New Zealand CPL Meteorology (MET) Practice Exam (Sample)

Study Guide

Everything you need from our exam experts!

Questions

1. What type of cloud is likely to produce light to moderate icing?

A. Stratocumulus

B. Cirrus

C. Alto-cumulus

D. Cumulonimbus

2. What is a consequence of the tilt of the Earth on its axis?

A. It leads to uniform heat distribution

B. It affects the strength of solar radiation received

C. It has no impact on climate

D. It causes extreme weather conditions

3. What is the primary tool used to measure relative humidity?

A. Barometer

B. Psychrometer

C. Anemometer

D. Rain gauge

4. What type of precipitation can Cumulus clouds sometimes release?

A. Constant light drizzle

B. Brief heavy showers

C. Long-lasting rain

D. Freezing rain

5. Which two forces primarily influence the movement of air within a pressure system?

A. Coriolis force and surface tension

B. Pressure gradient and Coriolis force

C. Centrifugal force and friction

D. Wind shear and jet stream

6. What does an Automatic Weather Station (AWS) primarily monitor?

A. Atmospheric pressure, surface wind, precipitation

B. Visibility, cloud cover, air quality

C. Temperature, humidity, atmospheric composition

D. Cloud heights, jet streams, solar radiation

7. Which term describes the process of water droplets joining together to form larger droplets?

A. Deposition

B. Evaporation

C. Coalescence

D. Condensation

8. How does the ELR change during the night in terms of stability?

A. It becomes unstable

B. It remains unchanged

C. It tends to stabilize

D. It fluctuates rapidly

9. What is a significant characteristic of the atmosphere above an inversion layer?

A. The air tends to be unstable throughout

B. It often remains turbulent with low visibility

C. Conditions are typically smooth with limited cloud cover

D. It is always cooler than the air below

10. Where is water vapor's presence most significant in the atmosphere?

A. Polar regions

B. High altitudes

C. Tropical regions

D. Desert regions

Answers

1. C
2. B
3. B
4. B
5. B
6. A
7. C
8. C
9. C
10. C

Explanations

1. What type of cloud is likely to produce light to moderate icing?

A. Stratocumulus

B. Cirrus

C. Alto-cumulus

D. Cumulonimbus

The type of cloud that is likely to produce light to moderate icing is alto-cumulus. This is primarily because alto-cumulus clouds form at altitudes between approximately 2,000 to 6,000 meters (6,500 to 20,000 feet) and are primarily composed of water droplets. When temperatures within these clouds fall to the freezing point or below, the supercooled water droplets can exist in a liquid state, which creates conditions for icing as the droplets can freeze upon contact with aircraft surfaces. Alto-cumulus clouds are characterized by their puffy, white, or gray appearance, often occurring in patches or layers that may suggest atmospheric instability. While they are not as violent as cumulonimbus clouds, which are known for severe weather, alto-cumulus can still create a risk for light to moderate icing due to the presence of supercooled droplets. In the case of stratocumulus clouds, although they can produce light precipitation, they generally do not produce significant icing because they often form in stable air where the temperature is not conducive to supercooled liquid water. Cirrus clouds, being thin and wispy, typically do not produce icing due to their high altitude and the absence of liquid water.

2. What is a consequence of the tilt of the Earth on its axis?

A. It leads to uniform heat distribution

B. It affects the strength of solar radiation received

C. It has no impact on climate

D. It causes extreme weather conditions

The tilt of the Earth on its axis, known as axial tilt, is approximately 23.5 degrees and plays a crucial role in the seasons and how solar radiation is distributed across the planet. This tilt results in varying angles at which sunlight strikes different parts of the Earth throughout the year. During summer in one hemisphere, that area leans towards the sun, receiving more direct sunlight and therefore experiencing stronger solar radiation and warmer temperatures. Conversely, during winter, the hemisphere tilts away from the sun, resulting in less direct sunlight, reduced solar energy, and cooler temperatures. The effect of axial tilt is a fundamental factor in defining seasonal changes, which leads to geographical variations in climate rather than uniform distribution of heat. Therefore, the accurate relationship between Earth's axial tilt and solar radiation received is that this tilt directly influences the intensity and distribution of sunlight, which in turn affects climate and weather patterns.

3. What is the primary tool used to measure relative humidity?

A. Barometer

B. Psychrometer

C. Anemometer

D. Rain gauge

The primary tool used to measure relative humidity is a psychrometer. This device typically consists of two thermometers: a dry bulb thermometer that measures air temperature and a wet bulb thermometer, which has a wetted wick that cools as water evaporates from it. The difference in readings between the two thermometers is used to calculate relative humidity. When air has a high amount of moisture, the wet bulb temperature is closer to the dry bulb temperature, while in drier conditions, the wet bulb temperature will be significantly lower. This measurement is crucial in meteorology as relative humidity plays a vital role in weather forecasting, climate studies, and understanding atmospheric processes. The psychrometer's ability to provide accurate measurements across various conditions makes it an essential instrument for meteorologists.

4. What type of precipitation can Cumulus clouds sometimes release?

A. Constant light drizzle

B. Brief heavy showers

C. Long-lasting rain

D. Freezing rain

Cumulus clouds are typically associated with fair weather, but they can develop into larger and more vertical structures, such as cumulonimbus clouds, under certain conditions. When these clouds do precipitate, the type of precipitation is usually brief and can often be heavy. This is due to the convective processes within the cloud, where warm air rises rapidly, leading to the development of showers that can be intense but short-lived. The characteristic of having brief heavy showers aligns with the nature of cumulus clouds when they evolve to bring precipitation. In contrast, constant light drizzle would more commonly originate from stratus clouds, while long-lasting rain is typically associated with larger weather systems such as fronts. Freezing rain occurs under specific conditions involving temperatures around or below freezing, which is not a general trait of cumulus clouds. Thus, brief heavy showers are the most accurate representation of the precipitation type that cumulus clouds can release when they do produce precipitation.

5. Which two forces primarily influence the movement of air within a pressure system?

A. Coriolis force and surface tension

B. Pressure gradient and Coriolis force

C. Centrifugal force and friction

D. Wind shear and jet stream

The movement of air within a pressure system is primarily influenced by two key forces: the pressure gradient force and the Coriolis force. The pressure gradient force arises from differences in air pressure across a region. Air naturally moves from areas of higher pressure to areas of lower pressure, and the strength of this movement is directly related to the magnitude of the pressure difference. A steep pressure gradient results in stronger winds, while a gentler gradient leads to lighter winds. The Coriolis force is a result of the Earth's rotation, which causes moving air to be deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. This force influences the direction of wind flow and contributes to the formation of large-scale weather patterns and cyclonic motions within pressure systems. Together, these two forces interact to drive the dynamic movements of air in response to pressure systems, forming the basis for wind patterns and weather systems.

6. What does an Automatic Weather Station (AWS) primarily monitor?

A. Atmospheric pressure, surface wind, precipitation

B. Visibility, cloud cover, air quality

C. Temperature, humidity, atmospheric composition

D. Cloud heights, jet streams, solar radiation

An Automatic Weather Station (AWS) primarily monitors key meteorological parameters that are essential for understanding local weather conditions. The primary focus of an AWS includes atmospheric pressure, surface wind, and precipitation, which are fundamental to weather observation and forecasting. Atmospheric pressure readings help in understanding weather patterns, as changes in pressure are often associated with different weather systems. Surface wind measurements are crucial for assessing wind speed and direction, which can affect everything from aviation operations to local climate conditions. Additionally, precipitation monitoring provides data on rainfall or snowfall, which is vital for both weather predictions and assessing water resources. The other choices include important meteorological elements, but they either focus on specialized aspects (such as visibility and cloud heights) or parameters that are less immediate for general weather monitoring. While visibility and cloud cover are also important, they are not the primary focus of an AWS. The same goes for temperature, humidity, and atmospheric composition, which, while critical, are secondary compared to the core functions of pressure, wind, and precipitation monitoring as offered by the typical AWS setup.

7. Which term describes the process of water droplets joining together to form larger droplets?

A. Deposition

B. Evaporation

C. Coalescence

D. Condensation

Coalescence accurately describes the process where small water droplets collide and merge to form larger droplets. This phenomenon is essential in the development of precipitation within clouds. As the larger droplets form, they become heavy enough to overcome updrafts in the atmosphere, leading to rain. The other terms relate to different processes. Deposition refers to the transformation of water vapor directly into ice without passing through the liquid phase, commonly observed in the formation of frost. Evaporation is the process by which liquid water turns into water vapor, losing energy in the process. Condensation involves water vapor transitioning back to liquid form, often observed when water vapor in the air cools and forms dew or clouds. Each of these processes plays a role in the water cycle but does so in different contexts from coalescence.

8. How does the ELR change during the night in terms of stability?

A. It becomes unstable

B. It remains unchanged

C. It tends to stabilize

D. It fluctuates rapidly

The change in the Environmental Lapse Rate (ELR) during the night is typically characterized by a stabilization of the atmosphere. At night, the ground cools due to the loss of solar radiation, which leads to a decrease in the temperature of the air immediately near the surface. This process enhances the stability of the atmosphere, as cooler air sinks and alters the vertical temperature gradient. In general, a stable atmosphere means that the ELR is lower than the adiabatic lapse rates, making it less likely for air to rise and form clouds or storms. The cooling of the surface at night leads to a temperature inversion, where the temperature increases with height at lower levels, further contributing to atmospheric stability. Thus, the night-time conditions promote a stable environment, reducing turbulence and convection. This behavior is contrasted with daytime conditions, where solar heating often leads to a more unstable atmosphere as the surface warms and the ELR increases. The stabilization process at night is important for understanding various meteorological phenomena, including fog formation and the development of low-level clouds.

9. What is a significant characteristic of the atmosphere above an inversion layer?

A. The air tends to be unstable throughout

B. It often remains turbulent with low visibility

C. Conditions are typically smooth with limited cloud cover

D. It is always cooler than the air below

The correct choice highlights a significant characteristic of the atmosphere above an inversion layer, which is that conditions are typically smooth with limited cloud cover. This occurs because an inversion layer acts as a cap, trapping cooler air beneath warmer air, which can stabilize the atmosphere. This stability often leads to a reduction in vertical mixing, thus contributing to calmer conditions and minimal cloud formation. When an inversion layer is present, the air above tends to remain stratified, leading to a more uniform temperature profile. The lack of turbulence allows for smooth flying conditions, which is particularly relevant for pilots looking for stable weather phenomena. Additionally, since the warmer air acts as a barrier, it inhibits convection currents that would typically promote cloud development, resulting in clearer skies above the inversion layer. In contrast, the other choices do not accurately describe the atmospheric conditions above an inversion layer. The idea of unstable air, turbulence, low visibility, or consistently cooler temperatures above the inversion does not align with the typical effects of an inversion layer.

10. Where is water vapor's presence most significant in the atmosphere?

A. Polar regions

B. High altitudes

C. Tropical regions

D. Desert regions

Water vapor is most significant in the tropical regions because these areas receive abundant solar radiation, resulting in higher temperatures and consequently increased evaporation from oceans and other bodies of water. The warm air found in the tropics can hold more moisture than cooler air, leading to a concentration of water vapor which plays a critical role in weather patterns, cloud formation, and precipitation. In contrast, water vapor presence diminishes in polar regions, where the cold temperatures limit the amount of moisture the air can hold. At high altitudes, despite being cooler and less dense, there is still a relative decrease in the moisture content compared to tropical areas. Desert regions, characterized by dry air and limited precipitation, would also feature lower concentrations of water vapor. Therefore, the tropical regions stand out as the area where water vapor is most abundant and its influence on the atmosphere is most pronounced.