

## **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 \_\_\_\_\_  
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 \_\_\_\_\_.
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 \_\_\_\_\_ than cool air molecules.
8. Warm air molecules are spaced \_\_\_\_\_.
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 \_\_\_\_\_. This is called the sun on the \_\_\_\_\_.
12. On December 22, the Northern Hemisphere is \_\_\_\_\_ from the sun. tilted directly \_\_\_\_\_. 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
61. Air masses are classified by their \_\_\_\_\_ regions. \_\_\_\_\_ and the \_\_\_\_\_ of the \_\_\_\_\_ letter
62. Air masses are identified by a two-letter code consisting of a \_\_\_\_\_ letter.
63. An air mass' temperature or latitude is placed into four categories: \_\_\_\_\_ (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 \_\_\_\_\_. \_\_\_\_\_ stage
72. \_\_\_\_\_ of a thunderstorm is dominated by updrafts. \_\_\_\_\_ is the most dangerous part of a thunderstorm. \_\_\_\_\_ are the main reason for the tremendous destruction associated
74. A tornado's \_\_\_\_\_ 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 \_\_\_\_\_.