



**KWAZULU-NATAL PROVINCE**

**EDUCATION**  
REPUBLIC OF SOUTH AFRICA

**CURRICULUM GRADE 10-12 DIRECTORATE**

**NCS (CAPS) SUPPORT**

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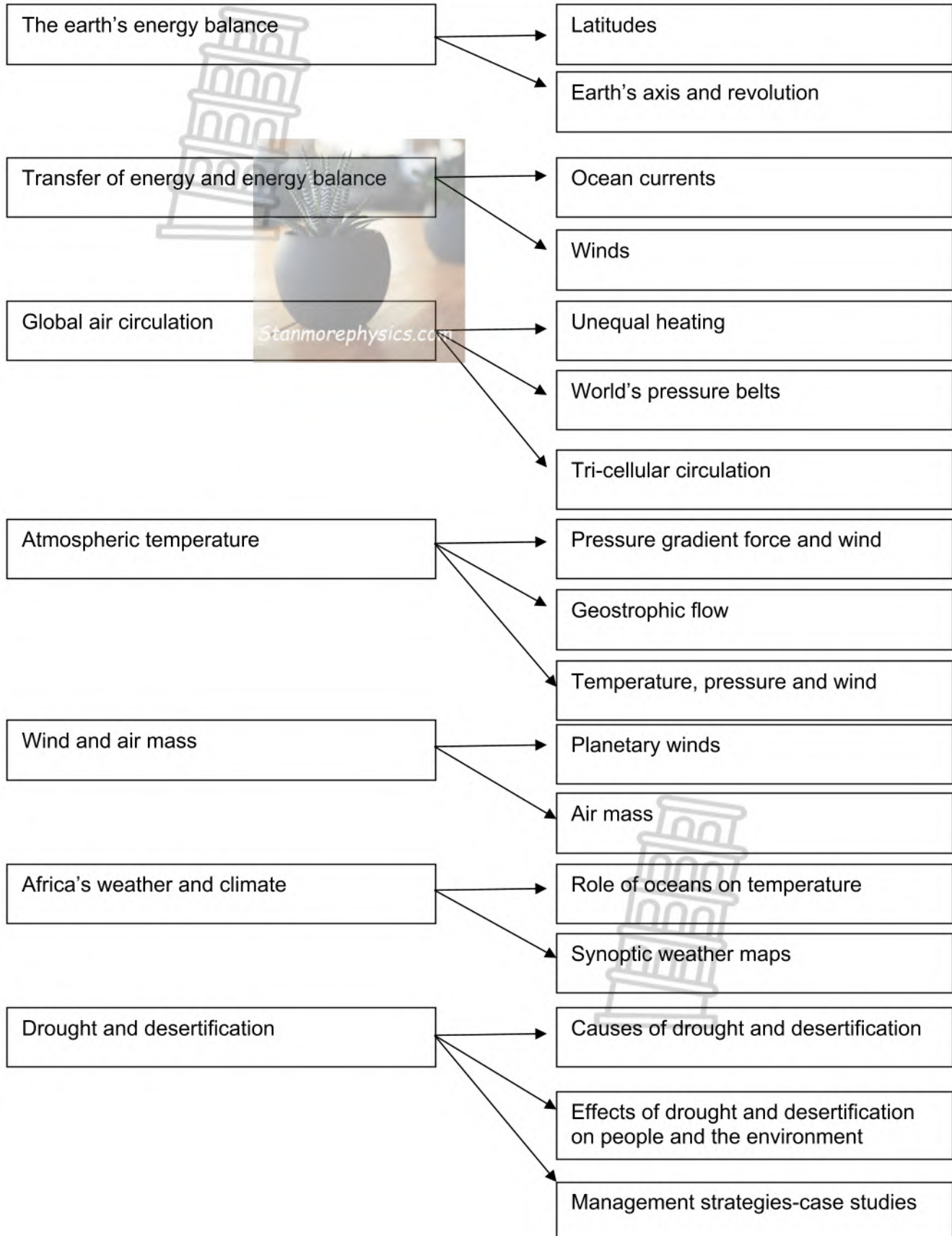
**GEOGRAPHY**

**GRADE 11**

**2025**



# THE ATMOSPHERE



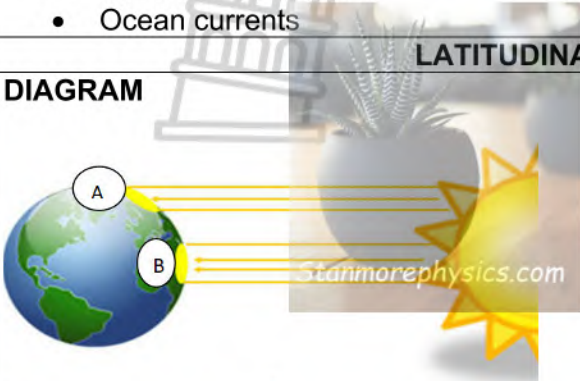
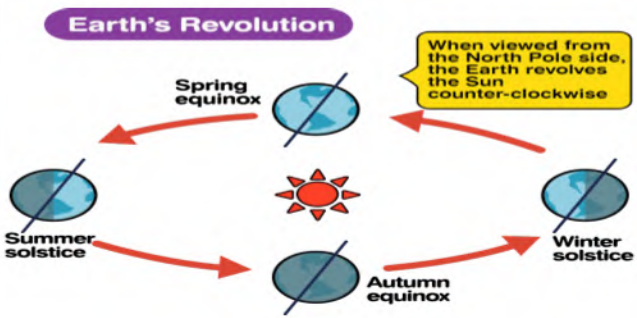
<b>TERMINOLOGY</b>		
1	<b>Insolation</b>	Incoming solar radiation also known as short wave radiation
2	<b>Revolution</b>	Movement of the earth in an orbit around the sun
3	<b>Isotherm</b>	Lines on a map joining places of equal temperature
4	<b>Isobars</b>	Lines on a synoptic map that join places of the same atmospheric pressure
5	<b>Isohyets</b>	Line on a map joining places with the same amount of rainfall
6	<b>Summer solstice</b>	Experiencing the longest day and shortest nights
7	<b>Winter solstice</b>	Experiencing the longest night and the shortest day
8	<b>Equinox</b>	Sun strikes directly at the equator resulting in equal day and night
9	<b>Terrestrial radiation</b>	Radiant energy emitted from the earth, also called <b>long wave radiation</b>
10	<b>Radiative equilibrium</b>	Condition where the total thermal radiation leaving an object is equal to the total thermal radiation entering it.
11	<b>Thermal radiation</b>	Process by which electronic radiation is emitted by a heated surface in all directions
12	<b>Atmospheric pressure</b>	Is the weight of the atmosphere on the earth surface
13	<b>Divergence</b>	Air mass that is moving away from the central point
14	<b>Convergence</b>	Air mass that is moving towards the central point
15	<b>Dew-point</b>	Temperature at which water vapour condenses
16	<b>Intertropical convergence zone (ITCZ)</b>	The zone where two tropical easterlies converge
17	<b>Front</b>	Zone where two air masses of different temperatures meet
18	<b>Polar front</b>	Zone along 60° where cold polar easterlies and warm sub-tropical westerlies winds meet.
19	<b>Cold front</b>	Leading edge of cold air
20	<b>Warm front</b>	Leading edge of warm air
21	<b>Pressure gradient force</b>	Force that determines the speed at which air flows from a high-pressure region to a low-pressure region
22	<b>Coriolis force</b>	Force which deflects winds due to the earth's rotation
23	<b>Ferrell's law</b>	States that because of Coriolis force, the winds are deflected to the left in the southern hemisphere and to the right in the northern hemisphere
24	<b>Geostrophic flow</b>	Winds that blow parallel to the isobars due to the equal strength of the pressure gradient force and Coriolis force
25	<b>Friction</b>	Force that operates in the opposite direction to that of the wind
26	<b>Planetary winds</b>	Major winds that blow from high pressure belts to low pressure belts in the same direction throughout the year
27	<b>Air mass</b>	Large body of air with same temperature, atmospheric pressure and humidity
28	<b>Monsoon winds</b>	Are seasonal winds that blow in tropical regions
29	<b>Fohn (mountain) winds</b>	Local warm dry winds that descend on the leeward side of the mountain in winter
30	<b>Leeward slope</b>	Side of the slope where winds warm up as they descend
31	<b>Windward slope</b>	Side of the slope where winds cool as the rise

32	<b>Dry adiabatic lapse rate (DALR)</b>	The rate at which air gains heat as they descend ( $1^\circ/100\text{m}$ )
33	<b>Wet adiabatic lapse rate</b>	Rate at which temperature of saturated air decrease with an increase in height ( $0.5^\circ/100\text{m}$ )
34	<b>Seasonal temperature range</b>	Difference between the maximum and minimum temperatures or between the highest and lowest temperatures during specific time intervals (summer and winter)
35	<b>Prevailing winds</b>	Winds that blow most often
36	<b>Onshore winds</b>	Winds that blow from the ocean toward the land
37	<b>Offshore winds</b>	Winds that blow from the land towards the ocean
38	<b>El Niño</b>	Climate change brought by warm conditions in the Pacific Ocean
39	<b>La-Nina</b>	When cooler than usual ocean temperatures between equator and south America leading to dry conditions and drought
40	<b>Synoptic weather map</b>	Map showing weather conditions for a particular place and time
41	<b>Ridge</b>	Elongation of isobars in a high-pressure cell
42	<b>Trough</b>	Elongation of isobars in a low pressure
43	<b>Drought</b>	Long period with little or no rain
44	<b>Desertification</b>	Process whereby once fertile area becomes increasingly more arid (dry)



**WEEK 1: EARTH'S ENERGY BALANCE**

- **Insolation:** incoming solar radiation that heats the earth
- **Terrestrial radiation:** heat given off by the heated surface of the earth

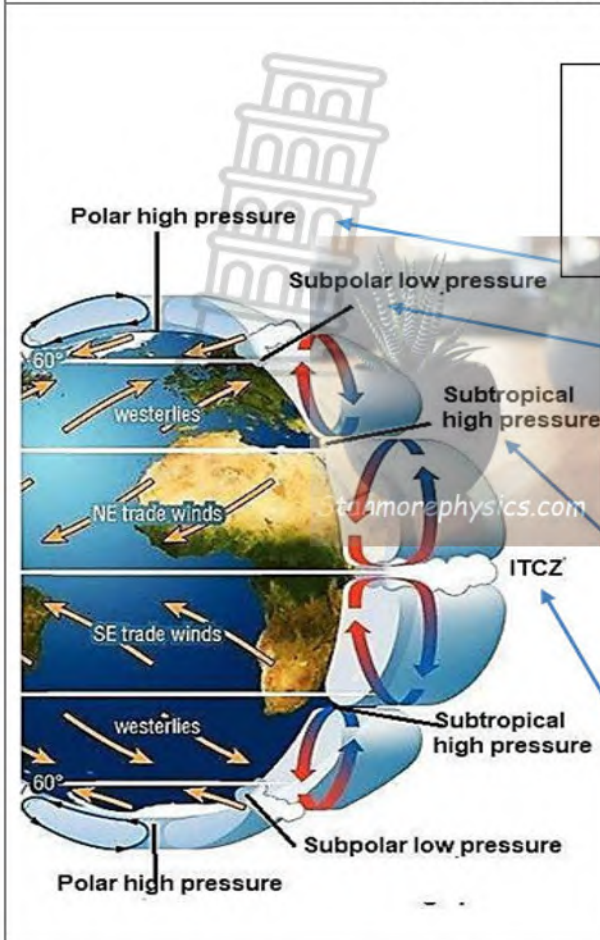
<p><b>The amount of insolation which reaches the earth's surface is determined by:</b></p> <ul style="list-style-type: none"> <li>• Latitudinal temperature differences</li> <li>• Seasonal temperature differences</li> <li>• Tilt of the earth's axis</li> <li>• Ocean currents</li> </ul>	
<p><b>LATITUDINAL TEMPERATURE</b></p>	
<p><b>DIAGRAM</b></p> 	<p><b>IMPACT</b></p> <p>At B <b>TEMPERATURES ARE HIGH DUE TO:</b></p> <ul style="list-style-type: none"> <li>➤ More direct sunlight at the equator</li> <li>➤ Small surface area heated</li> <li>➤ Sun rays pass through a small depth of the atmosphere</li> </ul> <p>At A <b>TEMPERATURES ARE LOW DUE TO:</b></p> <ul style="list-style-type: none"> <li>➤ Indirect rays/oblique rays</li> <li>➤ Less energy as bigger surface of earth is heated</li> <li>➤ Sun rays pass through a thick layer of the atmosphere</li> </ul>
<p><b>SEASONAL TEMPERATURES</b></p>	
<p><b>DIAGRAM</b></p> 	<p><b>IMPACT</b></p> <p><b>SUMMER:</b></p> <ul style="list-style-type: none"> <li>➤ Earth is tilted towards the sun</li> <li>➤ Sun rays are more concentrated</li> <li>➤ Longer day time and shorter night time</li> </ul> <p><b>WINTER:</b></p> <ul style="list-style-type: none"> <li>➤ Earth is tilted away from the sun</li> <li>➤ Sun rays are oblique</li> <li>➤ Shorter day time and longer night time</li> </ul>

TILT OF THE EARTH'S AXIS	
DIAGRAM	IMPACT
<b>WEEK 2 : WORLDS OCEAN CURRENTS AND WIND</b>	
<b>OCEAN CURRENTS</b>	
DIAGRAM	IMPACT
	<ul style="list-style-type: none"> <li>➤ The unequal insolation result in warmer water in the oceans at the equator and cooler waters near the poles</li> <li>➤ Because air and water moves, they can transfer heat from one area to another</li> <li>➤ <b>Warmer ocean</b> currents move from equator towards poles, they transfer heat from tropical zones towards temperate zones</li> <li>➤ <b>Cold ocean</b> currents transfer cold waters from polar regions towards temperate zones</li> </ul>

1.1 Study the sketch below and answer the questions that follow.			
Source: Examiner's drawing			
1.1.1	Define insolation	(1 x 2)	(2)
1.1.2	Near (37°/30°) North and South of the equator, a balance exists between energy gained and energy lost	(1 x 1)	(1)
1.1.3	Differentiate between latitude and altitude.	(2 x 2)	(4)
1.1.4	In a paragraph of approximately EIGHT lines, explain the reasons for unequal heating between position A and position B respectively	(4 x 2)	(8)

WEEK 3: GLOBAL AIR CIRCULATION	
ORIGIN OF HIGH AND LOW PRESSURE CELLS	
The difference in the reaction of land and water masses to heating and cooling at different latitudes cause high- and low-pressure belts	
High pressure cell	Low pressure cell
CROSS SECTION	
CROSS SECTION	
PLANVIEW	
PLANVIEW	
CHARACTERISTICS	<ul style="list-style-type: none"> <li>➤ Air subsides (descends)</li> <li>➤ Air diverges at the center</li> <li>➤ Has highest pressure readings at the center.</li> <li>➤ No release of latent heat</li> <li>➤ No cloud formation\ clear sky</li> <li>➤ <b>Oval</b> shaped isobars</li> <li>➤ Air circulates in an <b>anticlockwise direction in the southern hemisphere</b></li> <li>➤ Air circulates in a <b>clockwise direction in the northern hemisphere</b></li> <li>➤ Also called <b>anticyclones</b></li> <li>➤ <b>Three high pressure cells</b> <ul style="list-style-type: none"> <li>- South Atlantic Anticyclone</li> <li>- South Indian Anticyclone</li> <li>- Kalahari Anticyclone</li> </ul> </li> </ul>
CHARACTERISTICS	<ul style="list-style-type: none"> <li>➤ Air ascends (rises)</li> <li>➤ Air converges at the center</li> <li>➤ Latent heat is released during condensation</li> <li>➤ Clouds form and precipitation occurs</li> <li>➤ Air circulates <b>clockwise in the southern hemisphere</b></li> <li>➤ Also called a <b>Cyclone</b></li> <li>➤ <b>Forms: Low pressure cells</b> <ul style="list-style-type: none"> <li>- Coastal low</li> <li>- Mid-Latitude cyclones</li> <li>- Tropical cyclones</li> <li>- Thermal (heat) low</li> <li>- Cut-off low</li> </ul> </li> </ul>

### WEEK 3: WORLD PRESSURE BELTS



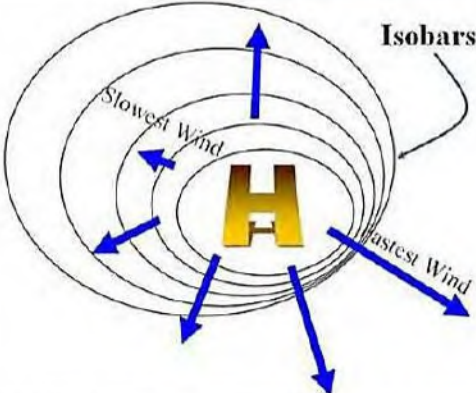
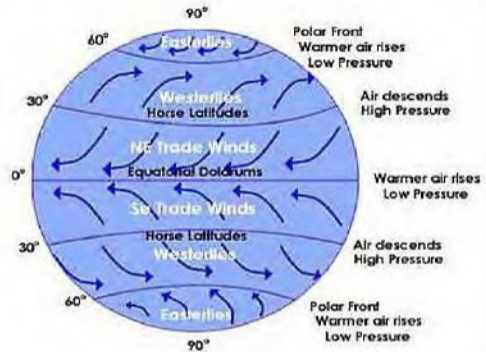
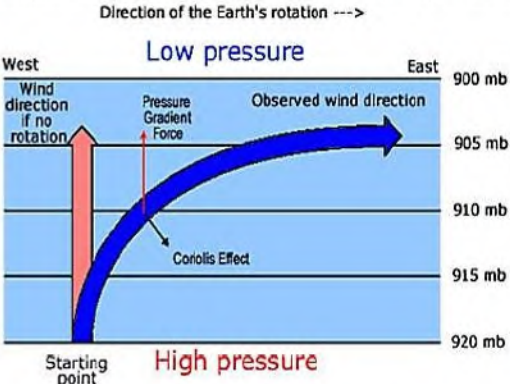
- Polar high-pressure zone located at 90 degrees N/S latitude
- Has very low temperatures, resulting in snow.
- Air sinks and diverges at the poles.
- Polar Easterlies blow towards here.

- Sub polar low-pressure belt
- Located at 60 degrees N/S of the equator
- Tropical Westerlies and polar Easterlies converge here to form polar front.
- Convergence and air uplift occurs resulting in unstable weather.

- A region of high pressure associated with subsiding air
- The descending air is warm and dry
- Associated with clear skies and low rainfall

- Hot air rises creating a low-pressure area at the surface
- The rising air is moisture laden
- Associated with thunderstorms and high rainfall
- Convergence of NE trade winds and SE trade winds at 5° North and South results in the development of **Tropical cyclones**
- A region of low pressure associated with the convergence of different air masses



PRESSURE GRADIENT	CORIOLIS FORCE	GEOSTROPHIC AIR FLOW
<p>Force that influences how strong or gentle a wind blow</p>	<p>Force that influences the direction that the wind blows</p>	<p>Flow of wind that is parallel to the isobars due to equal Coriolis force and pressure gradient force</p>
		
<ul style="list-style-type: none"> <li>➤ <b>Atmospheric pressure</b> is the force exerted on the surface by the air above it as gravity pulls it to earth.</li> <li>➤ Differences in air pressure causes pressure gradient</li> <li>➤ <b>Pressure gradient</b> describes the speed in which air moves from a HP place to a LP.</li> <li>➤ If the change in pressure between a HP and LP is great, it will have a <b>steep pressure gradient</b>; isobars will be drawn close together.</li> <li>➤ If the change between a HP and LP is small the pressure gradient will be <b>gentle</b>, and the isobars will be further apart.</li> <li>➤ The <b>greater the difference</b> between the High and Low pressure the <b>steeper the gradient</b> and the <b>faster the wind</b></li> </ul>	<ul style="list-style-type: none"> <li>➤ Coriolis force is caused by the rotation of the earth; this force changes the direction of air movement.</li> <li>➤ Air moving in the <b>northern hemisphere</b> will be deflected to the <b>right</b>, and air moving in the <b>southern hemisphere</b> will be deflected to the <b>left</b>. (Ferrell's law)</li> <li>➤ Coriolis force mainly affects air and water; ascend from the surface as there is less friction.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Wind that would result from an exact balance between the Coriolis force and the pressure gradient force</li> <li>➤ This condition is called the Geostrophic balance which results in Geostrophic flow</li> <li>➤ Geostrophic wind blows parallel to isobars</li> <li>➤ <b>Friction</b> slows the flow of air and the effect of Coriolis force.</li> </ul>

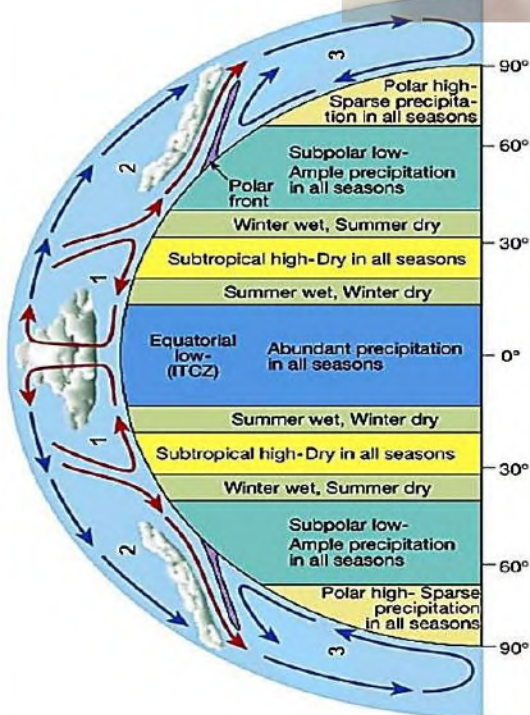
## TRI-CELLULAR ARRANGEMENT

### Wind is moving air

- Wind that blows from **Polar Regions** towards warmer regions it will cool the region down.
- Winds restore the energy balance over the Earth's surface.
  - **Tropical easterlies** blow from subtropical HP towards the equatorial LP. They bring cooler temperature.
  - **Westerlies** blow from subtropical HP to sub polar LP, bringing warm temperatures.
  - **Polar easterlies** blow from polar HP to sub polar LP, they bring cool temperatures.

The movement of air around the planet through 3 main circulations per hemisphere:

1. Hadley cell
2. Ferrell cell
3. Polar cell



### 1. HADLEY CELLS

- These cells are found at the equator, air is heated and ascends vertically.
- As the air ascends it will reach the top of the troposphere and diverge towards the poles.
- At around 30° north & south of the equators, the air has lost heat and sinks creating a stable, high-pressure zone (Sub-tropical high-pressure belt)
- The air then diverges at the surface and flows towards the equator
- Tropical easterlies occur in the Hadley cell can flow from east to west, this helps pull the diverging air at the sub-tropics back towards the equator.

### 2. FERREL CELLS

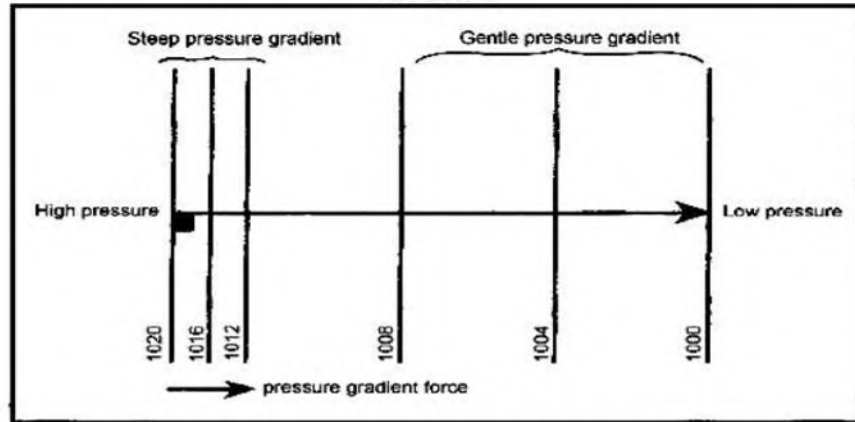
- The weakest cell is called the Ferrell cell, its situated from 30° to 60° north and south of the equator.
- At the northern most edge, warm air moving out of the tropics collides with cool air from the poles creating a Polar Front.
- Warmer moist air pushed by the subtropical westerlies overrides the cooler, dry air drawn down by the polar easterlies.
- This creates an area of low pressure named the sub-polar low.
- The sporadic mixing of these two air masses is responsible for the formation of a mid-latitude cyclone and accounts for the Cape town's frontal rainfall in winter.

### 3. POLAR CELLS

- Air at the poles is cold and sinks due to its greater density.
- The polar easterlies push the cold, dry sinking air back towards the polar front.
- It then collides with the arriving subtropical air.
- Some of the air is pulled back towards the poles to complete the polar cell and the remaining air be sucked back into the Ferrell cell and make its way back to the equator.

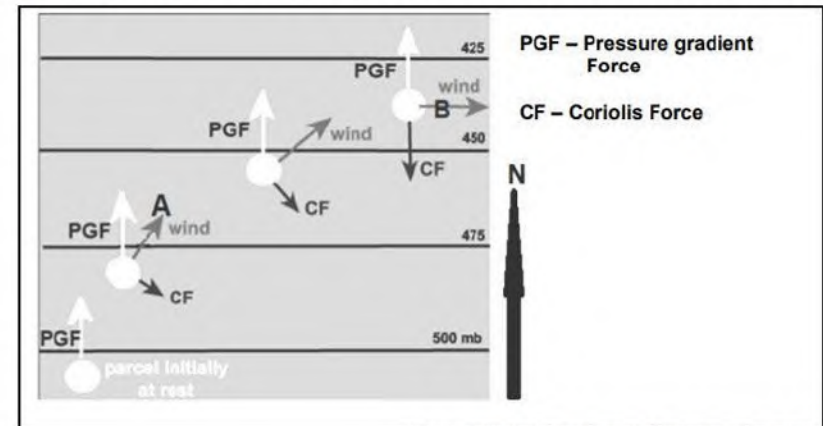
1.2 Refer to FIGURE 1.2 showing the relationship between air pressure and wind. Choose ONE term in brackets to make each of the following statements true.

FIGURE 2.2



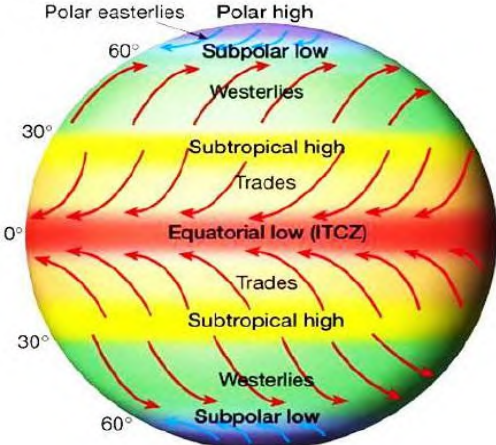
- 1.2.1 We measure air pressure in (millibars/degrees). (6 x 1) (6)
- 1.2.2 Lines joining places of equal pressure are known as (isotherms/isobars).
- 1.2.3 The difference in pressure between two places is known as the (pressure gradient force/pressure force).
- 1.2.4 Winds always blow from a (low/high) pressure to (high/low) pressure.
- 1.2.5 The isobaric interval on the sketch is (four/eight) hectopascals.
- 1.2.6 Air that subsides on the surface of the earth creates a high pressure, and so (convergence/divergence) takes place.

1.3 Study FIGURE 1.3, showing the development of a geostrophic wind



[Source: [http://en.wikipedia.org/wiki/Geostrophic\\_current](http://en.wikipedia.org/wiki/Geostrophic_current)]

- 1.3.1 Name the force that is caused by the rotation of the earth. (1 x 1) (1)
- 1.3.2 What is the initial movement of air direction? (1 x 1) (1)
- 1.3.3 Provide the wind direction at A. (1 x 1) (1)
- 1.3.4 In which hemisphere is this Geostrophic wind developing? Provide a reason for your answer. (1 + 2) (3)
- 1.3.5 The wind at B is Geostrophic. Substantiate this statement. (1 x 2) (2)
- 1.3.6 In a paragraph of approximately EIGHT lines, explain how the Geostrophic wind develops. (4 x 2) (8)

PLANETARY WINDS	CHARACTERISTICS OF AIR MASSES	
 <ul style="list-style-type: none"> <li>➤ They blow throughout the year.</li> <li>➤ They don't blow directly north-south or south-north</li> <li>➤ They are deflected to the left or right because of Coriolis force</li> <li>➤ Between 90° and 60° N/S are cold polar easterlies</li> <li>➤ Between 60° and 30° N/S are the warm westerlies</li> <li>➤ Between the 30° and 0° N/S are the Tropical easterlies/Trade winds</li> <li>➤ Land and sea heat and cool differently</li> <li>➤ Land masses heat up quickly in summer, therefore a low pressure develop over the land, on the other hand the ocean remains cooler so higher pressures are found over the oceans</li> </ul>	<ul style="list-style-type: none"> <li>➤ An air mass is a large (usually thousands of miles across) volume of air that has horizontally uniform properties in terms of temperature, and to a lesser extent humidity</li> <li>➤ Air masses form in areas called source regions.</li> <li>➤ The air mass takes on the properties of the source region.</li> <li>➤ <b>Polar air masses</b> become very cold, especially in the winter, because relatively little sunlight shines on the poles</li> <li>➤ <b>Continental polar</b> air mass will be somewhat colder and less humid (from being over very cold land) than a "maritime polar" air mass</li> <li>➤ A <b>"tropical maritime"</b> air mass will be very warm and humid.</li> <li>➤ <b>Fronts</b> are the boundaries between air masses of different temperature.</li> </ul>	
	<b>WARM AIR MASS:</b>	<b>COLD AIR MASS:</b>
	<ul style="list-style-type: none"> <li>➤ Less dense</li> <li>➤ Associated with formation of rainfall</li> <li>➤ Has high moisture content</li> <li>➤ Rising</li> </ul>	<ul style="list-style-type: none"> <li>➤ More dense</li> <li>➤ Associated with dry conditions</li> <li>➤ Less ability to hold moisture</li> <li>➤ Sinking</li> </ul>

### SEASONAL WINDS IN TROPICAL REGIONS

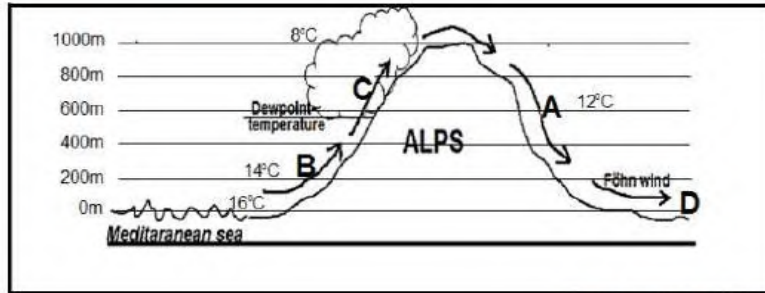
- **Regions affected:** northern Australia, Africa, South America, USA
- Mostly known in India

		SUMMER MONSOON	WINTER MONSOON
<b>DIAGRAM</b>			
<b>CHARACTERISTICS</b>		<p><b>SUMMER MONTHS</b></p> <ul style="list-style-type: none"> <li>➤ Hot land surfaces cause rising air and thus a low pressure</li> <li>➤ Over the ocean temperatures are not as warm and result in a higher pressure</li> <li>➤ Warm, moist winds blow onshore from the ocean towards the land mass.</li> <li>➤ Resultant weather: Humid winds blow onto the land from the Indian Ocean.</li> </ul>	<p><b>WINTER MONTHS</b></p> <ul style="list-style-type: none"> <li>➤ Cold winter temperatures cause strong subsiding air</li> <li>➤ Subsiding air is stable high-pressure area over the continent.</li> <li>➤ A low pressure develops over the ocean.</li> <li>➤ Cool, dry winds blow offshore from the interior towards the low-pressure region over the ocean.</li> <li>➤ Resultant weather: Dry winds with very little rainfall.</li> </ul>
<b>IMPACT</b>		<ul style="list-style-type: none"> <li>➤ Flooding impact humans, environment and economy</li> <li>➤ Humans: drowning, illness e.g. cholera, destruction of homes</li> <li>➤ Environment: damage crops, mudslides, pollute water</li> <li>➤ Economy: Damage infrastructure, loss of production</li> </ul>	<ul style="list-style-type: none"> <li>➤ less than expected rain fall results in less production.</li> <li>➤ Less export</li> <li>➤ Food chain and food web disrupted</li> <li>➤ Food price increase</li> </ul>

DIAGRAMS		CHARACTERISTICS	
CROSS SECTION			
	<ul style="list-style-type: none"> <li>➤ <b>Local topography</b> (mountains) can influence small-scale wind systems.</li> <li>➤ Wet adiabatic lapse rate of <math>0.5^{\circ}\text{C}</math> per 100m of vertical rise</li> <li>➤ As a result of the adiabatic cooling of the air, part of the water condenses leads to the <b>formation</b> of clouds and rain on the windward side of the mountain.</li> <li>➤ As the wind descends on the other side of the mountain, adiabatic heating takes place and the wind is warm and dry on the leeward side of the mountain. The <b>dry adiabatic</b> lapse rate has a value of about <math>1^{\circ}\text{C}</math> per 100 m of vertical rise</li> <li>➤ <b>FÖHN winds</b> are warm, dry and gusty winds that descend on the leeward side</li> <li>➤ The <b>föhn</b>, Chinook and Berg winds form because of adiabatic heating.</li> </ul>		
	<p style="text-align: center;"><b>FÖHN WINDS</b></p> <ul style="list-style-type: none"> <li>➤ <b>warm, dry winds</b> that blow across countries to the north of the European (Switzerland and Germany).</li> </ul>	<p style="text-align: center;"><b>CHINOOK</b></p> <ul style="list-style-type: none"> <li>➤ Interior west of North America and Canada</li> </ul>	<p style="text-align: center;"><b>BERG WINDS</b></p> <ul style="list-style-type: none"> <li>○ The hot, dry and gusty winds</li> <li>○ As air descend the escarpment in winter of South Africa</li> </ul>

1.4 Study the sketch, FIGURE 1.4, which indicates the development of Föhn winds. Choose the correct answer between brackets to make the statement true. Write ONLY the correct answer next to the question number (1.4.1 to 1.4.7), for e.g. 1.4.8 climatology

FIGURE 2.1: FÖHN WINDS



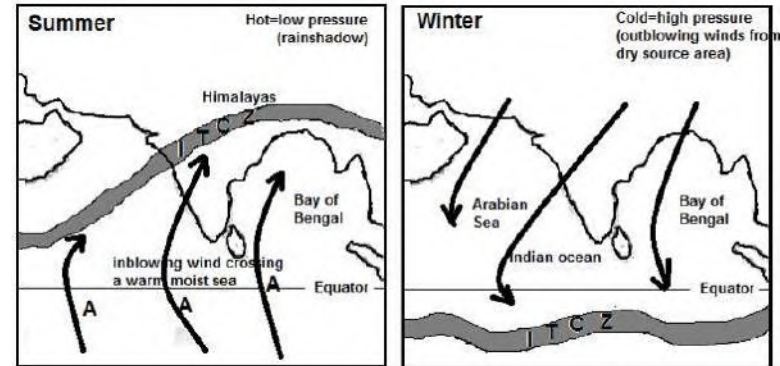
[Source: Examiners own sketch]

- 1.4.1 The descending air at **A** is on the (windward/leeward) side of the mountain.
- 1.4.2 The lapse rate at **B** is called the (wet adiabatic/dry adiabatic) lapse rate.
- 1.4.3 The lapse rate at **C** is (0,5°Cper100m/1°Cper100m).
- 1.4.4 The dew point temperature is reached at approximately (500 m/800 m).
- 1.4.5 The air temperature at **D** will be (16°C/18°C).
- 1.4.6 The continent where the Föhn wind occurs is (North America/ Europe).
- 1.4.6 A similar type of wind as the one at **A** occurs on the coastal regions of South Africa and is called a (berg wind/chinook).

(7x1) (7)

1.5 FIGURE 1.5 is a representation of monsoon conditions over the sub-continent of India.

FIGURE 2.3: MONSOON CONDITIONS OVER INDIA

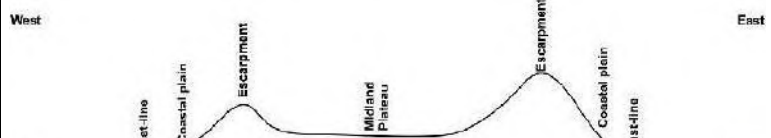



[Source: Examiners own sketch]

- 1.5.1 Define Inter-tropical convergence zone (1x2) (2)
- 1.5.2 Explain how the ITCZ plays a role in the formation of monsoon conditions over India. (2x2) (4)
- 1.5.3 Why does the wind at **A** change direction from south east to south west? (2x2) (4)
- 1.5.4 Comment on the fact that the summer monsoon is both a blessing and a curse for the people of India. (3 x 2) (6)

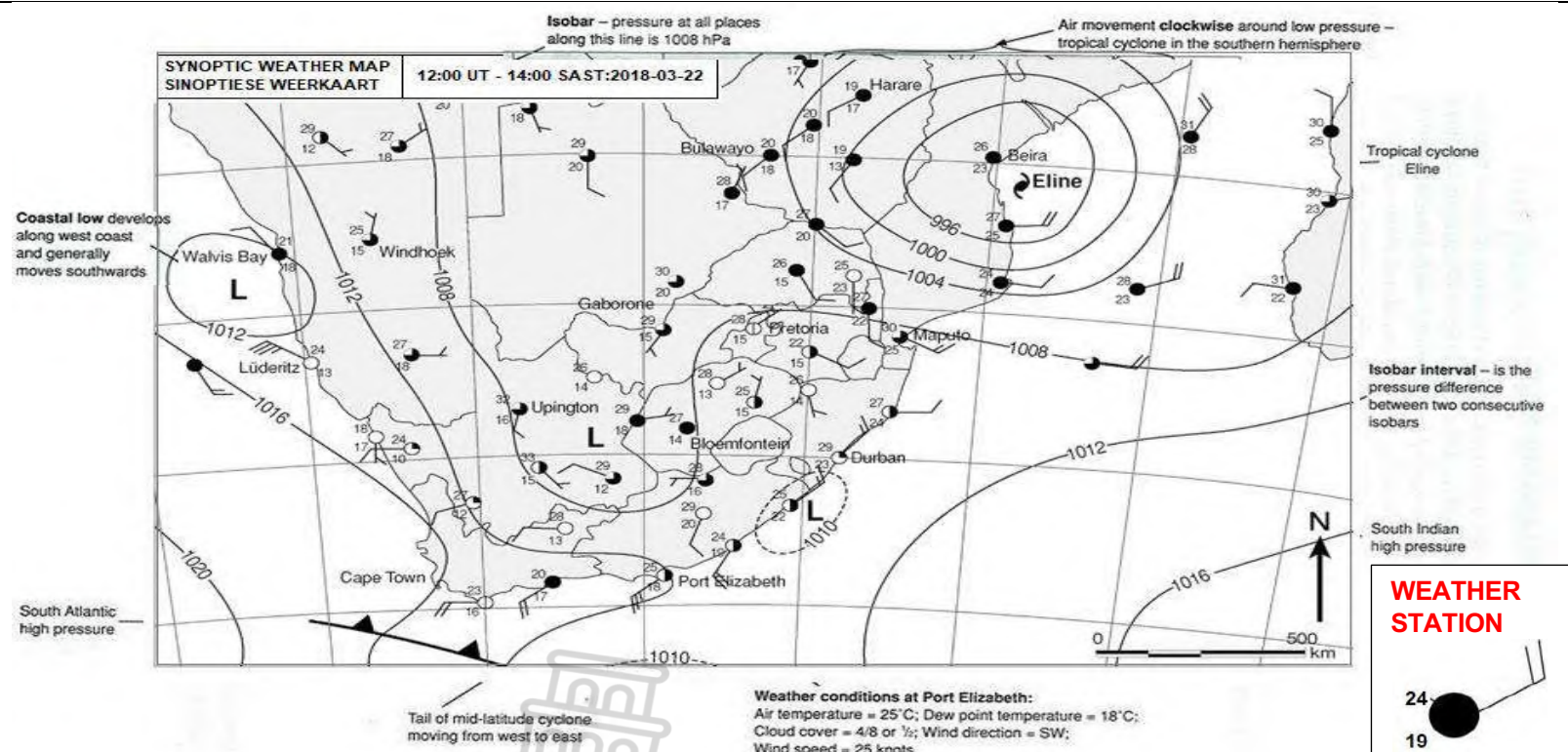
[16]

**WEEK5: AFRICA'S WEATHER AND CLIMATE**

FACTORS INFLUENCING AFRICA'S CLIMATE AND WEATHER		TEMPERATURE	RAINFALL	
<p><b>SEASONAL CHANGES:</b></p> <ul style="list-style-type: none"> <li>➤ Places close to the equator experience hot temperatures and rain throughout the year</li> <li>➤ When moving further from the equator the difference in the temperatures of summer and winter become greater.</li> </ul>	LATITUDE	<ul style="list-style-type: none"> <li>➤ Places closest to the equator are hotter</li> <li>➤ Places further away from the equator are cooler</li> </ul>	<ul style="list-style-type: none"> <li>• Convection currents are created when hot air expands and rises</li> <li>• Rising air cools, condensation occurs, and <b>Convection rain</b> occurs.</li> </ul>	
	ALTITUDE	<ul style="list-style-type: none"> <li>➤ Parts of East Africa is above 1000m above sea level because temperature decreases with altitude</li> </ul>	<ul style="list-style-type: none"> <li>• Air rises along a mountain, cools and condenses resulting in <b>Orographic relief rain</b></li> </ul>	
	DISTANCE FROM OCEAN	<ul style="list-style-type: none"> <li>➤ Areas closer to the ocean has moderate temperatures. E.g., Durban and Cape Town</li> <li>➤ Areas further from the ocean have a big difference between winter and summer temperatures. E.g., Pretoria</li> </ul>	<ul style="list-style-type: none"> <li>• Places closest to the ocean have more rain</li> <li>• More rain on the East coast because of the warm Agulhas Ocean current</li> <li>• Less rain on the West coast because of the cold Benguela ocean current</li> </ul>	
<p><a href="https://youtu.be/Xpbhd3GSEVw">https://youtu.be/Xpbhd3GSEVw</a></p>	OCEAN CURRENTS	<ul style="list-style-type: none"> <li>• Ocean currents influence the weather of the coastal areas.</li> <li>• Due to evaporation from the oceans, the winds blowing from the sea to the carry moisture (<b>Onshore winds</b>) to coastal areas.</li> <li>• Any moisture in the air condenses to form either mist or fog.</li> </ul>	<p><b>EAST COAST</b></p> <ul style="list-style-type: none"> <li>• warm Agulhas</li> <li>• Air above warmer ocean currents is warmer, moister and therefore is more likely to bring rain</li> </ul>	<p><b>WEST COAST</b></p> <ul style="list-style-type: none"> <li>• Cold Benguela</li> <li>• Air above cold ocean currents holds little moisture, therefore areas washed by cold currents are drier</li> </ul>

CLOUD COVER

	Drizzle
	Shower
	Rain
	Snow
	Hail
	Thunderstorm
	Mist
	Fog
	Clear Sky
	1/8
	2/8
	3/8
	4/8
	5/8
	6/8
	7/8
	8/8
	Sky Obscured

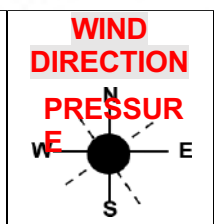


**FRONTS**

	Cold front
	Warm front
	Occluded front

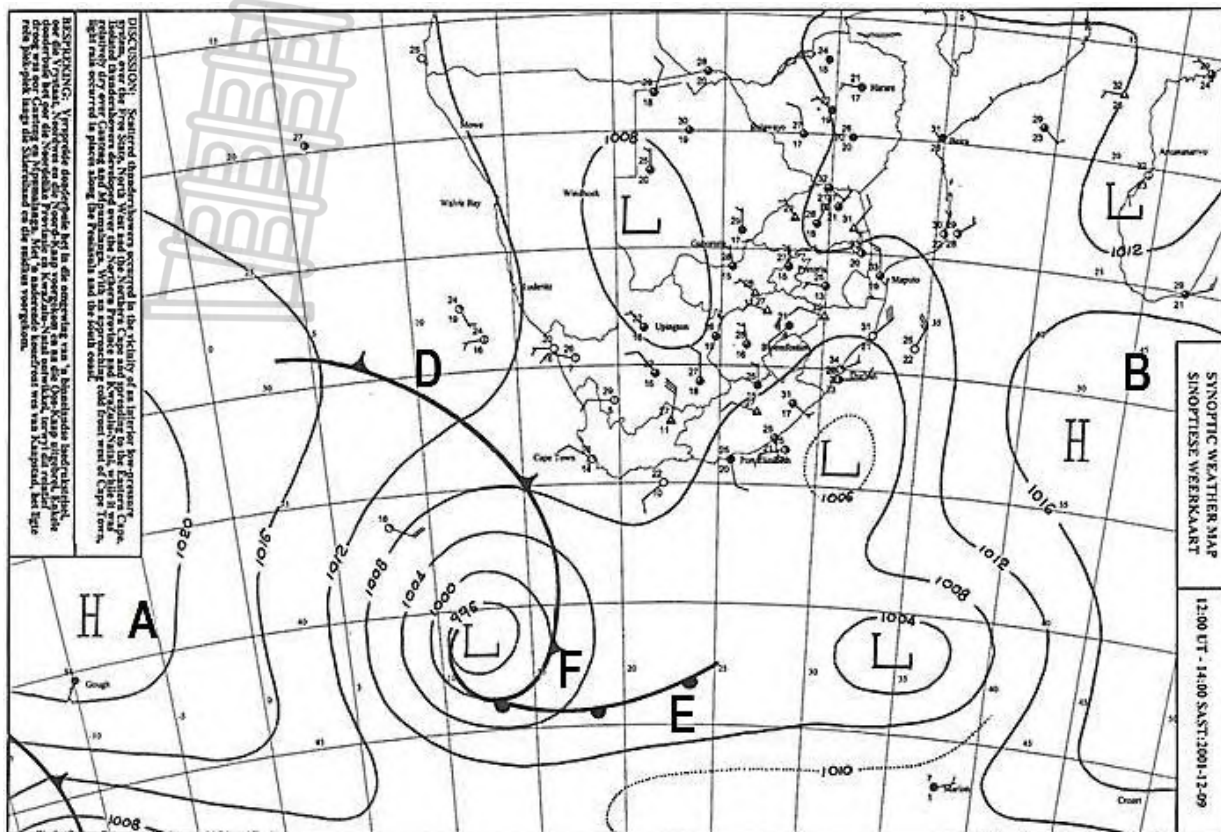
**WINDSPEED**

	1 - 2 Knots		15 Knots
	5 Knots		20 Knots
	10 Knots		50 Knots or more



H	High pressure system
L	Low pressure system

1.6 Study FIGURE 1.6 Synoptic Weather map



- 1.6.1. Identify the high-pressure cells labeled A and B. (2 x 1) (2)
- 1.6.2 Identify the weather phenomenon labeled F. (1 x 1) (1)
- 1.6.3 Describe the general movement of this weather phenomenon. (1 x 2) (2)
- 1.6.4 Explain your answer to (QUESTION 1.6.3). (1 x 2) (2)
- 1.6.5 Identify the fronts labeled D and E. (2 x 2) (4)
- 1.6.6 What effect will the front labeled D have on the weather of Cape Town. (2 x 2) (4)

[15]

# TERM TWO

## TOPOGRAPHY ASSOCIATED WITH HORIZONTALLY LAYERED ROCKS

**What are horizontally layered rocks?** – rocks which occur in layers are called **stratified rocks**. The planes separating each layer or strata are called **bedding planes**. Horizontal layers of rocks are found where sediments have been deposited (and lithified without a change in their horizontal position, due to large scale lava flows and as dolerite sills).

### Topography associated with horizontally layered rocks

The landscapes that develop are **hilly landscapes, basaltic plateaus, canyon landscapes, and Karoo landscapes**.

### KEY CONCEPTS

**Badlands** – landscape with narrow gullies and sharp ridges formed in arid climates.  
**Bedding planes** – planes separating layers of rocks  
**Dolerite sill** – horizontal layer of igneous rock that has formed along a bedding plane.  
**Gullies** – small, narrow, long area of erosion on a slope.  
**Igneous rock** – rock formed when magma cools and solidifies.  
**Landscapes** – area with a number of landforms  
**Lava flow** – lava pours out onto the earth where it cools and solidifies  
**Plateau** – large high lying area that is relatively flat  
**Sedimentary rock** – rock formed from deposition and consolidation of sediments.  
**Sheet wash** – rainfall flowing over the land as sheets.  
**Stratified rock** – rock with layers or **strata**  
**Tectonic uplift** – rising of a land mass due to crustal forces.  
**Cap rock** – horizontal layer hard, resistant rock at the top of the mountain  
**Mesas** – flat topped mountain with greater width than height  
**Buttes** – flat topped hills with greater height than width  
**Pointed butte** – narrow hill with a sharp peak at the top  
**Conical hill** – small pointed hills  
**Scarp retreat / Back wasting** – erosion of a scarp slope causing loss of ground over the whole slope but no loss of height.

### Hilly landscapes

Hilly landscapes are influenced by the **climate of the region** and the **resistance of the rock**. In **hot and humid regions**, the slopes are **steep and rounded**. High rainfall results in mass wasting and sheet erosion, while higher temperatures encourage chemical weathering. **Arid climates** results in hills with **narrow gullies and sharp ridges**.

### Basaltic plateaus

Basaltic plateaus are also called **lava plateaus**. They are built up over millions of years by lava pouring out of long narrow cracks in the ground. The lava floods the landscape building up to **form layers of basaltic rocks**. These layers are **uniformly resistant to weathering and erosion**. The Drakensberg is the remnants of a basaltic plateau, and a popular **tourist and holiday destination** in South Africa.

### Canyon Landscapes

Canyon landscapes develop where horizontal layers **erode at different rates (not uniformly resistant)**. At first the land is level, but running water soon finds **weak places** in the **hard surface layer**. The rivers erode vertically into the land and **form deep valleys**. The valleys have **stepped sides**. The **resistant rock** forms **steep cliffs** and the **less resistant rock** forms the gentler **slopes**.

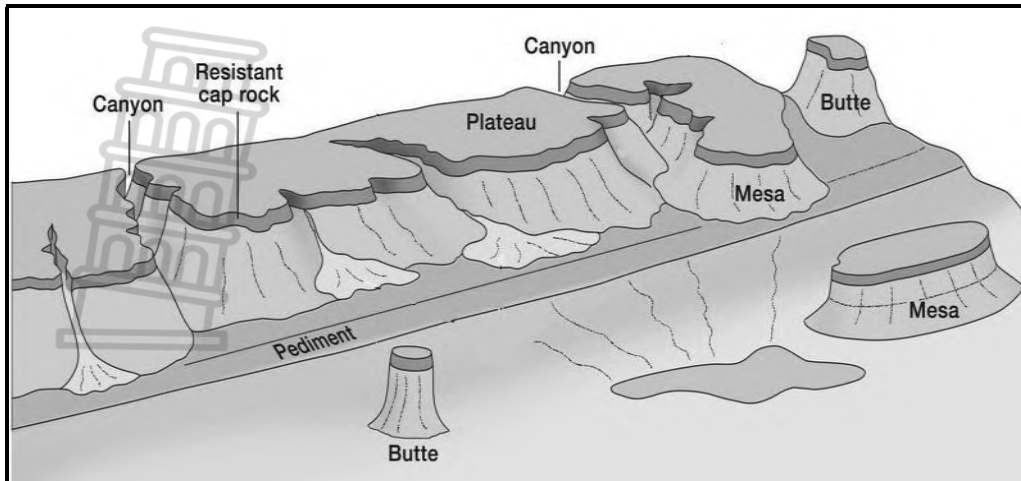
#### Uses of canyons:

- Canyons sometimes are dammed to make very deep dams, often used for hydroelectric power.
- The surrounding plateau itself may be too dry to be of agricultural value.
- Impressive scenery makes canyons good tourist attractions.

### Karoo landscapes

Karoo landscapes develop from **canyon landscapes**. Large areas are covered with horizontal layers. The plateau is protected by a **resistant hard rock** such as dolerite. Rivers erode vertically, forming canyons.

2.1 Refer to the sketch on topography associated with horizontally layered rocks.

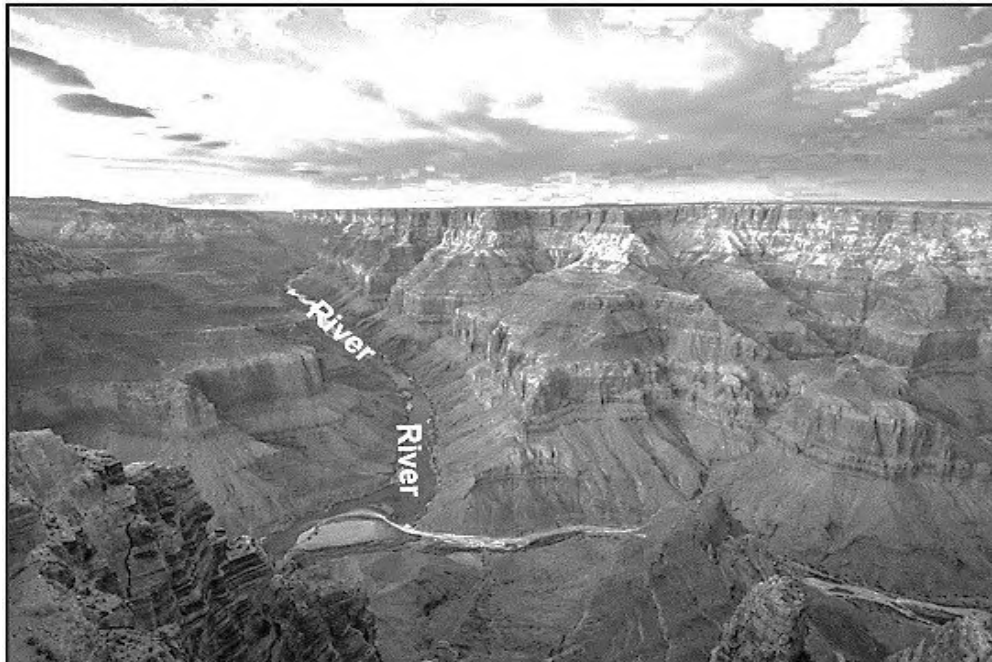


[Source: <https://www.google.com/search?q=topography+associated+with+horizontally>]

2.1.1	Comment on the height of the mesa and the butte	(1 x 1)	(1)
2.1.2	Provide a reason for your answer to QUESTION 2.1.1.	(1 x 1)	(1)
2.1.3	The topography above is (equally/unequally) resistant to erosion.	(1 x 1)	(1)
2.1.4	Discuss how are canyons formed.	(2 x 2)	(4)
2.1.5	Explain the socio-economic impact of the topography associated with horizontally layered rocks.	(2 x 2)	(4)
			<b>[11]</b>



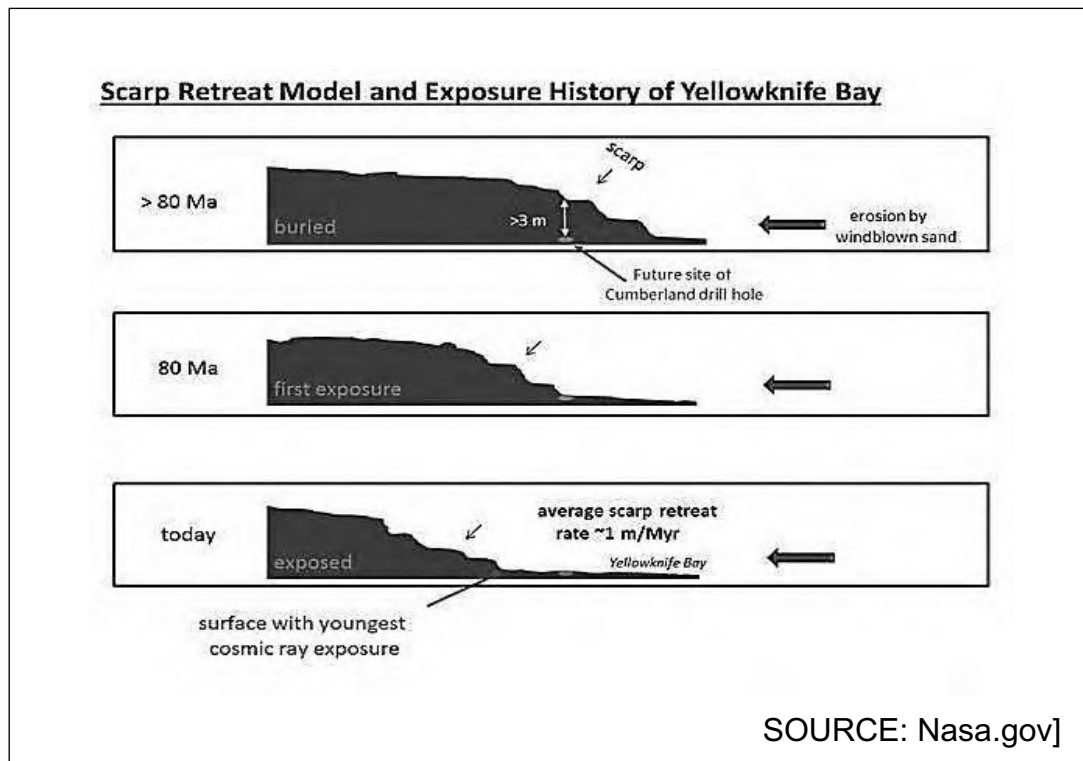
2.2 Study FIGURE 2.2 showing a canyon landscape.



[Source: [nationalgeographic.com](http://nationalgeographic.com)]

2.2.1	State evidence from the sketch to justify that this landscape developed from strata of unequal resistance to erosion.	(1 x 1)	(1)
2.2.2	Describe the climate of this canyon landscape as depicted by FIGURE 2.2.	(1 x 2)	(2)
2.2.3	Name ONE advantage of this canyon landscape for human activity	(1 x 1)	(1)
2.2.4	Discuss the role of the river in the sketch in the formation of canyon landscapes.	(2 x 2)	(4)
2.2.5	In a paragraph of approximately EIGHT lines, explain how Karoo landforms develop from a canyon landscape.	(4 x 2)	(8)
			<b>[16]</b>

2.3 Refer to the sketch on topography associated with horizontally layered rocks.

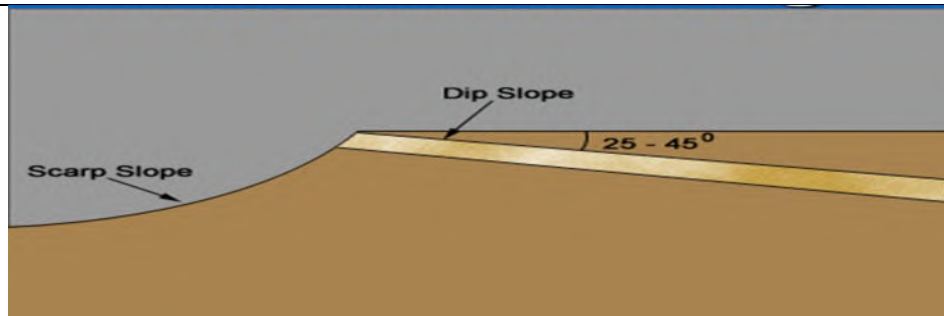


2.3.1	Name the cap rock that is likely to be found on this landscape.	(1 x 1)	(1)
2.3.2	State the rate at which this landscape experienced scarp retreat.	(1 x 1)	(1)
2.3.3	Give TWO pieces of evidence from the diagram that scarp retreat has taken place.	(2 x 1)	(2)
2.3.4	Explain ONE advantage and ONE disadvantage of scarp retreat.	(2 x 2)	(4)
2.3.5	Explain how slope retreat develop.	(2 x 2)	(4)
			<b>[12]</b>

<b>TOPOGRAPHY ASSOCIATED WITH INCLINED/TILTED ROCK STRATA</b>	
<b>KEY CONCEPTS</b>	
<b>Homoclinal ridge:</b>	Ridge formed from inclined strata
<b>Scarp slope</b>	Steep slope of a homoclinal ridge
<b>Dip slope</b>	Less steep slope of a homoclinal ridge
<b>Mass wasting</b>	Movement of eroded material down a slope due to gravity
<b>Undercutting</b>	Erosion of rock at the base of a slope with subsequent collapse of the overhang
<b>Homoclinal shifting</b>	Movement of a homoclinal ridge towards the dip slope
<p style="text-align: center;"><b>CHARACTERISTICS &amp; PROCESSES ASSOCIATED WITH THE DEVELOPMENT OF HOMOCLINAL LANDSCAPES</b></p> <p>Inclined strata are layers of rock below the earth's surface which tilt at an angle. The tilting was caused by tectonic forces. Hard and soft layers are exposed at the surface. It forms when horizontal strata are tilted or dip at an angle. There must be alternate layers of hard and soft rock</p>	
<p><b>FACTORS INFLUENCING THE TILTED STRATA</b></p> <p>Weight of deposited sediment Tectonic movement (folding and faulting)</p>	

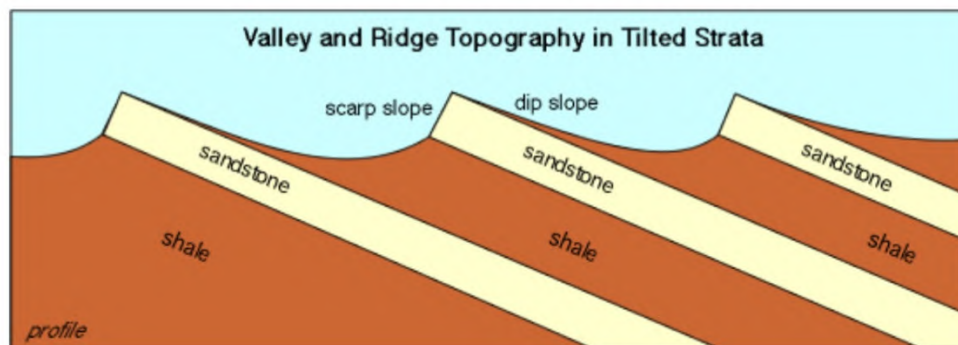
## TYPES OF RIDGES

### HOMOCLINAL RIDGE



Source: <https://slideplayer.com/slide/10437558/>

Homoclinal ridges are asymmetrical ridges which have a steeper slope on one side and a gentler slope on the other. The dip slope is at angle of  $25^\circ - 45^\circ$ . These form from alternating sedimentary rock strata of varying resistances that have been uplifted and tilted by warping, folding and faulting. Homoclinal landscapes refer to a landscape formed of inclined strata that are tilted by the same degree of dip in the same direction.



Source: [https://www.columbia.edu/~vjd1/structure\\_landforms\\_basic.htm](https://www.columbia.edu/~vjd1/structure_landforms_basic.htm)

### DIP AND SCARP SLOPES

Surface erosion exposes the inclined strata.

This results in ridges having a scarp slope and a dip slope.

Erosion is less on the dip slope as it has a more resistant rock than the scarp slope

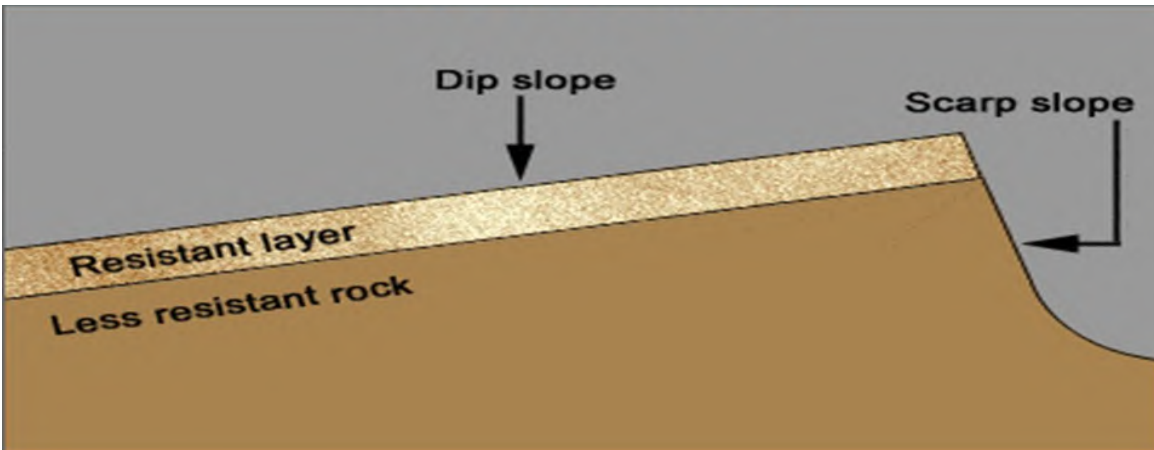
The scarp slope is eroded through sheet wash and mass wasting

Scarp recession occurs as undercutting and collapse cause the scarp slope to erode in the direction of the dip slope. (homoclinal shifting)

## CUESTAS

Formation of Cuesta basins & Cuesta domes

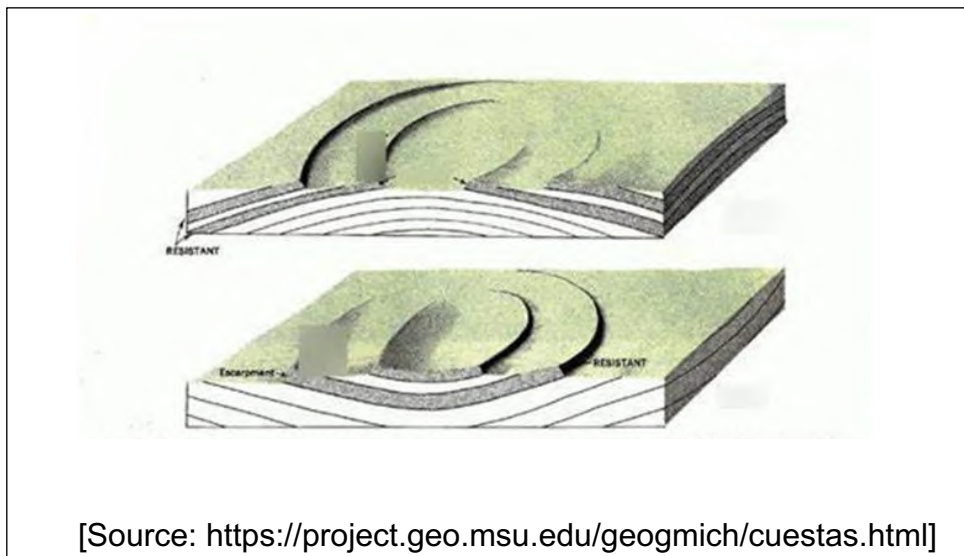
As a result of folding, strata are raised into a dome shape or bend downwards into a basin shape



Source: <https://slideplayer.com/slide/10437558/>

Erosion of overlying material leads to a circular shape called cuesta domes or cuesta basins

Cuesta the dipping strata lie at an angle of 10 – 25 degrees. It is an asymmetrical ridge. It formed due to volcanic intrusions.



[Source: <https://project.geo.msu.edu/geogmich/cuestas.html>]

### **Cuesta Dome**

Strata dip away from the centre or outwards

The dip slope faces outwards and scarp slope inwards

The intrusion is dome of mushroom shaped

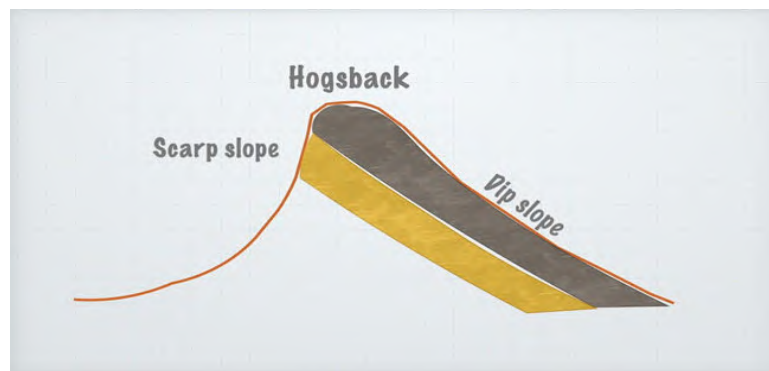
### **Cuesta basin**

The strata dip towards the centre or inwards

The dip slope faces inwards and the scarp slope outwards

The intrusion is saucer shaped

### **HOGSBACKS**



Source: <https://youtu.be/31dvnJ1qn5U?feature=shared>

Hogsbach the dipping strata lie at an angle of more than 45 degrees. It is an asymmetrical ridge

Depending on the angle of the resistant strata, we differentiate between a cuesta and a hogsbach



Source: <https://geologypics.com/we-20/>

### **UTILISATION OF LANDSCAPE ASSOCIATED WITH INCLINED STRATA**

The dip slope of a cuesta is rocky with thin soil, this is used for forestry

The scarp of a cuesta slope is too steep to be used by people

Homoclinal ridges are areas used to build dam walls

Cuesta domes may contain oil or gas

Cuesta basins may hold (artesian wells) if a layer of permeable rock lies between two layers of impermeable rock.

Ridges make it difficult to construct transport networks

### **TOPOGRAPHY ASSOCIATED WITH MASSIVE IGNEOUS ROCK**

Massive means rocks without strata and bedding planes

Igneous rocks are formed from cooling magma

Erosion occurs along lines of weakness called joints and cracks

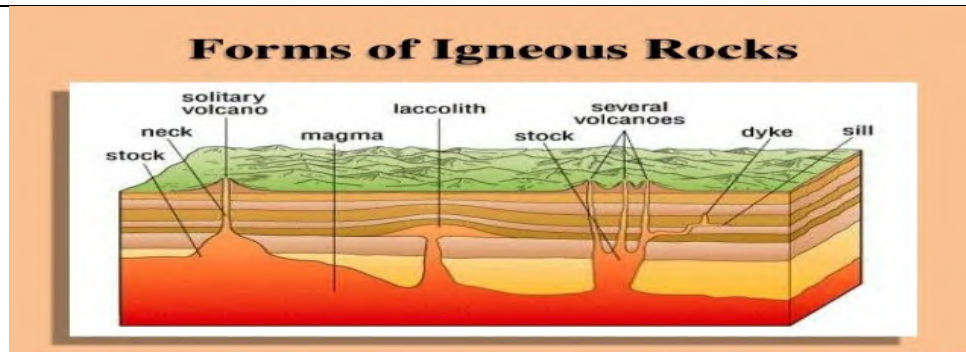
When water penetrates into joints, chemical weathering occurs

### **INTRUSIVE IGNEOUS ACTIVITY & FEATURES**

The Earth's mantle is made of magma (molten rock), magma is less dense than rock and works its way through cracks and joints to the earth's crust.

When magma cools it forms igneous intrusions.

We classify these igneous intrusions according to their shape, size and depth.



Source: <https://slideplayer.com/slide/16861238/>

### **Batholiths**

Batholiths are the largest & deepest igneous intrusions.

Magma cools slowly to form rocks with large crystals, granite is the most common rock associated with batholiths.

### **Monolith**

Monoliths are very large intrusions.

When exposed on the earth surface they form a huge area of domed rock.

Monoliths are batholiths that have been exposed.

### **Laccoliths**

Laccoliths are dome-shaped intrusions.

They form when magma is forced between layers of sedimentary rock & pushes up the layer of rock above it.

Laccoliths can cause mountains to be pushed up.

### **Lopolith**

Similar to a Laccolith, but the weight from the overlaying strata causes the lopolith to sink into a saucer shaped structure.

### **Dyke & Sills**

Dykes are caused by magma forcing its way vertically through layers of rock.

They are usually only a few meters across.

Dolerite is a common rock seen in dykes.

Sills are caused by magma forcing its way horizontally through layers of strata.

## **GRANITE BATHOLITHS**

Massive igneous rocks don't have bedding planes but they do have joints and cracks  
Joints form when magma cools, it contracts and solidifies to form granite, these contractual joints cross one another at right angles

Pressure from overlying material compresses the granite and forms pressure-release or off-loading joints.

## **GRANITE DOMES**

Granite domes are exposed batholiths (monoliths)

The dome is made visible by erosion of the overlying material, or uplift that takes place below the earth's surface

As the dome is exposed, it undergoes pressure release due to the weight of the overlying material being removed

As the pressure is released the granite expands, causing dilation joints to form along the surface

Further erosion and weathering along these joints cause exfoliation type weathering and slabs of granite slip off the dome.

## **TORS**



Source: <https://www.langstonemanor.co.uk/dartmoors-famous-tors-best-time-of-year-to-visit/>

Tors are composed of granite, dolerite or metamorphic rocks that form when erosion widens the rocks joints

Before being exposed water seeped into the ground and chemically weathered the parent rock along its joints and bedding plains.

Following uplift or the removal of material due to erosion, the rocks are weathered and eroded at an accelerated rate, and the joints are enlarged

This structure appears as boulders loosely stacked on each other

As weathering of tors continues, the rock is broken down further

Hillsides are covered in loose rocks, known as clitter

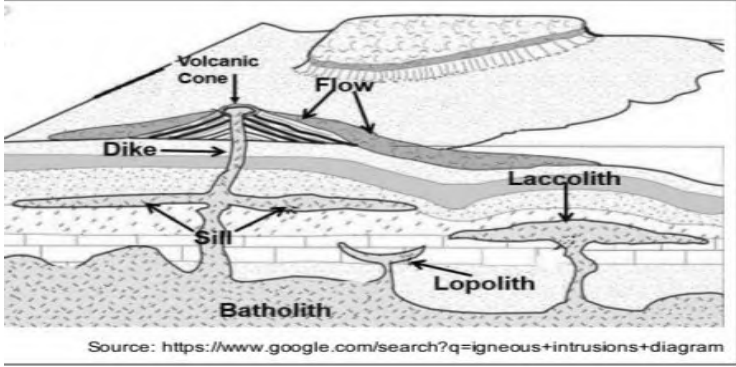
Eventually the granite is weathered down to a sandy gravel known as growan, which consists on individual crystals

Tors are common in temperate climates

Inselbergs in tropical climates

Both suggest the removal of material by the way of solifluction

2.4	Choose the correct word(s) from those given in brackets. Write only the word(s) next to the question numbers (2.4.1 to 2.4.8) in the ANSWER BOOK, e.g. 2.4.9 Inclined.		
2.4.1	Basaltic plateau forms from layers of lava that flow (vertically/ horizontally) onto the earth's surface.	(1 x 1)	(1)
2.4.2	Type of weathering causing exposed igneous rocks to peel off is termed (sheet-wash/ exfoliation).	(1 x 1)	(1)
2.4.3	A cuesta (basin/ dome) has a dip slope that faces outward, and the scarp slope that faces inwards.	(1 x 1)	(1)
2.4.4	(cuesta/ hogsback) asymmetrical ridge with a gentle dip slope between 10°–25°.	(1 x 1)	(1)
2.4.5	The (dip/ scarp) slope forms from hard rock that weathers slowly.	(1 x 1)	(1)
2.4.6	A mesa is an example of (horizontally layered/ inclined) rock.	(1 x 1)	(1)
2.4.7	The Fish River Canyon is found in (America/ Africa).	(1 x 1)	(1)
2.4.8	Homoclinal ridge refers to rock strata that is (tilted/ horizontal).		
		(8 x 1)	(8)

2.5	<p>Refer to the sketch on intrusive landforms. Choose the correct landform from the sketch that the description below refers to. Write only the landform next to the question numbers (2.5.1 to 2.5.8) in the ANSWER BOOK.</p>  <p>Source: <a href="https://www.google.com/search?q=igneous+intrusions+diagram">https://www.google.com/search?q=igneous+intrusions+diagram</a></p>		
2.5.1	The largest of all intrusive forms.	(1 x 1)	(1)
2.5.2	A vertical intrusion of igneous rock that forms a wall.	(1 x 1)	(1)
2.5.3	When magma is exposed on the earth's surface.	(1 x 1)	(1)
2.5.4	Igneous intrusion that forms when strata is forced upwards.	(1 x 1)	(1)
2.5.5	A horizontal intrusion of igneous rock that forms a sheet.	(1 x 1)	(1)
2.5.6	Igneous intrusion that forms when sedimentary strata create a basin.	(1 x 1)	(1)
2.5.7	A triangle-shaped hill formed from material of eruptions.	(1 x 1)	(1)
		(7 x 1)	(7)

2.6 Refer to the images **A** and **B** below.

**IMAGE A**

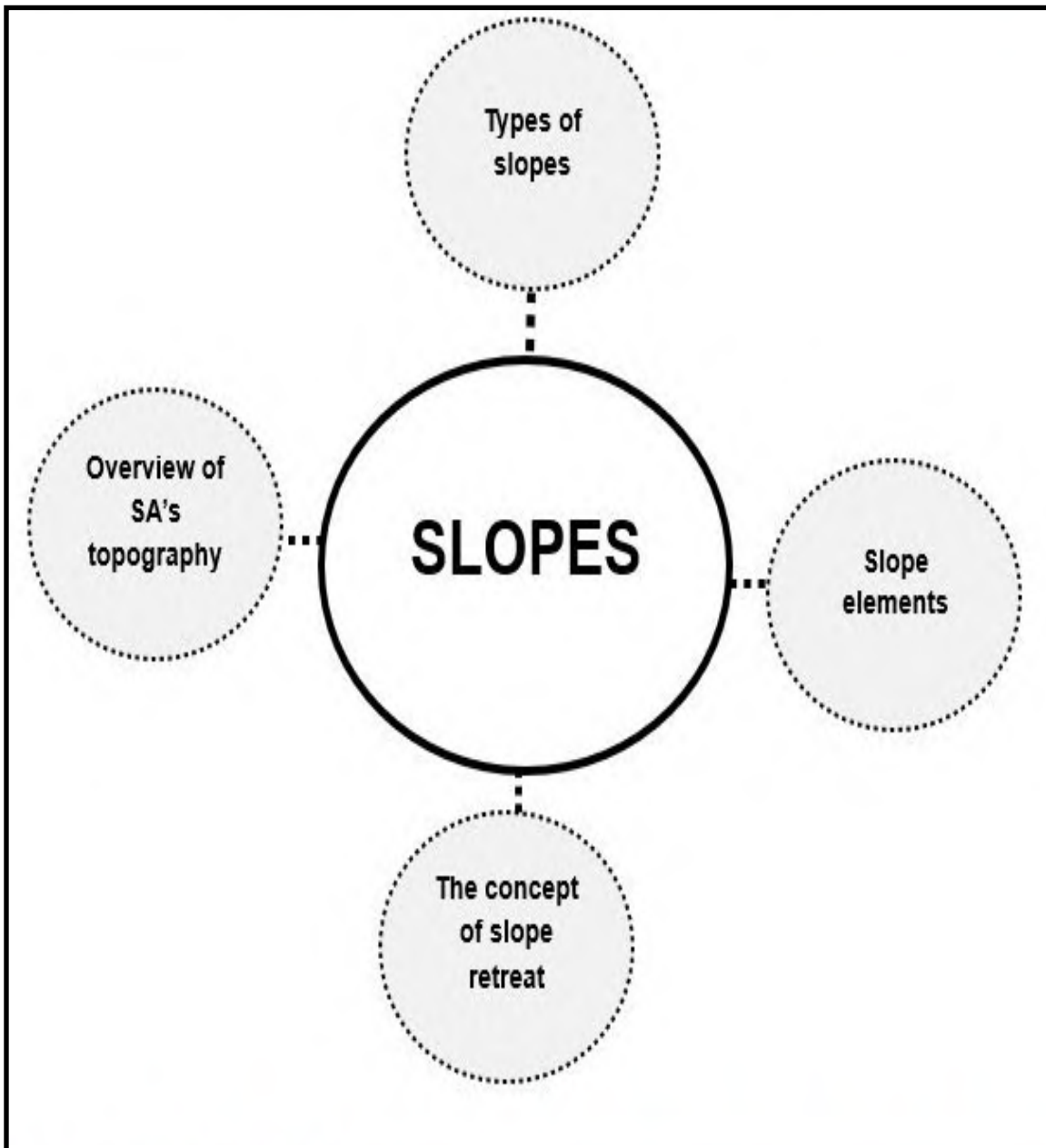


**IMAGE B**



Source: <https://m.wikidata.org/wiki/Q5430808>

2.6.1	Identify the landforms associated with massive igneous rocks in photo <b>A</b> and photo <b>B</b> .	(2 x 1)	(2)
2.6.2	Name ONE characteristic of massive igneous rocks that is evident in the sketch.	(1 x 1)	(1)
2.6.3	From what igneous intrusions do the landforms in photo A and photo B originate?	(2 x 1)	(2)
2.6.4	How are these landforms in photo <b>A</b> and photo <b>B</b> exposed on the earth's surface?	(1 x 2)	(2)
2.6.5	In a paragraph of approximately EIGHT lines, explain the role of weathering in the formation of these TWO landforms identified in QUESTION 2.6.1	(4 x 2)	(8)
			<b>[15]</b>



KEY CONCEPTS	DEFINITION
<b>Topography</b>	The shape and form of the Earth's surface.
<b>Plateau</b>	A high plain or tableland that is fairly flat.
<b>Escarpment</b>	A steep slope that is a margin between highland and lowland.
<b>Slope retreat</b>	The cutting back or receding of a slope.

### OVERVIEW OF SOUTH AFRICA'S TOPOGRAPHY

Topography is the shape of the Earth's surface- its landforms and mountains and valleys

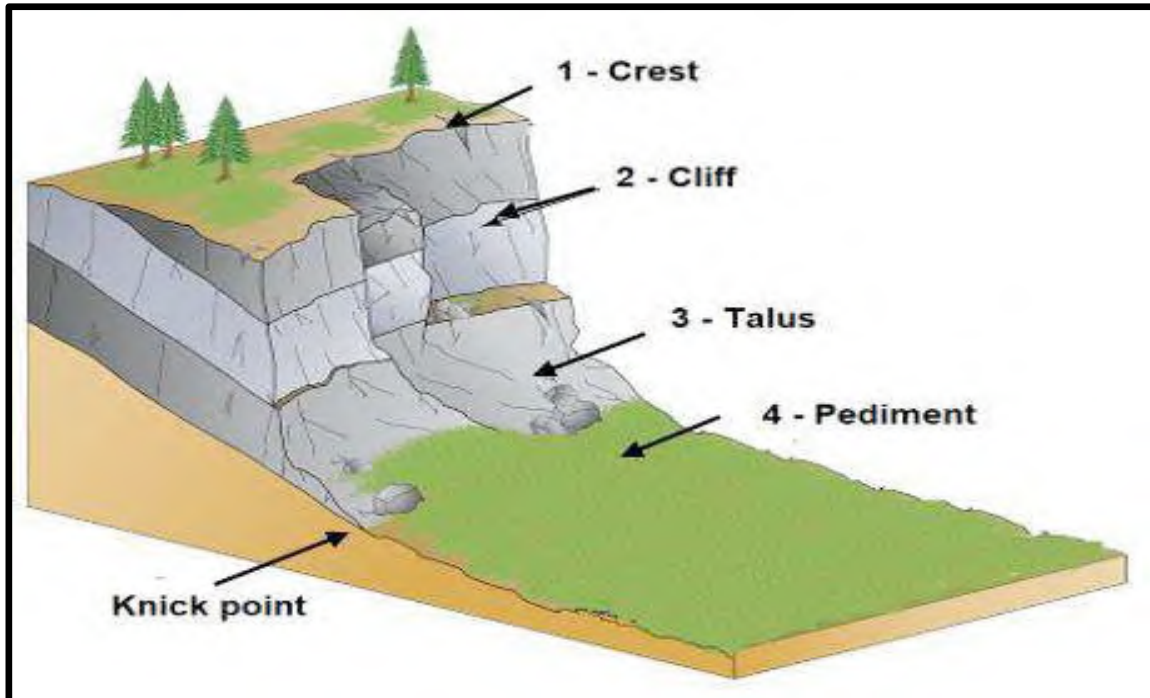


[source: [www.image/jpeg;base64](http://www.image/jpeg;base64) ]

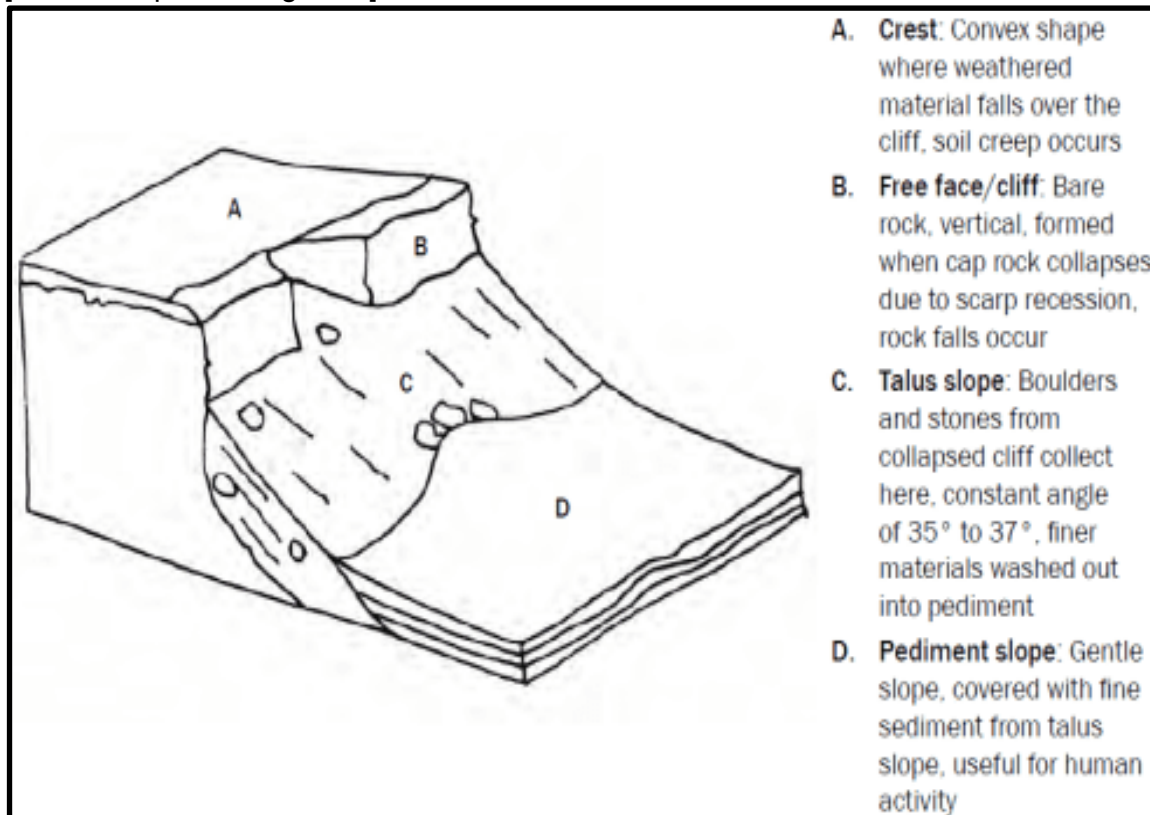
### TYPES OF SLOPES

Steep slope		Contour lines close together	
Gentle slope		Contour lines far apart	
<b>3- Convex Slope</b> A slope which becomes progressively steeper <u>downhill</u>			
<b>4- Concave Slope</b> A slope which becomes progressively steeper <u>uphill</u>			

### SLOPE ELEMENTS



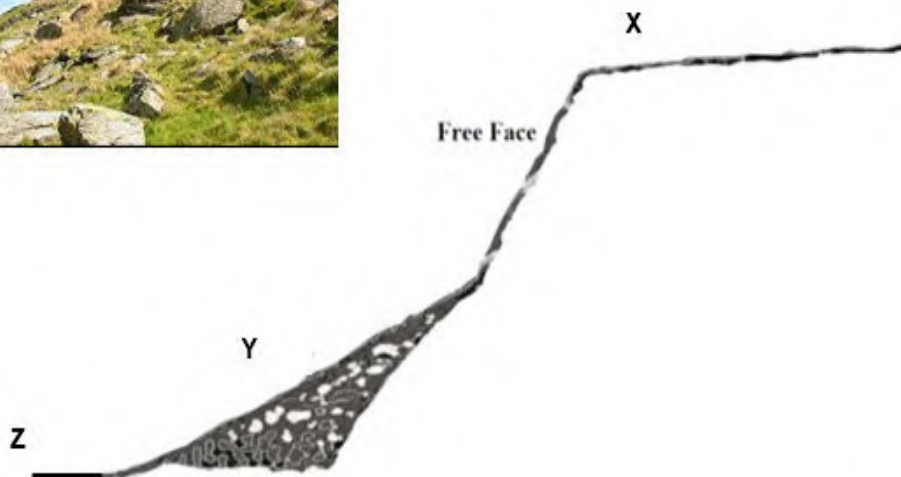
[Source: <https://th.bing.com> ]



[Source: <https://sageography.co.za> ]

1.7 Refer to the sketch on slope elements.

Extracted slope element



[Adapted: <https://th.bing.com>]

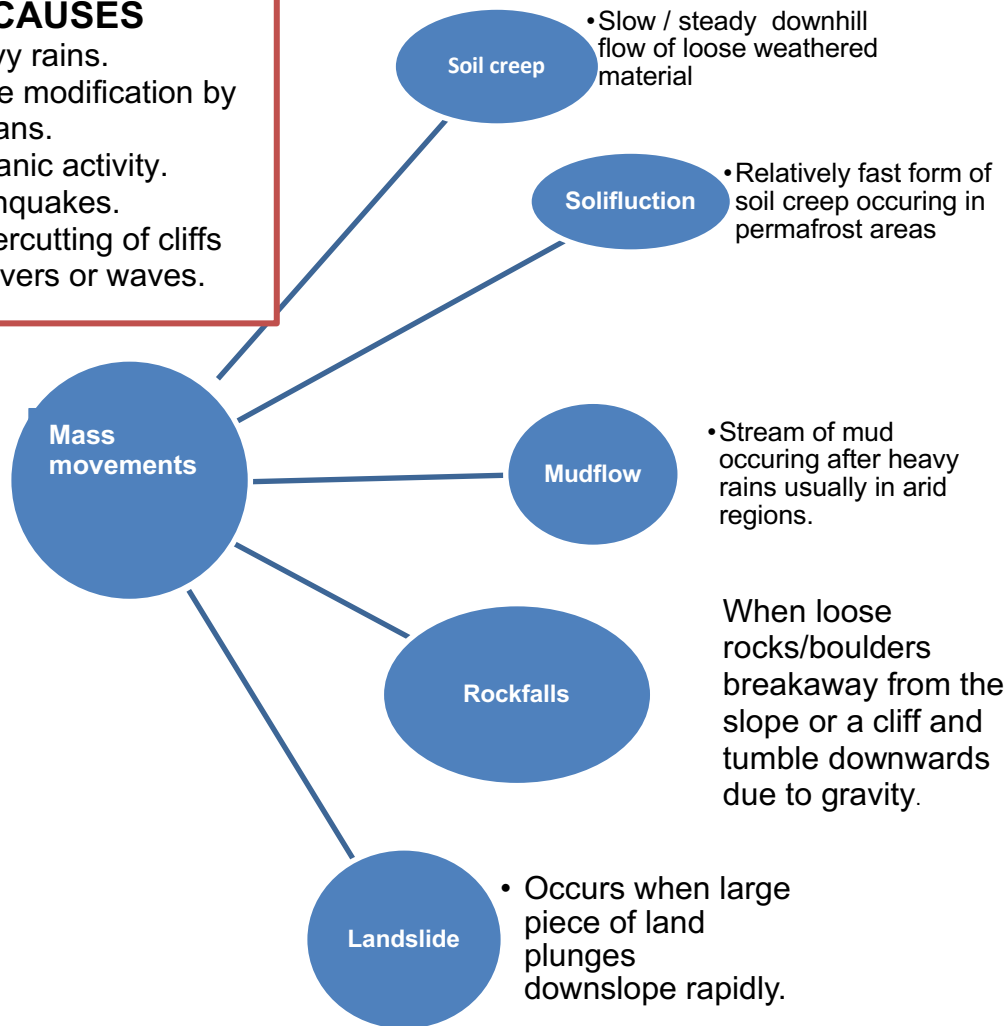
2.7.1	Give ONE characteristic of the free face slope.	(1 x 1)	(1)
2.7.2	Name the process whereby the free face erodes backward.	(1 x 1)	(1)
2.7.3	Match the extracted picture of the slope element with either <b>Y</b> or <b>Z</b> .	(1 x 1)	(1)
2.7.4	Explain why soil creep is dominant at <b>X</b> .	(2 x 2)	(4)
2.7.5	In a paragraph of approximately EIGHT lines, describe the shape of slope element <b>Z</b> and explain how it is most ideal (suitable) for human activities.	(4 x 2)	(8)
			<b>[15]</b>

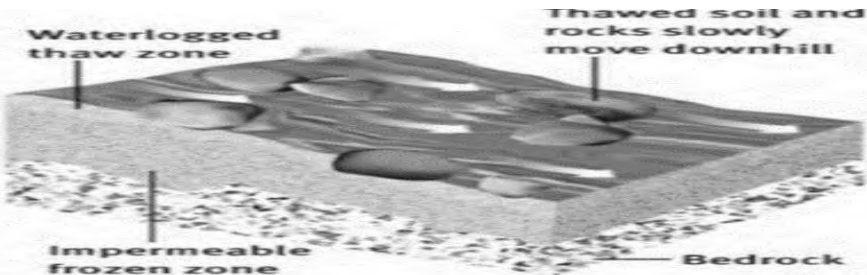
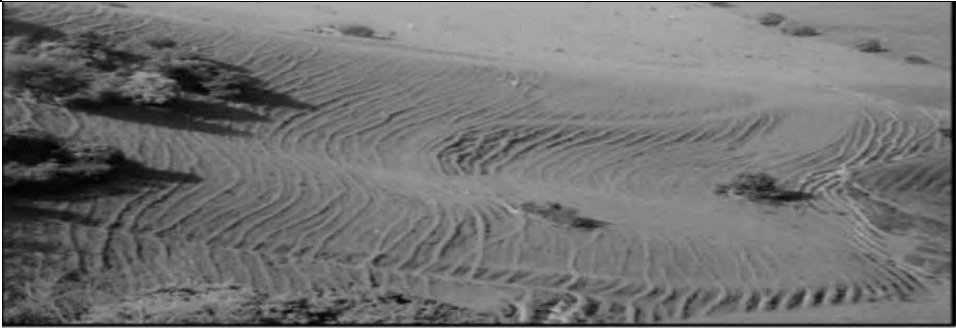



## MASS MOVEMENTS: TYPES OF MASS MOVEMENTS

**Definition:** Gradual or sudden movement of loose weathered material down the slope as a result of gravity.

### CAUSES

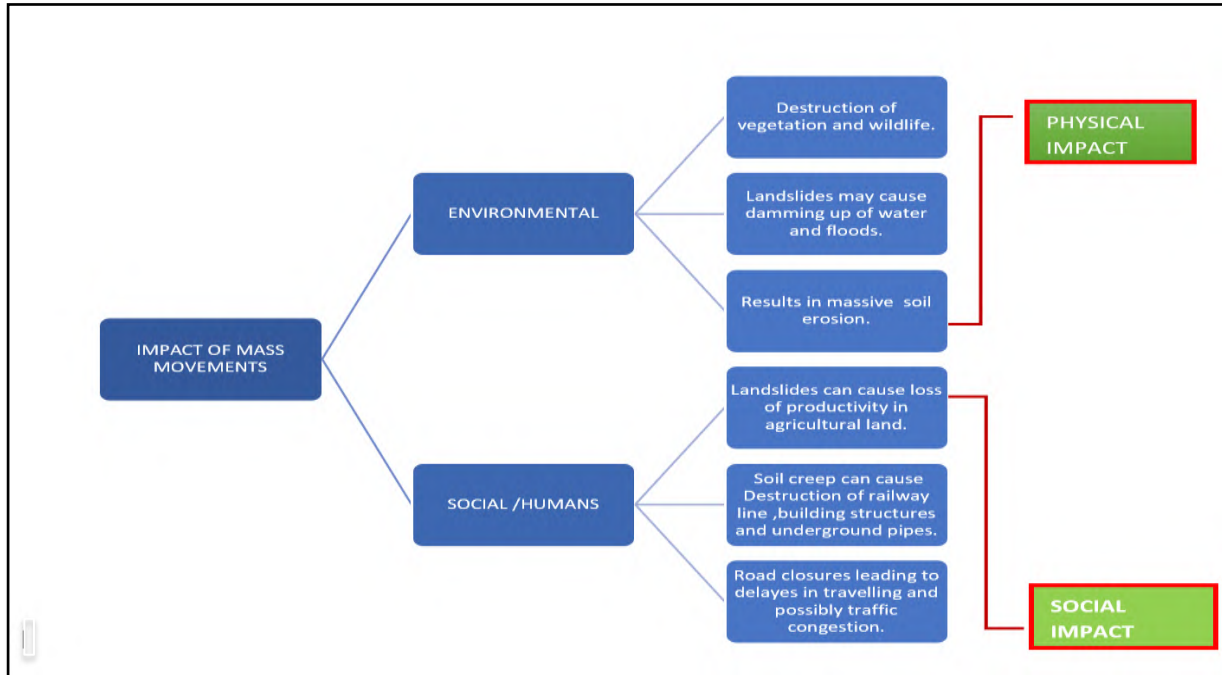
- Heavy rains.
- Slope modification by humans.
- Volcanic activity.
- Earthquakes.
- Undercutting of cliffs by rivers or waves.



<p><b>SOLIFLUCTION</b></p>	 <p>Waterlogged thaw zone</p> <p>Thawed soil and rocks slowly move downhill</p> <p>Impermeable frozen zone</p> <p>Bedrock</p>	
<p><b>SOIL CREEP</b></p>		
<p><b>MUD FLOW</b></p>		
<p><b>ROCK FALL</b></p>		
<p><b>LAND SLIDE</b></p>		

Source: google images

## IMPACT OF MASS MOVEMENT



2.8

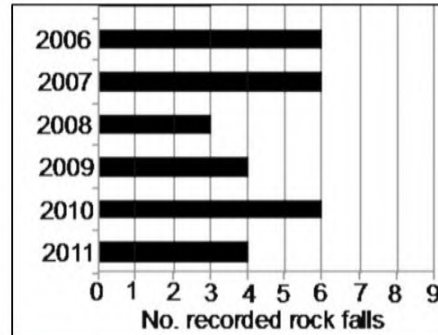
### READ THE INFOGRAPHIC AND ANSWER THE QUESTIONS THAT FOLLOW

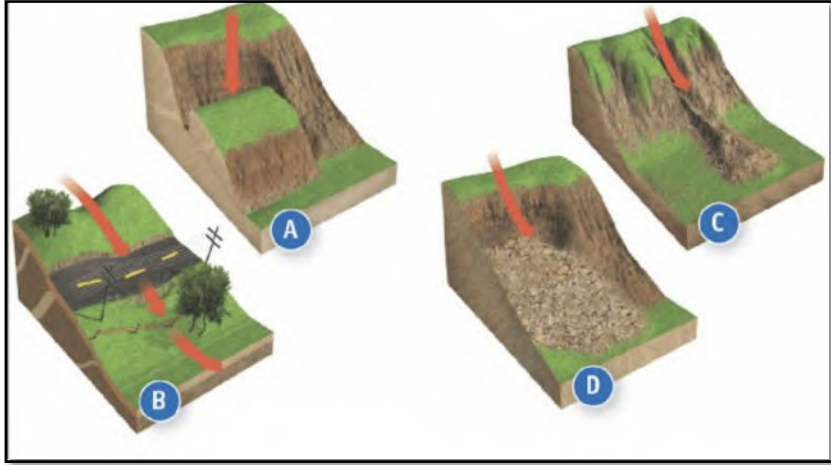
**NATIONAL NEWS** - Chapman's Peak in the Western Cape has been closed after a rock fall between Noordhoek and Hout Bay in Cape Town.

The rock fall comes after a strong cold front made landfall in Cape Town on Sunday night, with the South African Weather Service (Saws) warning residents of icy conditions sweeping over the province for the rest of the week.

The adverse weather conditions have brought intense strong winds and heavy downpours in most parts of the province.

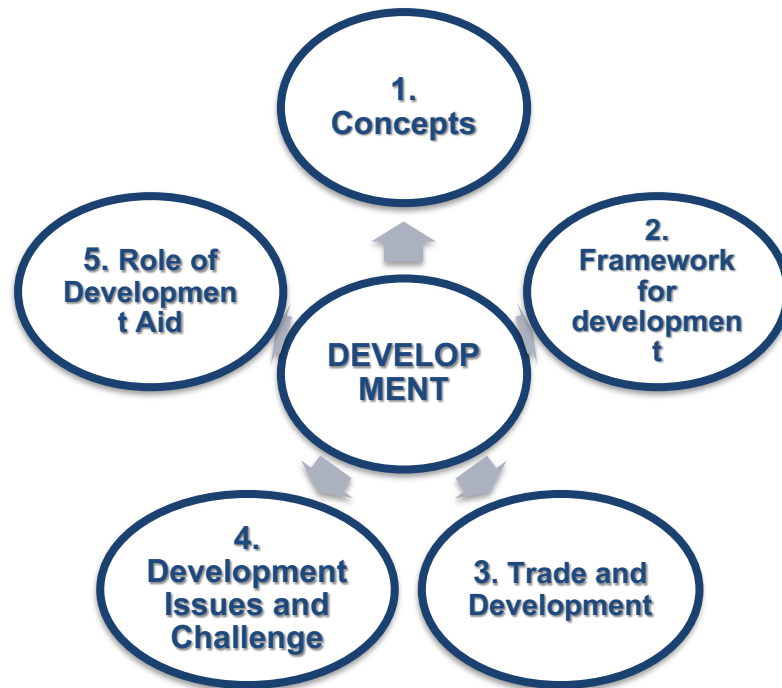
“These cold fronts are expected to result in strong winds, high waves, heavy rainfall, light snow and a significant drop in temperatures,” warned the weather service.



2.8.1	Define <i>mass movement</i> .	(1 x 2)	(2)
2.8.2	Identify the type of mass movement that occurred in Chapman's Peak according to the infographic.	(1 x 1)	(1)
2.8.3	Indicate the type of weather that may have led to the occurrence of the mass movement.	(1 x 2)	(2)
2.8.4	In which year was the lowest number of rock-falls recorded?	(1 x 1)	(1)
2.8.4	Write down one negative social impact of the type of mass movement discussed above evident in the infographic.	(1 x 2)	(2)
2.8.5	In a paragraph of not more than EIGHT lines, describe how would you as a municipality manager of Cape Town ensure that the negative impact of the above-mentioned mass movement is minimized.	(4 x 2)	(8)
			<b>[16]</b>
2.9	Match the following forms of mass movements with each description and write only the correct letter e.g. 2.9.1 A		
	 <p>Source: <a href="https://quizlet.com/251586554/erosion-by-gravity-mass-movement-diagram/">https://quizlet.com/251586554/erosion-by-gravity-mass-movement-diagram/</a></p>		
2.9.1.	Slow downslope movement of soil occurring at a pace of 1mm/year.	(1 x 1)	(1)
2.9.2.	Stream of mud flowing down a steep slope after heavy rainfall.	(1 x 1)	(1)
2.9.3.	Large piece of land that breaks loose and plunges downslope.	(1 x 1)	(1)
2.9.4.	They are slope failures caused by rotational movement. The movement can be fast or slow.	(1 x 1)	(1)
2.9.5.	Fastest of all the mass movements.	(1 x 1)	(1)
			<b>[5]</b>

# TERM THREE

## DEVELOPMENT



### Terminology associated with development:

- **Development:** The use of resources and technology to bring about change, which is mainly associated with improvement of quality of lives and standard of living.
- **Developed countries:** Countries with an economic base built on secondary and tertiary sectors rather than primary. Also known as **first world, Rich North, More Economically Developed (MEDC)**.
- **Developing Countries:** A non-industrialized poor countries. Also known as **third world, poor south or Less Economically Developed Country**.
- **Newly Industrial Countries:** Developing countries that have transitioned from agricultural economy to more industrial economy.
- **Economic growth:** the ability of the country to generate wealth through proper control and use of its resources.
- **Brandt line:** it is an imaginary line which separates the rich north and poor south.

### **The concept of development**

1. **Economic development:** development concerned with economic wealth of a specific area, it includes development of human capita (education and training), infrastructure, regional competitiveness (trade) and environmental sustainability.
2. **Social Development:** refers to the improvement in aspect like level of education, standard of living, gender inequality, access to basic services and control of diseases. Promotion of a sustainable working society that is worthy of human dignity by empowering marginalized groups through eradication of poverty, employment generation and social harmony.
3. **Sustainable development:** a type of development that meet the need of the present without compromising the abilities of the future generations to meet their own, it includes the wise use of resource to ensure that the future generation is not deprived of the same resources.

### **Economic indicators of development**

- **Gross Domestic Products (GDP):** The total value of goods and services produced in a country in a given year.
- **GDP per capita:** Value of goods and services produced in a country in one year, divided by the total population of a country.
- **Per capita income:** the average income earned per person per year in a given country.
- **Gross National Product (GNP):** The total value of goods and services produced in a country within a given year by permanent inhabitant.
- **GNP per capita:** the total GNP divided by the number of people in a country.
- **GINI- coefficient:** 'GINI' stand for **generalized inequality index**. It measures the level of income inequalities between rich and poor countries or between two countries.

### **Social indicators of development**

- **Human Development Index (HDI):** it measures the standard of living of people and combines life expectancy, level of education and GDP per capita. *Zero (0)* indicate the worse possible quality of life. While *One (1)* shows an almost perfect.

### **Demographic indicators of development:**

- **Life expectancy:** the average number of years a person is expected to live, it is higher in developed countries and lower in developing countries
- **Infant mortality:** The number of deaths of infants less than 1 year old per 1 000 live births in a given year.

3.1	Choose the correct term in COLUMN B that matches the description in COLUMN A. Write the letter (A–I) next to the question number (3.1.1–3.1.8) in your ANSWER BOOK, for example 3.1.9 J.		
	<b>COLUMN A</b>	<b>COLUMN B</b>	
3.1.1	The use of resources and technology to bring about change.	A. GDP per capita	
3.1.2	Type of development that meet the need of the present without compromising the abilities of the future generations.	B. Gini- coefficient	
3.1.3	Value of goods and services produced in a country in one year, divided by the total population of a country.	C. GDP	
3.1.4	Anything sold in large quantities.	D. Developing country	
3.1.5	Total value of all goods and services produced by a country in one year including foreign earnings.	E. Development	
3.1.6	Indicates how wealth is shared in a country.	F. Commodities	
3.1.7	Countries whose economy is based on Industry.	G. Sustainable development	
3.1.8	A non-industrialized poor country that is seeking to develop its resources by industrialization.	H. Industrialized countries	
		(8 x 1)	(8)

	<b>FRAMEWORK FOR DEVELOPMENT</b>
	<p data-bbox="261 247 721 279"><b>Factors That Affect Development</b></p> <p data-bbox="310 296 643 327"><b>1. Access to resources</b></p> <ul data-bbox="310 348 1419 688" style="list-style-type: none"><li data-bbox="310 348 1419 432">• Development requires resources. However, there is an uneven distribution of the world's natural resources such as minerals, oil, fertilizers soil, water etc.</li><li data-bbox="310 453 1419 632">• If resources are absent or have to be bought to a country development can be affected. While if resources deplete development can be at jeopardy. If development is community-based people need access to resources otherwise, development will fail.</li><li data-bbox="310 653 1328 688">• Developed countries often need more resources than developing countries.</li></ul> <p data-bbox="261 709 509 741"><b>2. Political factors</b></p> <p data-bbox="310 758 456 789"><b>1. History</b></p> <ul data-bbox="310 810 1419 1241" style="list-style-type: none"><li data-bbox="310 810 1419 842">• Every country has its own history. A countries past influences present and future.</li><li data-bbox="310 863 1419 936">• Factors such as colonization, apartheid, migration, wars and slave trade affect the economic development of a country</li><li data-bbox="310 957 1419 1136">• Colonization (if the country is colonised host countries exploit resources as a result most countries which were once colonised has shown less economic development). Large scale migration caused by slave trade, wars and famine also negatively affect development.</li><li data-bbox="310 1157 1419 1241">• If the country has a political instability many countries refuse to trade with the country.</li></ul> <p data-bbox="261 1262 461 1293"><b>Social Factors</b></p> <p data-bbox="310 1314 610 1346"><b>1. Population growth</b></p> <ul data-bbox="310 1367 1419 1650" style="list-style-type: none"><li data-bbox="310 1367 1016 1398">• The world's population is increasing at a rapid rate.</li><li data-bbox="310 1419 1419 1650">• Developing countries usually has young and fast-growing population. <b>Positively</b>, a fast-growing population means a large market to buy and consume products, and an expanding labour pool. However, <b>negatively</b>, this put pressure on land and resources. Therefore, this leads to overexploitation of resources, environmental degradation, squatter settlements and unemployment</li></ul> <p data-bbox="261 1671 610 1703"><b>2. Education and training</b></p> <ul data-bbox="310 1724 1419 1856" style="list-style-type: none"><li data-bbox="310 1724 1057 1755">• Technology is increasingly part of modern-day society.</li><li data-bbox="310 1776 1419 1856">• People require education and training (skills) in order to be able to operate computers, machines and technology.</li></ul>

- High level of illiteracy rate hampers the development progress
- Therefore, the higher the literacy level in a country the high level of economic development.

### **Economic factors**

#### **1. Trade Imbalances**

- Occurs when the value of imports is greater than exports. This is known as a trade deficit or trade gap. This is a characteristic of developing country and it has a negative impact on trade. To eliminate trade imbalance a country should focus on “export promotion”.

#### **2. Energy**

- More than half the world’s population does not have access to clean, cheap energy.
- Development requires a stable source of energy e.g. electricity for machinery and fuel for vehicles. If energy is not present, runs out or too expensive development is affected.

#### **3. Environmental degradation**

- Most development is associated with environmental impacts e.g., air and water pollution from factories, deforestation to clear land for agriculture, degradation of land by mining.
- Development should be sustainable and environmentally friendly. Environmental impact assessment should be conducted before any major development projects are undertaken.

### **Trade and Development**



[source: <https://www.thebalancemoney.com/>]

**Important concepts:**

- **Trade:** refers to the exchange of goods and services for money.
- **Exports:** goods sold by one country to another country e.g., SA exports wine to UK.
- **Import:** goods brought by a country from another country e.g., SA imports clothing from Italy.
- **Raw materials:** unprocessed goods extracted from their natural form e.g., coal, timber etc.
- **Commodities:** goods which are sold in large quantities e.g., coal, gold etc.
- **Manufacturing industries:** factories that process raw materials into finished products e.g., vehicle factory, clothing factory etc.
- **Transportation:** carrying and moving goods across the globe e.g., by sea (ship), land (train/ truck) etc.

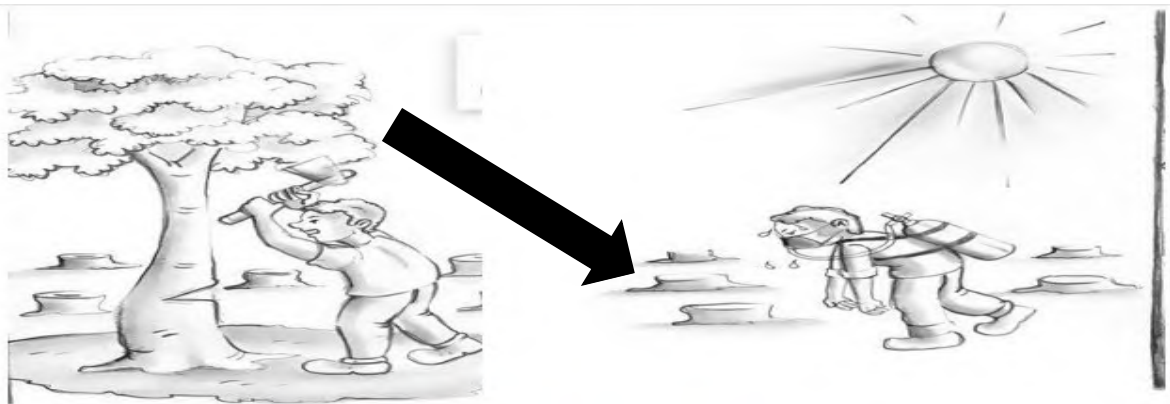
**International trade and world markets**

**International trade:**

- Refers to exchange of goods and services between countries. Also known as foreign trade. It involves import and export of goods and services or exchange of commodities. Today trading between countries drives the world economy. Such trading is called international trade as it is between countries across borders.

3.2

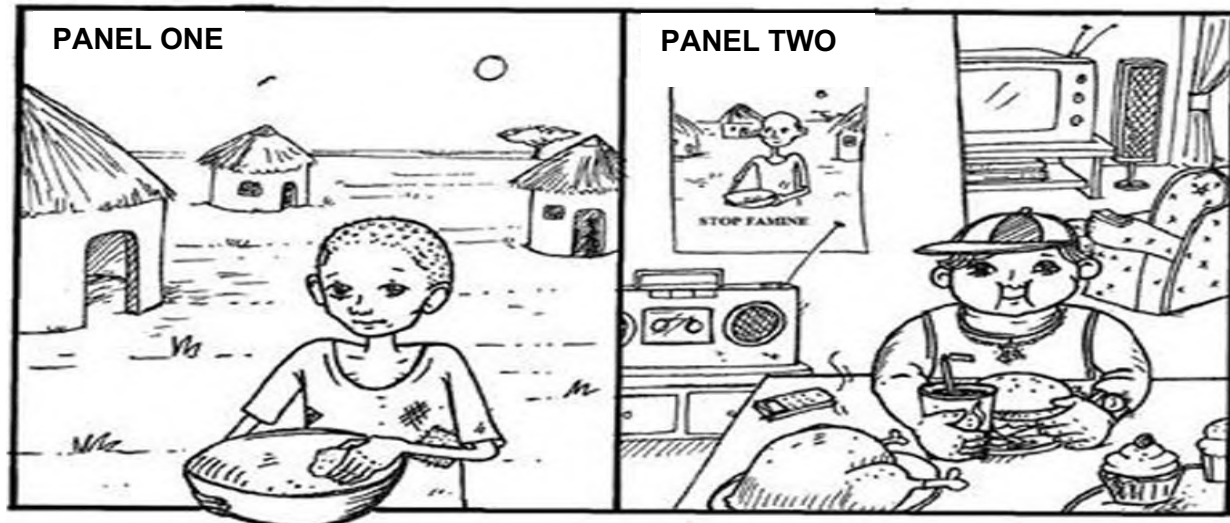
Refer to the following image and answer the questions that follow.



Source: <https://ca.pinterest.com/pin/how-to-draw-effect-of-deforestation--688487861795503054/>

3.2.1	Define the concept <i>deforestation</i>	(1 x 2)	(2)
3.2.2	Name the natural resource being depleted in the cartoon	(1 x 1)	(1)
3.2.3	How does the depletion of this natural resource affect the environment	(1 x 2)	(2)
3.2.4	Explain how development influence depletion of natural resource mentioned in QUESTION 3.2.2 above	(1 x 2)	(2)
3.2.5	Discuss the sustainable strategies that countries could implement to protect exploitation of natural resources	(3 x 2)	(6)
			<b>[13]</b>

3.3. Refer to the following cartoon and answer the questions that follow



Source: <https://effinghamsecondary.co.za/wp-content/uploads/2022/10/Geography-Activities.pdf>

3.3.1	Define the concept development	(1 x 2)	(2)
3.3.2	What form of development is represented by panel one and panel two respectively?	(2 x 1)	(2)
3.3.3	Which panel represents an economically more developed country and which one represent and economically less developed country? Support your answer by using geographically sound theory	(1 x 2)	(2)
3.3.4	How does the development indicator 'access to food' differ in panel 1 and 2?	(2 x 2)	(4)
3.3.5	Explain the environmental factor that could have resulted to lack of access to food in panel	(1 x 2)	(2)
			<b>[12]</b>

3.4 Refer to the case study below and answer the set questions below:			
<p>The trade surplus in South Africa widened to a record high of ZAR 57.68 billion in June of 2021, well above market forecasts of ZAR 52 billion. Exports were up to 2% to ZAR 166.5 billion, mainly boosted by sales of precious metals and stones (7%), base metals (9), chemicals (23%) and vegetable products (10%) while shipments of vehicles declined (31%). Most exports went to the US, China, Germany, the UK and Japan. Imports were little changed at ZAR 108.8 billion, with main declines seen purchases of minerals products (-11%), vehicles and transport equipment (-15%). Most equipment's came from China, the US, Germany. India and Italy. Considering the first half of 2021, exports were up with 51% and imports 19.3%, resulting in a trade surplus of ZAR 255.6 billion.</p>			
3.4.1	Define the term <i>Balance of Trade</i>	(1 x 2)	(2)
3.4.2	The South African Revenue Services depicts (shows) positive balance of Trade.	(1 x 1)	(1)
3.4.3	(a) Provide ONE product which is exported by South Africa, according to the case study.	(1 x 1)	(1)
	(b) Give evidence from the case study to validate the statement that the balance of trade is positive for South Africa.	(1 x 2)	(2)
3.4.4	Explain how fair trade could help struggling countries to have a better balance of trade.	(2 x 2)	(4)
3.4.5	Discuss the importance of a positive balance of trade	(3 x 2)	(6)
			<b>[15]</b>
<p><b>Terms of trade</b></p> <ul style="list-style-type: none"> <li>The differences in values between a country's imports and its exports is called <b>balance of trade</b>. The balance of trade can either be favourable or unfavourable. <ul style="list-style-type: none"> <li><b>Unfavourable trade balance:</b> the value of imports is greater than the value of exports.</li> <li><b>Favourable trade balance:</b> the value of exports is greater than the value of imports.</li> </ul> </li> </ul> <p><b>Advantages of a favorable trade balance</b></p> <ul style="list-style-type: none"> <li>Foreign capital flow into a country. Economic growth is stimulated. Jobs are created. Improvement in standard of living.</li> </ul>			

**Disadvantages of unfavorable trade balance**

- Foreign capital flows out of a country. Economic growth is slow. Retrenchments occurs. Decrease in standard of living.

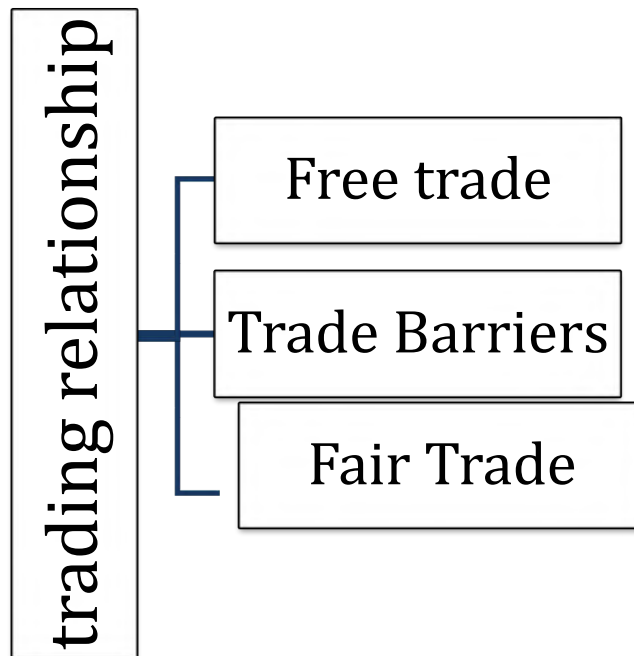
**Balance of payment:**

- A financial summary made by a country to the rest of the world and its receipt from all countries.

**Ways of correcting unfavorable trade balance:**

- Measures that are taken by countries to attain a favorable balance of trade.
  - Export promotion: to increase quantity and variety of goods that are exported government offers subsidies and tax rebates.
  - Import substitution: replacement of imported goods by locally produced goods.
  - Protectionism: restrictions are placed on trade between countries by using import tariffs, quotas and regulations.

**TYPES OF TRADING RELATIONSHIP**



## **Types of trading relationships**

### **1. Free trade**

- A trade that occurs without any restrictions. When there is free trade, nations open their borders to one another, and goods and services move freely between them. There are no tariffs or customs duties that might increase the process. Free trade is meant to benefit all trading partners.

### **2. Trade barriers**

- This occurs in order to protect local manufacturers. Governments might introduce measures to make imported goods more expensive. These include:

#### **2.1. Protectionism**

- Restrictions are placed on trade between countries by using import tariffs, quotas and regulations. Import is restricted by:
  - **Tariffs/ import duties:** a tax collected by government on goods coming into a country, mainly to make imported goods expensive than locally produced.
  - **Subsidies:** financial assistance given by lower production cost.
  - **Quotas:** restrictions are placed on the amount or quantity of goods that can be imported.
  - **Sanctions:** economic penalties put in place by government to punish another country e.g. trade boycotts (refusing to trade with) and trade embargos (bans).

### **3. Fair Trade**

- Trade that supports farmers in developing countries by paying fair prices, workers enjoy better working conditions and are not exploited. This type of trade is closely linked to sustainable development. Fair trade organisations also improve infrastructure and social development (education and training) in developing countries

3.5 Refer to the cartoon below on international trade and answer the questions that follow



[Source: [www.google/Business Day](http://www.google/Business Day); 26 January 2017]

3.5.1	Define the concept <i>international trade</i> .	(1 x 2)	(2)
3.5.2	Name ONE commodity that is being imported to South Africa	(1 x 1)	(1)
3.5.3	List four ways in which international trade is restricted	(4 x 1)	(4)
3.5.4	Suggest how cheap import negatively affect the GDP of South Africa	(2 x 2)	(4)
3.5.5	Discuss TWO possible measures that the SA government can introduce to regulate unfavorable balance of trade	(2 x 2)	(4)
			<b>[15]</b>

### Globalisation

- A **technological, political, social, economic** and **cultural partnership** which links all countries of the world closer together. It involves the exchange and flow of ideas, goods, services and money across political boundaries.



[Source: <https://www.cartoonmovement.com/>]

**Characteristics of globalisation:**

- Has resulted in increase in international trade.
- Greater investments.
- Development of multi-national companies.
- More accessibility in international travels.

**Examples of multi-national companies:**

- Microsoft (computer),
- Samsung (cell phones),
- Shell (petrol)
- Coca-Cola

**Effects of globalisation in the economy:**

Positive effects of globalisation	Negative effects of globalisation
<ul style="list-style-type: none"><li>• Transfer of knowledge and skills.</li><li>• More jobs opportunity which stimulates economic growth.</li><li>• Improvement in transport, technology and telecommunication.</li><li>• Stimulate international trade enabling the flow of foreign currency.</li></ul>	<ul style="list-style-type: none"><li>• Exploitation of people for cheap labour as most jobs are low paying.</li><li>• Poor working conditions and long working hours.</li><li>• Very less is spent on preventing environmental damage.</li><li>• It enables diseases like HIV/AIDS to spread more quickly over a wider area.</li><li>• Resources are extracted with no value added.</li></ul>

**The effect of globalisation on the environment:**

- Development is linked to increases in industrialisation and technology. The positive impact this brings for human beings is economic and social improvements; however, this can have a negative impact on the environment. Some of these effects include:
  - Global warming has increased, the frequency of severe droughts, heatwaves, extreme weather (heavy rains and floods) as well as rise in sea- level.
  - Over-exploitation of resources, harmful mining operations little regard for the environment, fertilizers and genetically modified seeds which can negatively affects food security
  - Deforestation due to rapid urbanisation, severe air pollution in cities posing health hazards
  - Increase desertification and Soil erosion
  - Destruction of biodiversity and ecosystems due to excessive pollution

### **PORT-LED DEVELOPMENT**

- Refers to the development of the economy over time that is caused by expansion of the country's exports. It involves **export promotion** and **import substitution**.
- **Export promotion** refers to increase quantity and variety of goods that are exported. Government offers subsidies and tax rebates. It involves industrial expansion (export orientated industries) and job creation.
- **Import substitution** refers to replacement of imported goods by locally produced goods. It is encouraged by the introduction of import quotas, import duties, import tariffs and other trade barriers.
- Export-Led development earns foreign capital, increases productivity and stimulates local job opportunities.
- It also has a multiplier effect where it promotes the growth of other industries.
- The challenge is finding distributors for goods in foreign countries more especially in their barrier in language, culture and religion.

### **DEVELOPMENT ISSUES AND CHALLENGES**

Development issues and challenges are varying across different countries, regions, and communities.

### **ECONOMIC DEVELOPMENT CHALLENGES**

- **Poverty and inequality**- persistent poverty and rising inequality threaten social cohesion and economic growth
- **Unemployment**- lack of decent work opportunities hinder economic development and social stability.
- **Infrastructure deficit**- inadequate infrastructure, such as road, energy and water, constrains economic growth and development.
- **Corruption and poor governance**- corruption and poor governance undermine trust, discourage investment and hinder development.

### **SOCIAL DEVELOPMENT CHALLENGES**

- **Education and skill development-** inadequate education and skills development limit human potential and hinder economic growth.
- **Healthcare and wellbeing-** inadequate healthcare and poor living conditions compromise human well-being and affect productivity.
- **Population growth and demographic changes-** rapid population growth and demographic changes put pressure on resources, infrastructure and services.
- **Social exclusion and discrimination-** deny marginalized groups access to opportunities and **services**

### **ENVIRONMENTAL CHALLENGES**

- **Climate change-** climate change threatens eco-system, economies, and human well-being.
- **Natural resource depletion-** overexploitation of natural resources compromises eco-system and threatens sustainable development.
- **Environmental degradation-** pollution, deforestation and land degradation undermine eco-system and human well-being.

### **ROLE OF DEVELOPMENT AID**

#### **What is a development aid?**

It refers to the financial, technical and humanitarian support provided by developed countries, international organizations and non-governmental organizations (NGOs) to developing countries. The primary goal of development aid is to promote economic, social, and political development in recipient countries, ultimately reducing poverty, inequality and improving living standards.

## WHY COUNTRIES NEED DEVELOPMENT AID?

### ECONOMIC FACTORS

- **Poverty**- many countries struggle with widespread poverty, which hinders economic growth and development
- **Limited resources**- developing countries often lack sufficient financial resources, infrastructure, and technology to drive development
- **Debt burden**- high levels of debt can limit a country's ability to invest in development projects and programs

### SOCIAL FACTORS

- **Healthcare**- developing countries often face significant healthcare challenges, including limited access to medical services and healthcare infrastructure.
- **Education**- many countries struggle to provide quality education, resulting in low literacy rates, limited skills, and lack of qualified professionals
- **Food insecurity**- food shortages, malnutrition, and famine are common challenges in developing countries.

### POLITICAL AND INSTITUTIONAL FACTORS

- **Weak institutional** – developing countries often have weak institutions, which can hinder development efforts
- **Corruption**- corruption can divert resources away from development projects and undermine trust in institutions.
- **Conflicts**- countries affected by conflicts or instability often require development aid to rebuild and to recover.

### TYPES OF DEVELOPMENT AID

<u>TECHNICAL AID</u>	<u>HUMANITARIAN AID</u>	<u>CONDITIONAL AID</u>
Refers to form of foreign aid, where help is provided to developing human resources through improvement in the level of skills, knowledge and productive aptitudes of population	Refers to type of aid designed to save lives, alleviate poverty, suffering and protect human dignity during emergencies.	When one country donates money or resources to another country with conditions attached.

in developing countries.

### ADVANTAGES AND DISADVANTAGES OF DEVELOPMENT AID

#### ADVANTAGES

- **Poverty reduction-** development aid can help to reduce poverty by providing financial support, improving infrastructure, and promoting economic growth
- **Improved healthcare-** aid can help to support healthcare systems, leading to better access to medical services and reduced mortality rates.
- **Education and skill development-** aid can support education and skills development, helping to build a more skilled and educated workforce.
- **Infrastructure development-** aid can support the construction of critical infrastructure such as roads, bridges and ports to facilitate trade.
- **Humanitarian assistance-** aid can provide critical support during humanitarian crisis, such as natural disasters, wars, and refugee crisis.

#### DISADVANTAGES

- **Dependency on aid-** recipient countries can become dependent on aid, rather than developing their own domestic resources and capacities.
- **Corruption and mismanagement-** aid can be vulnerable to corruption and mismanagement, undermining its effectiveness.
- **Debt accumulation-** aid can lead to debts accumulation as recipient countries can struggle to pay.
- **Create unequal relationship-** aid can create unequal relationships between donors and recipients, perpetuating power imbalances and undermining recipient country autonomy

3.6 Read the extract from an article in FIGURE 3.6 Below and answer the questions that follow.

**EAST AFRICA’S DROUGHT: THE AVOIDABLE DISASTER**

The deaths of tens of thousands of people during drought in east Africa could have been avoided if the international community, donor governments and humanitarian agencies had responded earlier and more swiftly to clear warning signs that a disaster was in the making, according to a new report.

Figures compiled by the department for international development suggest that between 50 000 and 100 000 people, more than half of them children under five, died in the 2011 Horn of Africa crisis that affected Somalia, Ethiopia and Kenya. Hundreds of thousands remain at continuing risk of malnutrition.

The authors of the report, published by save the children and Oxfam, suggest current emergency response systems, which they believe to be seriously flawed, will soon be tested again as new humanitarian crises loom in west Africa and sahel, where growing food shortages are reported.

[Adapted from the Guardian, Wednesday 18 January 2012]

3.6.1	Explain the term development aid.	(1 x 2)	(2)
3.6.2	Name the type of development aid that is referred to in the extract	(1 x 1)	(1)
3.6.3	Explain the difference between Bilateral and humanitarian aids	(2 x 2)	(4)
3.6.4	Do you agree that humanitarian aid should be granted (given) to avoid humanitarian crisis in west Africa and Sahel? Motivate your answer in a paragraph of approximately EIGHT lines by discussing the advantages and/or the disadvantages of providing humanitarian aid	(4 x 2)	(8)
			<b>[15]</b>

3.7. Read the following extract and answer the questions that follow

**AFRICAN COUNTRIES RECEIVE AID AFTER CYCLONE FREDDY**

The European Union (EU) provided €2,5 million (R48 600 000) emergency funding to Mozambique, Malawi and Madagascar when they were struck by Tropical Cyclone Freddy in February 2023. Tropical storms and cyclones, floods, droughts and epidemics occur often, rendering the African region highly vulnerable to these risks.

An air support operation helped humanitarian stakeholders to reach communities affected by the flooding and strong winds. With this aid, humanitarian partners on the ground were able to procure essentials such as food, protection, emergency shelter and non-food items. Health and emergency services were also assisted because of the cholera epidemic that broke out in the region. Aid was allocated to partners working in the water, sanitation and hygiene sector to try and curb the effects of the water-borne diseases.

[Adapted from <https://civil-protection-humanitarian.com>]

3.7.1	What is humanitarian aid?	(1 x 2)	(2)
3.7.2	Name TWO countries that were affected by Tropical Cyclone Freddy	(2 x 1)	(2)
3.7.3	Identify an example of humanitarian aid mentioned in the extract.	(1 x 1)	(1)
3.7.4	Why was humanitarian aid needed in these countries?	(1 x 2)	(2)
3.7.5	Why do LEDCs face more challenges in their efforts to recover from natural disasters compared to MEDCs?	(2 x 2)	(4)
3.7.6	Explain the negative impact of humanitarian aid on developing countries	(2 x 2)	(4)
			<b>[15]</b>

## RESOURCES AND SUSTAINABILITY IMPORTANT CONCEPTS

- **Biogas energy** the energy produced by the heat and methane gas that is released as plant and animal matter decompose (decay or breakdown)
- **Biomass energy** the energy produced by burning vegetation and organic material
- **Conventional energy Sources** these traditional resources include fossil fuels (coal, oil and natural gas), and nuclear power.
- **Fossil fuel** fuels that have taken millions of years to form, e.g., oil and coal.
- **Geothermal energy** the energy produced by using the heat of underground rocks and water.
- **Greenhouse gases** that add to the increase in temperature of the atmosphere.
- **Hydroelectric power** electricity produced by using the force of running water.
- **Nuclear energy** the energy produced by nuclear reaction.
- **Solar energy** the energy produced by the heat of the sun's rays. Thermal energy is created using a resource that creates heat, (coal) called a fossil fuel.
- **Watt** one unit of electrical power.
- **Wind energy** - The energy produced by using the wind to drive turbines and produce electricity.

3.8 Match column A with the description in column B.

3.8.1	Thermal Power	A. Energy generated from the power of tides
3.8.2.	Nuclear Power	B. Government is supplying panels at subsidized rates to increase this type of power usage.
3.8.3.	Hydro- energy	C. Energy mostly from the coal burned in the power stations.
3.8.4.	Solar energy	D. Energy gathered from hot rocks below the earth's surface.
3.8.5.	Tidal power	E. The use of organic material especially plant and vegetable matter to generate electricity.
3.8.6	Geothermal energy	F. Electricity produced from controlled reactions taking place in atomic nuclei.
3.8.7.	Biofuel	G. Power generated.
3.8.8	Biomass	H. Fuel formed from natural organic matter.
		(8 x1) (8)

## SOIL EROSION

### What is soil erosion?

The process whereby top fertile soil is lost. The soil is either blown away by wind or washed away by surface run-off.

### CAUSES OF SOIL EROSION

- **Water erosion-** rainfall and runoff can cause soil particles to be washed away.
- **Wind erosion-** strong winds can pick up and transport soil erosion, especially in dry and bare areas
- **Deforestation and land degradation-** removal of vegetation cover can expose soil to erosion, while land degradation can reduce soil's ability to absorb water.
- **Agricultural urbanization-** intensive farming, monoculture and inadequate soil conservation measures can contribute to soil erosion.
- **Urbanization and construction-** soil can be eroded during construction activities, while urbanization can lead to soil sealing and reduced infiltration

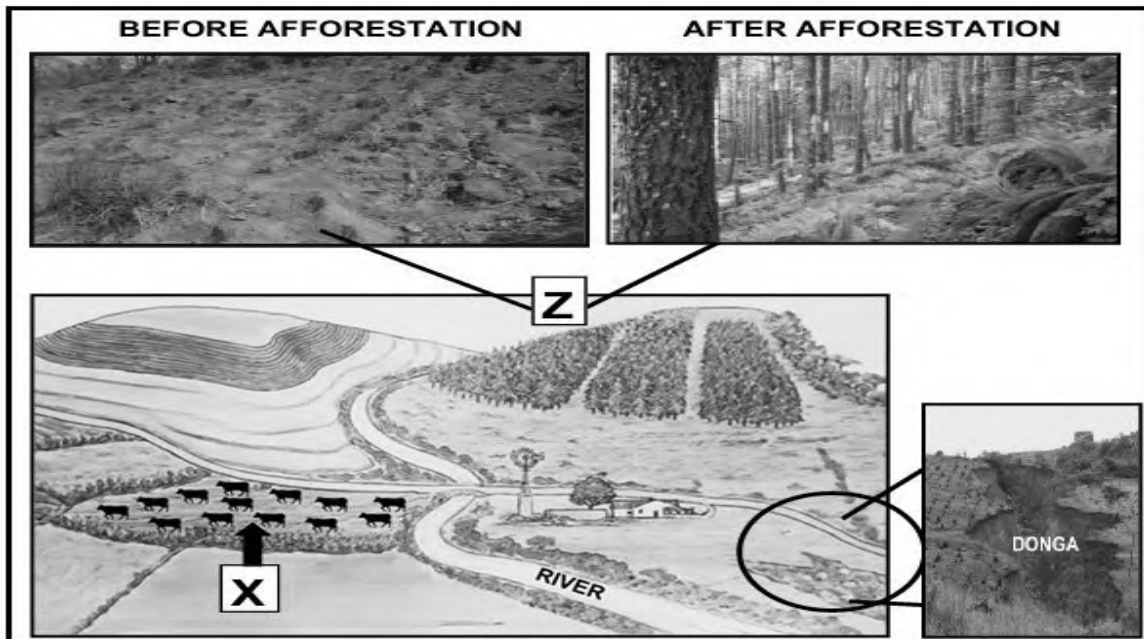
### **EFFECTS OF SOIL EROSION**

- **Loss of fertile land-** soil erosion can lead to the loss of fertile top soil, reducing agricultural productivity and food security
- **Increased sedimentation-** eroded soil particles can enter waterways, causing sedimentation and reduced water quantity
- **Reduced water infiltration-** soil erosion can reduce soil's ability to absorb water, leading to increased runoff and flood risk.
- **Decreased biodiversity-** soil erosion can lead to loss of soil biota and reduced biodiversity

### **STRATEGIES TO REDUCE AND CONTROL SOIL EROSION**

- **Restoration and afforestation-** planting of trees on degraded land helps to stabilize soil, reduce soil erosion, and improve biodiversity.
- **Cover cropping-** planting cover crops like legumes, grasses between crop cycles helps to reduce soil erosion, improve soil health, and increases fertility of soil.
- **Crop rotation and intercropping-** rotating crops and intercropping help to improve soil structure, fertility and reduce soil erosion.
- **Diversions and dams-** building diversions and dams help to reduce and control surface runoff and reduce soil erosion.

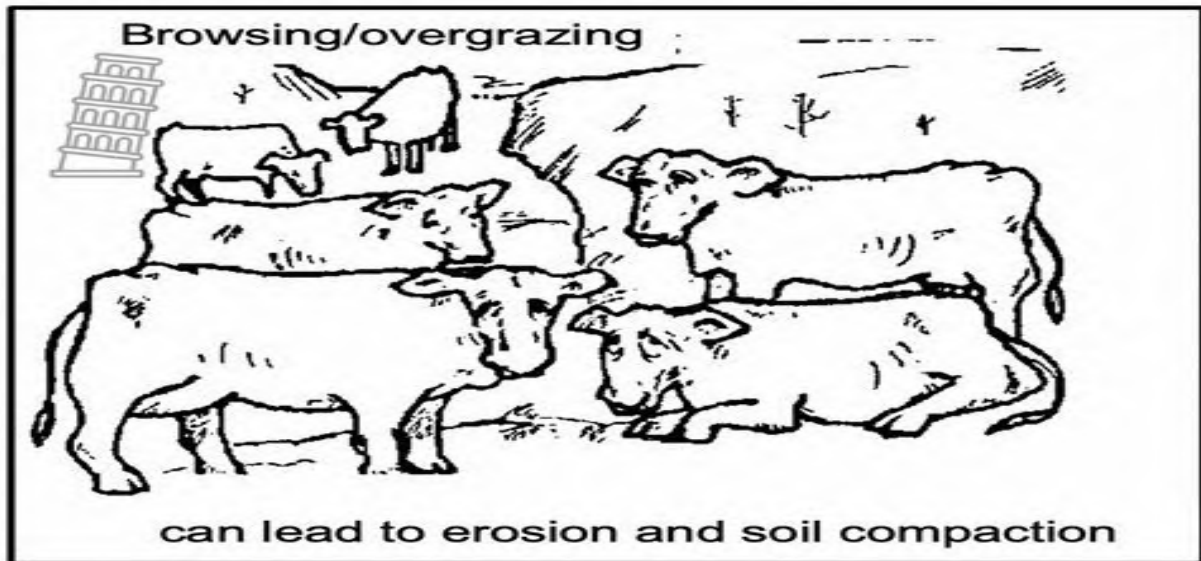
3.9 Refer to the sketch and photos on soil erosion.



[Adapted from <https://rethink.earth/farming-with-nature/>]

3.9.1	What is soil erosion	(1 x 2)	(2)
3.9.2	From the sketch above, provide ONE piece of evidence of soil erosion	(1 x 1)	(1)
3.9.3	Explain why does overgrazing by livestock at X contribute to soil erosion?	(2 x 2)	(4)
3.9.4	Describe the negative economic effects of soil erosion	(2 x 2)	(4)
3.9.5	Discuss TWO sustainable strategies to reduce soil erosion	(2 x 2)	(4)
			<b>[15]</b>

3.10 Refer to the sketch on soil erosion below and answer the following questions



[Source: [www.ndzi.org](http://www.ndzi.org)]

3.10.1.	Define the term soil.	(2 x 1)	(2)
3.10.2.	According to the cartoon identify the cause of erosion.	(1 x 1)	(1)
3.10.3.	Refer to QUESTION 3.10.2 above and provide a solution to the factor identified.	(1 x 2)	(2)
3.10.4.	Discuss TWO negative impact of soil erosion developing countries.	(2 x 2)	(4)
3.10.5	Suggest THREE sustainable strategies that developing countries can employ to reduce soil erosion	(3 x 2)	(6)
			<b>[15]</b>

### Convictional energy source and their impact on the environment

- **Thermal power**
- Energy derived from coals which are non- renewable resource. Over 90% of South Africa's electricity is generated form coals. Therefore, coal is regarded as black gold. Most of the electricity if generated by Eskom. Most thermal power is generated in coal fired power stations located on or near coal fields in Gauteng, Free state and Northern Cape

### **Disadvantages of thermal power**

- Environmental disposal, mining has resulted in permanent destruction of the environment.
- Solid waste, coal mines releases coal dust.
- Waste gases, coal mining releases toxic or explosive gases and carbon dioxide.
- Acid rains, occurs when Sulphur dioxide produced by the burning of coal reacts with oxygen to form Sulphur trioxide.

### **2. Hydro energy production**

- It is a renewable source of energy. Hydro- electric power is produced by running water or falling water. In hydro- electric power plant, water from a river or reservoir flow through a turbine, causing them to spin. The turbines are connected to generators which convert the mechanical energy from turbines into electrical energy.

### **Advantages of hydro- electrical power**

- No pollution or waste is produced
- Renewable energy source
- Very reliable energy source
- Not expensive to maintain once the dam has been built

### **3. Nuclear energy production**

- An electrical power produced from energy realized from nuclear radiator. Nuclear energy is derived from uranium which is a non- renewable mineral. Thus, nuclear energy is a non-renewable energy. Once uranium deplete nuclear energy can no longer be produced.

### **Advantages of nuclear energy**

- Does not create any air pollution
- Does not contribute to global warming and climate change
- Power plants can be situated anywhere
- Produces small amount of waste
- It is reliable energy source

### Disadvantages of nuclear energy

- Uranium is a non- renewable energy
- Accidents can occur at nuclear power stations
- Nuclear power plants are expensive built
- The time needed for formalities, planning and building of a new nuclear power plant is about 10 years

### 3.11 Read the following extract and answer the following questions

#### NUCLEAR WASTE AND STORAGE:

Africa's only nuclear power plant is at Koeberg outside Cape Town. Here, all low-level waste is sealed in drums and sent to Vaalputs in the Northern Cape. High level waste is stored on site at Koeberg because no adequate waste disposal site has yet been found or licenced. It takes many thousands of years to lose its (nuclear waste) radioactivity.



#### SWISS VOTE AGAINST NUCLEAR POWER

Swiss voters have voted overwhelmingly in favour of a policy proposal to phase out nuclear power. Preliminary results of their referendum suggest that voters are in favour of environmentally friendly electric power.

The Swiss government, after the nuclear disaster at Fukushima in Japan, indicated that they wanted to move away from nuclear power. There is no indication when the country's five nuclear power stations will be closed.

Nuclear power currently provides a third of the country's electricity. Solar, wind and hydro power stations are beginning to play a larger role in providing electricity.

3.11.1.	Differentiate between renewable and non- renewable energy resources.	(2 x 2)	(4)
3.11.2.	State any ONE renewable electricity provision resource mentioned in the CASE STUDY that can be used as an alternative to nuclear power.	(1 x 1)	(1)
3.11.3.	The Swiss' government wants nuclear power phased out. Give TWO reasons for this decision.	(2 x 1)	(2)
3.11.4.	Discuss TWO negative effects of nuclear power that will support this decision of the Swiss' government as mentioned in question 3.11.3.	(2 x 2)	(4)
3.11.5	If the Swiss' government closes the five nuclear power stations, explain TWO negative impacts it could have on the Swiss'	(2 x 2)	(4)
			<b>[15]</b>

**3.12 Fracking; Extraction; Thermal energy; Convectional; Biomass energy; non-convectional; Biogas energy**

3.12.1.	Energy transferred from one source to another.		
3.12.2.	The removal of raw materials from its natural environment.		
3.12.3.	Energy of the usual type, normal or traditional.		
3.12.4.	Energy sources that provide an alternative.		
3.12.5	The energy produced by heat and from the methane gas that is released as plant and animal matter decompose.		
3.12.6.	The energy produced by burning vegetation and organic material.		
3.12.7.	Extraction natural gas from sedimentary rocks.		
		(7 x 1)	(7)

**NON-CONVENTIONAL ENERGY SOURCES**

**SOLAR ENERGY**



[<https://www.renogy.com/blog/do-solar-panel-sizes-actually-matter-facts-you-should-know/>]  
Solar power uses the nature energy from the sun to generate electricity.

**Advantages of using solar energy**

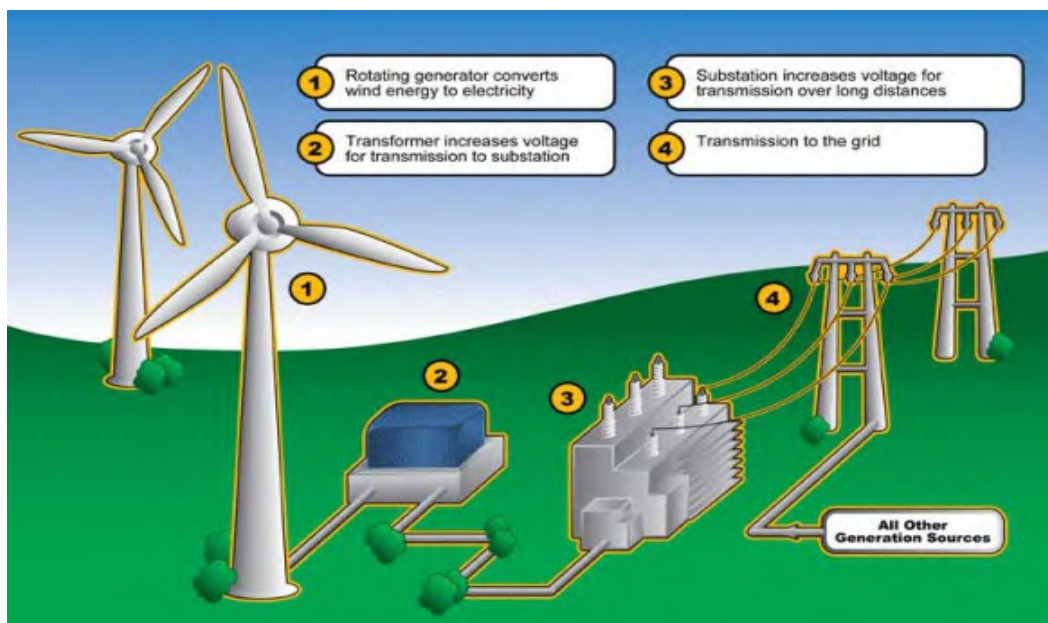
- The sun's energy is free to use, which makes the process cheaper.
- The process is completely non-polluting.
- It can be used in wide variety of locations over the world where there is sun.

### Disadvantages of using solar energy

- Cost of the panels and equipment is expensive, however will become cheaper in time.
- It can work only when the sun is available

Please note: In South Africa, most areas have an average of more than 2500 hours of sunshine per year and an average of solar radiation levels range between 4.5 and 4.5 to 6.5 KWh/m<sup>2</sup> in one day. This makes South Africa's local resource as one of the highest in the world.

### WIND ENERGY



[<https://loeriesfonteinwind.co.za/wind-energy-library/wind-turbine-facts/>]

- Wind power refers to the energy contained in the force of wind. Wind farm is a large area of land on which there are number of wind turbines that generate electricity.

### Advantages of wind energy

- Wind is free and in abundance and uses technology to capture the power of wind efficiently.
- The costs for wind turbines are only initial costs, once the turbine is built there are minimal involved.
- Wind turbines produce energy with minimal damage to the world's environment and produces clear power

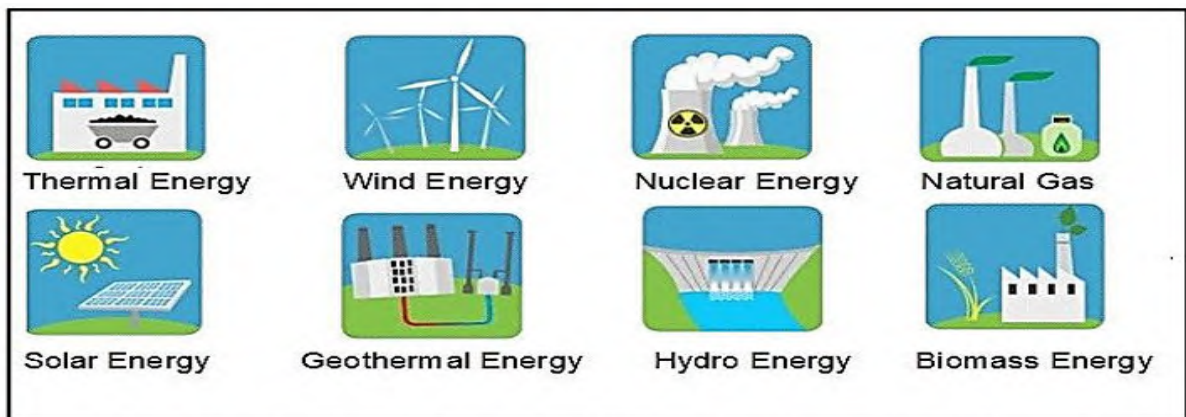
**Disadvantages**

- Some pollutants are given off into the atmosphere in creation of a wind turbine.
- Wind turbines can be quit noisy.
- Wind speed is not constant and therefore there will not always be a definite supply of power form a wind turbine.

**EFFECTS OF USING NON-CONVENTIONAL ENERGY ON THE ECONOMY**

- It will lower the demand for fossil fuels which will help to resolve the problem of global warming.
- It will reduce importing of expensive fuels such as oil
- It will reduce poverty level
- Will encourage economic development

3.13. The photographs below show different ways how electrical energy is obtained in South Africa. Match the descriptions below with the appropriate energy source. Write only the energy source next to the question numbers (3.13.1 To 3.13.8) in the ANSWER BOOK, for example 3.13.9 Thermal energy.



[Adapted from <https://www.sciencedirect.com/topics/engineering/primary-energy-source>]

3.13.1.	Obtained by splitting uranium atoms		
3.13.2.	Use of heat of underground rocks and water		
3.13.3.	Burning vegetation and organic material		
3.13.4.	Photovoltaic panels converting the sun's rays		
3.13.5.	Energy obtained by burning coal in power stations		
3.13.6.	Energy that is a combination of renewable and a non-renewable		
3.13.7.	Using the force of running water		
3.13.8.	Referred to as heat energy		
		(8 x 1)	(8)