

MODULE 3

AIR ENVIRONMENT

Chapter 1 - Air Circulation

Learning Outcomes

After completing this chapter, you should be able to:

- Describe how the sun heats the Earth.
- Describe the Earth's rotation and revolution, and its effect on the Earth's seasons.
- Explain the various theories of circulation.
- Describe Coriolis Force.
- Define the jet stream.

Chapter 2 - Weather Elements

Learning Outcomes

After completing this chapter, you should be able to:

- Define wind.
- Describe the Beaufort Scale.
- Define heat.
- Explain what temperature is and how it can be expressed.
- Describe what wind chill is and what it does.
- Describe how a microburst can affect a plane.

Chapter 3 - Moisture and Clouds

Learning Outcomes

After completing this chapter, you should be able to:

- Describe the condensation process.
- Describe how saturation occurs.
- Define dew point.
- Define what precipitation is and give some examples.
- Define fog.
- Define turbulence.

Chapter 4 - Weather Systems and Changes

Learning Outcomes

After completing this chapter, you should be able to:

- Define an air mass and identify air mass characteristics.
- Define a front and describe the types of fronts.
- Describe hurricanes, thunderstorms and tornadoes.
- Identify the stages of a thunderstorm.
- Outline safety precautions for thunderstorms and tornadoes.

Chapter 1 - Air Circulation

1. The sun heats the _____ and is the fundamental cause of our _____.
2. The sun heats parts of the earth _____ than others.
3. This _____ or _____ heating causes _____ and _____ differences. This creates _____ or the _____ of air.
4. The sun heats the earth through a method known as _____.
5. Heat from the sun is _____ depending on the _____ or the _____.
6. About _____ % of the sun's radiation is absorbed by the Earth's surface. The other _____ % is _____ and _____ in the atmosphere and space.
7. Warm air _____. This is an ingredient for producing _____.
8. Warm air molecules are spaced _____ than cool air molecules.
9. The Earth _____ around the sun. The Earth's revolution takes _____ days, _____ hours and _____ minutes.
10. The Earth rotates on its axis at an angle of _____ degrees. The rotational tilt causes the length of the _____ to vary and the rotation plus the revolution cause the _____ to occur.
11. The Northern Hemisphere is tilted directly toward the sun on _____. This is called the _____.
12. On December 22, the Northern Hemisphere is tilted directly _____ from the sun. This is called the _____.
13. The _____ occurs on March 21, and the _____ occurs on September 22. On both occasions, the sun's direct rays strike the equator.
14. The Earth rotates on its axis in a _____ direction in the Northern Hemisphere. This rotation causes an object moving freely in the Northern Hemisphere to be deflected to the right of its intended path. This deflection is called _____.
15. Between 30° north and south latitude and the equator, the movement of air toward the equator is called _____.
16. Converging trade winds can cause an area of calm winds. This area of calm is called the _____.
17. _____ in the Northern Hemisphere are responsible for many of the weather movements across the US and Canada.
18. Winds at about 60° latitude result from the air over the poles cooling, sinking and spreading out. This area of winds is called the _____.
19. The _____ is wind that usually crosses the US at 30,000-35,000 feet and generally moves in a west to east direction.

Chapter 2 - Weather Elements

20. _____ is a body of air in motion.
21. _____ is defined as the direction from which the wind is blowing.
22. A knot equals _____ mph.
23. A scale for estimating winds on either land or sea is called the _____.
24. To determine _____ you use temperature and wind speed to explain how cold it feels.
25. Airplanes takeoff _____ the wind because the wind gives the plane more lift.

26. A strong tailwind will _____ a plane's air speed.
27. A _____ is defined as a downdraft or downburst of wind.
28. _____ is the total energy of all molecules within a substance.
29. _____ is a measure of molecular motion expressed on a man-made scale.
30. Fahrenheit's freezing point is _____° and its boiling point is _____°.
31. Celsius' freezing point is _____° and its boiling point is _____°.
32. Kelvin's freezing point is _____° and its boiling point is _____°.
33. Warmer temperatures require _____ runways for takeoff.
34. Extreme heat can cause heat _____, _____, _____ and _____
_____. Always drink plenty of _____ when it is extremely hot.
35. In extreme cold, _____ and _____ may occur.
36. The weight or push on the Earth's surface is called _____.
37. Scientists and meteorologists mainly use a _____ barometer.
38. A _____ is found in weather stations and gives a permanent record of pressure readings.

Chapter 3 - Moisture and Clouds

39. _____ is the most important element in the development of weather.
40. Moisture, in its gaseous state, is called _____.
41. When a parcel of air is holding all of the water it can, _____ is reached.
42. The temperature at which the air becomes saturated is called the _____.
43. Converting water vapor to a liquid is called _____.
44. Clouds and fog are products of _____.
45. _____ is the amount of humidity in the air compared to its total water vapor capacity at a given temperature. It is expressed in a _____.
46. _____ is composed of tiny droplets of liquid water in contact with the surface. It is actually a cloud that is touching the ground.
47. Clouds are made up of minute droplets of _____ or _____ of _____ or both.
48. There are three basic cloud forms: _____, _____ and _____.
49. _____ is a fair weather cloud indicating good weather.
50. _____ has a very uniform appearance with very little vertical development.
51. _____ clouds are white, thin, wispy clouds, usually in patches, filaments, hooks or bands and are mainly composed of ice crystals.
52. _____ is heavier and darker than stratus and produces rain that can last for hours.
53. _____ is the cloud that produces thunderstorms with thunder and lightning.
54. The cumulonimbus _____ occurs at the base of the cloud and looks like bulges or pouches.
55. _____ is the unrest or disturbance of the air and refers to its instability.
56. Many types of _____ clouds are associated with turbulence.
57. _____ is the general term given to the various types of condensed water vapor that fall to the Earth's surface, such as rain or snow.
58. Rain that freezes on contact with the ground or highway is called _____.

Chapter 4 - Weather Systems and Changes

59. An _____ is a huge body of air, usually 1,000 miles or more across that has the same temperature and moisture characteristics.
60. An air mass' place of origin is called its _____. The ideal source region must be very _____ and the _____ must be consistent throughout. _____ and _____ locations are the best source regions.
61. Air masses are classified by their _____ and the _____ of the surface in their _____.
62. Air masses are identified by a two-letter code consisting of a _____ letter and a _____ letter.
63. An air mass' temperature or latitude is placed into four categories: _____(P), _____(A), _____(T) and _____(E).
64. The lowercase letter of an air mass is either an _____ (_____) or _____ (_____).
65. A boundary between two air masses is called a _____.
66. A _____ occurs when warm air moves into an area of colder air and they collide.
67. A _____ occurs when the air moving into the area is colder than the already present warmer air.
68. When air masses bump against each other, but not strong enough to force movement, it is called a _____.
69. When three differing air masses are involved with each other, it is called an _____.
70. _____ come from cumulonimbus clouds and always possess thunder and lightning.
71. Thunderstorms have three stages: _____, _____ and _____.
72. The _____ stage of a thunderstorm is dominated by updrafts.
73. _____ is the most dangerous part of a thunderstorm.
74. A tornado's _____ are the main reason for the tremendous destruction associated with tornadoes.
75. The _____ explains the categories of wind speed and expected damage for tornadoes.
76. If a tornado is coming and time permits, get to a _____ or underground.
77. If a tornado is coming and you are in open country, move at _____ angles away from it.
78. To be classified as a hurricane, the winds must go above _____ miles per hour.
79. Hurricanes are classified into _____ categories. These categories are presented on the _____.
80. The center of a hurricane is called an _____.