CURRICULUM GRADE 10 -12

JUST IN TIME CPTD PROGRAMME

GEOGRAPHY

GRADE 10

TERM 1

THE ATMOSPHERE
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<tr>
<td>• Importance of the atmosphere.</td>
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<tr>
<td>• The composition and structure of the atmosphere – troposphere, stratosphere, mesosphere and thermosphere.</td>
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<tr>
<td>• The ozone layer – in the stratosphere.</td>
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<tr>
<td>• Causes and effects of ozone depletion.</td>
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<td>• Ways to reduce ozone depletion.</td>
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<tr>
<td><strong>RELATED CONCEPTS</strong></td>
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</tr>
<tr>
<td>• <strong>Atmosphere</strong>-The layer of gases that surrounds Earth</td>
<td></td>
</tr>
<tr>
<td>• <strong>Air</strong> -The mixture of gases.</td>
<td></td>
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<tr>
<td>• <strong>Atmospheric pressure</strong> -Weight of the atmosphere which presses down on the earth.</td>
<td></td>
</tr>
<tr>
<td>• <strong>Air density</strong> -The concentration of air particles.</td>
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<tr>
<td>• <strong>Troposphere</strong> -The lower atmosphere with the densest layer of air. Temperature decreases with altitude.</td>
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<tr>
<td>• <strong>Stratosphere</strong> -The second layer of atmosphere above earth containing ozone. Temperature increases with altitude.</td>
<td></td>
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<tr>
<td>• <strong>Mesosphere</strong> – The third layer of atmosphere where meteors burn up. Temperature decreases with altitude.</td>
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<tr>
<td>• <strong>Thermosphere</strong> -The fourth and furthest layer of the atmosphere where temperature increases with altitude.</td>
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</tr>
<tr>
<td>• <strong>Solar radiation</strong> -The transfer of energy in the form of electromagnetic waves from the sun.</td>
<td></td>
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<tr>
<td>• <strong>Ozone</strong> -A form of oxygen which is blue in colour and absorbs ultraviolet rays from the sun.</td>
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<tr>
<td>• <strong>Ozone layer</strong> -Part of the stratosphere which is rich in ozone.</td>
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</tr>
<tr>
<td>• <strong>Chlorofluorocarbons (CFCs)</strong> -Chemicals containing chlorine that destroy ozone.</td>
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<tr>
<td>• <strong>Hydrofluorocarbons (HFCs)</strong> -Non-ozone depleting chemicals which are used instead of CFCs. (Ozone-friendly)</td>
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<tr>
<td><strong>Language skill - Reading and viewing</strong></td>
<td></td>
</tr>
<tr>
<td>• Brain storming- unpacking a topic in simple language (Composition and structure)</td>
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</tr>
<tr>
<td>• Vocabulary –through defining concepts</td>
<td></td>
</tr>
<tr>
<td>• Illustrations – Showing different layers and processes using diagrams.</td>
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</tr>
<tr>
<td>• Case Study - On ozone depletion.</td>
<td></td>
</tr>
<tr>
<td>• Graphs - Showing temperature changes in each layer -Showing composition of various gases</td>
<td></td>
</tr>
<tr>
<td>• Satellite Images- Showing ozone depletion</td>
<td></td>
</tr>
</tbody>
</table>
| BACKGROUND AND PRE-KNOWLEDGE | 1. Climate and Weather (SS Grade 5, 6 and Grade 8)  
2. Matter and Materials e.g. gases (NS Grade 7) |
|-------------------------------|--------------------------------------------------------------------------------------------------|
| METHODOLOGY                   | • Brainstorm around composition and structure of the atmosphere using simple language.  
• Definition of concepts related to composition and structure of the atmosphere.  
• **Importance of the atmosphere**: - With learners, explain and clarify the importance of the atmosphere in sustaining life on earth.  
• Learners annotate (label) a sketch representing the structure of the atmosphere on worksheets provided.  
• Learners view satellite images of the atmosphere and ozone depletion using overhead projectors, data projectors and pictures.  
• Using case studies to read and interpret ozone depletion and its effects in selected areas of the earth e.g. Mount Kilimanjaro  
• Elicit responses of learners on the ways of reducing ozone depletion |
| RESOURCES                     | • Diagrams/ illustrations / graphs  
• Data projector/ overhead projector  
• Images  
• Internet  
• Textbooks  
• Case studies |
| IMPACTS/EFFECTS STRATEGIES TO REDUCE | • Allow learners to discuss impact of ozone depletion.  
• Use different case studies, to identify different strategies to reduce ozone depletion. |
| ASSESSMENT                    | • Refer to the line graph showing the relationship between temperature and altitude of different layers of the atmosphere  
• Refer to recent case study on ozone depletion |
| PROBLEM AREAS                 | • Confusion in differentiating layers and zone of separation between layers of the atmosphere (e.g. mesosphere and mesopause).  
• Confusion between the variable gases and permanent gases  
• Confusion on differentiating between weather and climate (e.g. daily observation of cloud cover perceived as climate) |
| DIFFERENTIATED TEACHING APPROACHES, HIGHFLYERS AND PROGRESSED LEARNERS | • Teaching approaches catering for all cognitive levels and level of difficulty.  
• Giving assessment that incorporates activities specifically designed for struggling learners and high-flyers respectively. |
THE ATMOSPHERE: TERM ONE

GRADE 10 GEOGRAPHY
ACTIVITY ONE
Marks: 15

TIME: 15 Minutes

QUESTION 1

1.1. Refer to the diagram below showing the layers of the atmosphere and answer the questions set.

[Diagram showing layers A, B, C, D with height and temperature axes]

1.1.1. Define the term 'atmosphere'. (1x1) (1)
1.1.2. Identify layers A and C respectively (2x1) (2)
1.1.3. Which gas constitute the most percentage in the atmosphere (1x1) (1)
1.1.4. Mention the layer that is found in the stratosphere that acts as a sunshield against ultraviolet rays (UV). (1x1) (1)
1.1.5. Explain the relationship that exists between temperature and height at layer D. (1x2) (2)
1.1.6. Discuss any TWO climatic importance of layer A? (2x2) (4)
1.1.7. Suggest TWO reasons why long-distance air crafts usually fly in the lower layer of the stratosphere. (2x2) (4)

[15]
QUESTION 1

1.1. Read the following article based on ozone depletion and answer the questions that follow.

Mysterious rise in banned CFC gas emissions from China could delay the healing of the hole in the ozone layer over the Antarctic by almost 20 years

Unexpected emissions of banned gases from China could delay the recovery of the hole in the ozone layer above the Antarctic by almost 20 years, a study has found. The ozone layer is important to life as it acts like a shield — filtering out the Sun's harmful ultraviolet rays before they reach the Earth's surface.

The production of ozone-damaging (CFCs) — used as refrigerants and foaming agents — is restricted by the Montreal Protocol of 1987. Following the protocol's implementation, it was expected that the size of the ozone hole above the Antarctic would return to its 1980 level by the late 21st century. In 2018, however, scientists reported that emissions of trichlorofluoromethane (CFC-11) had not been continuing to decline as expected since the mid-2000s. CFC-11 contributes around a quarter of the man-made chlorine transported into the stratosphere which reacts with and breaks down ozone.

The unexpected emissions have been attributed to Chinese factories using the banned chemicals in the production of insulating foam. According to the experts, however, the impact of the emissions has been limited so far - and their rapid halt could reduce the delay in the hole's recovery to a few years.

1.1.1. What is meant by ozone depletion? 

1.1.2. Write CFCs in full. 

1.1.3. According to the case study, what world summit addressed the issue of the production of ozone-damaging CFCs? 

1.1.4. Explain TWO possible reasons why the natural recovery of the hole in the ozone layer is being delayed. 

1.1.5. In a paragraph of approximately EIGHT lines, suggest measures that the people of China could implement to reduce the continued damage caused to the ozone layer.
<table>
<thead>
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<th>WEEK TWO AND THREE</th>
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<tbody>
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<td>TOPIC HEATING OF THE ATMOSPHERE</td>
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<td>Weighting As per ATP</td>
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**SUBTOPICS /CLARIFICATION**
- Processes associated with the heating of the atmosphere – insolation, reflection, scattering, absorption, radiation, conduction and convection.
- The Greenhouse Effect – impact on people and the environment
- Factors that affect the temperatures of different places around the world – latitude, altitude, ocean currents and distance from oceans.
- Global warming – evidence, causes, and consequences with reference to Africa.
- The impact of climate and climate change on Africa’s environment and people – deserts, droughts, floods and rising sea levels.

**RELATED CONCEPTS**
- **Insolation**- amount of incoming solar radiation that strikes the earth surface
- **Reflection** - the bouncing back of light and heat to the atmosphere without being absorbed
- **Scattering** - light and heat sent in all directions
- **Absorption** - gases in the atmosphere take in radiation
- **Terrestrial radiation** - the heat energy that the earth radiates
- **Conduction** - transfer of heat energy from one air molecule to another by contact
- **Convection** – vertical transfer of heat energy by movement of air molecules
- **Latent heat**- ‘hidden’ or stored heat in water vapour
- **Albedo**- measure of how much a surface reflects light or heat
- **Greenhouse gases**- gases that absorb radiated heat or energy
- **Greenhouse effect** -ability of the atmosphere to trap heat and remain warm
- **Latitude**- angular distance north or south of the equator
- **Altitude** – height above the sea level
- **Temperature inversion**- increase in temperature with an increase in height
- **Global warming** -slow increase in the average temperatures of the earth
- **Climate change** -the long pattern changes in weather patterns
<table>
<thead>
<tr>
<th>EAC</th>
<th>Language skill - Reading and viewing</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Marine climate- climate with moderate temperatures due to the influence of the oceans</td>
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<tr>
<td></td>
<td>• Continental climate- climate with extreme temperatures which occur in places far from the sea</td>
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<tr>
<td></td>
<td>• Aspect – angle in which the sun’s rays strike a slope</td>
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<tr>
<td></td>
<td>• Brain storming- unpacking a topic in simple language (heating of the atmosphere- e.g. sun heats the surface and surface heats the atmosphere)</td>
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<tr>
<td></td>
<td>• Vocabulary – through defining concepts</td>
</tr>
<tr>
<td></td>
<td>• Illustrations – Showing absorption, reflection and scattering.</td>
</tr>
<tr>
<td></td>
<td>• Case Study - On greenhouse effect, global warming and climate change</td>
</tr>
<tr>
<td></td>
<td>• Graphs – Showing relationship between latitude and altitude e.g. snowline on a mountain top</td>
</tr>
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<td></td>
<td>• Satellite Images – Showing global warming</td>
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<td>4. Climate and weather (SS Grade 5)</td>
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<td></td>
<td>5. Heat transfer (NS Grade 7)</td>
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</tbody>
</table>

| METHODOLOGY | • Brainstorm around heating of the atmosphere using simple language. |
|-------------| Definition of concepts related to heating of the atmosphere. |
|             | • Processes associated with the heating of the atmosphere: |
|             | - demonstrating insolation and scattering by using a globe and a torch |
|             | - demonstrating reflection using a torch and a mirror |
|             | - demonstrating absorption using a torch, an A4 paper and a globe |
|             | - demonstrating conduction, convection and radiation using apparatus such as Bunsen burner and a pot |
|             | • Greenhouse effect – example of a practical demonstration using a car which is left with its windows closed on a very sunny day. Materials to be left in the car e.g. candles. After a while learners will observe the consequences. |
|             | • Factors that affect the temperature of different places around the world- using a torch and a globe to demonstrate variation of insolation in different parts of the world (latitudes). |
|             | - Use of diagrams/ illustrations to show temperature differences in different altitudes |
|             | - Demonstrating the different ocean currents using the world map (atlases) |
- **Distance from the ocean** - demonstrating using a globe
- **Aspect** – using diagrams showing the north and south facing slopes
  - Global warming - recent case study on global warming for learners to read and interpret the ‘what, where and how’ tag questions.
  - **The impact of climate and climate change on Africa’s environment and people** - recent case study on climate change for learners to read and interpret the ‘what, where and how’ tag questions (cause, impact and possible solutions)

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<td>• Satellite images</td>
</tr>
<tr>
<td>• Internet</td>
</tr>
<tr>
<td>• Bunsen burner and a pot</td>
</tr>
<tr>
<td>• Globe</td>
</tr>
<tr>
<td>• Torch</td>
</tr>
<tr>
<td>• A4 paper</td>
</tr>
<tr>
<td>• Car</td>
</tr>
<tr>
<td>• Candles</td>
</tr>
<tr>
<td>• Textbooks</td>
</tr>
<tr>
<td>• Case studies</td>
</tr>
<tr>
<td>• Atlases/world map</td>
</tr>
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<td>• Chalk board</td>
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<table>
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<tr>
<th>IMPACTS/EFFECTS STRATEGIES TO REDUCE</th>
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<tbody>
<tr>
<td>• Allow learners to discuss impact of greenhouse effect, global warming and climate change.</td>
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<tr>
<td>• Use different case studies, to identify different strategies to reduce the effects of global warming and climate change</td>
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<tr>
<td>• Refer to the diagrams illustrating heating of atmosphere</td>
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<td>• Refer to recent case studies on global warming/ climate change</td>
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<table>
<thead>
<tr>
<th>PROBLEM AREAS</th>
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<tbody>
<tr>
<td>• Confusion in differentiating latitude and altitude</td>
</tr>
<tr>
<td>• Confusion between temperature inversion and the relationship between temperature and latitude (e.g. the higher you go the colder it becomes)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DIFFERENTIATED TEACHING APPROACHES, HIGHFLYERS AND PROGRESSED LEARNERS.</th>
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</thead>
<tbody>
<tr>
<td>• Teaching approaches catering for all cognitive levels and level of difficulty.</td>
</tr>
<tr>
<td>• Demonstration using apparatus for concepts of conduction, convection, reflection, scattering etc.</td>
</tr>
<tr>
<td>• Demonstration of greenhouse effect using a car with its windows closed on a very sunny day</td>
</tr>
<tr>
<td>• Giving assessment that incorporates activities specifically designed for struggling learners and high-flyers respectively.</td>
</tr>
</tbody>
</table>
QUESTION 1

1.1. Refer to the diagram below showing the heating of the atmosphere and answer the set questions.

1.1.1. What is insolation? (1x1) (1)

1.1.2. Name the THREE processes responsible for the loss of the sun’s heat in the atmosphere. (3x1) (3)

1.1.3. Determine the percentage of the sun’s energy eventually reaching the earth at A. (1x2) (2)
1.1.4. Name the process responsible for the release of heat energy by the earth to the atmosphere. (1x1) (1)

1.1.5. In a paragraph of approximately EIGHT lines, discuss the various ways in which the atmosphere is heated by the earth. (4x2) (8)

GRADE 10  GEOGRAPHY

ACTIVITY FOUR  Marks : 15

QUESTION 1

1.1. Refer to the illustration below showing the factors affecting temperature of different places in South Africa and answer the questions that follow.

1.1.1. Define *ocean current*. (1x1) (1)

1.1.2. Identify the ocean currents A and B. (2 x1) (2)

1.1.3. Explain the impact that the ocean currents identified in 1.1.2 have on temperature and rainfall conditions on the east and west coast of South Africa respectively. (2x2) (4)
1.1.4. Match cities X and Y as maritime and continental climate respectively. (2x1) (2)

1.1.5. In a paragraph of approximately SIX lines, account for the varying annual temperature ranges between Bethlehem (X) and East London (Y). (3x2) (6) [15]

**GRADE 10 GEOGRAPHY**
**ACTIVITY FIVE**
**TIME: 15 Minutes**
**Marks : 15**

**QUESTION 1**

1.1. Read the case study below based on global warming and answer the questions that follow.

**HOW DOES COAL CONTRIBUTE TO GLOBAL WARMING?**

Of all the fossil fuels (coal, oil and natural gas), coal is the one that produces most carbon dioxide when burnt (to make electricity). And carbon dioxide is a greenhouse gas that is contributing to global warming.

Coal is plentiful and cheap to mine and burns easily to produce electricity, so it is difficult for governments to legislate to close coal mines.

Therefore, it is so important to continue research and development in the areas of renewable energy like solar, wind and waterpower.
When coal is burnt, it releases poisonous gases and it doesn't burn completely which contributes to global warming.

1.1.1. Differentiate between global warming and climate change. (2x1) (2)

1.1.2. Identify the gas mentioned from the case study that contribute to global warming. (1x1) (1)

1.1.3 Why are governments reluctant (not willing) to shut down coal mines? (1x2) (2)

1.1.4. Explain ONE impact of burning fossil fuels such as coal to the Africa’s natural environment. (1x2) (2)

1.1.5. In a paragraph of approximately EIGHT lines, outline sustainable strategies to be employed by environmentalists in dealing with global warming. (4x2) (8) [15]
<table>
<thead>
<tr>
<th>WEEK</th>
<th>FOUR</th>
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<tbody>
<tr>
<td>TOPIC</td>
<td>MOISTURE IN THE ATMOSPHERE</td>
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</tbody>
</table>

**SUBTOPICS / CLARIFICATION**
- Water in the atmosphere in different forms: water vapour, liquid and ice.
- Processes associated with evaporation, condensation and precipitation.
- Concepts of dew point, condensation level, humidity, relative humidity: The factors affecting relative humidity
- Stages of development and related weather conditions.
- Weather patterns associated with: cold, warm, and occluded fronts.
- Reading and interpreting satellite images and synoptic weather maps.

**RELATED CONCEPTS**
- Evaporation – the change from liquid to gas
- Water vapour - is water in its gaseous state instead of liquid or solid(ice) (it is totally invisible in the atmosphere)
- Condensation – the change from gas to liquid
- Condensation level – height at which condensation occurs
- Sublimation – change directly from solid to gas
- Crystallization – change directly from gas to solid
- Hydrological cycle/ water cycle – circulation of water between the sea, land and atmosphere
- Precipitation – any form (could be liquid in the form of rain or solid in the form of snow/ hail) of water coming from cloud
- Humidity – the amount of water vapour in the atmosphere
- Relative humidity – the percentage of moisture in the atmosphere
- Saturated air – air that is full of water vapour
- Dew point temperature – the temperature at which condensation occur
- Dew – the drops of water that condensed on cool surfaces (vegetation)
- Frost – ice crystals that collect on cold surfaces

**EAC**
Language skill – Interpretation skills
- Diagrams and illustrations
- Vocabulary – through defining concepts
- Listening and writing
- Presentation - speaking

**BACKGROUND AND PRE-KNOWLEDGE**
1. The composition and structure of the atmosphere
2. Heating of the atmosphere
| METHODOLOGY | • Refer to figure 1, to explain the three states of water  
• Demonstrate using the diagram how each state changes from one to the other  
• Display figure 2 resembling the water cycle and assign learners to identify the hydrological processes with description to each, indicated by arrows, with emphasis on evaporation, condensation and precipitation  
• Recap and give feedback on previous activities  
• Display figure 3 with pictures illustrating dew and frost while learners differentiate between the two  
• Critically explain the concept of humidity and challenge learners to describe some other factors affecting relative humidity and show learners how to calculate relative humidity |
| --- | --- |
| RESOURCES | • Diagrams  
• Images  
• Google  
• Textbooks |
| ASSESSMENT | • Activity 1 – written – presentation  
• Activity 2 – written - presentation  
• Activity 3 – written – presentation |
| PROBLEM AREAS | • Confusion with the processes of evaporation, condensation, sublimation and crystallisation.  
• Problem with practical application of the processes on the water cycle.  
• Struggling to differentiate between humidity and relative humidity. |
| DIFFERENTIATED TEACHING APPROACHES | • Content differentiation through activities catering for cognitive levels.  
• Activities cater for the different cognitive levels and levels of difficulty |
RESOURCES

FIGURE 1 DIFFERENT FORMS OF WATER IN THE ATMOSPHERE

FIGURE 2 HYDROLOGICAL CYCLE
1. Refer to figure 1, which shows the processes associated with changes in the state of water in the atmosphere. Match the description below with the terms/processes given in the illustration. Write only the correct term/processes next to the question number; example (1.6 – Freezing)

1.1. The process whereby a liquid changes to a gas
1.2. The process whereby a liquid changes to a solid
1.3. The process whereby a gas changes to a liquid
1.4. The process whereby a solid changes to a liquid
1.5. The process whereby a gas changes into a solid

(5x1) (5)
Activity 2

1. Choose the correct definition in column B to match the term in column A. Write down only
   numbers and letters.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 relative humidity</td>
<td>A. The temperature at which condensation takes place.</td>
</tr>
<tr>
<td>1.2 Dew point</td>
<td>B. When water vapour cools and changes into tiny droplets.</td>
</tr>
<tr>
<td>1.3 Condensation</td>
<td>C. The amount of water vapour in the air compared to how much water vapour the air can hold at a specific temperature.</td>
</tr>
<tr>
<td>1.4 Saturated air</td>
<td>D. The amount of water vapour in the air.</td>
</tr>
<tr>
<td>1.5 Humidity</td>
<td>E. When the amount of water vapour entering by evaporation equals the amount leaving by condensation.</td>
</tr>
</tbody>
</table>

Activity 3

1. Copy the table below showing minimum and maximum temperatures, and determine the
   temperature differences and relative humidity respectively.

<table>
<thead>
<tr>
<th>Maximum temperature</th>
<th>Minimum temperature</th>
<th>Temperature difference</th>
<th>Relative humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>30°C</td>
<td>28 °C</td>
<td>2°C</td>
<td></td>
</tr>
<tr>
<td>20 °C</td>
<td>9 °C</td>
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</table>

2. Complete the sentence by underlining the correct word within brackets
   (a) When the temperature difference between the maximum and minimum temperatures is small, relative humidity is (high/low).  (1 x 1)  (1)
   (b) When the temperature difference between the maximum and minimum temperatures is high, relative humidity is (high/low).  (1 x 1)  (1)

3. Explain the relationship that exists between temperature differences and the probability of precipitation.  (2 x 2)  (4)

4. In a paragraph of approximately six lines, briefly explain how trends in relative humidity of an area can assist in agriculture.  (3 x 2)  (6)
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<td>MOISTURE IN THE ATMOSPHERE</td>
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<td>WEIGHTING</td>
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</tbody>
</table>
| SUBTOPICS /CLARIFICATION | - How and how clouds form.  
- Cloud names and associated weather conditions  
- Different forms of precipitation- hail, snow, rain, dew and frost.  
- Mechanisms that produce different kinds of rainfall- Relief, Convection and Frontal |
| RELATED CONCEPTS | - Cloud – floating mass of condensed water droplets or ice crystals formed when water vapour condenses.  
- Mist – thin cloud just above the ground  
- Fog - a cloud that is thicker than mist  
- Condensation nuclei/ hygroscopic nuclei – small dust particles on which water vapour condenses around in order to form clouds  
- Rain – precipitation that reaches the ground in liquid form  
- Hail – frozen form of precipitation that falls as ice pellets  
- Snow – frozen form of precipitation that falls as ice crystals  
- Front – a boundary between a warm and a cold air mass  
- Orographic / relief / mountain rainfall – rainfall that is produced by moist air rising on a mountain  
- Convectional rain – forms when hot moist air expands, rises and cools  
- Frontal/ cyclonic rain – forms when warm moist air rising up a front |
| EAC | Language skill – Interpretation skills  
- Diagrams and illustrations  
- Vocabulary –through defining concepts  
- Listening and writing  
- Presentation |
| BACKGROUND AND PRE-KNOWLEDGE | - Processes associated with evaporation, condensation and precipitation.  
- Concepts of dew point, condensation level, humidity, relative humidity: The factors affecting relative humidity |
| METHODOLOGY | - Observe the different cloud shapes  
- Explain the concept of clouds while they observing.  
- Using the chalkboard in the classroom and explain how and why clouds are formed. |
- Use figure 1 to identify and name the different types of clouds.
- Revise the concept of precipitation, explain different types of precipitation with the aid of pictures.
- Assign learners to differentiate each type of precipitation from the other.
- Display sketches in figure 2 for learners to distinguish the three types of rainfall.
- Discuss with them how each type of rainfall is formed.

### RESOURCES

- Figure 1
- pictures
- Textbooks
- chalkboard

### ASSESSMENT

- Activity 1 (outdoor)
- Activity 2
- Activity 3

### PROBLEM AREAS

- Learners confusing frost with snow
- Struggling in differentiating between the types of rainfall
- Learners cannot identify clouds correctly.

### DIFFERENTIATED TEACHING APPROACHES, HIGH FLYERS AND PROGRESSED LEARNERS.

- Content differentiation through activities catering for all cognitive abilities.
RESOURCES

Figure 1 Main types of cloud and their associated weather.

TYPES OF RAINFALL
Warm air rises and cools: water vapour condenses

Cold air

Warm air

Cold air

Warm air rises and cools: water vapour condenses

The rising air expands and cools. Condensation takes place.

Rising warm air

Rain
ASSESSMENT TASKS

ASSESSMENT TOPIC: Moisture in the atmosphere

TYPES OF CLOUDS

ACTIVITY 1

Redraw and complete the table in your activity book.

Outside the classroom observe and draw the shapes of the clouds, provide names of different clouds types visible, describe the shape of clouds and the likely weather associated with them.

<table>
<thead>
<tr>
<th>Drawing</th>
<th>Name</th>
<th>shape</th>
<th>Associated weather</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Activity 2 different types of precipitation

2. Provide one term for each of the following descriptions.

   a. Forms when water vapour condenses onto the ground.
   b. Forms when dew freezes or when the dew point temperature is below zero degree Celsius.
   c. Forms in Cumulonimbus clouds. The water droplets freeze and are taken up into the top of the cloud by strong updraughts. Eventually they are too heavy to be held aloft.
   d. Forms when temperatures are below the freezing point and water droplets freeze and form tiny ice crystals on the surface.
   e. Forms when the air is saturated, condensation nuclei are available, and temperature cools to dew point or below.

   (5x1) (5)

Activity 3: different types of rain

3. Look at the map of South Africa in the figure below which shows three regions where three different types of rainfall take place. Copy and complete the summary table below.

![Map of South Africa showing regions with different types of rainfall](image)

Study & master grade 10
<table>
<thead>
<tr>
<th>Region</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of rainfall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How the air rises</td>
<td>Air is forced to rise over a mountain.</td>
<td>Warm air rises on a hot day by convection.</td>
<td>Warm air rises over cold air.</td>
</tr>
<tr>
<td>Type of cloud</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Form of rain</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## WEEK SIX

### TOPIC
READING AND INTERPRETING SYNOPTIC WEATHER MAPS

### SUB-TOPICS/ CONTENT
- Weather elements—temperature, dew point temperature, cloud cover, wind direction, wind speed and atmospheric pressure.
- Weather conditions—eg. Rain, drizzle, thunderstorms, hail and snow as illustrated on station models

### RELATED CONCEPTS
- synoptic – a summary
- Synoptic weather map – a map showing a summary of weather conditions of a particular area.
- station model – the symbols that represent weather conditions at a particular weather station
- Weather symbols – a symbolic representation of weather elements on synoptic weather maps.
- Atmospheric pressure – the force exerted by the layers of the atmosphere on the earth’s surface.
- Isobars – lines joining places of the same atmospheric pressure on a synoptic weather map.
- Isobaric interval – difference in air pressure between two successive isobars.
- warm front – the leading edge of warm air
- cold front – the leading edge of cold air
- high pressure (anti-cyclones) – an area where the air is cold and sinks (subsides) onto the surface
- low pressure (cyclone) – an area where warm air is light/ less dense and rises (ascends)
- Weather features – any aspect of the weather, such as cloud type, cloud cover, temperature, visibility, air pressure, precipitation, wind direction, wind speed and moisture in the atmosphere.
| PRIOR BACKGROUND AND KNOWLEDGE | • Composition of the atmosphere  
• Cloud names and associated weather conditions  
• Different forms of precipitation - hail, snow, rain, dew and frost. |
|-------------------------------|--------------------------------------------------------------------------------|
| RESOURCES                     | • Textbook  
• Chalkboard  
• Diagrams showing weather symbols on a station model  
• Synoptic weather map |
| METHODOLOGY                   | • Display synoptic weather map in figure 1 and synoptic weather station information in figure 2, for learners to identify all the features on the map while the teacher is explaining them.  
• Analyse and interpret (with learners) the weather elements with more emphasis on related concepts e.g cold & warm fronts; isobars and pressure patterns. |
| ACTIVITIES/ASSESSMENT         | • Activity 1  
• Activity 2  
• Activity 3 |
| EAC                           | **Language skill – Interpretation skills**  
• Diagrams and illustrations  
• Vocabulary – through defining concepts  
• Listening and writing  
• Presentation |
| ERRORS/MISCONCEPTION/ PROBLEMATIC AREAS | • Learners are confusing isobars with contour lines.  
• struggling |
| Different teaching approaches/ progressed/ struggling learners | • Content differentiation through activities catering for all cognitive abilities. |
RESOURCES

SYNOPTIC WEATHER STATION INFORMATION

**Total Sky/Cloud Cover**
- No clouds (clear sky)
- 1/8th sky cover (Few)
- 2/8th sky cover (Scattered)
- 3/8th sky cover
- 4/8th sky cover
- 5/8th sky cover
- 6/8th sky cover (Broken)
- 7/8th sky cover
- 8/8th sky cover (Overcast)
- Sky obscured from view (e.g., by smoke or fog)

**Wind Speed**
- Calm Wind
- 1-2 kts
- 5 kts
- 10 kts
- 50 kts

**Station Model**

- Temperature
- Significant Weather
- Dew Point Temperature
- Cloud Cover
- Wind Speed and Direction

Temperature: 28
Significant Weather: 26
Dew Point Temperature: 28
Cloud Cover:
Wind Speed and Direction: 
ASSESSMENT TASK 1

1. Define the following terms
   a) Synoptic weather map
   b) Station model

   (2x1)
2. Copy the following table into your exercise book and complete it using station A and B above.

<table>
<thead>
<tr>
<th>Weather elements</th>
<th>Station A</th>
<th>Station B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dew Point Temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cloud cover</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind direction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Precipitation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ASSESSMENT TASK 2 – EXTENDED TASK MAKE YOUR OWN SYNOPTIC MAP

1. Draw an outline map of South Africa
2. Locate Durban, Johannesburg and Cape Town
3. Use the following information to draw a station model for each city

<table>
<thead>
<tr>
<th></th>
<th>Johannesburg</th>
<th>Durban</th>
<th>Cape Town</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud cover</td>
<td>Clear skies</td>
<td>¼ cloud cover (2/8 )</td>
<td>Overcast</td>
</tr>
<tr>
<td>Wind direction</td>
<td>NNE</td>
<td>NE</td>
<td>SW</td>
</tr>
<tr>
<td>Wind speed</td>
<td>5 Knots</td>
<td>10 knots</td>
<td>35 knots</td>
</tr>
<tr>
<td>Air temperature</td>
<td>21</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>Dewpoint</td>
<td>4</td>
<td>16</td>
<td>11</td>
</tr>
</tbody>
</table>

4. Draw a high pressure cell to the east of South Africa. Use two isobars with isobaric interval of 2hPa. The highest pressure reading must be 1004 hPa.

5. Illustrate a cold front to the right of Cape Town.

ASSESSMENT TASK 3

1. Match the description in column A with the cloud type in column B.
<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Dark grey, thick layer that usually covers the whole sky. Bring</td>
<td>Cirrus</td>
</tr>
<tr>
<td>continuous rain or snow.</td>
<td></td>
</tr>
<tr>
<td>1.2 Can be 12 km high anvil shaped thunder cloud</td>
<td>Cirrostratus</td>
</tr>
<tr>
<td>1.3 Almost thin transparent sheets, usually covers the entire sky</td>
<td>Nimbostratus</td>
</tr>
<tr>
<td>1.4 White curly feathery, found at high altitude</td>
<td>Stratus</td>
</tr>
<tr>
<td>1.5 Layered grey clouds that lead to drizzle. Usually covers</td>
<td>Cumulonimbus</td>
</tr>
<tr>
<td>mountain tops.</td>
<td></td>
</tr>
</tbody>
</table>

2. Refer to the synoptic weather map below and answer the questions.

a) Define isobar (1)
b) State the approximate atmospheric pressure in Bloemfontein (1)
c) Describe the weather conditions experienced in Bloemfontein (6)
d) Account for the type of precipitation at Bloemfontein (4)
## Grade 10 Geographic Skills and Techniques

### Week 7

<table>
<thead>
<tr>
<th>Topic</th>
<th>GIS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUBTOPICS</strong></td>
<td></td>
</tr>
<tr>
<td>• Reasons for the development of GIS</td>
<td></td>
</tr>
<tr>
<td>• Remote sensing – concepts and application</td>
<td></td>
</tr>
<tr>
<td>• Satellite images related to meteorology and climatology</td>
<td></td>
</tr>
<tr>
<td>• Atlases</td>
<td></td>
</tr>
<tr>
<td>• Fieldwork and practical work</td>
<td></td>
</tr>
</tbody>
</table>

### Prior Knowledge
- Ask learners to explain the concepts information, computer, user, photographs, satellite, navigator, GPS and remote.

### Related Concepts
- **Geographic Information System (GIS)**
  - A system for capturing, storing, analysing and representing geographic information
- **Remote Sensing** – the collection of information about an object from a distance
- **Data** – meaningless or raw facts
- **Satellite images** – an image of the earth recorded from a satellite in space.
- **Sensor** – a device that identifies and records the properties of an object.
- **Hardware** – computer system on which GIS operates
- **Software** – Programmes or applications for a computer
- **User** – people who manage the system and develop plans
- **Methods** – are the well-designed implementation plans and business rules, which are the models and operating practices unique to each organisation.

### Resources
- Maps
- Photographs
- Atlases
- A computer or laptop
- Cell-phone

### Methodology
- Give learners pictures showing different components of GIS and ask them to identify each component.
- The educator must explain what GIS is and how an ordinary computer differs from a GIS computer
- GIS stands for **geographic information system**
- GIS uses a special/specific GIS **software**
- **Reasons for the development of GIS**
  - GIS is capable of working with difficult data
- GIS help industries in planning and monitoring, e.g. Telkom network services, urban planning, transportation planning, environmental impact analysis, agricultural planning, land use planning, surveying, computer development, traffic density planning, forest fires hazards.
GIS investigates spatial relationships and patterns, e.g. drought and desertification.

**Advantages of GIS over paper maps**
- GIS is faster and more efficient
- GIS can cope with large quantities of data
- GIS requires less time for data collection and saves money by sharing data.
- GIS can conveniently select any sub-study area
- GIS can cover a large study area
- GIS saves in storing space

**Disadvantages of GIS**
- Setup costs are very high
- Time consuming to create a database
- To input data into a computer is time consuming
- Staff takes time to learn to use the system

Remote Sensing is collecting information about an object from a distance without physical contact, e.g. switching on/off a TV using a remote.

The educator leads the discussion on the sources of data which are: paper maps, analogue maps, photographs, digital maps, tabular data, GPS, sensors, remotely sensed images, surveys, fieldwork/investigation.

**How remote sensing works**
- Remote sensing uses a satellite to capture information from a distance.

The educator will give learners different pictures: one taken by a satellite and another taken by an aeroplane.
- Satellite images are generalized

**Advantages of remote sensing**
- Satellite images offer a more synoptic or generalized view than maps and aerial photos.
- It has a much higher temporal resolution.
- Provides accurate and up to date information.
- Data is in digital format – convenient to analyse with a computer
- Provides us information that we cannot see with the naked eye
- Can access inaccessible/dangerous areas
- Covers a large area

**Disadvantages of remote sensing**
- It is too costly
- You need training to be able to analyse images
- Resolution is often poor
- Accuracy of measure is not certain

### Week 8  Fieldwork

**Methodology**

- Learners go out and record different weather elements for a specified time frame (3-5 days)
  - Learners must present their recordings in a form of graphs.
  - Learners may consult media to acquire information about the different weather elements, record weather for two different towns in terms of position e.g. one along the west coast and one along the east coast, record weather for at least a period of five days.
  - Learners should make conclusions based on the information collected.

**Example**
Use media for a maximum and minimum temperature for Cape Town e.g. Monday 19/26 Tuesday 20/29 Wednesday 17/25 Thursday 18/24 Friday 21/31

Data processing
Organise data into sets or groups

<table>
<thead>
<tr>
<th>January 2020</th>
<th>14th</th>
<th>15th</th>
<th>16th</th>
<th>17th</th>
<th>18th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max temp.</td>
<td>26</td>
<td>29</td>
<td>31</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>Min temp.</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>17</td>
<td>18</td>
</tr>
</tbody>
</table>

Data presentation
Use different graphs to present their findings e.g. Bar graph or line graph.

Methodology
- The educator gives learners an atlas and expose them to different types of maps such as:
  - World maps
  - Political maps
  - Physical maps
  - Road maps
  - Street maps
  - Thematic maps
- Give learners a map of South Africa.
  - Ask learners to identify neighbouring countries, rivers, oceans on Figure 5 below
Ask learners to locate capital cities and countries using geographical coordinates (lines of latitude and line of longitude) on Figure 6 below.

Assessment
- Refer to activity below

EAC
- Glossary of terms
- English dictionary,
- reading and viewing skill

Common errors /misconceptions
- Learners are struggling to differentiate between:
  - Data and information
  - Reading and interpretation of satellite images

Differentiation
- Group highflyers with struggling learners
- Peer teaching – where the better performing learner is assigned responsibility over struggling learners
ANNEXURE (sources)

Figure 1: The examples of satellite images

Image A

Image B

Image C

Image D

Image E
FIGURE 2: METEOROLOGY AND CLIMATOLOGY PHOTOGRAPHS

IMAGE A

IMAGE B

Image C

Image D

Google map images
Figure 5: Map of Southern Africa

Figure 6 A and B: Co-ordinates of Capital cities and countries of South East Asia

Figure 6 A

<table>
<thead>
<tr>
<th>Page</th>
<th>Place</th>
<th>Country</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>Chiang Mai</td>
<td>Thailand</td>
<td>18°50’N</td>
<td>98°30’E</td>
</tr>
<tr>
<td>41</td>
<td>Chumphon</td>
<td>Thailand</td>
<td>10°30’N</td>
<td>99°10’E</td>
</tr>
<tr>
<td>41</td>
<td>Hanoi</td>
<td>Vietnam</td>
<td>21°00’N</td>
<td>105°50’E</td>
</tr>
<tr>
<td>41</td>
<td>Ho Chi Minh City</td>
<td>Vietnam</td>
<td>11°00’N</td>
<td>106°40’N</td>
</tr>
<tr>
<td>41</td>
<td>Kuala Lumpur</td>
<td>Malaysia</td>
<td>3°19’N</td>
<td>101°40’E</td>
</tr>
<tr>
<td>41</td>
<td>Vientiane</td>
<td>Laos</td>
<td>19°40’N</td>
<td>102°10’E</td>
</tr>
<tr>
<td>41</td>
<td>Mandalay</td>
<td>Myanmar</td>
<td>22°0’N</td>
<td>96°10’E</td>
</tr>
<tr>
<td>41</td>
<td>Nakhon Ratchasima</td>
<td>Thailand</td>
<td>15°00’N</td>
<td>102°10’E</td>
</tr>
<tr>
<td>41</td>
<td>Phnom Penh</td>
<td>Cambodia</td>
<td>11°30’N</td>
<td>104°50’E</td>
</tr>
<tr>
<td>41</td>
<td>Pinang</td>
<td>Malaysia</td>
<td>5°20’N</td>
<td>100°20’E</td>
</tr>
<tr>
<td>41</td>
<td>Rangoon</td>
<td>Myanmar</td>
<td>16°30’N</td>
<td>96°40’E</td>
</tr>
<tr>
<td>41</td>
<td>Singapore City</td>
<td>Singapore</td>
<td>1°20’N</td>
<td>103°50’E</td>
</tr>
</tbody>
</table>

Figure 6 B
ASSESSMENT ACTIVITY

1. Define the following concepts
   1.1 Geographical information system. 1 x 1 (1)
   1.2 Remote sensing 1 x 1 (1)

2. Refer to the diagram below showing the components of GIS

![Components of GIS](image)

2.1 Identify the GIS components labelled A, B and C respectively. 3 x 1 (3)

3. Refer to the meteoSat image below and answer the questions that follow.

![MeteoSat image](image)

3.1 Suggest any two advantages of using a satellite to monitor weather. 2 x 2 (4)

3.2 In a paragraph of approximately eight (8) lines, explain how GIS can assist a farmer to determine the best location for a sugarcane farm in KZN. 4 x 2 (8)