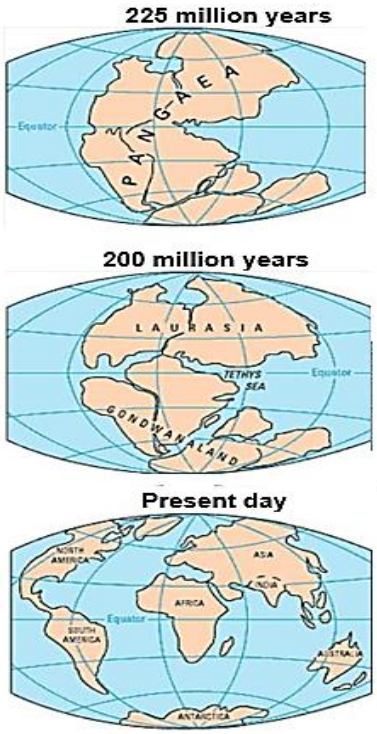
2.6.3 Explain what a fossil is. (1 x 2) (2)

2.6.4 Describe the process of formation of the type of rock identified in QUESTION 2.6.4. (3 x 2) (6)

2.6.5 Crude oil and coal forms over time in this rock type. Identify the original source from which crude oil and coal respectively forms. (2 x 2) (4)

WEEK: 3 PLATE TECTONIC THEORY

DIAGRAM OVER TIME	**EVIDENCE OF CONTINENTAL DRIFT**



Pangea

North - Laurasie
South - Gondwanna

North - N America, Asia
South - S America, Africa
India, Australia
Antarctica

CONTINENTAL FIT

- Coastlines of South America and West Africa fit together like a jigsaw puzzle
- Rocks of similar age and sequence are found on both continents
- Mountain belts are the same on both continents
- Ore reserves match up across continents

FOSSIL MATCH

- Fossils of the same animals are found in South America and Africa,
- Some fossils are only found in Antarctica, India, South America, South Africa, and Australia
- Some of the fossils can only be found in Antarctica, India, and South Africa

SEA FLOOR SPREADING

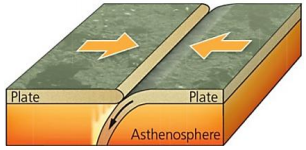
- The age of the seafloor rocks is younger than the age of the continental rocks
- Ocean floor is new and is being added to on a regular basis
- Age of rocks on either side of the mid oceanic ridge mirror each other
- The youngest rocks are found closest to the ridges and the oldest rocks closest to the continents

GLACIAL DEPOSITS

- Similar glacial deposits are found in Antarctica, Africa, South America, India, and Australia
- Glacial striations show the direction of movement from the continents

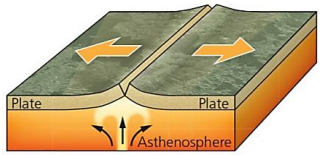
What is the plate boundary types?

CONVERGING



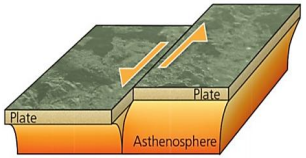
- Plates move towards each other
- One plate is forced beneath the other into the mantle and melts
- **Activities**: Earthquakes and volcanoes

DIVERGING



- Plates move away from each other
- Molten material forced up from mantle
- Creates new crust
- **Activities:** Earthquakes and volcanoes

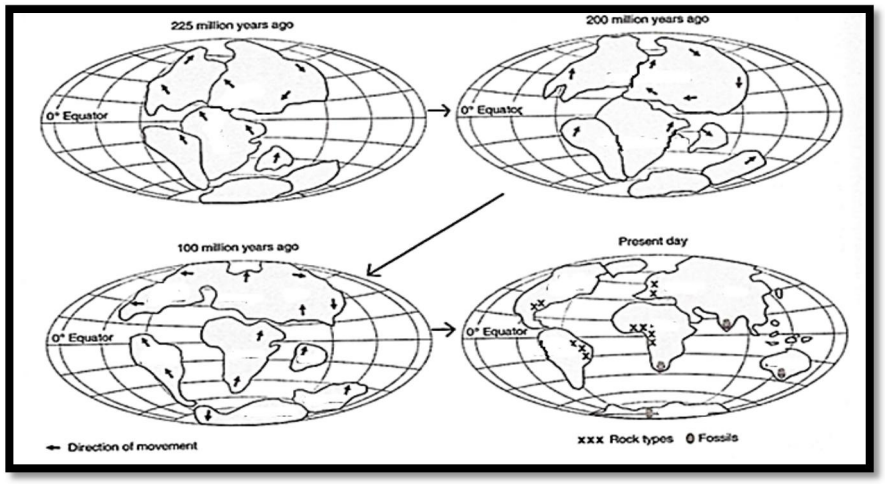
TRANSFORMING



- Plates move past each other
- No new crust is made or destroyed
- Conservative boundary
- **Activities:** Earthquakes

ACTIVITIES: PLATE TECTONIC THEORY

3.1 Refer to **FIGURE 3.1** on 'Continental Drift'



3.1.1 Who is the "father" of the continental drift theory? (1 x 1) (1)

3.1.2 Recall the large water mass that existed 250 million years ago. (1 x 1) (1)

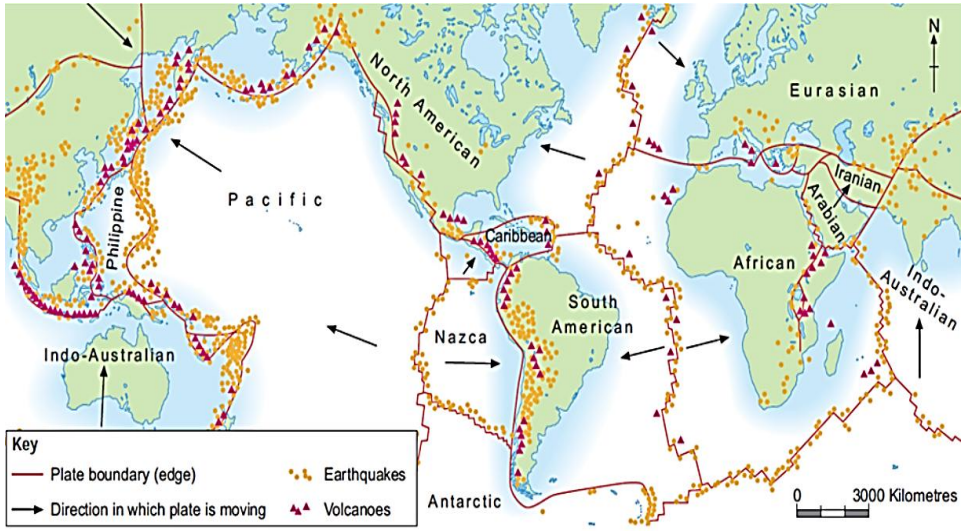
3.1.3 Name the large landmass that existed 250 million years ago. (1 x 1) (1)

3.1.4 Name the **TWO** landmasses found in the north and south respectively when this large landmass split. (2 x 1) (2)

3.1.5 Locate any **TWO** of the present-day continents that used to be part of Gondwanaland. (2 x 1) (2)

3.1.6 Identify the present-day country that broke away from the southern continents to join the northern continents of today. (1 x 1) (1)

3.2 Refer to the diagram below showing world plate boundaries



3.2.1 What name did Alfred Wegener give to the one large supercontinent that existed before the continents broke up? (1 x 1) (1)

3.2.2 All the continents and adjacent water masses are divided into tectonic plates. What is a tectonic plate? (1 x 1) (1)

3.2.3 Name the plates found on either side of the plate boundary on the west coast of South America? (2 x 1) (2)

3.2.4 Name this type of plate boundary. (1 x 1) (1)

3.2.5 Briefly explain how the continents move. (1 x 2) (2)

3.2.6 Summarize, in a paragraph of approximately EIGHT lines, evidence that scientists use to prove the continents of Africa, Antarctica and South America were once joined. (4 x 2) (8)

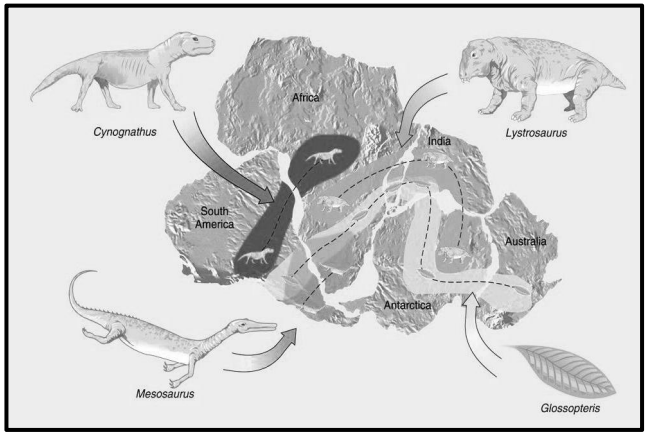
3.3 Match the statements in Column A with the concepts in Column B

3.4 FIGURE 3.4 can be used as sustained evidence for Alfred Wegener's theory of

	COLUMN A		COLUMN B
3.3.1	Edge of a crustal plate	A	Mid oceanic ridge
3.3.2	Central belt of mountain area below the ocean	B	Constructive boundary
3.3.3	Formation of molten rock pushing the plates apart	C	Destructive boundary
		D	Sea floor spreading
3.3.4	One crustal plate pulled down under the other	E	Subduction zone
3.3.5	Area where new crust is formed	F	Plate boundary
3.3.6	Collision of plates occurs in this area	G	Oceanic trench
3.3.7	Deepest part of the ocean	H	Transformation boundary
3.3.8	Two plates move sideways past each other	I	Oceanic ridge
		J	Crustal plate

(8 x 1)(8)

continental drift. Wegener is the father of the theory of continental drift.



3.4.1 What is your understanding of the term *continental drift*? (1 x 1) (1)

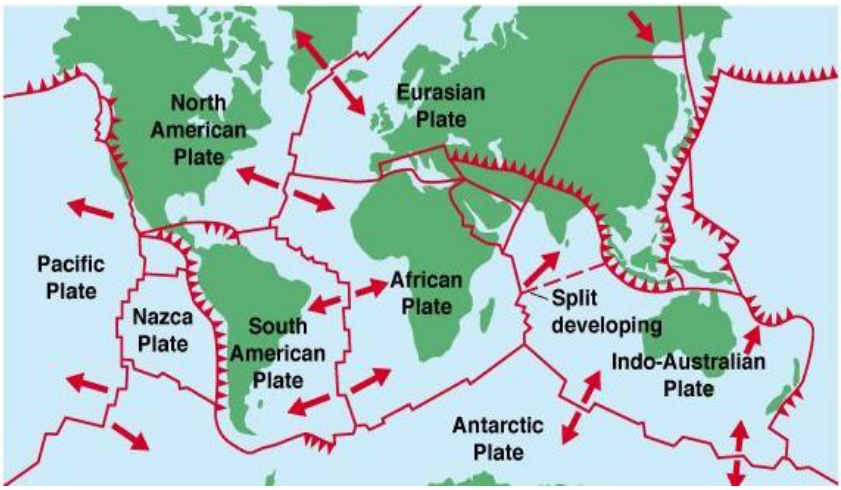
3.4.2 Why is Alfred Wegener being referred to as 'the father of the theory of continental drift'? (1 x 1) (1)

3.4.3 The diagram shows various fossils that were found on different continents. How are fossils formed? (2 x 2) (4)

3.4.4 Explain why it was far more difficult for Alfred Wegener to provide conclusive evidence for his theory than present day scientists. (2 x 2) (4)

3.4.5 Apply the information in FIGURE 3.4 as evidence for continental drift. (2 x 2) (4)

3.5 **FIGURE** 3.5 is a world map showing these oceanic and continental plates.



3.5.1 Is the common border between the South American Plate and the African Plate a constructive or a destructive plate border? (1 x 1) **(1)**

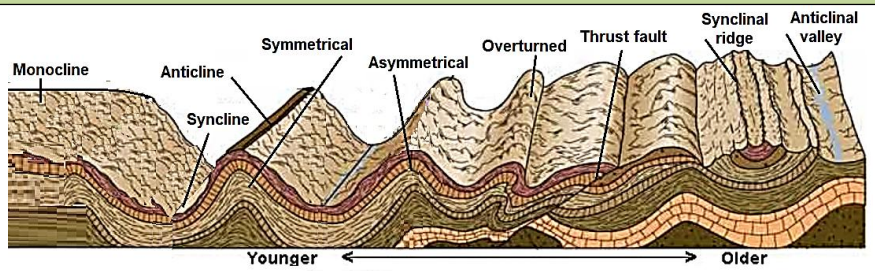
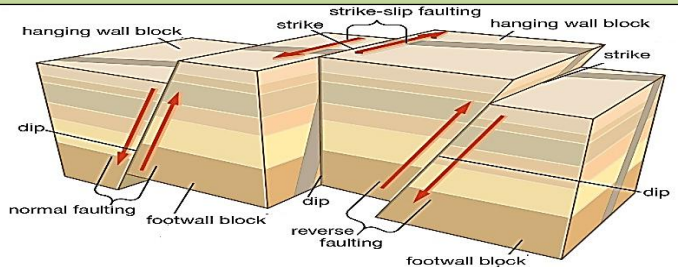
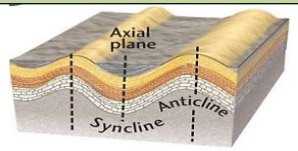
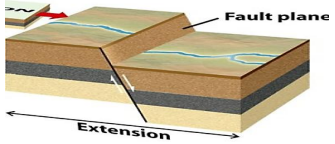
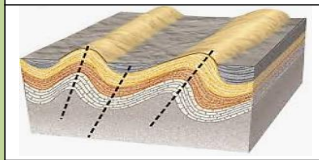
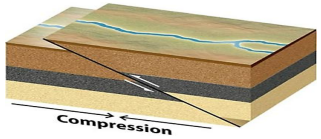
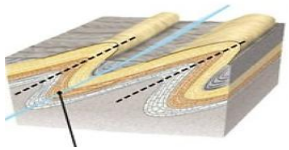
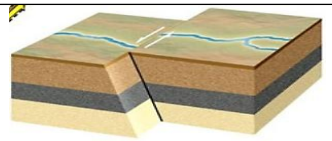
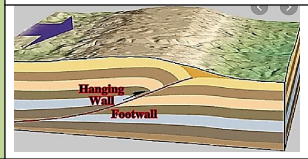
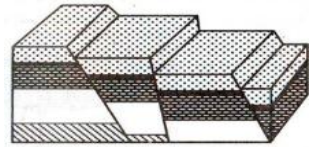
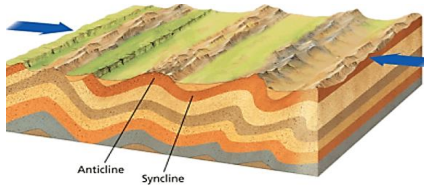
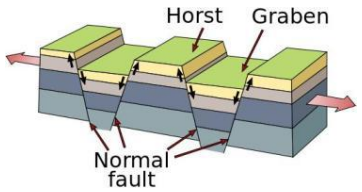
3.5.2 Give **ONE** reason for your answer. (1 x 2) (2)

3.5.3 Why are Fold Mountains found along the west coast of many continents? (1 x 2) (2)

3.5.4 What is the name of the fault plane in California on which Los Angeles and San Francisco is situated? (1 x 2) **(2)**

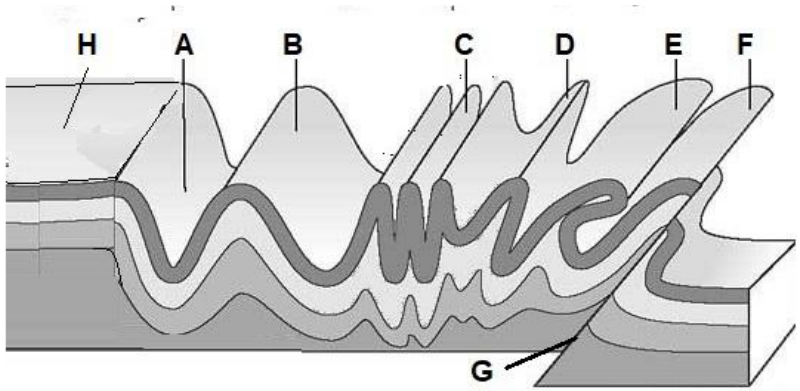
3.5.5 Earthquakes usually occur on the plate boundaries. In a paragraph of EIGHT lines, explain what type of plate boundary results in the San Andreas fault and how it is evidence that plate movement do take place. (4 x 2). **(8)**

WEEK 4 & 5 : FOLDING AND FAULTING

	You must study with these questions in mind					
Type	**FOLDING**			**FAULTING**		
WHAT IS THE STRUCTURE						
IDENTIFY THE DIFFERENT TYPES	**DIAGRAM**	**TYPE**	**TYPE OF STRESS?**	**DIAGRAM**	**TYPE**	**TYPE OF STRESS?**
		**SYMMETRICAL**	Equal pressure from both sides		**NORMAL**	Tension Hanging wall drops relative to foot wall
		**ASYMMETRICAL**	Pressure greater from one side Fold leans to one side		**REVERSE**	Compression Hanging wall is pushed up over the footwall
		**OVER FOLD**	Pressure even greater on one side One limb very steep		**TRANSFORM**	Shear Movement in the opposite direction
		**OVER THRUST**	Pressure from one side results in a break in the Earth's crust		**PARALLEL**	Tension
LANDFORMS		**Fold mountains**: At these colliding, compressing boundaries, rocks and debris are warped and **folded** into rocky outcrops, hills, **mountains**, and entire **mountain** ranges.			*Horst* and *Graben* are always formed together. *Graben* are usually represented by low-lying areas such as rifts and river valleys whereas horsts represent the ridges between or on either side of these valleys.	

ACTIVITIES: FOLDING AND FAULTING

4.1 Study the illustration in **FIGURE 4.1** showing different types of folding that can occur if crustal layers of the earth bend or fold.



4.1.1 Which letter on the diagram represents an over thrust fold?

4.1.2 Write the letter on the diagram which represents an over fold.

4.1.3 Which letter represents an asymmetrical fold?

4.1.4 The force which forms folds is (compressional / tensional).

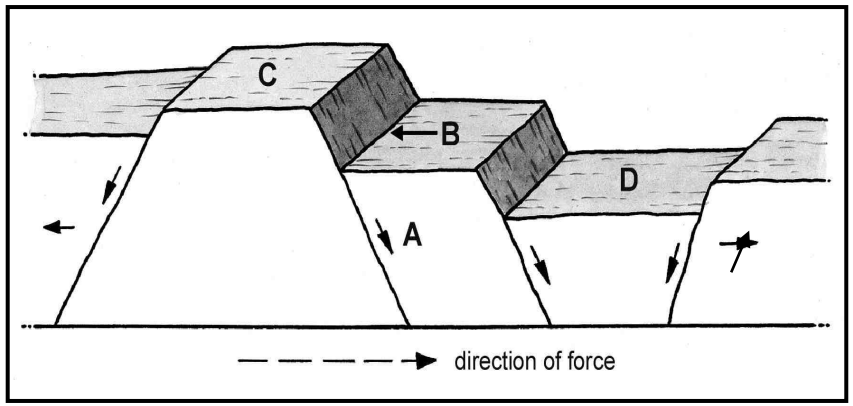
4.1.5 The part of the fold indicated by letter 'A' represents a/an (anticline / syncline).

4.1.6 Find the letter which indicates the fault line?

4.1.7 A Monocline is indicated by letter …

(7 x 1) (7)

4.2 Study **FIGURE 4.2** and then answer the questions that follow.



4.2.1 Name the fault labelled **A**. (1 x 1) (1)

4.2.2 Recall the part of the fault labelled **B**. (1 x 1) (1)

4.2.3 State the feature labelled **C.** (1 x 1) (1)

4.2.4 Briefly explain how feature **C** formed. (2 x 2) (4)

4.2.5 Identify the land formation illustrated at **D** on the diagram. (1 x 1) (1)

4.2.6 Give **ONE** use of the landform labelled D. (1 x 2) (2)

4.2.7 Outline how feature **D** formed. (2 x 2) (4)

4.3 Refer to **FIGURE 4.3** showing a plate movement and faulting.

4.3.1 Identify the type of Plate movement as seen in the FIGURE 4.3. (1 x 1) (1)

4.3.2 Describe how this plate movement in QUESTION 4.3.1 develop. (1 x 2) (2)

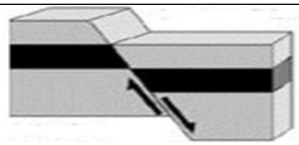
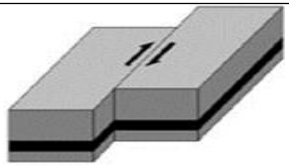
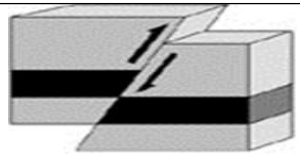
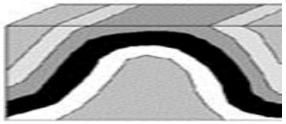
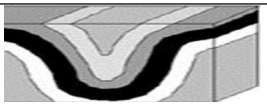
4.3.3 Name the TWO continental plates that cause this type of plate movement as seen in FIGURE 4.3. (2 x 1) (2)

4.3.4 Name the famous example of the type of plate movement as seen in FIGURE 4.3 found in USA. (1 x 2) (2)

4.3.5 Why is the plate movement in QUESTION 4.3.4 so dangerous? (2 x 2) (4)

4.3.6 Discuss possible precautions that can be implemented to reduce the effect of the plate movement described in QUESTION 4.3.4. (2 x 2) (4)

4.4 Geomorphology terminology on landforms associated with plate tectonics. Match the picture in COLUMN **B** with the term in COLUMN **A**. Write you answer as follows on your answer sheet. E.g. 4.4.8 H.

COLUMN A		**COLUMN B**	
4.4.1	Anticline	A	
4.4.2	Syncline	B	
4.4.3	Over Fold	C	
4.4.4	Over thrust fold	D	
4.4.5	Normal fault	E	
4.4.6	Reverse fault	F	
4.4.7	Lateral fault	G	

4.5 Study FIGURE 4.5 A and FIGURE 4.5 B below.

FIGURE A

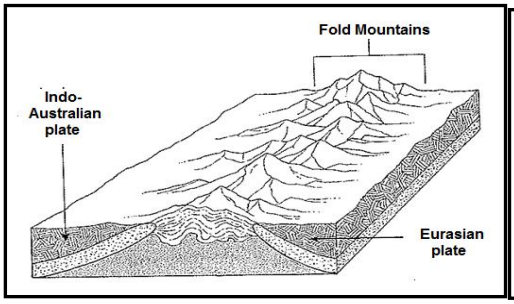
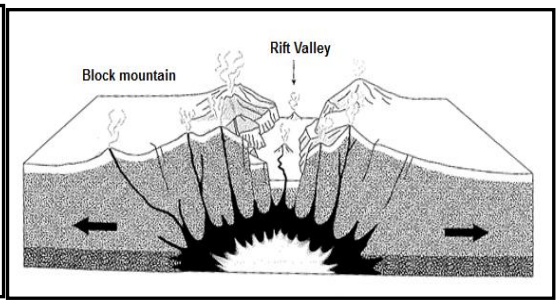


FIGURE B



4.5.1 Identify the two crustal plates that are colliding in Diagram **A** to form the fold mountains on the sketch. (2 x 1) (2)

4.5.2 In both diagrams above, does convergence or divergence occur? (1 x 1) (1)

4.5.3 Classify the two plate boundaries at **A** and **B** as destructive or constructive boundaries respectively. (1 x 1) (1)

4.5.4 Explain your answer in QUESTION 4.5.3. (2 x 2) (4)

4.5.5 Differentiate between folding and faulting. (1 x 1) (1)

4.5.6 State at which of the plate boundaries, **A** or **B,** faulting will take place? (1 x 1) (1)

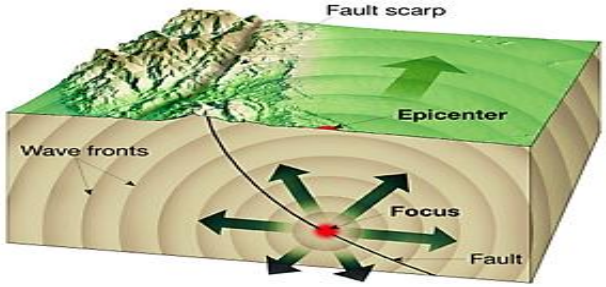
4.5.7 Give a reason for your answer in QUESTION 4.5.4. (1 x 2) (2)

WEEK 6 & 7 : EARTHQUAKES

You must study with these questions in mind

HOW DOES IT OCCUR?

A Sudden and violent movement of the Earth's crust because of a sudden release of energy.



FOCUS:
Exact point beneath the Earth's surface where the plates shift

EPICENTER:
Point directly above the focus on the Earth's surface.

FAULT SCARP:
The steep exposed rock face.

FAULT:
Crack in the Earth's crust resulting from the movement of rock.

WAVE FRONTS:
Seismic waves releasing energy through the crust.

SEISMIC WAVES:
A wave of energy generated by an earthquake.

WHAT CAUSES EARTHQUAKES?

- **DIVERGENT PLATE boundaries** cause tension to build up in crust.
- **VOLCANOES**: The sudden release of molten minerals through a crack in the earth's crust

HOW IS IT MEASURED?

- **RICHTER SCALE:** Method to allocate a magnitude number to qualify the energy released by an earthquake.
- **SEISMOGRAPH:** Instrument used to measure and record an earthquake.
- **SEISMOGRAM:** A graph output from a seismograph.

WHAT IS THE IMPACT OF AN EARTHQUAKE?

PEOPLE:
- Injuries and/or death of people and animals
- Destruction of infrastructure e.g. roads, houses
- Transport and communication disrupted
- Landslides flatten and destroy buildings
- Burst water pipes reduce availability of fresh water
- Contaminated water cause health issues e.g. cholera
- Gas pipe leaks cause fires

ENVIRONMENT:
- Disruption of habitat
- Destruction of vegetation
- Landslides, mudslides
- Soil liquefaction
- Contamination of natural resources e.g. water, soil

ECONOMIC:
- Businesses destroyed
- Reduce employment
- Expenses to rebuild/fix damages to infrastructure
- Developing countries are more affected because of lower economic growth
- A **TSUNAMI** can develop. A large wave produced by an Earthquake under the ocean

WHAT IS THE IMPACT OF A TSUNAMI?

PEOPLE:
- Results in flooding
- Injuries to people
- Destroys infrastructure
- Contaminates food and water
- Waterborne diseases develop

ENVIRONMENT:
- Salinisation of rivers, lakes and groundwater
- Flooding causes sewerage contamination of fresh water resources
- Pollute wetlands, coastal areas, agricultural fields and forests
- Deposition of sediments lead to changes in habitats and species

What strategies can be implemented to reduce the impact of Earthquakes and Tsunamis'?

- Develop early warning systems e.g. electronic media
- Upgrade the infrastructure e.g. buildings, sea walls
- Improved communication systems must be in place
- Disaster management program must be in place
- Coordinated rescue teams
- Unified plan of action for local services e.g. army, medical personnel, police
- Education of the population

EARTHQUAKE ACTIVITIES

5.1 Study the article FIGURE 5.1 on the earthquake in Indonesia below.

Indonesia earthquake: at least 98 dead after quake struck Lombok

At least 98 people have been confirmed dead and more than 236 severely injured in a 6.9 magnitude earthquake that rocked the Indonesian tourist island of Lombok on Sunday evening.

The damage in northern Lombok was 'massive', a spokesman for the National Disaster Mitigation Agency said. In several districts, more than half the homes were destroyed or severely damaged.

The death toll is expected to rise, as rescuers are yet to reach some areas. Rescue efforts have been hampered by power outages, broken bridges and a lack of phone reception in some areas.More than 100 aftershocks have hit the area since the quake that struck the island at 6.46pm local time on Sunday.

The United States Geological Survey said the epicenter of the quake was on land on Lombok, though initial reports put it just off the coast. The focus was at a depth of 3,1 km.

[Source: The Guardian, 6 August 2018 (adapted)]

5.1.1 The earthquake struck at a depth of 3,1 km. What does one call this point of origin of an earthquake? (1 x 1) (1)

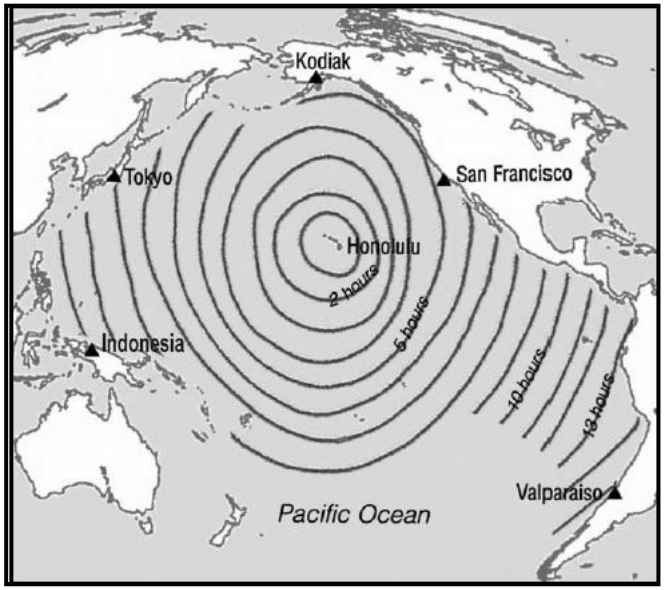
5.1.2 Mention TWO ways in which the earthquake caused 'massive' damage in Indonesia. (2 x 1) (2)

5.1.3 Why was it not necessary to issue a tsunami warning once the earthquake struck? (1 x 2) (2)

5.1.4 Provide ONE possible reason why the death toll is expected to rise long after the earthquake struck. (1 x 2) (2)

5.1.5 In a paragraph of approximately EIGHT lines, demonstrate how the government of Indonesia can plan for, and reduce the impact of an earthquake that may strike in future. (4 x 2) (8)

5.2 Use the information presented in **FIGURE 5.2** to answer the following questions.



5.2.1 Differentiate between an *earthquake and a tsunami*. (2 x 1) (2)

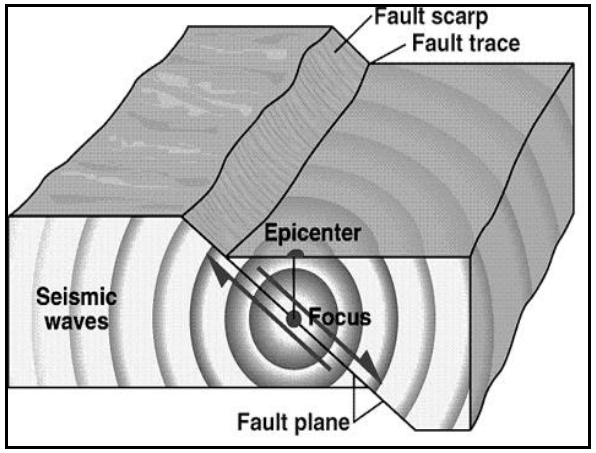
5.2.2 Where was the epicenter of the earthquake? (1 x 1) (1)

5.2.3 If the earthquake generated a tsunami, how many hours later would the tsunami reach San Francisco? (1 x 2) (2)

5.2.4 Why would the impact of this natural disaster be less in San Francisco than in Indonesia? (2 x 2) (4)

5.2.5 Discuss in a paragraph of approximately EIGHT lines the impact of a tsunami on the coast city San Francisco, and suggest some strategies that can be implemented to reduce the impact on the population and environment on this coast. (4 x 2) (8)

5.3 Examine the diagram **FIGURE 5.3** of an earthquake in Nepal. Answer the questions that follow.



5.3.1 Define the terms **focus** and **epicentre**. (2 x 1) (2)

5.3.2 What type of fault caused the development of this earthquake? (1 x 2) (2)

5.3.3 The Nepal earthquake measured at 7.3 Magnitude.

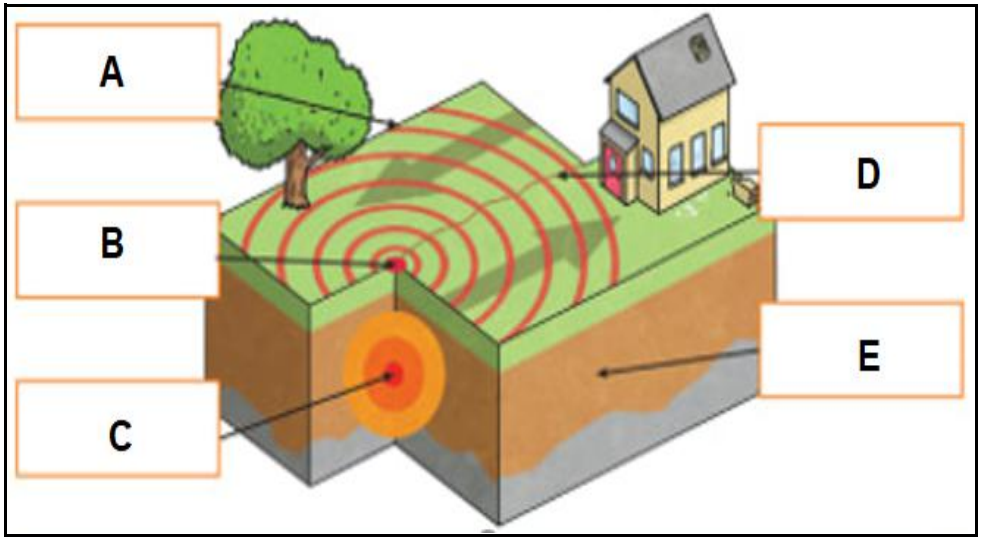
(a) Name the scale used to measure earthquakes. (1 x 1) (1)

(b) Explain what this scale measures. (1 x 2) (2)

5.3.4 Explain the occurrence of seismic waves. (1 x 2) (2)

5.3.5 An earthquake of this magnitude is usually followed by aftershocks that results in more damage in the area. Explain this statement. (3 x 2) (6)

5.4 Study the diagram below, FIGURE 5.4, and select a term from the information block to identify the features labeled A to E.



FOCUS	SEISMIC WAVES	EPICENTER
FAULT PLANE	CRUST	MANTLE

(5 x 1) (5)

5.5 Study the case study below on Earthquakes.

EARTHQUAKES

NEW DELHI: A mild earthquake measuring 3.5 on the Richter scale hit Delhi and neighbouring areas around 5:45pm on Sunday.

The tremors lasted for 25 to 30 seconds. Officials from the Department of Disaster Management Authority in Delhi said there were no immediate reports of any damage. The earthquake, which occurred at a depth of 8 km, was categorised in the "yellow, slight" level, according to Ajay Kumar, officer on duty at the National Centre for Seismology (NCS). "The earthquake was unexpected, there were no signs of it coming," said Kumar, adding he cannot say if it will be followed by another set of tremors. "We will be closely monitoring the situation over the next 12 hours to assess the situation," Kumar said.

The epicenter of the earthquake was reported near Sonia Vihar in north-east Delhi, about 16 km from the NCS head office at Lodhi Road, said M Rajeevan, secretary, ministry of earth sciences

https://economictimes.indiatimes.com//news/politics-and-nation/earthquake-of-magnitude-3-5-strikes-delhi-neighbouring-

5.5.1 Define the following terms:
a) *Epicenter*
b) *Richter Scale*
c) *Earthquake* (3 x 1) (3)

5.5.2 According to the article, where has this earthquake occurred? (1 x 1) (1)

5.5.3 On which continent is New Delhi located? (1 x 1) (1)

5.5.4 Where was the epicenter of the earthquake? (1 x 1) (1)

5.5.5 What could be an explanation to the statement “no immediate reports of any damage “. (1 x 2) (2)

5.5.6 Why are they worried about the possibility of tremors? (1 x 2) (2)

5.5.7 Discuss why the earthquake was unexpected and why it is difficult to predict. (2 x 2) (4)

5.6 Match the term in COLUMN **B** with the description in COLUMN **A**. Write you answer as follows on your answer sheet. E.g. 5.6 I.

	COLUMN A	**COLUMN B**	
5.6.1	A crack in the Earth’s crust	A	Seismogram
5.6.2	Instrument that allocates a magnitude number to quantify the energy released by an earthquake	B	Seismograph
		C	Fault
5.6.3	A wave of energy that generates an earthquake	D	Tsunami
5.6.4	A graph output from the magnitude of an earthquake.	E	Focus
5.6.5	An instrument used to measure and record details of earthquakes	F	Seismic wave
		G	Richter scale
5.6.6	A large wave caused by an earthquake under the ocean	H	Epicenter
5.6.7	The location where the plates move under the earth		(7 x 1)(7)

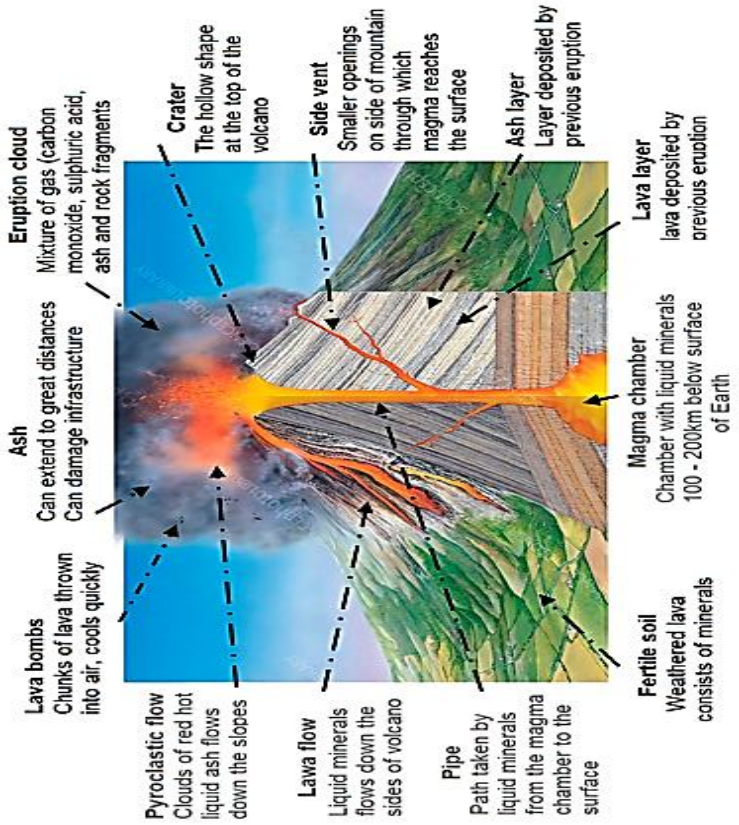
WEEK 8 & 9 : VOLCANOES

You must study with these questions

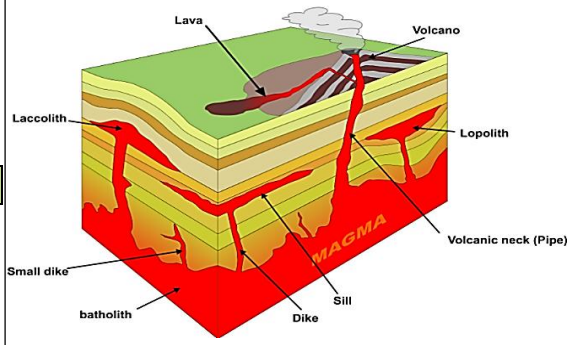
HOW DOES A VOLCANO FORM?

- Magma rises through cracks in the Earth's crust.
- When pressure is released, e.g. as a result of plate movement, magma explodes to the surface causing a **volcanic** eruption.
- The lava from the eruption cools to form new crust.
- Over time the rock builds up and a **volcano** form.

WHAT IS A VOLCANO'S STRUCTURE?



IDENTIFY DIFFERENT TYPES OF VOLCANOES?



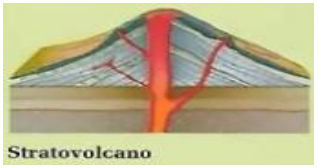
- **Extrusive volcano:** When magma pours onto the Earth's surface as lava.
- **Intrusive volcano:** When magma cools and solidifies within the Earth's crust.
- **Active volcano:** Volcano that erupt regularly.
- **Dormant volcano:** Volcano that is not currently erupting but is still capable of erupting.
- **Extinct volcano**: Volcano that has not erupted in recorded history.

SHIELD VOLCANO

- Wide with gentle slopes
- Low viscosity, lava flow slow and far before it hardens
- Forms a shield-like mound
- Volcanic islands

COMPOSITE/STRATOVOLCANO

- Tall steep sided
- Alternating layers of lava and ash
- Explosive volcanoes
- Small crater
- Lava highly viscous does not flow far before it hardens



CINDER CONE VOLCANO

- Smaller than stratovolcano
- Steep sides
- Mainly rock and ash deposits, less lava flow
- Large, bowl shaped crater

ADVANTAGES'

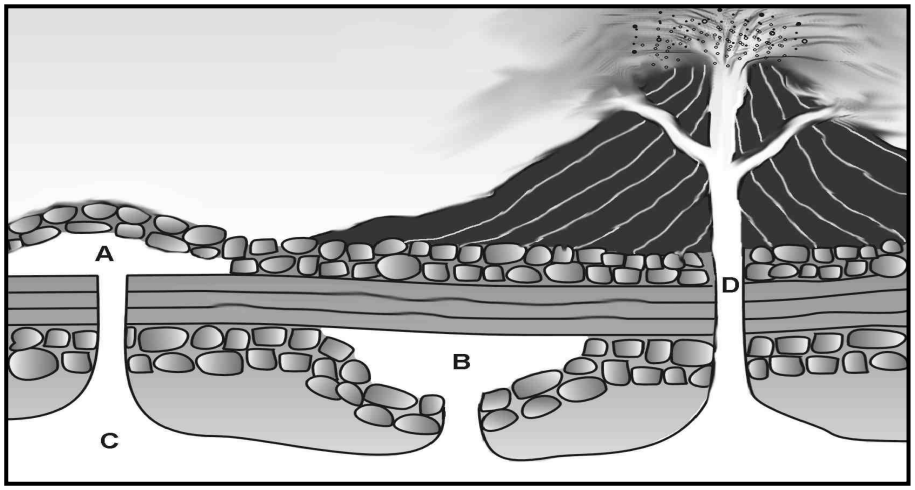
- Ash and lava weather to form fertile soil
- Tourist attraction
- Hot springs
- Generation of geothermal energy
- Produce minerals e.g. diamonds, gold, copper, zinc

DISADVANTAGES

- Lava burns property and destroys farmland
- Pyroclastic flows kills living creatures
- Can triggers thunderstorms, floods, mudflows
- Blasts of eruptions are dangerous
- Emits greenhouse gasses
- Ash clouds block sunlight and influences growth of crops and disrupts air traffic

ACTIVITIES: VOLCANOES

6.1 Use the figure below to help you answer the questions that follow.



6.1.1 The figure shows examples of both intrusive and extrusive volcanisms. What do *intrusive and extrusive* mean? (2)
(2 x 1)

6.1.2 Provide labels for intrusive features **A** and **B.** (2)
(2 x 1)

6.1.3 What valuable mineral could possibly be mined from feature **D**? (1)
(1 x 1)

6.1.4 What type of volcano is shown in the figure? Give a reason for your answer. (3)
(1 + 2)

6.1.5 'Volcanic eruptions do cause much death and destruction, but they also often have positive effects on people and the environment.' Examine in a paragraph of no more than EIGHT lines the positive

6.2 Match column B to the correct meaning in column A

	COLUMN A	COLUMN B	
6.2.1	Molten minerals underneath the Earth's surface.	A	Batholith
		B	Dormant
6.2.2	A volcano that consists of soft liquid lava, which rapidly flows outwards.	C	Lopolith
6.2.3		D	Extinct
	A volcanic cone built up by ash, leading to concave slopes forms	E	laccolith
6.2.4	a … volcano.	F	Active
6.2.5	Mushroom-shaped volcanic intrusion.	G	Magma
6.2.6	An intrusion that cuts horizontally along the crustal layers.	H	Composite
6.2.7		I	Shield
	The largest volcanic intrusion is called …	J	sill
6.2.8			(8 x 1) (8)
	A volcano that hasn't erupted in recent years.		
	Volcano that has not **erupted** in recorded history.		

and negative effects of volcanoes. (8)
(4 x 2)

6.3 Read the article below about a recent volcanic eruption in Japan.

TOKYO—with at least 36 hikers presumed dead, the eruption at Mount Ontake serves as a grim reminder of the challenges involved in predicting volcanic explosions.

Toxic fumes and volcanic tremors stalled rescue workers' efforts Tuesday to search for survivors and retrieve bodies from the mountain after an unexpected eruption on Saturday trapped climbers and spewed ash over a wide area.

The Japan Meteorological Agency warned rescue squads Tuesday morning that volcanic tremors close in intensity to those observed following the eruption were being recorded, raising fears of a fresh explosion. But while similar tremors were first recorded around 10 minutes before the deadly eruption at 11:52 a.m. on Saturday, the agency said there was little else that indicated the onset of an eruption of this scale.

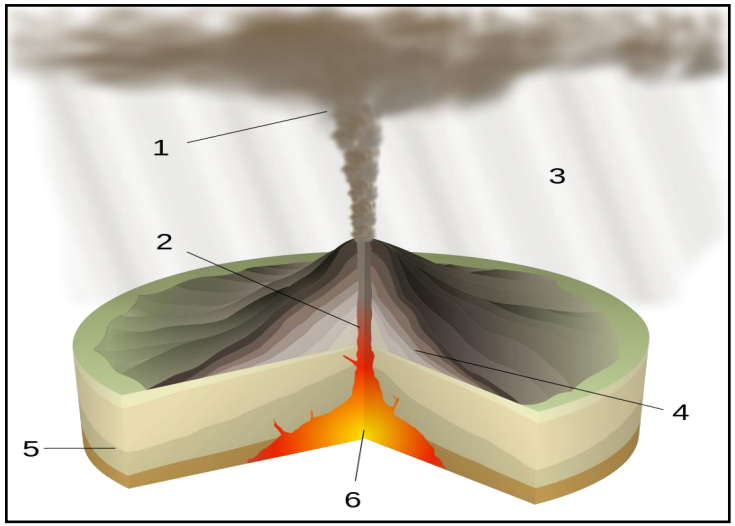
By the time the agency raised the alert level on a scale of five for Mount Ontake from one to three, which restricts entry to the mountain, it was 12:36 p.m., 44 minutes after the eruption sent plumes of toxic volcanic ash and rock into the air and hikers running for their lives.

With 36 people presumed dead and possibly more hidden under the ashes, the eruption is the deadliest in Japan since 43 lives were claimed during the 1991 eruption of Mount Unzen in the southern Nagasaki prefecture. Located in the so-called Pacific Ring of Fire, Japan has 110 active volcanoes, and has recorded nine major eruptions in the past 25 years. *Sourced from:* http://online.wsj.com/.

6.3.1 This volcano lies on the Pacific Ring of Fire. Briefly explain what this is. (1 x 2) (2)

6.3.2 Explain why the fumes escaping the volcano are described as toxic. (1 x 2) (2)

6.4 FIGURE 6.4 is a Structure of a Volcano



6.4.1 Explain what is an *active volcano*? (1)
(1 x 1)

6.4.2 Identify the volcano in FIGURE 1.3 as a cinder cone or composite volcano? Give a reason for your answer. (1 + 2) (3)

6.4.3 Identify labels **1** and **4.** (2)
(2 x 1)

6.4.4 Describe how a caldera is formed. (2)
(1 x 2)

6.4.5 In a paragraph of approximately EIGHT lines, discuss the socio-economic effects of volcanoes in developing countries. (8)

6.3.3	Despite the existence of these active volcanoes, people have still settled on the Japanese Islands. Report on **TWO** advantages that people experience as a result of these volcanoes. (2 x 2) (4)	(4 x 2)
6.3.4	Discuss in a paragraph of no more than EIGHT lines, the negative impacts that this volcanic eruption will have on the surrounding settlements. (4 x 2) (8)	

6.5 Study the case study below.
ETNA DISCOVERY

8-days hiking & study tour on Mt. Etna volcano, Italy
...I highly recommend this trip. (Giannella G., USA, about the Etna Discovery tour)
"Hi, Irina,

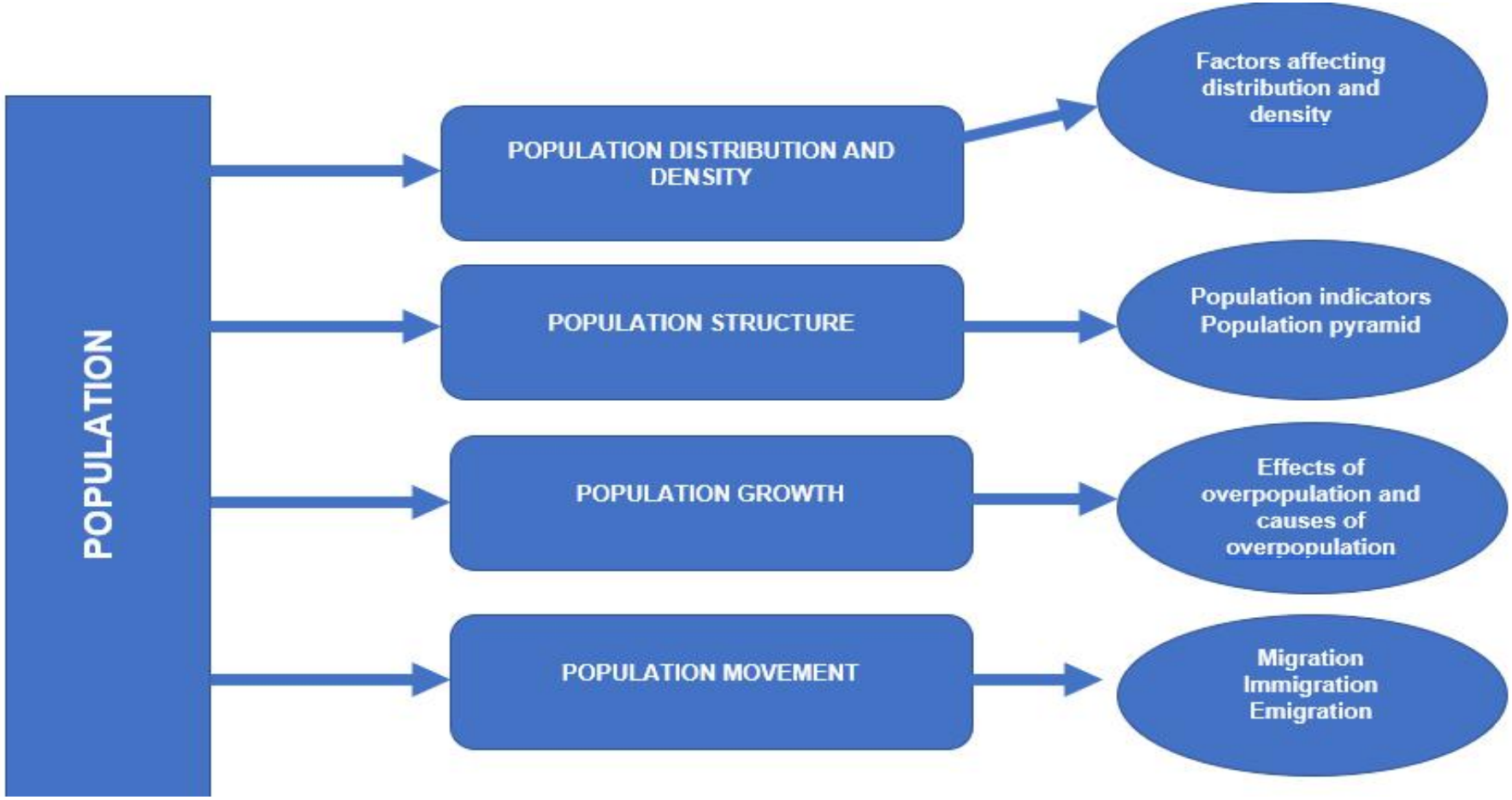
Here is a short testimonial about my wonderful Mt. Etna experience:

I took Volcano Adventure's "Etna Discovery" trekking excursion May 2019. Months later, I am still smiling over the great views, unexpected hornito eruption and excellent guiding by volcanologist, Evelyne Pradal. Each day we covered a new area, exploring the stunning diversity of Etna's slopes — beech forests, tube caves, scorched lava sands, ropey pahoehoe, a stunning ash valley, and so much more. Pradal knows Etna well, having led many groups there over the years. She and the local guides who accompanied us daily shared fascinating information about the history of the volcano and its lava flows. We stayed at a comfortable, rustic lodge, where every night after a hot shower and before dinner, we sat in front of a cozy fireplace discussing the day's experiences over wine. We trekked

6.5.1	What is volcanologist?	(1 x 1)	(1)
6.5.2	What excursion do we read about in the extract?	(1 x 1)	(1)
6.5.3	Volcanoes can be destructive in nature. Mention TWO Positive impacts, volcanoes can provide to the people of the area where it has occurred.	(2 x 2)	(4)
6.5.4	What is the difference between Magma and Lava.	(2 x 1)	(2)
6.5.5	Indicate dangers volcanoes can bring to the environment of an area	(2 x 2)	(4)
6.5.6	The volcanologist describes eco-tourist destinations which developed because of volcanic activity. Identify THREE of these destinations that is referred to in the article.	(3 x 2)	(6)

anywhere from three to six hours per day and spent one rest day visiting the lovely town of Taormina, a Norman castle built on top of a hydromagma volcano, and Gola Alcantara, a river canyon with spectacular, columnar lava formations. I highly recommend this trip. In fact, I enjoyed it so much that I plan to do it again next year! Here is the link to my Erta Ale article. Best regards, Giannella" (Giannella G., USA, about the Etna Discovery tour)	

POPULATION GEOGRAPHY

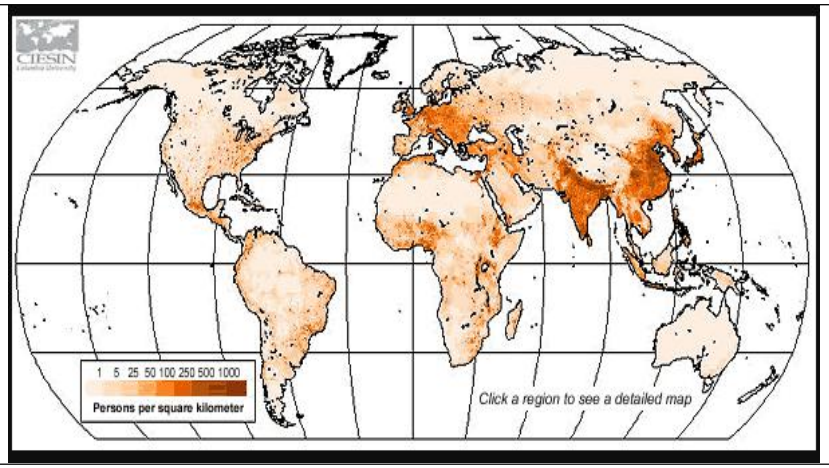


TERMINOLOGY

Population distribution	The arrangement or spread of people living in a given area.

Population density	The measurement of how many people there are in an area.
Sparsely populated	Containing few people.
Densely populated	Containing many people.
Human factors	That affect population density include social, political, and economic factors.
Physical factors	That affect population density include water supply, climate, relief (shape of the land), vegetation, soils and availability of natural resources and energy.
Population indicators	Different measurements which give information about a country's population characteristics.
Birth rate	the number of babies born per 1000 of the population per year.
Death rate	number of deaths per 1000 of the population per year.
Life expectancy	average number of years a person can expect to live
Infant Mortality Rate:	the number of infant deaths per 1000 live births
Natural increase	the rate at which a country's population is growing.
Fertility rate	the average number of children an average woman would have if she were to live to the end of her childbearing years.
Literacy rate	the percentage of the total population who can read and write.
GDP per capita	the gross domestic product per person.
Population structure	how a country's population is made up.
Population pyramid	a type of a graph showing a country's population according to age groups and gender
Dependency ratio	a population indicator which shows how many people in a country need to be supported because they are not economically active.
Zero population growth	when a population remains stable where the number of births and immigrants is equivalent to that of deaths and emigrants.
Population growth	the increase in the number of people in a population
Exponential growth	ever more rapid growth of a population over a short period of time
Contraception	method of birth control
Sterilisation	a permanent form of contraception
One child policy	strategy to control birth rate
Migration	the movement of people from one place to another
Genocide	the deliberate killing of people from a certain ethnic group or nation
Voluntary migration	when a person chooses to migrate.
Forced migration	when a person is forced to migrate because of religion or political factors etc.

TOPIC: POPULATION DISTRIBUTION AND DENSITY	
• World population distribution is uneven. Places which are sparsely populated contain few people. Places which are densely populated contain many people. • Sparsely populated places tend to be difficult places to live. These are usually places with hostile environments e.g. Antarctica. Places which are densely populated are habitable environments e.g. Europe.	• **Population density** is a measurement of the number of people in an area. It is an average number. Population density is calculated by dividing the number of people by area. • Population density is usually shown as the number of people per square kilometre. The map below is a choropleth (shading) map and illustrates population density. The darker the colour the greater the population density.
International migration	movement of people across a country's boarders
Emigration	movement of people out of their home country to another country
Immigration	movement of people into a new country of residence
Regional migration	movement of people within a region
Urbanisation	process by which an increasing percentage of the world's population live in urban areas.
Globalisation	the integration and connection of countries
Rural-urban migration	movement of people from farms to cities
Depopulation	a decline in the number of people living in an area.
Push factors	factors that force people to leave rural areas.
Pull factors	factors that draw people to urban areas.
Centrifugal forces	forces that cause people to leave rural areas.
Centripetal forces	forces that attract people to urban areas.
Migrant worker	a person who migrates specifically to find work.
Economic migrant	a migrant worker
Political migrant	a person who migrates for political reasons

• The population of the world is now over 7 billion people, the vast majority of whom live in the developing world. • The world's population is spread unevenly across the globe with concentrations of large numbers of people living in the same area. • The world as a whole has more 'empty' areas than 'crowded' areas. There are several physical and human factors to explain this.	
	• The map above shows that world population distribution is uneven. Some areas have a high population density while others have a low population density. Areas of high population density tend to be located between 20° and 60°N. This area contains a large land area and a relatively temperate climate.

ACTIVITIES: POPULATION DISTRIBUTION AND DENSITY

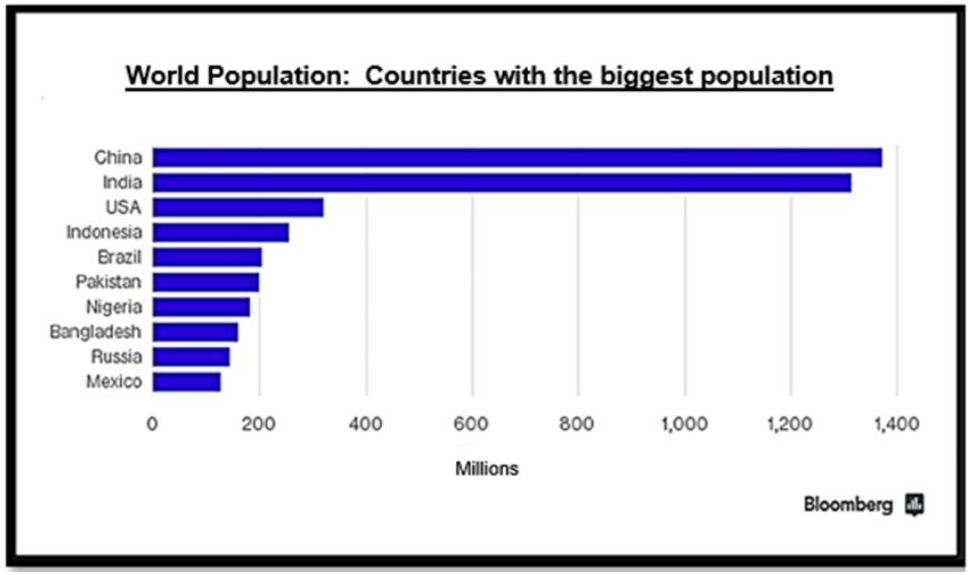
ACTIVITY 1	ACTIVITY 2
1.1 Give ONE word/term for each of the following descriptions by choosing a word/term from the list below. Write only the word/term next to the question number population distribution; population density; census; literacy rate; 'brain drain'; life expectancy; birth rate; infant mortality; death rate	1.2 Study FIGURE 1.2 that shows the World

(1.1.1–1.1.8) in the ANSWER BOOK.

1.1.1 The number of people that live per square kilometre.
1.1.2 The percentage of people that can read and write.
1.1.3 The loss of professional people from a country.
1.1.4 Shows the spread of people over an area.
1.1.5 The number of children that die per 1 000 people of the population.
1.1.6 The average number of years that a person is expected to live.
1.1.7 A survey done to count all the people that live in a country.
1.1.8 The total number of live births per 1 000 people of the population.

(8X1) (8)

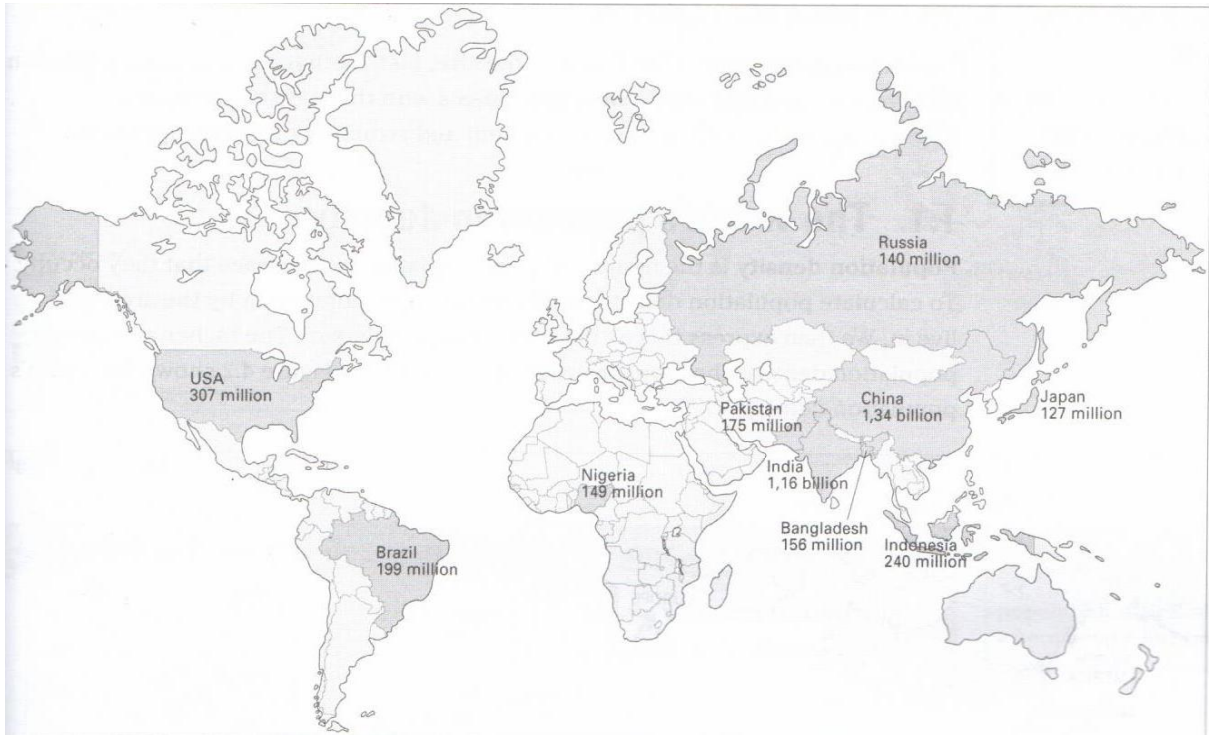
population and answer the following questions.



1.2.1 Explain the difference between developed and developing countries. (2X2) (4)
1.2.2 Name the country from FIGURE 1.2 that can be seen as the most developed country. (1X2) (2)
1.2.3 Identify the amount of people (in millions) that constitutes the population of the country mentioned in QUESTION 1.2.2? (1X2) (2)
1.2.4 Identify the TWO countries in FIGURE 1.2 with the largest population? (2X1) (2)
1.2.5 Describe TWO physical factors that would contribute to the high population in the countries as mentioned in QUESTION 1.2.4. (2X2) (4)

ACTIVITY 3

1.3 Study the map and answer the questions. (Source: Focus Geography Grade 10)



1.3.1 The map shows ten countries with their population figures. Arrange these countries from the most populous to the least populous. (10x1) (10)

1.3.2 On which continent are most of these countries? (1x1) (1)

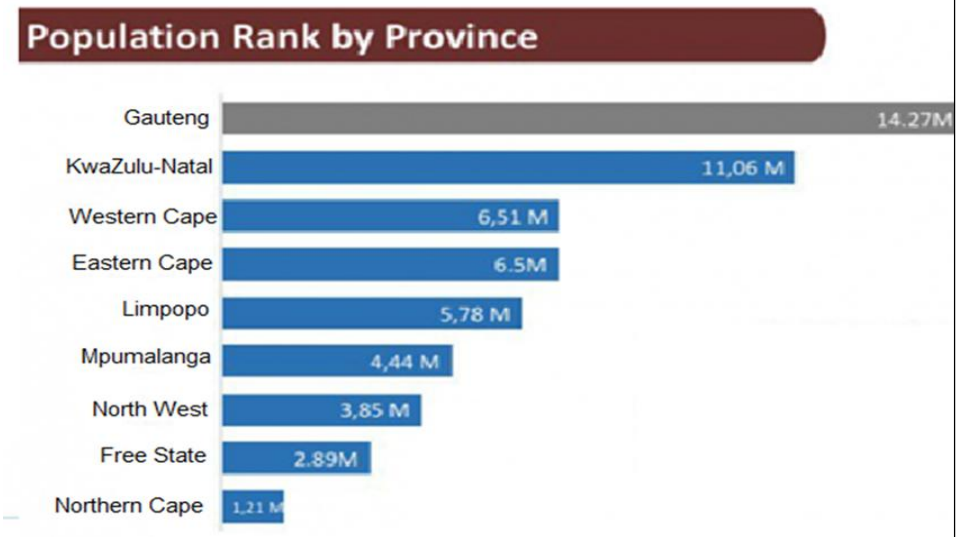
1.3.3 Calculate the total population of Japan, Bangladesh and Indonesia. (1x1) (1)

1.3.4 Which country of the ten has the smallest area? (1x1) (1)

1.3.5 Do you think a population map for 2020 will look the same as this one? Explain your answer. (1x2) (2)

ACTIVITY 4

1.4 Refer to FIGURE 1.4 showing the 2017 population distribution in South Africa



1.4.1 Define the term Urbanisation. (1x1) (1)

1.4.2 Name the province with the smallest population. (1x1) (1)

1.4.3 Which is the most populated province in South Africa? (1x1) (1)

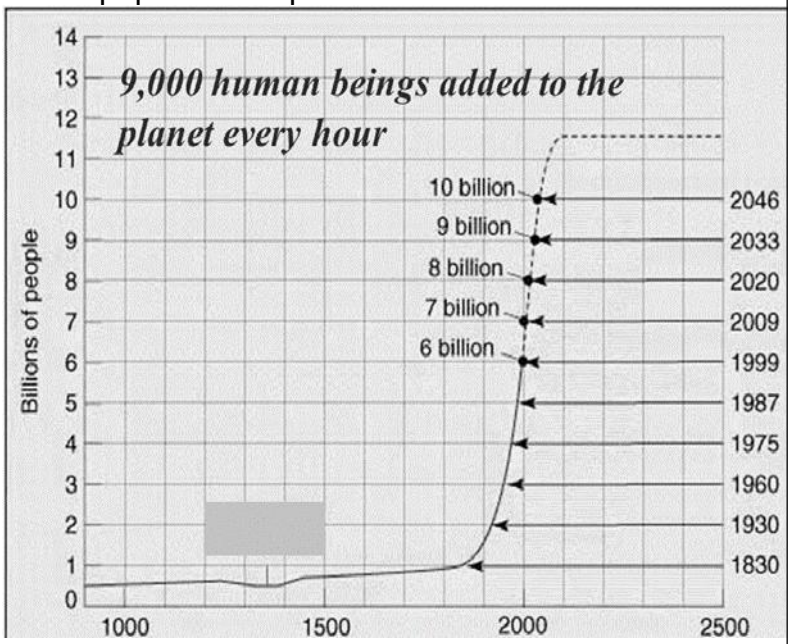
1.4.4 Provide **TWO** reasons for the high population in the province named in question 1.4.3. (1x1) (2)

1.4.5 Based on the data from the graph, what is the total population of South Africa? (1x2) (2)

1.4.6 In a paragraph of not more than 8 lines discuss the push factors Or conditions forcing people to leave rural areas. (4x2) (8)

ACTIVITY 5

1.5 Refer to FIGURE 1.5 showing world population explosion



1.5.1 Define the term population explosion. (1x1) (1)

1.5.2 How many billions of people were there in 1975? (1x1) (1)

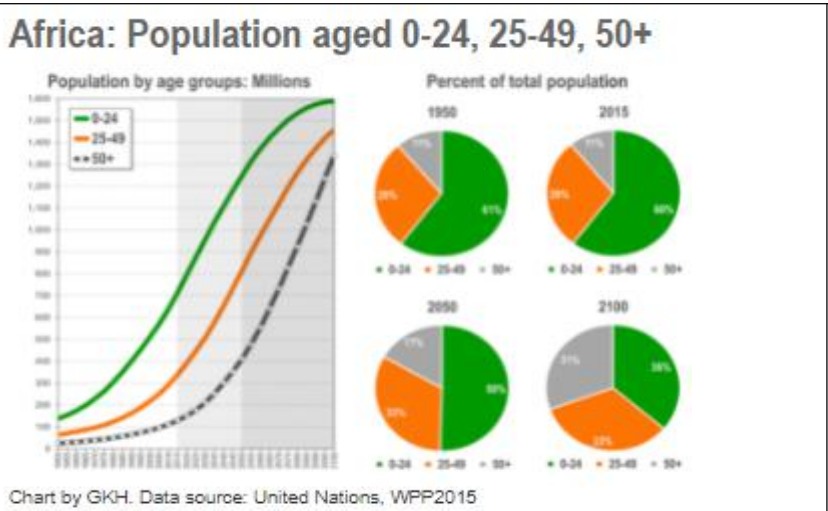
1.5.3 How many billions of people increased between 2020 and 2033? (1x1) (1)

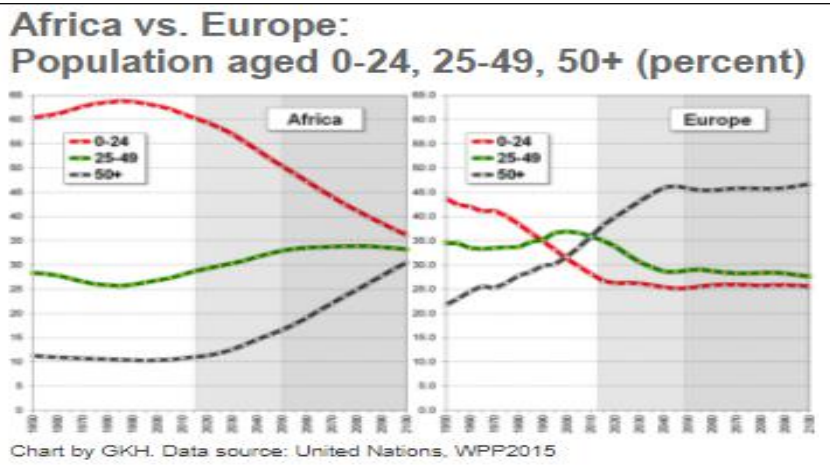
1.5.4 Which year shows the highest population in the world? (1x1) (1)

1.5.5 Predict the number of people in 10 years from

	2046?	(1x1) (1)

TOPIC: POPULATION STRUCTURE	
• Studying the population structure of a country can involve examining different characteristics including age, gender, fertility (birth rates expressed as the number of babies born per 1000 people), mortality (number of deaths per 1000 people) and migration. • The population of a country is made up of different groups including the youth and elderly population, which together are known as dependents. The working population consist of people who are of working age and are economically active. The dependency ratio is the proportion of dependent people to the working population.	• Some countries have a large youth population because birth rates are high, infant mortality is low and sanitation may be improving. However, those with a small youth population may have low birth rates due to lifestyle changes as children become more expensive and young people are more career-focussed. • Countries with a high elderly population often have better health care leading to longer life expectancy. However, those with a small elderly population typically have poor healthcare provision and therefore a shorter life expectancy.





An ageing population

A country with an ageing population (an increasing proportion of elderly people) can experience a number of problems. These include:

- fewer workers to support the financial demands of an ageing population.
- greater pressure on health and social care services
- increased expense from pension claims, that can lead to tax increases to meet the demand.

- a higher dependency ratio

Large youthful population

A country with a large youthful population can experience a

Small youthful population

A country with a small youthful population can experience a number of problems including:

- the potential for population decline

- fewer future consumers and taxpayers which can impact economic development.

number of problems including: • increased pressure on education, nursing and healthcare services • increased dependency ration • increased tax rates to fund the demand for services.	

ACTIVITIES: POPULATION STRUCTURE

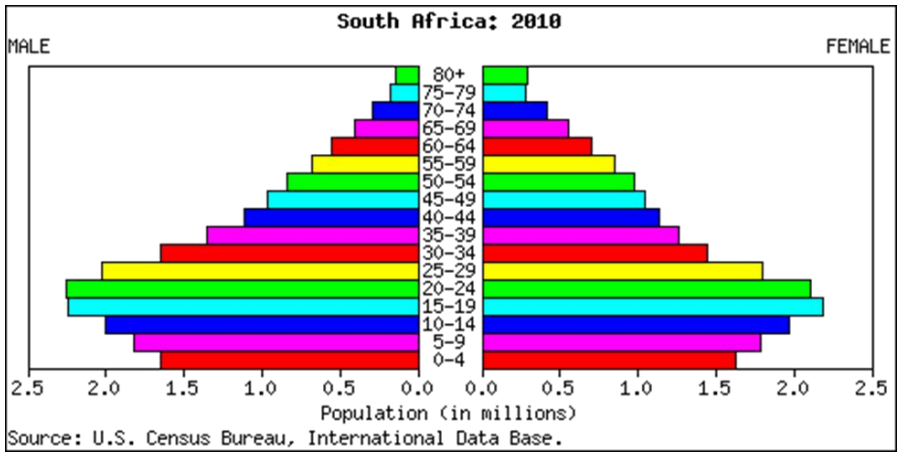
ACTIVITY 6

2.1 Match the following items in COLUMN A with the correct definition in COLUMN B. Write only the number and letter e.g. 2.1.1 M

COLUMN A	COLUMN B
2.1.1 GDP per capita 2.1.2 Natural increase 2.1.3 Life expectancy 2.1.4 Fertility rate 2.1.5 Birth rate 2.1.6 Literacy rate 2.1.7 Death rate	A. Number of babies born per 1000 of the population per year. B. The gross domestic product per person. C. The number of deaths per year per 1000 of the population. D. The rate at which a country's population is growing. E. The average number of children an average woman would have if she were to live to the end of her child-bearing years. F. The average number of years a person can expect to live.

ACTIVITY 7

2.2 Study the population pyramid FIGURE 2.2 for South Africa based on 2014 statistics.



2.2.1 Describe the shape of the population pyramid. (1x2) (2)
2.2.2 Which age group makes up the largest portion of South Africa's population? (1x2) (2)
2.2.3 Which gender lives longer in South Africa? (1x2) (2)
2.2.4 The birth rate in South Africa has dropped over the last decade. Give reasons for the reduction in the birth rate. (2x2) (4)
2.2.5 Define the term dependency ratio. (1x1) (1)
2.2.6 Is South Africa's dependency ratio high or low? (1x2) (2)

ACTIVITY 9

2.4 Refer to FIGURE 2.4 showing population pyramid of

	G. The percentage of the total population who can read and write.

ACTIVITY 8

2.3 Study the population pyramid FIGURE 2.3 (a) and 2.3 (b).

Figure 2.3 A

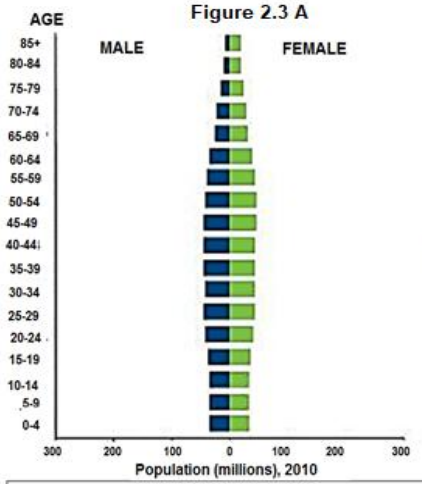
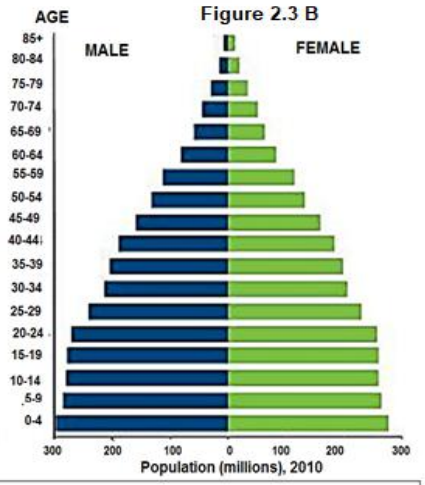


Figure 2.3 B

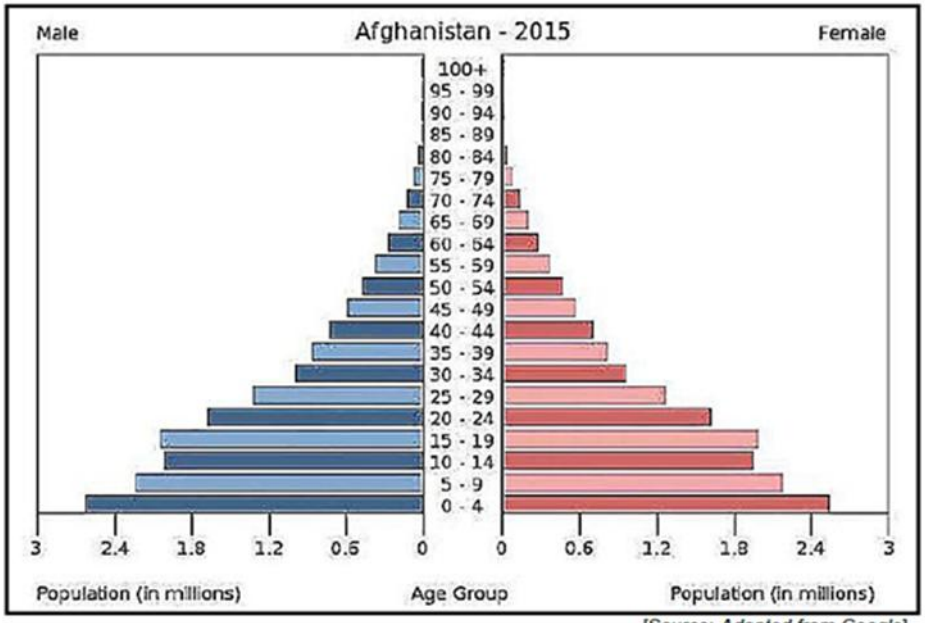


Bron: UN Population Division, *World Population Prospects: The 2008 Revision* (2009)

2.3.1 Identify the type of population pyramid that is illustrated respectively in FIGURE 2.3 (a) and FIGURE 2.3 (b) as a developed or a developing country. (2x2) (4)

2.3.2 Which age groups according to FIGURE 2.3 (a) and FIGURE 2.3 (b) would represent the following

Afghanistan (2015).



[Source: *Adapted from Google*]

2.4.1 Use the population pyramid to determine the following:
(a) Number of males aged 25 to 29 years (1x1) (1)
(b) Number of females aged 45 to 49 years (1x1) (1)
(c) Total number of people aged 0 to 4 years (1x1) (1)

2.4.2 Identify the age group that makes up the biggest portion of the total population. (1x1) (1)

2.4.3 Would you classify Afghanistan as a developing or developed country (1x1) (1)

2.4.4 Provide ONE piece of evidence from the pyramid to support your answer in QUESTION 2.4.3. (1x2) (2)

2.4.5 In a paragraph of approximately EIGTH lines, describe

economic status in a population pyramid:
a. Youth dependants
b. Elderly dependants
c. Economic active population (3x1) (3)

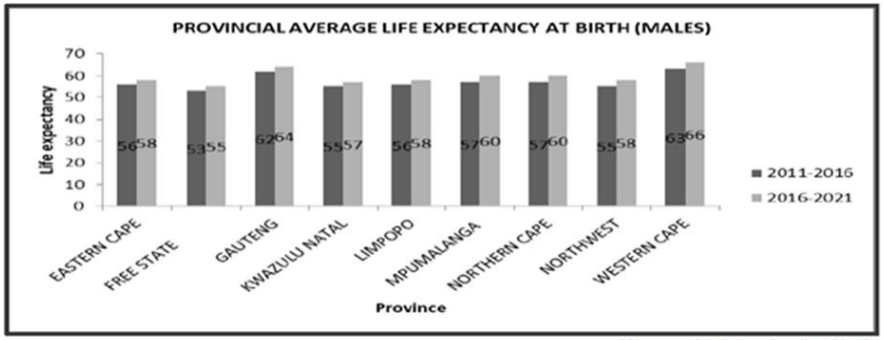
2.3.3 Which population pyramid FIGURE 2.3 (a) or FIGURE 2.3 (b) would represent South Africa's population? (1x1) (1)

2.3.4 Write a paragraph of approximately 8 lines discussing the population characteristics of a developed country. Refer to the birth rate, death rate, dependency ratio and education of the population. (4x2) (8)

negative effects of overpopulation in a country such as Afghanistan. (4x2) (8)

ACTIVITY 10

2.5 Study FIGURE 2.5 showing provincial average life expectancy.



[Source: Statistics South Africa]

2.5.1 Define the term life expectancy. (1x1) (1)

2.5.2 Which province has respectively the lowest and highest life expectancy between 2011–2016? (2x1) (2)

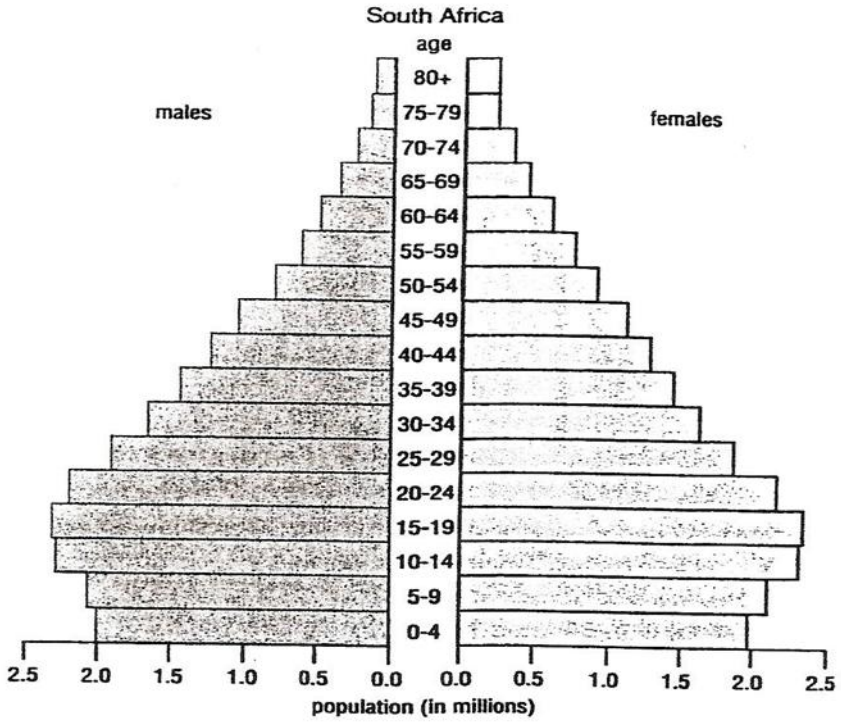
2.5.3 Compare the life expectancy for the years 2011–2016 with 2016–2021. (1x2) (2)

2.5.4 Explain TWO factors that can decrease life expectancy among males. (2x2) (4)

2.5.5 Discuss THREE ways to advise males to improve life expectancy. (3x2) (6)

ACTIVITY 11

2.6 Study FIGURE 2.6 showing population pyramids.



2.6.1 How many males are aged 15 - 19? (1x2) (2)

2.6.2 How many females are aged 15 - 19? (1x2) (2)

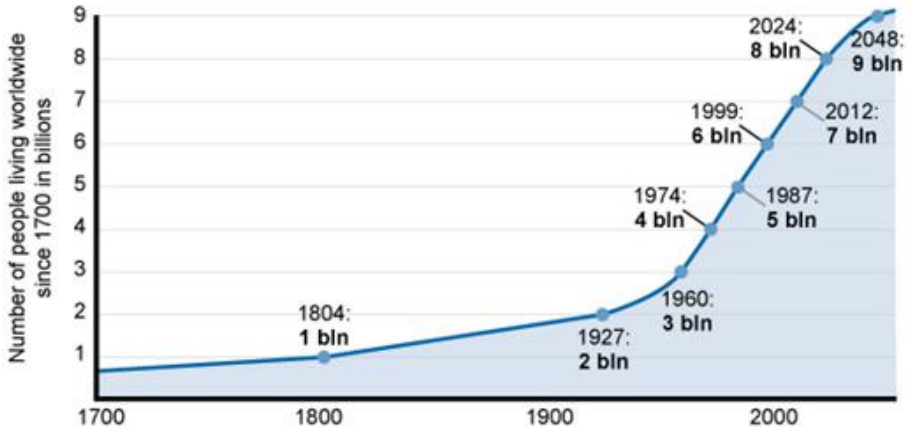
2.6.3 Which age group makes up the largest number of the total Population? (1x2) (2)

2.6.4 How many people (male and female) are aged 60 and over? (1x2) (2)

2.6.5 How many people (male and female) are under 15 years old? (1x2) (2)

2.6.6 Classify the shape of the pyramid. (1x2) (2)

TOPIC: POPULATION GROWTH



- Overpopulation is an undesirable condition where the number of the existing human population exceeds the actual carrying capacity of Earth. Overpopulation is caused by a number of factors. Reduced mortality rate, better medical facilities, depletion of precious resources are few of the causes which result in overpopulation. It is possible for a sparsely populated area to become densely populated if it is not able to sustain life.

- Population growth (positive or negative) is caused exclusively by the operation of fertility, mortality, and migration. Regarding the population growth of countries and other national populations, the effect of migration is normally not as influential as the effects of fertility and mortality, usually considered to be the major factors directly causing national population growth.
- Population growth can also lead to a rising demand for food. Problems of instability in food production are particularly difficult for some developing countries with high population growth rates and low technological changes in agriculture.

- An increasing number of people in the population leads to pressures on land resources, which limits the amount of arable agricultural land and tends to worsen the situation of food supply and human reproduction.

- Furthermore, a high rate of population growth is likely to increase population density in certain geographic areas, particularly urban settings. As a result, overcrowding, unemployment, and poverty are likely to lead to social problems in some localities.

CAUSES OF OVERPOPULATION

- Decline in the Death Rate:

The fall in death rates that is decline in mortality rate is one fundamental causes of overpopulation. Owing to the advancements in medicine, man has found cures to the previously fatal diseases. The new inventions in medicine have brought in treatments for most of the dreadful diseases.

- Rise in the Birth Rate:

Thanks to the new discoveries in nutritional science, we have been able to bring in increase in the fertility rates of human beings. Medicines of today can boost the reproductive rate in human beings.

- Migration:

Immigration is a problem in some parts of the world. If the inhabitants of various countries migrate to a particular part of the world and settle over there, the area is bound to suffer from the ill effects of overpopulation

Migrants who have just crossed the border from Serbia into Hungary walk along a railway track in August 2015 near Szeged, Hungary. Photo by Matt Cardy/Getty Images

- Lack of Education:

Illiteracy is another important cause of overpopulation. Those lacking education fail to understand the need to prevent excessive growth of population. They are unable to understand the harmful effects that overpopulation has.

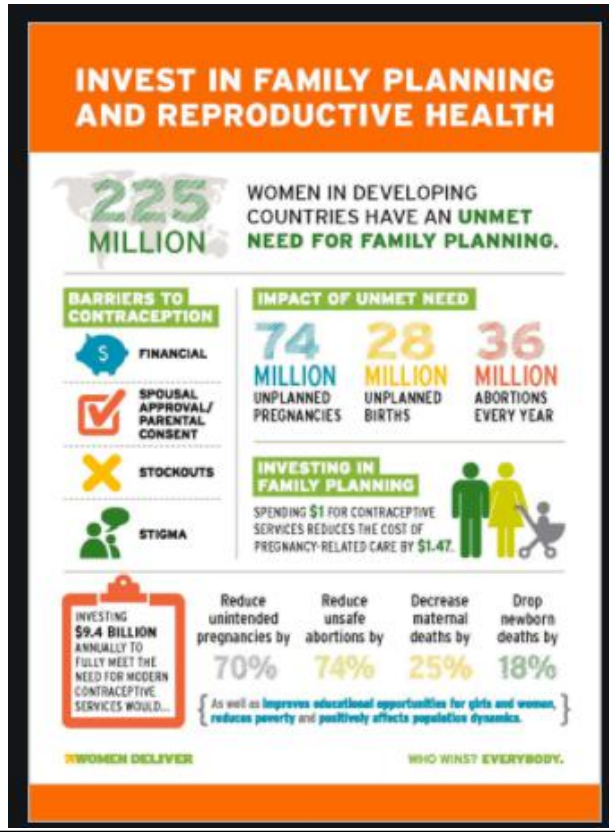
SOLUTIONS TO OVERPOPULATION

- Better Education

One of the first measures is to implement policies reflecting social change. Educating the masses helps them understand the need to have one or two children at the most.

- Making People Aware of Family Planning

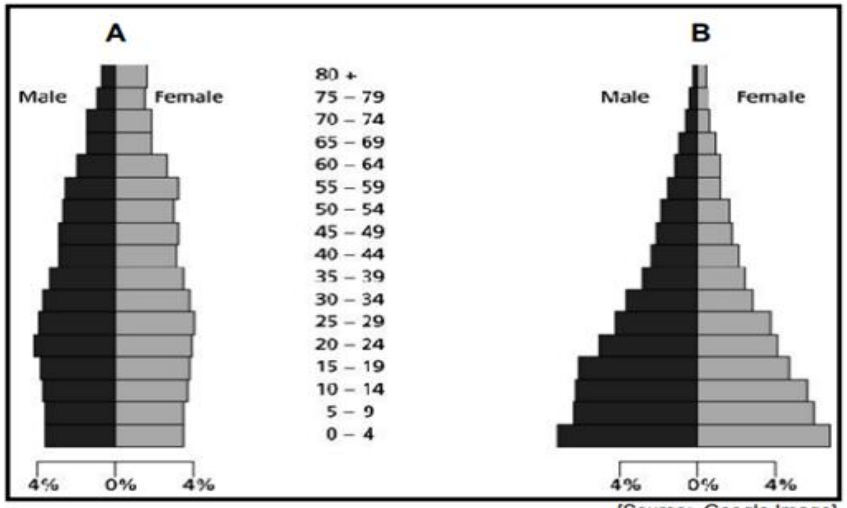
As the population of this world is growing at a rapid pace, raising awareness among people regarding family planning and letting them know about serious after-effects of overpopulation can help curb population growth.



ACTIVITIES: POPULATION GROWTH

ACTIVITY 12

3.1 Study the two population pyramids in FIGURE 3.1. They represent two different countries. Indicate which pyramid, A or B, is referred to in each of the descriptions below.



[Source: Google Image]

3.1.1 The country with high birth and death rates (1X1) (1)
3.1.2 The country showing a slow population growth. (1X1) (1)
3.1.3 A triangular population pyramid (1X1) (1)
3.1.4 The country with a high life expectancy (1X1) (1)
3.1.5 The country with many young people (1X1) (1)
3.1.6 The country with many adults (1X1) (1)
3.1.7 The country with a high life expectancy for females older than 80 years (1X1) (1)

ACTIVITY 13

3.2 Study FIGURE 3.2 on population growth.

There is 800 000 more people in South Africa in 2016…

July Mc Lennon, July 1, 2016

South Africa has had a population growth of 800 000 people according to Statistics South Africa. This means that the population has grown with more than 15 million people from 1996.

Statistics South Africa released a community study in 2016 where it shown that the country's population reached a total of 55.7 million people. This growth from 2001 took place as follows:

- 2001: 44.8 million
- 2011: 51.8 million
- 2015: 54.9 million
- 2016: 55.7 million

Gauteng with 13.4 million people has the highest population and KwaZulu-Natal with 11.1 million people came second. Then the Eastern Cape with 7 million people and lastly the Western Cape with 6.3 million people.

The greatest increase in the population was the age group between 5 – 9 years old with a growth from 4.8 million in 2011 to 5.6 million in 2016.

3.2.1 What was South Africa's population in 2001? (1 x 1) (1)
3.2.2 Which province has the highest population and how many people live there? (2 x 1) (2)
3.2.3 Give TWO reasons why the greatest population increase was in the age group between 5 – 9 years old. (2 x 2) (4)
3.2.4 Discuss THREE negative impacts that the increased population growth has on the infrastructure in South Africa.

ACTIVITY 14

3.3 Refer to FIGURE 3.3 that shows the population characteristics of Brazil.

[Source: Google Image]

3.3.1 Is Brazil a developed or developing country? (1 x 2) (2)

3.3.2 Give ONE reason for your answer to QUESTION 3.3.1. (1 x 2) (2)

3.3.3 Give TWO possible reasons for the high birth rate in (3 x 2) (6)

3.2.5 Give ONE suggestion how South Africa can improve control of population growth in the future. (1 x 1) (1)

ACTIVITY 15

3.4 Refer to FIGURE 3.4 showing population increase in South Africa.

There are 800 000 more people in South Africa in 2016

July McLennon, July 1, 2016

South Africa had a population growth of 800 000 people according to Statistics South Africa. This means that the population has grown with more than 15 million people from 1996.

Statistics South Africa released a community study in 2016 where it was shown that the country's population reached a total of 55,7 million people. This growth from 2001 took place as follows:

- 2002 – 44,8 million
- 2011 – 51,8 million
- 2015 – 54,9 million

Gauteng with 13,4 million people has the highest population and KwaZulu-Natal with 11,1 million people came second. Then the Eastern Cape with 7 million people and lastly the Western Cape with 6,3 million people.

The greatest increase in the population was the age group between 5–9 years old with a growth from 4,8 million in 2016.

[Adapted from Google]

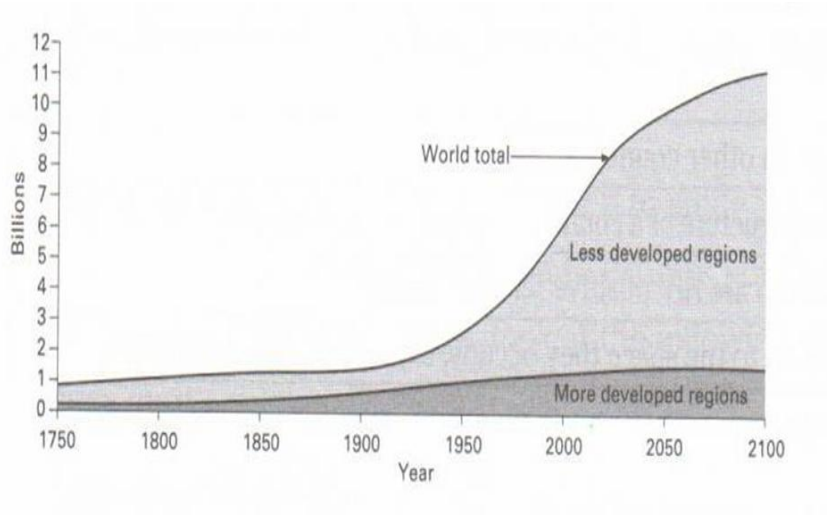
3.4.1 Define the term population. (1 x 1) (1)

3.4.2 What was South Africa's population in 2001 and 2015 respectively? (2 x 1) (2)

3.4.3 Name the province with the lowest population and the number of people living in this province. (2 x 1) (2)

3.4.4 Comment on the trend from 2001 to 2016 in the article

Brazil. (2 x 2) (4) 3.3.4 Discuss the negative impact of a rapid population growth rate on Brazil. (2 x 2) (4) 3.3.5 Suggest TWO methods that Brazil can use to reduce the rapid population growth in their country. (2 x 2) (4)	regarding the population of South Africa. (1 x 2) (2) 3.4.5 Discuss TWO negative impacts that the increased population growth has shown on the natural resources of the country. (2 x 2) (4) 3.4.6 Suggest any TWO strategies that can be put in place to manage the population growth in South Africa. (2 x 2) (4)

ACTIVITY 16 3.5 Study the graph showing global population growth from 1750 to 2100 and answer the questions. (Source: Focus Geography Grade 10)  3.5.1 Describe the growth in total world population from	**ACTIVITY 17** 3.6 Study FIGURE 3.6 showing population explosion.  3.6.1 Do you agree with the comment that the dog has

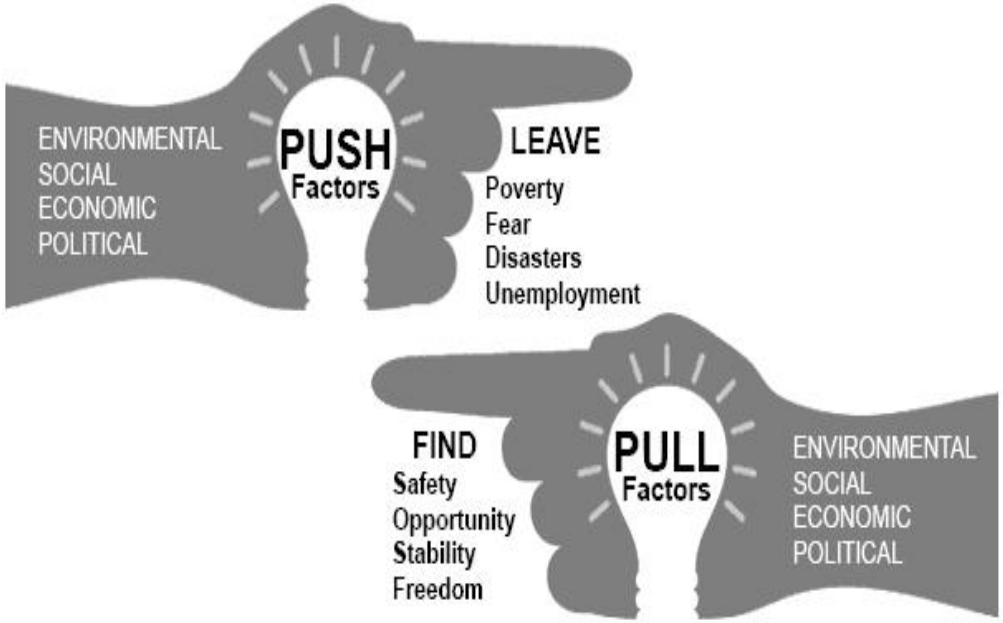
1750 to around 1950. 3.5.2 Describe the total world population growth from 1950 to today. 3.5.3 Compare the population growth in less developed countries with the population growth in more developed countries. (2x2) (4) 3.5.4 Determine the total world population according to the graph for 2015.	made? (1 x 2) (2) 3.6.2 Give evidence from the cartoon to motivate the comment of the dog in 1.6.1. (1 x 2) (2) 3.6.3 Write a paragraph of 10 lines and explain the challenges that this 'population explosion' could have on this lady in the future. (8 x 1) (8)

TOPIC: POPULATION MOVEMENTS	
• The movement of people from place to place is referred to as migration. These people are called migrants. There are many different types of migration. • Migration refers to the movement of people from one country to another. • Migration can be classified into different categories. Immigration is the movement of people into a country. Emigration is the movement of people out of a country. Rural - urban migration is the movement from rural to urban areas. • International migration is controlled by governments. They may encourage or discourage migration into their country. Illegal migrants can be returned to their country of origin (deported)	Factors which influence migration • Social factors – the desire to live a better life, housing, environment, improved living conditions, improved services, facilities, activities, relationships. • Political factors – people move because they are unhappy with the political system, mainly a push factor. • Economic factors – seeking a better job from business or industry. • Religious factors – people may move to avoid being persecuted because of their religion. Move to where they can practise their religious beliefs. • Physical factors – people may move to avoid physical dangers, a harsh climate or infertile soil. • Attitudes to refugees and immigrants (xenophobia) Negative attitudes towards immigrants are attributed to various factors: • Refugees are people who have been forced to leave their home country because of war, persecution or natural disaster.

- Reasons for migrations

  Pull factors: Favourable conditions that attract people to another area. Lead to spontaneous population movements.

  Push factors: Unfavourable conditions that discourage people from remaining in an area. Lead to forced migrations.



Pull factors:

- Better physical environment
- The lure of foreign lands
- Better communication links
- Better economic opportunities

Push factors:

- Political Unrest
- Racial discrimination
- Religious persecution
- Revolutions and wars
- Unfavourable physical environment
- Industrial and scientific revolutions

EFFECTS OF POPULATION MOVEMENTS

POSITIVES	NEGATIVES
• People who enter the country have specialized skills and the new country benefits from the added skills of the immigrants. • People who leave rural areas send money to people remaining behind. The economic prosperity is thereby increased and distributed. • The new country receives cultural influences that enhance the country e.g. the influence of the Malayan people, the Dutch; British Settlers.	• People who leave the country are highly skilled and well educated. This means a loss of developmental possibilities of the country of origin. • The people who move may be exploited at the new place. • They have left all possessions behind. • Families are separated from each other.

ACTIVITIES: POPULATION MOVEMENTS

ACTIVITY 18

4.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question number (4.1.1–4.1.7) in the ANSWER BOOK, for example, 4.1.8 D.

4.1.1 A person who migrates for political reasons is called a …
A political migrant.
B economic migrant.
C socio-economic migrant.
D social emigrant.

4.1.2 A sum of money sent by a worker to their families back home is …
A tax.
B remittance payment.
C black tax.
D pocket money.

4.1.3 A person who visits a place for the purpose of taking a holiday is a(n) …
A migrant worker.
B tourist.
C refugee.

D assailant.

4.1.4 A(n) … is an undocumented migrant.
A legal migrant
B migrant labour
C economic migrant
D illegal migrant

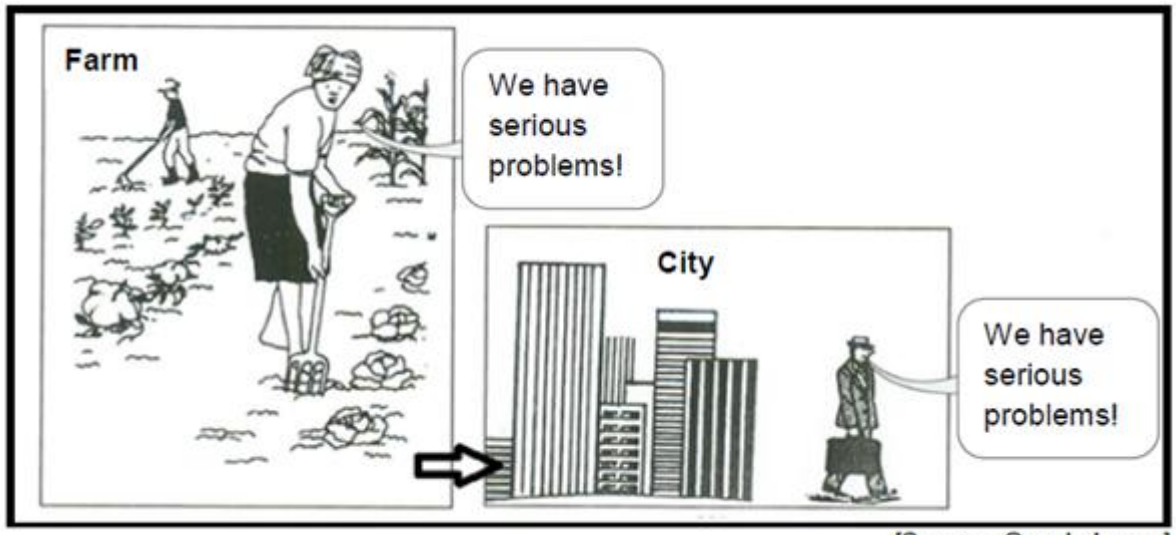
4.1.5 Which of the following can be used to control a high birth rate?
A Polygamy
B Migration
C Contraception
D Polyandry

4.1.6 A graph showing a country's population according to age groups and gender is called …
A population distribution.
B population density.
C population geography.
D population pyramid.

4.1.7 …occurs when there more people than available resources.
A Under-population
B Over-population
C Optimum population
D Even population (7 x 1) (7)

ACTIVITY 19

4.2 Refer to FIGURE 4.2.



[Source: Google Image]

4.2.1 Identify the type of migration taking place in FIGURE 3.4. (1 x 2) (2)
4.2.2 Name TWO push factors resulting in people leaving their farms. (2 x 2) (4)
4.2.3 State TWO problems experienced by a city as a result of people moving there. (2 x 2) (4)
4.2.4 Discuss TWO methods that can be used to reduce the number of people who leave their farms. (2 x 2) (4)

ACTIVITY 20

4.3 Read the excerpt below and answer the questions that follow.

REFUGEES FLEE SA ATTACKS

John left Zimbabwe hoping for sanctuary in South Africa. Now he fears for his life. 'I left home to try and support my family. But it is better to starve at home than to die here.' A mob had attacked him in Johannesburg. They took all his belongings.

4.3.1 Explain the meaning of the following terms:

(a) Refugee (1 x 2) (2)

(b) Xenophobia (1 x 2) (2)

4.3.2 Name any ONE other African country (excluding Zimbabwe) from where South Africa attracts refugees. (1 x 2) (2)

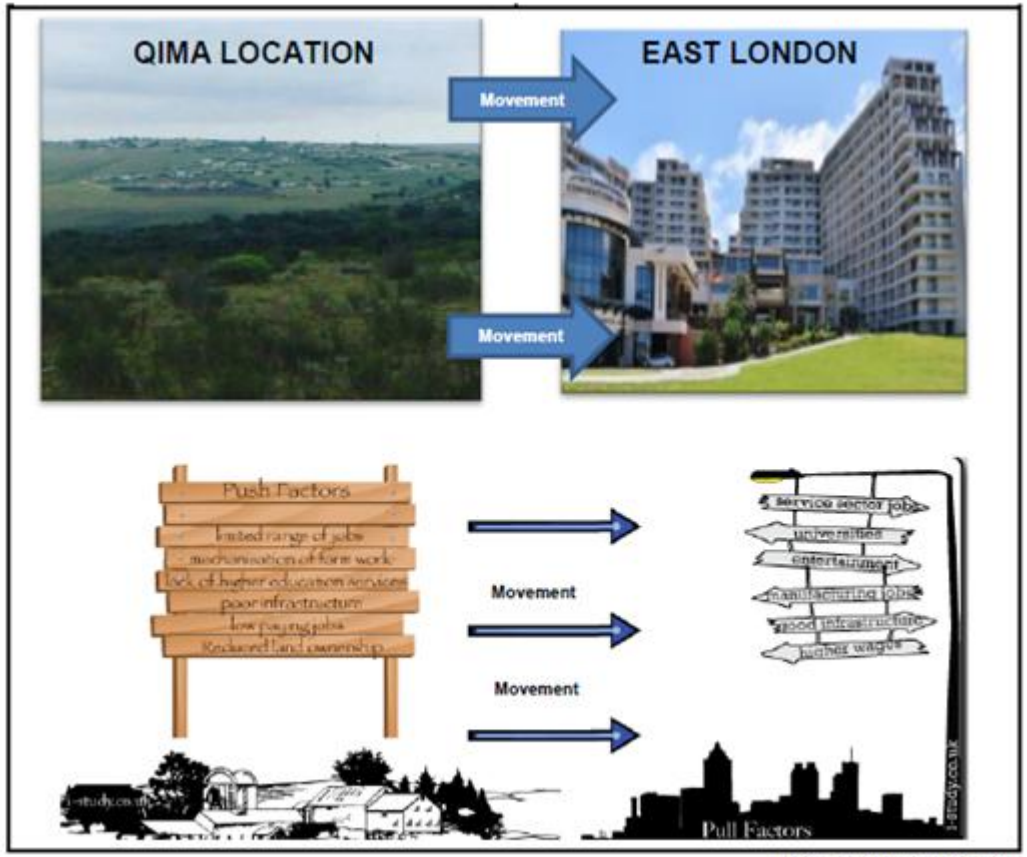
4.3.3 Give TWO possible reasons why Zimbabweans leave their country. (2 x 2) (4)

4.3.4 Explain why many South Africans do NOT want refugees in the country. (2 x 2) (4)

4.3.5 State ONE positive impact that refugees might have on South Africa. (1 x 2) (2)

ACTIVITY 21

4.4 Study FIGURE 4.4 showing movement of people from rural areas to cities.



[Source:Google Images]

4.4.1 Classify QIMA LOCATION as an urban or rural area.	(1 x 1) (1)
4.4.2 Name the type of migration taking place in FIGURE 4.4	(1 x 1) (1)
4.4.3 Give the term that describes the decrease of population in rural areas.	(1 x 1) (1)
4.4.4 Mention TWO push factors resulting in people leaving their villages like Qima to move to cities.	(2 x 1) (2)
4.4.5 Suggest ONE reason for rural areas to remain with mainly older people.	(1 x 2) (2)
4.4.6 Discuss TWO problems experienced by a city because of many people moving there.	(2 x 2) (4)
4.4.7 Suggest TWO solutions that can be used to reduce the number of people leaving the rural areas.	(2 x 2) (4)

ACTIVITY 22

4.5. Refer to FIGURE 4.5 on xenophobia.

Xenophobic attacks in South africa

Each year there are reports of xenophobic attacks in various parts of the country. These attacks were particualarly violent and widespread in May 2008. In a period of just two weeks, more than 60 people were killed, several hundred, and many thousands displaced when homes and bussinesses were attacked by angry crowds accusing foreigners of taking theirs jobs.

Brian left Somalia hoping for getting job and better standard of living in South Africa. Now he fears for his life. 'I left home to try and support my family. But it is better to starve at home than to die here.' A crowd had attacked him in Johannesburg. They took all his belongings.

Victims of xenophobic attacks in SA

A protest against xenophobia in May 2008

[Source: *Adapted from Google*]

4.5.1 Define the following terms:
- (a) Xenophobia (1 x 1) (1)
- (b) Refugee (1 x 1) (1)

4.5.2 Name Brian's country of birth. (1 x 1) (1)
4.5.3 Provide TWO reasons from the extract why Brian left his country of birth. (2 x 1) (2)
4.5.4 Explain a possible reason why many South Africans do not like refugees. (1 x 2) (2)
4.5.5 Discuss TWO positive impacts that refugees might have on South Africa. (2 x 2) (4)
4.5.6 Suggest TWO strategies that can be implemented (applied) by the South African government to assist refugees. (2 x 2) (4)

ACTIVITY 23

4.6 Read the following article below and answer the questions that follow:

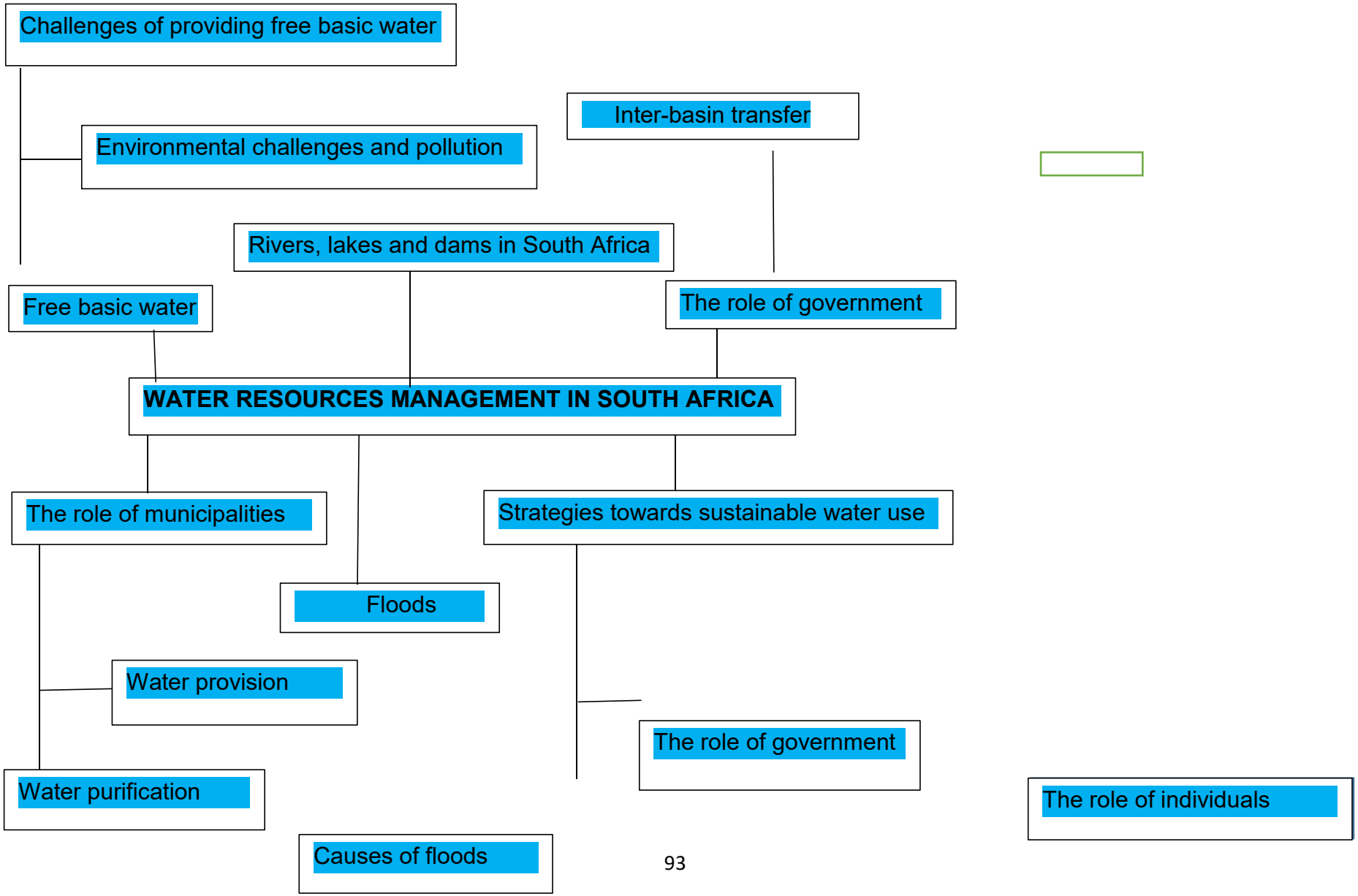
REFUGEES

Like other countries, South Africa is obliged to grant protection to refugees. Although it did not recognize refugees until 1993, it became a signatory to the UN and Organisation of African Unity conventions on refugees after its transition to democracy.
The 1998 Refugees Act established the institutions and procedures to offer protection to those who are fleeing persecution and instability in their home countries.
According to the UNHCR, the UN's refugee agency, South Africa has a "liberal asylum legislation that incorporates all basic principles of refugee protection including freedom of movement, the right to work and access to basic social services".
The Government of South Africa supports international efforts to protect and assist refugees and asylum-seekers, in particular by providing them with access to health facilities, schools and social services.

Article from : http://www.southafrica.info/travel/documents/refugees_asylum.htm#.V_uE9CF97IU#ixzz4MgRg3SSH

4.6.1 What are refugees? (1x2) (2)
4.6.2 Why do they need protection? (1x2) (2)
4.6.3 Provide one word that describes the dislike or fear of people from other countries. (1x2) (2)
4.6.4 From which countries do most of the refugees in South Africa coming from? Choose the correct answer in brackets (African /European/Asian). (1x2) (2)
4.6.5 Discuss two pull and push factors influencing the movement of people from one place to another. (2x4) (8)

MIND MAP: WATER RESOURCES MANAGEMENT IN SOUTH AFRICA and FLOODS



Concepts

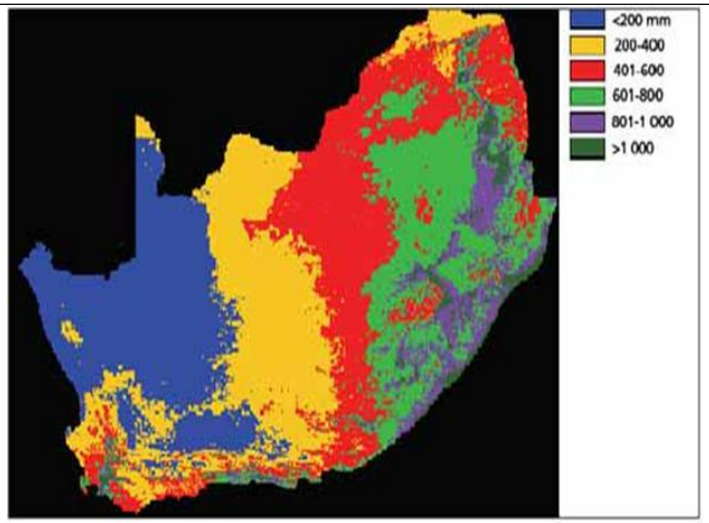
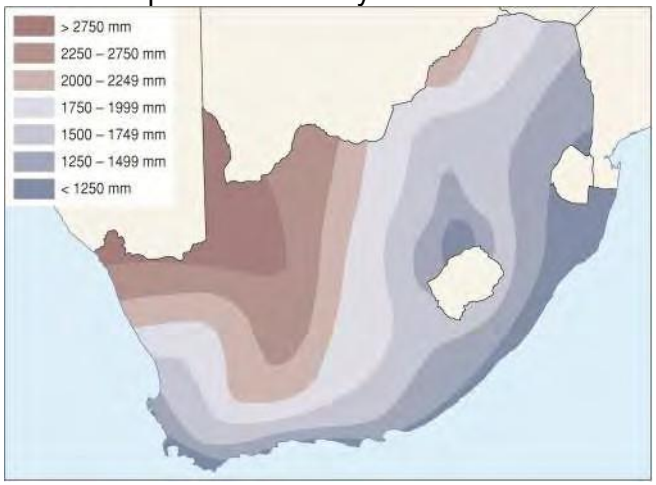
Alien vegetation	it is the plants that is brought into the country from another country
Basic water-	clean drinkable water.
Chlorination	chlorine and ammonia mixture is used to treat water against bacteria.
Coagulation	calcium carbonate is burnt and mixed with water to produce slaked lime.
Disinfection	when water is treated with chlorine to remove any bacteria.
Filtration	water is filtered through high grade silica sand and pebbles to remove the remaining suspended particles
Flocculation	clumping together of suspended particles to form a larger heavier particle called flock.
Flood line	it is the line that delineates an area of floods.
Flood plains	are found in the lower parts of the river where the valley is widened by means of lateral erosion
Infrastructure	the basic facilities that and installations that help a government or community to run.
Inter-basin transfer of water	How water is transferred from an area where there is a surplus to the area where there is a need.

Sedimentation	when coagulated and flocked material become heavy and settle in large horizontal layers.
Siltation	silt carried by the flowing river and deposited in a dam or sea mouth.
Slaked lime	colorless crystal or white powder used to treat sewage.
Stabilization	when slaked lime and other material is added to water, it purifies it to have a high PH.

Grade 10 – Term 4

Week: _____ **Date:_____** **_____% Curriculum Coverage**

Topic: Water Management in South Africa - Introduction

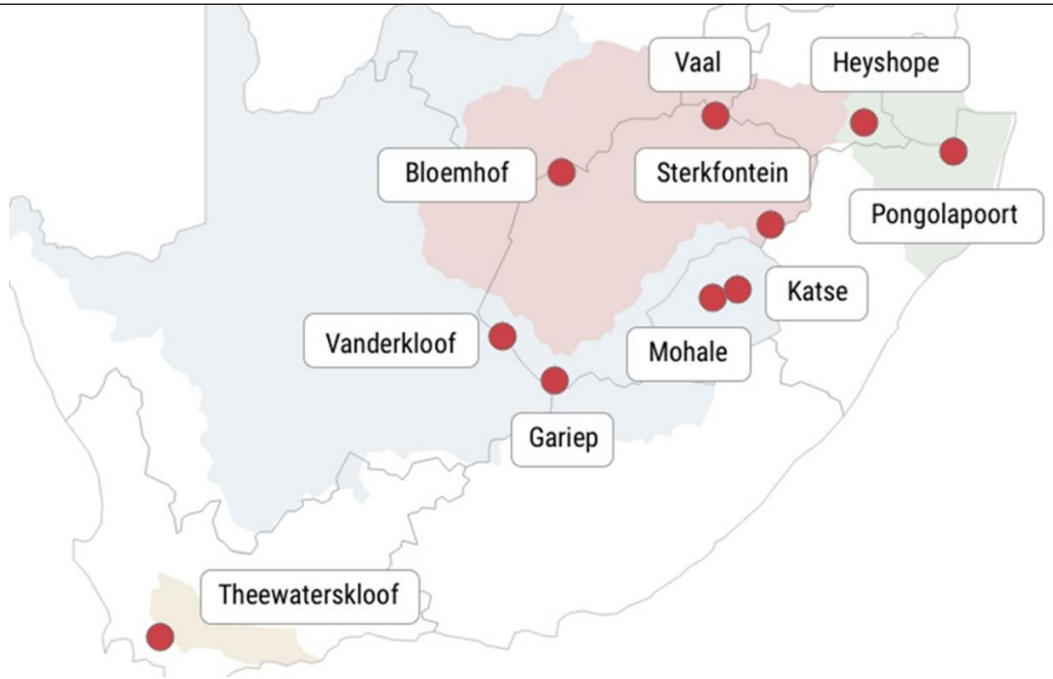
Water in South Africa	Mean Annual Rainfall in South Africa	Evaporation rates in South Africa
• South Africa is a semi-arid country — one of the 30 driest countries in the world. • Uneven water availability across the country — annual rainfall varies from less than 100 mm (west coast) to 1000 mm (east coast). • Large parts of South Africa receive only 250-500 mm of rain per year. • The average rainfall of about 450 mm a year is well below the world average of 860 mm a year. • No rain in winter for most of the country. In south-western part of Western Cape, no summer rain.	 • Agriculture is a major user of South Africa's water. • South Africa is a water-poor country with an average of only 500mm of rain a year. 65% of the country gets less than 500 mm. • Forest and sugar plantations extract so much water that only 9% of the rainfall in these areas reaches the rivers. (World average 31%) • Dams in South Africa are shallow with wide surface areas so nearly half of all stored water evaporates again. • The population of South Africa is still growing. • The individual water needs of each person are	• Large amount of water is lost through evaporation annually. 

	still growing.	
• South African rivers are small by African and world standards. • The total flow of all South African rivers is less than half that of the Zambezi River, the closest large river to South Africa. • Large inter-basin transfers of water have been carried out in South Africa. This process transfers water from one river basin (Orange) to another (Fish) through tunnels and canals. • There are a few small estuaries (St Lucia) — the wide part of the river where it meets the sea — in South Africa; no large		

lakes.

Dams in South Africa

Many large storage dams have been built to help store and manage our water supplies. There are more than 500 dams, with a total capacity of 37 000 million cubic meters. These often are part of major water transfer schemes



The uses of dams	The impact of dams

		• Provide water to towns/cities • (Gauteng-Vaal Dam)/recreation • Crop irrigation • Hydroelectric power – electricity • Control/reduce floods	• Settlements • Ecosystems/biodiversity • Climate change • Water/environment quality • Flooding

The impact of dams – the Msunduzi River, Pietermaritzburg

Activity 1 – Use your Atlas an answer the following questions:

1. Name South Africa's two major rivers.
2. List the countries that share South Africa's three trans-boundary rivers (rivers that cross the borders of different countries)
3. Name the 5 main dams in SA
4. Which is South Africa's biggest dam?
5. Name SAs largest fresh water lake

Grade 10 – Term 4

Week: ____ **Date: _____** **_____% Curriculum Coverage**

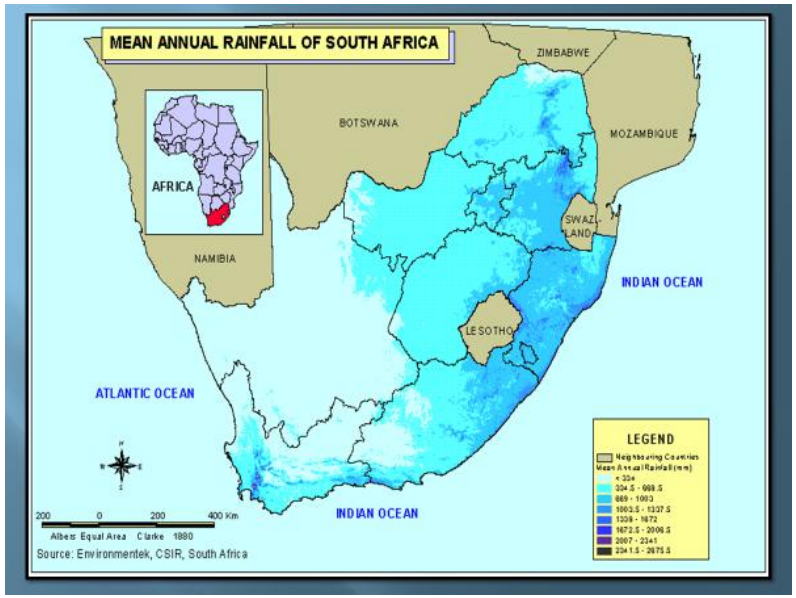
Topic: Water Management in South Africa – Factors Influencing the availability of water in SA

<table>
<tr><td>Factors</td><td colspan="3"></td></tr>
<tr><td>a. Human Factors
Population Growth
Increased demand of wood
Urbanisation
Untreated water waste
Mining and factories
Pollution of water sources
Agriculture
The water table
b. Physical factors
Rainfall
Alien vegetation
Climate change</td><td colspan="3"><table><tr><th>The land use practices</th><th>The effect of human activities</th></tr><tr><td>Built surfaces – roads and pavements – in towns and cities reduce infiltration and increase runoff.
Polluted city water requires expensive treatment before re-use.
Dams, bridges, water transfer schemes (Tugela-Vaal) and canals alter the rate of flow and quantity of water in our rivers.
Soil erosion results in silted dams, which reduces dam capacity.
Alien vegetation, which uses more water than indigenous vegetation, reduces stream flow by up to 10%.</td><td>Industry and mining activities create polluted water supplies – Acid Mine Drainage (AMD) – acid from mines.
Industrial pollution generates poisonous and hazardous chemicals increases salinity, nutrients sediments.
Agricultural water pollution (fertilizers and agro-chemicals)
eutrophication</td></tr></table></td></tr>
<tr><td>Activity 2</td><td colspan="2">1. There is an increased demand for water in South Africa, but the supply of usable water is decreasing.
Discuss THREE human and physical factors influencing the availability of water in South Africa.</td><td></td></tr>
</table>

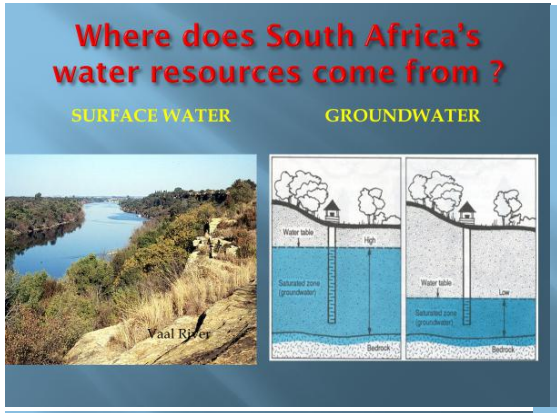
Grade 10 – Term 4

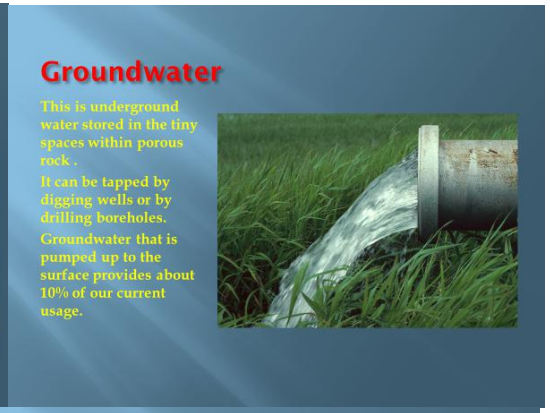
Week: **Date:** **% Curriculum Coverage**

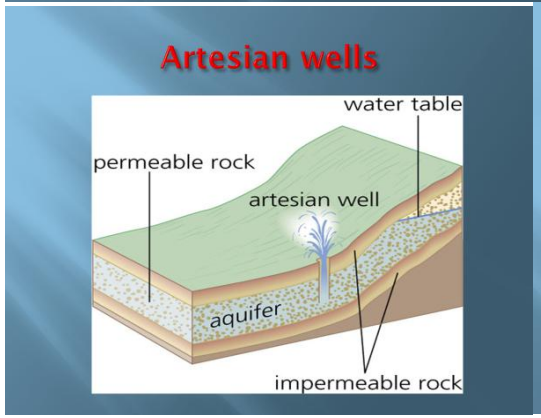
Topic: Water Management in South Africa – Challenges of providing free basic water to rural and urban communities in South Africa

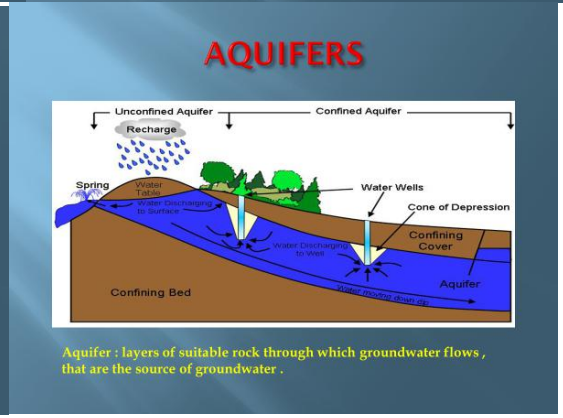
Challenges facing water provision in SA • The South African Constitution guarantees human rights to water. • Free Basic Water FBW policy (2000) allows every household 6 000 liters of free water per month. • Implementing FBW is time-consuming and expensive. • Rural communities are small and spread out – difficult to reach. • Urban areas are growing rapidly and increased informal settlements strain service delivery. • Rapid urbanisation has led to sanitation problems, with sewage contaminating water supplies. • Agricultural chemicals pollute rivers.	**Distribution of water in South Africa:** • Distributed water in South Africa is highly purified. • Only 15% of city dwellers (3, 6 million people) have only a minimal water supply, or no formal water supply. 16% of South Africans (7, 7 million people) do not yet have adequate water supply. • In 2005 there were still about 16 million people without basic sanitation 
Where do we get our water from?	

- Surface water: in the form of rivers and lakes supplies most of the water that we use.
- Dams built across the rivers store the water for use in the dry season.
- Many of South Africa's biggest urban concentrations are quite far from the major rivers.
- Water must be pumped and piped great distances to reach the urban areas.
- The water in some of our rivers is far from pure: chemicals, from fertilizers, mines and factories and other impurities have seeped into the groundwater and from there into the rivers.







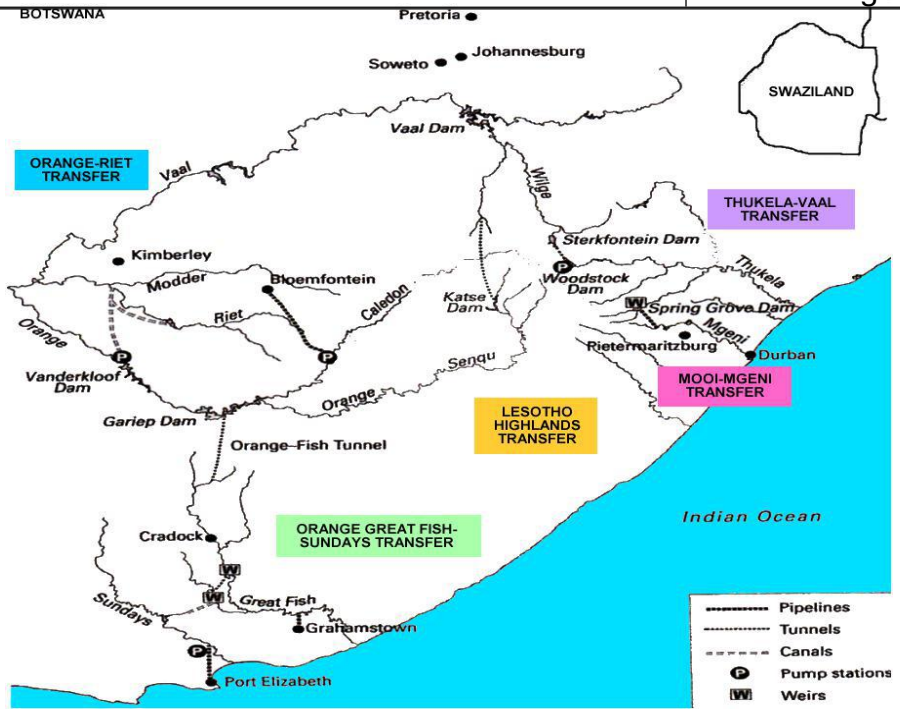


Grade 10 – Term 4

Week: _____ **Date: _____** **____ % Curriculum Coverage**

Topic: Water Management in South Africa – Role of government – initiatives towards securing water– inter-basin transfers; building dam

Water Transfer schemes		**THE ORANGE RIVER PROJECT** • Water from the Orange River at the Gariep Dam goes through tunnels and canals to the Sundays River and then to the Fish River in the Eastern Cape. • Provides water for irrigation and urban use in Port Elizabeth. • The Gariep and Vanderkloof Dams generate hydro- electric power. • Prevents flooding in the lower Orange River.	**THE LESOTHO HIGHLANDS WATER PROJECT** • Africa's largest water transfer scheme. • Supplies water from Lesotho to Gauteng from a system of large dams and tunnels across Lesotho and central South Africa. • The water runs north from the Katse Dam on the Orange River into the Vaal River basin. • The scheme provides hydro-electrical power in Lesotho – source of income. • Number of planned phases still to complete.	

	THE BERG RIVER SCHEME • Water is transferred from the Theewaterskloof Dam on the Sonder end River to the Berg River (which has a new dam). • Will capture high winter rainfall and store it for the dry summer months for Cape Town's urban and industrial use.	**THE TUGELA-VAAL SCHEME** • A pumped storage scheme that supplies water from the Tugela to the Vaal Dam. Water is pumped through the Drakensberg mountain range. • Supplies 11 million people, irrigation, house-holds, and industries in Pretoria, Witwatersrand and Vereeniging.
		

Activity 3

1. Explain the reasons for the following statements:

(a) South Africa may be short of water within the 10 to 2years

(b) Removing alien vegetation may improve water supply in places

2. Give the name of the transfer scheme shown in FIGURE 4.5.

3. Hydroelectricity is generated as part of this scheme. Explain what hydro-electricity is.

4. Which province in South Africa does the Vaal Dam supply water to?

5. Give ONE reason why there is a high demand for water in this province.

6. Although building of dams has drawn some negative impact, there are positive effects of building of dams. Explain THREE positive impacts that can be associated with building of dams.

Refer the following extract and FIGURE of a Water Transfer scheme in South Africa

South Africa is fundamentally a semi – arid and water scarce country with a mean annual rainfall of 490mm, which is half the world's average, with only 9% of that rainfall being converted to river runoff. Rainfall displays a distinct decreasing trend from east to west and is highly variable within and between years with recurrent droughts. This result in highly variable river levels, dam storage and groundwater storage over time. (DWAF 2008).

Activity 4

1. Explain what is meant by

THE GARIEP-ORANGE-FISH-SUNDAYS INTER BASIN TRANSFERS

water transfer. 2. Mention ONE municipality and the province that benefits from this water transfer. 3. Give TWO activities that water is used for in this municipality. 4. Explain the way water is transferred from the Great Fish River basin to the Sundays River basin. 5. There is an increased demand for water in South Africa, but the supply of usable water is decreasing. 6. Discuss THREE human and physical factors influencing the availability of water in South Africa.	A complicated canal and tunnel system takes water from the Gariep Dam to the Nelson Mandela Metropolitan area via the Fish and Sundays Rivers. This system transfers water from the Gariep-Orange river basin to the Fish and Sundays River basins. The extra water is used for irrigation in the rural areas as well as supplying the urban centres in the Nelson Mandela Metropolitan area. 1. Water is piped from the Gariep Dam into the Great Fish River basin. 2. A weir, Elands drift, diverts water from the Great Fish River into a canal and through a tunnel into the Little Fish River. 3. A pipeline pipes water into a canal and into Darlington Dam on the Sundays River. A pipeline pipes water from the Sundays River to the Nelson Mandela Metropolitan area

Grade 10 – Term 4

Week: ____ **Date:_____** **____ % Curriculum Coverage**

Topic: Water Management in South Africa – Role of municipalities – provision, water purification

Strategies towards sustainable use of water– role of government and individuals

Role of municipalities in water purification and provision	**There are three levels of water supply and sanitation.** • National Government (Department of Water Affairs) provides policies that manage water resources, sanitation, plans for new dams, and inter-basin transfer schemes (schemes which transfer water from high supply drainage basins to high demand and supply water areas). • Water Boards operate dams, offer retail services and run some waste-water treatment plants. • Fifteen water boards supply water to nearly half of South Africa's population in 90 municipalities. (Examples: Rand Water, Umgeni Water). • Municipalities buy water from Water Boards, purify it and sell it to customers, sending out accounts. Some municipalities own their own dams. (Example: Rand Water – One of the largest water utilities in the world. Its distribution network includes 3 056 km of large-diameter pipeline, feeding 58 service reservoirs. It supplies, on average, 3 653 million litres of water daily. Customers are mines, industry, local and metropolitan municipalities.)
Sustainable use of water – what governments and individuals can do	• Sustainable water use is using water resources in a way and at a rate that prevents the long-term loss of water. • Recycle water – purification or sewage treatment plants provide safe, quality water. • Do not waste water – reduce use of water. • Do not pollute – affects water supplies. • Restore wetlands – they reduce erosion, encourage wildlife, store and purify water. • Remove alien vegetation – high water consumption


NO!
YES!
YES!
Water your yard and outdoor plants early or late in the day to reduce evaporation.
Use a shut-off nozzle on your hose.
Use plants that require less water.
Mulch around plants to hold water in the soil.
Energy
Get an Energy Star labeled washing machine.
Wash only full loads.
Use a low flow showerhead.
Take shorter showers — five minutes or less is best.
Turn off the water while soaping hands and brushing teeth.
OFF
Turn off sink faucet while scrubbing dishes and pots.
Install new toilets that use less than 1.6 gallons per flush.
Put faucet aerators on sink faucets.
YES!
NO!
Us a broom, not a hose, to clean driveways and walkways.


What Can YOU Do to Protect Estuaries?
Estuaries are found where rivers meet the sea. Clean estuaries sustain vibrant economies and healthy coastal communities.
AT HOME
IN THE COMMUNITY
IN THE YARD
ON THE WATER
Reduce, reuse, and recycle packaging
Have your septic system inspected
Choose non-toxic products for household use
Help plant trees to reduce stormwater pollution
Volunteer at a local clean-up to pick up trash
Don't dump chemicals or trash down storm drains
Pick up your pet's waste and dispose of it properly
Plant a rain garden or install a rain barrel
Minimize use of fertilizers and pesticides on your yard
Use designated sewage pump-out stations
Keep your boat out of seagrass beds
Respect wildlife and keep your distance
Learn more about protecting estuaries: epa.gov/nep
EPA


HOW YOU CAN HELP THE OCEAN
USE FEWER PLASTIC PRODUCTS
Plastics can harm marine life by consumption, entanglement and habitat destruction!
CLEAN THE BEACH
SAVE WATER
EAT SUSTAINABLY
Protect ocean life diversity by knowing where your seafood comes from.
USE ECO-FRIENDLY PRODUCTS
While doing dishes, laundry or using personal care items, keep in mind where all of the products end up once they go down the drain.

Activity 5

Refer to FIGURE 4.6 showing the volume of water distributed to different industries in South Africa in 2010 and answer the questions that follow.

4.1 Identify the industry receiving the smallest and the largest volume of water respectively.
4.2 State the unit used to measure the volume of water.
4.3 How much is the total volume of water distributed in 2010?
4.4 Calculate the total volume of water distributed for households and industry in m3.
4.5 One of the individual strategies to increase domestic water supply is grey water. Briefly explain how to use this strategy of 'grey water' to save water.
4.6 Discuss THREE sustainable strategies to increase national water supply.

FIGURE 4.6: DISTRIBUTION OF WATER

TABLE 1
Volume of water distributed to different industries in South Africa in 2010 (Stats SA, 2012)

Type of customer	Volume (million m^3)
Redistributors	2 310
Agricultural users (farmers)	1 969
Households	308
Mining	236
Industry	119
Commercial users	93
Total water distributed	5 035

[Source: Adapted from *Google*]

Activity 6

1. What is water used for in FIGURE 3.6.
2. Provide TWO other examples of how rural communities use their water resources excluding the one illustrated in FIGURE 3.6.

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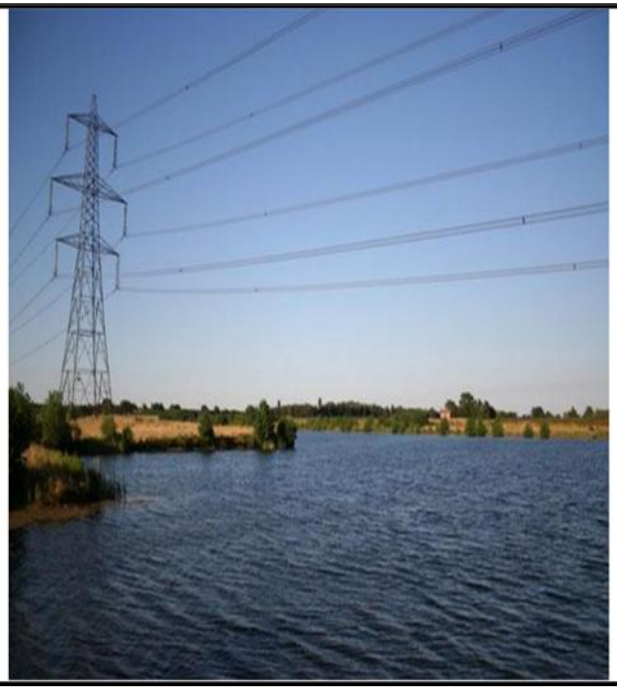
3. Briefly explain how groundwater contributes to the availability of water

   in South Africa
4. In a paragraph of approximately EIGHT lines suggest how individuals can sustainably save water at home, garden and in the community.



Grade 10 – Term 4

Week:_____ **Date: _____** **_____% Curriculum Coverage**

Topic: Floods – Causes, Characteristics and management of Floods

Definition of Floods

A flood occurs when a river has more water in it than the river's channel can hold. The water then flows over the banks of the river, onto the adjacent land areas

- Heavy rain over a short period of time or
- Gentle rain over longer periods
  – All the water cannot drain away
  – Rivers overflows their banks and areas that is usually dry is covered by water
- High rainfall over a period of days can yield more rainfall than rivers can carry. Excessively heavy rainfall can result in flash floods that uproot trees, move boulders, and destroy buildings.
- Snow melting – Rapid melting of snow, in countries that have heavy snowfalls, can cause floods.
- Relief – Flooding occurs in lowlands where rivers flow more slowly.
- Coastal flooding – Occurs at low-lying coastal areas when there are strong onshore winds with high tide. Storm surges of a tropical cyclone or hurricane, or a tsunami also can cause coastal flooding.

Human causes of flooding

Deforestation and poor farming practices lead to increased soil erosion, reduced infiltration of water and increased surface runoff.

Poor water management – Poorly constructed dams that collapse easily lead to flooding. When dam water is released too quickly, downstream areas are flooded.

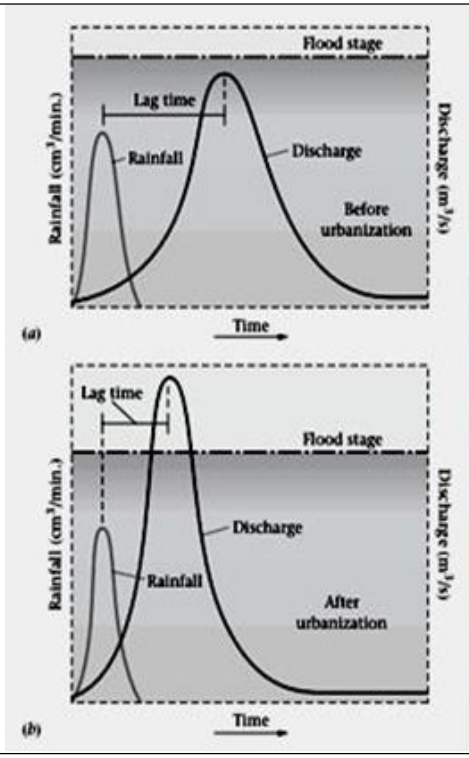
Debris – Floating debris like vegetation and ice in water can build up at an obstruction, such as a bridge, and block the flow of water, leading to a river overflowing its banks.

Population pressure and urbanisation – In cities,

	certain building materials and substances are impermeable – tar, concrete, and roofing materials – leading to rapid surface runoff. This increases the risk of a river overflowing its banks. Furthermore, vegetation is removed in cities
How people worsen the effects of floods • Rapid urbanization in Africa has led to a shortage of land and houses – more pressure on resources. • In many cities there are too many people living too close together and without proper water and sewage facilities, storm water drainage and roads. • Many informal settlements have developed on the floodplains of urban rivers. Shacks are built very close to a river. • The lack of suitable sites, poor drainage, increased runoff and lack of strong building materials result in hundreds of shacks being washed away when there are floods.	**Flood characteristics** • Floods cause the greatest number of weather-related deaths and large-scale damage. • A serious and costly natural disaster, floods damage roads, farmlands, and structure. They change people's lives and destroy businesses. • Floods often are followed by water-borne diseases such as cholera (especially when water purification systems are destroyed) and malaria (mosquitoes breed in pools of water).
Flooding also has positive effects • The annual flooding of the Nile is beneficial and welcomed by the people. • Fertile silt is deposited alongside the river in the Nile Delta. • However the Aswan Dam now regulates the flow of water in the Nile. The river now remains more constant throughout the year. • The river is navigable and more water is available for irrigation throughout the year. • With less silt being deposited, fertilisers have to be used and the delta is retreating.	**Flood protection schemes** • Build dams and reservoirs • Building 'upstairs shelters' as refuges in floods • Flood warning system • Temporary measure e.g. sandbags • Build levees high banks at the side of rivers) • Land use zoning so that less damage is done e.g. open spaces next to the river • Plant trees • Dredge and straighten rivers • Provide National Insurance • Evacuate people from flood prone areas • Widen rivers • Do nothing and bear the costs

Flood hydrographs represent the flow of water in a stream after rainfall.

A flood hydrograph, also called a storm hydrograph, represents a stream or river's response to a rainfall event. The hydrograph shows this response in terms of the flow rate. On a normally-shaped hydrograph, the graph line rises quickly to a peak discharge rate, then gradually falls back down to the normal flow rate of the stream. The x axis of a hydrograph shows the time in days or hours, and the y axis shows the flow rate, usually in cubic feet per second. Many hydrographs include a hyetograph, a graph of the rainfall intensity over time.



Flow hygrograms show the amount of rain fall compare to the run-off

- The flood peak is lower and the lag time longer when natural vegetation enhances infiltration and reduces run-off
- The many artificial surfaces in urban areas reduces infiltration, increases the run-off and reduce the lag time which can lead to flash flooding

Activity 7

FLOODING

Flooding is unavoidable during Cape Town's wet winter, especially in low-lying areas. Most of Cape Town's 3,2 million residents live in on the Cape Flats, which is prone to flooding because of its flat ground and high water table. In 2014, thousands of staff members from several City of Cape Town departments joined forces to co-ordinate and implement a thorough management plan to reduce the risk of flooding that does occur during winter storms. The city will take corrective action during flooding. Apart from this, it will also take more proactive measures. The City has set aside R18,4 million of its Solid Waste budget for cleaning storm water systems so as to minimize blockages.

Flood risk management

Assessing the risk of flooding and then taking measures to reduce the threat of flooding. Measures include:

•Construction of flood defenses.
•Creation of flood warning systems.
•Development of policies that reduce development in flood areas.

Flood management in rural areas

Execute a flood early warning system that:

•Forecasts the flood risk (water resource experts meet to plan).
•Detects and monitors flooding.
•Issues flood warnings.
•Team assesses flood situation to analyse information and assess.

Refer to FIGURE 3.5 illustrating an extract with a photo of flooding in Cape Town and answer the questions that follow.

1. Define the term flooding.
2. List TWO natural causes of floods.
3. Suggest a reason why the Cape Flats is at a high risk of floods.
4. Explain TWO negative effects of floods on the environment for the people of Cape Town.
5. Suggest THREE strategies that can be implemented (used) to reduce flooding in this area.

MANAGING FLOODS IN URBAN AREAS

•No development on floodplains.
•Ensure enough storm water drains that are clear of litter/vegetation.
•Establish greenbelts to promote infiltration and reduce runoff.
•Maintain wetlands to absorb extra water and reduce its speed of flow.
•Warn residents of flood occurrences.
•Secure food and shelter availability for flood victims.

FLOOD MANAGEMENT IN INFORMAL SETTLEMENTS

•High-risk flood areas (low-lying).
•Forecasting the flood risk.
•Detect and monitor flooding.
•Issue flood warnings.
•Providing alternative accommodation for flood victims.
•Create awareness of the risk of flooding.

Activity 8

MOZAMBIQUE REQUESTS AID FROM SOUTH AFRICA

High rainfall filled up rivers and marshes and a large area was flooded. The consequences of the disaster were so extensive that the army was summoned to evacuate people in some of the affected areas.

A cry of distress from the Mozambican government was issued to South Africa to come and lend a hand. Captain Jaco Theunissen confirmed that the Mocuba area was the worst hit by flooding. The poor road junctions and low water bridges were flashed away which made the area unreachable. This made it necessary to deploy two Oryx-helicopters, a Hercules C-130 freight airplane and medical staff from the SA Military Health Services to help relieve the distress experienced by the people in this area.

Approximately more than 8 000 people were left homeless after extensive flooding. People living in the informal settlement were affected the most as their building structures can't withstand such weather phenomena.

Read the extract in FIGURE 4.6 carefully before you answer the questions that follow.

1. Name the country affected by flooding in the extract.

2. Which country was called upon to assist the affectedcountry?
3. Mention the organisation that was deployed to the flooded area to provide relief to people

.

4. Explain why the houses illustrated in FIGURE 4.6 are referred to as 'informal'
5. Provide TWO examples of poor infrastructure that led to inaccessibility in the area affected by flooding.
6. Suggest THREE strategies to reduce the impact of flooding in the informal settlement

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