

Earth's Atmosphere Final Exam Review

The following are examples of questions that may appear on your final exam. Use your notes provided to you in class. If you have misplaced said notes they are also available for download from my website.

Multiple Choice

1. Which of the following is the furthest from Earth's surface?
 - a. Mesosphere
 - b. Stratosphere
 - c. Troposphere
 - d. Thermosphere
2. Where does all energy come from?
 - a. The Sun
 - b. Water
 - c. Food
 - d. The Moon
3. Air is a mixture of _____
 - a. Oxygen
 - b. Nitrogen
 - c. Gases
 - d. Methane
4. The carbon cycle's chemical symbol is _____.
 - a. CO₂
 - b. H₂O
 - c. N²
 - d. K₂CO₃

5. Which of these is **NOT** a greenhouse gas?
- a. Methane
 - b. Water Vapor
 - c. Neon
 - d. Carbon Dioxide
6. What do scientists use to measure rainfall?
- a. Rain Gauge
 - b. Thermometer
 - c. Hyper-drive
 - d. Barometer
7. The amount of water vapor in the air is _____?
- a. Saturation
 - b. Humidity
 - c. Condensation
 - d. Dew Point
8. A cloud that rests on the ground or a body of water is _____?
- a. Fog
 - b. Cirrus
 - c. Sleet
 - d. Drizzle
9. _____ changes where air masses meet.
- a. Pressure
 - b. Weather
 - c. Stationary Front
 - d. Front Current

10. _____ systems can become storms.
- Progressive
 - Low-pressure
 - High-pressure
 - Air-mass
11. Blinding snowstorms with winds of at least 56 km/h is a _____.
- Lake-effect snowstorm
 - Blizzard
 - Ice storm
 - Hail
12. A(n) _____ is the boundary between two air masses.
- Air front
 - High-pressure zone
 - Stationary Front
 - Mass boundary
13. What characteristics of an air mass form far from the equator? Air becomes cool as it loses energy to the cold land or water.
- Snow
 - Cold
 - Polar
 - Tundra
14. _____ fronts can move into regions quickly.
- Warm fronts
 - Cold fronts
 - Stationary fronts
 - Mass fronts

True & False

15. Altitude is a term used to signify the distance above the sea level. T & F
16. The atmosphere density increases as you travel upward. T & F
17. Volcanoes do not change the atmosphere. T & F
18. The Earth's atmosphere is really thin. T & F
19. The water cycle's chemical symbol is N₂ T & F
20. Greenhouses are cold all year long. T & F
21. Greenhouse gases don't absorb ultraviolet radiation. T & F
22. The ozone layer protects Earth by taking in the most ultraviolet radiation from the sun. T & F
23. The atmosphere of the earth reflects or takes in some sunlight. T & F
24. Atmosphere can absorb light, and reflect light, and it let it go through it. T & F
25. The ozone layer absorbs useful ultraviolet radiation from the sun. T & F
26. Gases can absorb and give off radiation. T & F
27. Trade winds move from the east towards the equator. T & F
28. The influence of Earth's rotation is called the Coriolis Effect. T & F
29. Cirrus Form in very hot air and high altitude. T & F
30. The cumulonimbus cloud is the biggest and can be up to 18km high. T & F
31. Form in layers when air cools over a large area with rising. T & F
32. Water is also stored in lakes, rivers, and ice sheets. T & F
33. in unsaturated air, more water evaporates into the air than condenses back in the water. T & F
34. Warm fronts move faster than cold fronts. T & F
35. Stationary fronts forms when two air masses pull against each other without moving. T & F
36. Air masses travel with global winds and jet streams. T & F
37. A low-pressure system formed when air moves all the way around a high-pressure system. T & F
38. Stationary fronts move more slowly than cold fronts. T & F

39. Kuwait usually is hot and dry with long summers and has a very cold winter 0 °C or below. T & F
40. In southwest region, Britain has light rain fall in that area. With warm summers and very cold winters. T & F
41. A climate is basically a long term weather pattern of an area. T & F

Matching

Match the meaning with the correct word

Barometer	Low	High	Jet-Streams	Monsoons	Pressure Systems	Ice storms
Evaporation	Condensation	Humidity	Precipitation	Freezing Rain	Sleet	Hail
Greenhouse Effect	Greenhouse Gases	Ozone	Atom	Rises	Sinks	Global
Jet streams	Climate	Low Air Pressure	High Air Pressure	Tornado	Tsunami	Climate
Storm Surge	Air Mass	Front	Tropical Storm	Blizzard	Weather Patterns	Weather Patterns change

42. _____ A gas molecule that consist of three oxygen atoms.
43. _____ The process by which cretin gases in a planet's atmosphere absorb.
44. Warm air _____ while cool air _____.
45. _____ winds travel thousands of kilometers in steady patterns.
46. _____ Gas such as carbon dioxide and methane that absorb and give off infrared radiation.
47. A _____ is a device that measures wind pressure.
48. Air pressure is _____ in high places while it is _____ in low places.

49. _____ are usually located in the troposphere.
50. _____ are winds that change according to the seasons.
51. _____ is rain that forms into ice pellets when it hits the ground or other surfaces
52. _____/is the quantity of water vapor in air
53. _____/is rain that freezes into ice pellets while going into cold air
54. _____/is the process by which a liquid changes into a gas
55. _____ occurs when a hurricane moves into a coastal area and pushes a huge mass of ocean water.
56. _____ occurs when rain falls onto freezing-cold ground and freezes instantaneously, forming a smooth, ice surface.
57. _____ can occur at different locations at the same time.
58. _____ is a low-pressure system that starts near the equator that blow at 65 km/h or more.
59. _____ is a large volume of air temperature and humidity are nearly the same in different locations at the same altitude.
60. _____ is a boundary between air masses.
61. _____ is a blinding snowstorms with winds of at least 56 km/h and low temperatures.
62. _____ is a pattern where the weather changes after weeks or days of the same weather.
63. _____ is a current of air where it can be very long and they form where there is a difference in temperature.
64. _____ is the region or place has a lower pressure than its surroundings.

Fill in the Blank

65. The _____ is a layer of air/gases that surrounds Earth.
66. Most of the materials in the atmosphere are _____.
67. The process by which certain gases in a planet's atmosphere absorb and emit infrared radiation are known as _____.
68. _____ is the most common gas that can be found in the ozone (greenhouse gases).
69. The ozone in the stratosphere is called _____.
70. Gases in the atmosphere absorbs _____.
71. Carbon Dioxide, Methane, Water Vapor and Nitrous Oxide are known as _____.
72. One way that _____ can form is through the combining of cloud droplets.
73. As the droplets continue to combine, they grow _____ and _____.
74. Cloud droplets are much _____ than a typical raindrop.

Short Answer Each Question is 3 marks

75. Define atmosphere.
76. Define Radiation.
77. Define Convection and give an example.
78. Define Ozone.
79. What is the ozone layer's job?
80. Why is the atmosphere so important? What will happen to earth without the atmosphere?
81. Most of the energy comes from where?
82. What are the three of the most important cycles that affect the atmosphere?
83. List the 5 layers of the atmosphere.
84. What are the three ways that heat is transferred through the atmosphere?

85. What are the two main things that happen to sunlight when it reaches Earth?
86. Briefly explain how Earth is like a greenhouse.
87. Why is the way of warming the Earth's surface referred to as the Greenhouse Effect?
88. What is the difference between ultraviolet radiation and infrared radiation?
89. The atmosphere can affect light in 4 ways. List 2 of them.
90. What is air pressure?
91. What is wind?
92. Explain the Coriolis Effect and its relation to global winds.
93. How many types of air pressure are there and why?
94. How are air pressure and density related?
95. What effect does altitude on air pressure?
96. Why does air move from one place to another?
97. How is air pressure measured?
98. How is an area of high pressure created?
99. Explain three types of precipitation.
100. How do clouds form?
101. What does precipitation mean?
102. How do clouds form?
103. How does water evaporate?
104. What is the definition of evaporation?
105. What is humidity?
106. Define Dew Point.
107. What causes a Storm Surge?
108. How does a low-pressure system form?
109. What are 4 characteristics of an air mass?
110. What are the effects of a hurricane?
111. What causes a weather pattern or storm?
112. How do jet streams form?

The following article will appear on your final exam with comprehensions to accompany it. I advise that you read through this article a few times so that you do not have to spend the time reading the article during the exam itself.

Hurricanes

How do hurricanes form?

Hurricanes are mind-boggling in their size and strength. Modern technology lets us see how big hurricanes are and track them through satellite imagery, while storm-penetrating aircraft measure their strength, in terms of wind speeds and atmospheric pressure. That technology gives us detailed warnings that people a century ago never had.

Hurricanes usually form in the tropical zones north and south of the equator, where warm waters offer ample fuel for storm formation. That's where you see **convection**, where warm air rises and forms clusters of thunderstorms. The Coriolis effect, created by the Earth's spinning motion, may cause this cluster of storms to rotate (counter-clockwise above the equator, or clockwise below), but the system has to be a few hundred miles from the equator for the Coriolis force to exert an effect. If the system becomes organized and strong enough, with sustained winds of 39 miles per hour, it becomes a tropical storm. At 74 miles per hour or more, it becomes a hurricane.

A hurricane can be hundreds of miles across. It's like a big engine, with upper-level winds acting as a vent, pulling the rising warm air away from the storm. Rain bands spiral around the center of the system. Air sinks in the clear center, or **eye**, which can be from 5 miles to more than 100 miles across.

Because the atmospheric pressure is so low in the eye, the water rises up there in a sort of mound. This contributes to the devastating **storm surge** when a hurricane hits land, but most of the surge comes from winds pushing the sea water ahead of the storm, raising ocean levels by several feet.



Hurricane Floyd approaches the Bahamas and the United States on September 12, 1999. (Photo courtesy NOAA / National Climatic Data Center)

When a hurricane hits land, it tends to weaken mostly because it has lost its source of energy - the warm ocean waters. Friction might slow down the surface wind, but it also can enhance turbulence and therefore gusts, scientists have found.

The **Saffir-Simpson scale** is used to classify hurricanes in the United States. It was invented by engineer Herbert Saffir and former National Hurricane Center director Robert Simpson. Here's a summary:

Saffir-Simpson hurricane scale				
Category	Damage	Wind speed	Storm surge	Pressure
1	Minimal	74-95 mph 118-152 km/h 64-82 knots	4-5 feet (1.2-1.5 meters)	over 980 millibars (over 28.94 inches)
2	Moderate	96-110 mph 153-176 km/h 83-95 knots	6-8 feet (1.8-2.4 meters)	965-980 millibars (28.50-28.91 inches)
3	Extensive	111-130 mph 177-208 km/h 96-113 knots	9-12 feet (2.7-3.6 meters)	945-964 millibars (27.91-28.47 inches)
4	Extreme	131-155 mph 209-248 km/h 114-135 knots	13-18 feet (3.9-5.4 meters)	920-944 millibars (27.27-27.88 inches)
5	Catastrophic	over 155 mph over 248 km/h 135+ knots	over 18 feet (over 5.4 meters)	under 920 millibars (under 27.17 inches)



Andrew (right) was classified as a fierce Category 4 storm when it hit south of Miami in 1992, but 10 years later, new wind research prompted the National Hurricane Center to upgrade Andrew to a Category 5. Compare it with the enormous size of Hurricane Floyd (left) in 1999, which was a strong Category 4 at its peak. Floyd curved north and missed Florida but brought devastating rains to the Carolinas when it made landfall as a Category 2. (Photo courtesy NOAA / National Climatic Data Center)

The United States' worst weather disaster was the Category 4 hurricane that hit Galveston, Texas, on September 8, 1900. More than 8,000 people died when a 15-foot storm surge flooded the island, which, at that time, was less than 9 feet above sea level. Now, the sea level of the island has been raised, and a sea wall has been built to try to protect the city.

In recent years, Hurricane Andrew hit south of Miami as a Category 4 on August 24, 1992, but was upgraded to a Category 5 in 2002 after 10 years of research. Hurricane Hugo, which came ashore at Charleston, South Carolina, on September 22, 1989, was also a Category 4. Camille, which hit Mississippi on August 17, 1969, was a Category 5.

Meteorologists give hurricanes names, which are reused unless the storm is particularly destructive. The names used to be all women's names, but since 1979, men's names have been used, too.

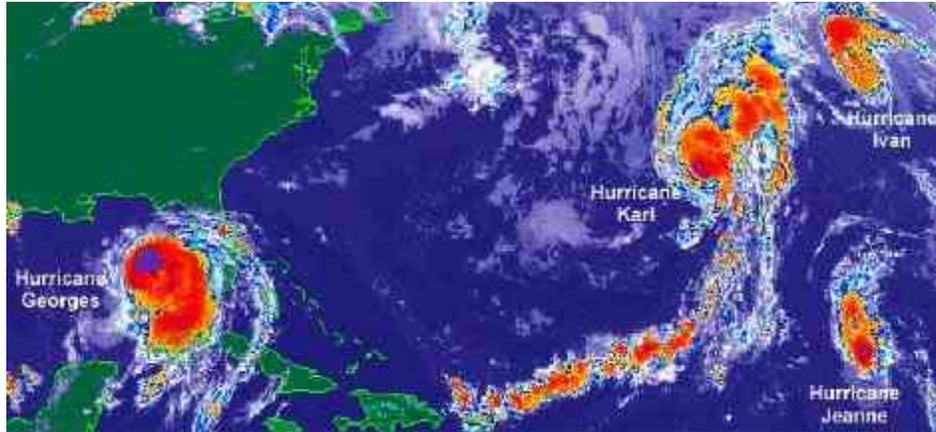
The Atlantic hurricane season begins June 1 and ends November 30, with the peak months from August through October.

In different parts of the world, hurricanes are known as typhoons (west of the International Date Line) or tropical cyclones (in the Indian Ocean or near Australia).

Hurricane safety

We are fortunate to have technology now that can detect the formation of a hurricane long before one is a danger to land. Yet, despite all the data we have, we can't predict exactly where a hurricane will go. The National Hurricane Center issues a **hurricane watch** 24 to 36 hours before expected landfall. **Hurricane warnings** are issued 24 hours in advance. Evacuation orders may be issued for long stretches of coastline. It's not wise to ignore an evacuation order. Hurricane winds are dangerous, yes, but storm surge can be even more devastating. So the best safety measure you can take is to get out of the hurricane's path, and to do it early. Waiting until the last moment may result in being stuck in a gigantic traffic jam, or weather conditions might have worsened so much that departure is impossible (for instance, bridges connecting barrier islands to the mainland may be closed when winds reach a certain speed).

If you are staying in an area that could be hit by a hurricane, you need to be in a sturdy shelter. Windows should be boarded up or shuttered. Secure or bring inside loose items that are outside, such as chairs or flowerpots. Turn your refrigerator and freezer to the coldest settings so that the cold lingers as long as possible in case the electricity goes out. Make sure your car has a full tank of gas.



At the height of hurricane season, storms can line up one after another. This satellite image shows four hurricanes in the Atlantic Ocean and Gulf of Mexico on September 26, 1998. (Photo courtesy NOAA / National Climatic Data Center)

Experts recommend having emergency supplies on hand, including:

- Flashlights and extra batteries
- Battery-operated radio and extra batteries
- First aid kit with instructions
- Non-perishable food (with manual can opener)
- Plenty of drinking water
- Prescription medicines
- Cash and credit cards
- Sturdy shoes (you may have to walk in debris)

The Federal Emergency Management Agency has hurricane tips that include teaching everyone in the family how to turn off gas, electricity and water. Make sure you have a place to keep your pet, since emergency shelters usually will not accept pets. Also have the phone number of a family contact outside of the threatened area so that, if family members are separated, they can call the contact to share information and locate each other.

After the hurricane, dangers remain. Avoid downed power lines and be careful around debris. Turn off gas lines if you smell or hear gas, get out of the area, and report the leak to the gas company. Watch out for animals, such as snakes, that may have been moved by flood waters. Families need to take pictures of damage for insurance purposes.