

Name: _____

Meteorology Time Allotted: 25 minutes

Key: (*) = none, one, or more than one answer possible (e.g. Answer: A, D, and E)

1. The atmospheric window:

- a) Is a local phenomenon similar to the ozone hole that opens over Antarctica in winter
- b) Is located at a band of wavelengths between 0.1 and 0.4 micrometers
- c) Allows certain wavelengths of longwave radiation to pass through the atmosphere
- d) Transmits certain wavelengths of light but with distortion

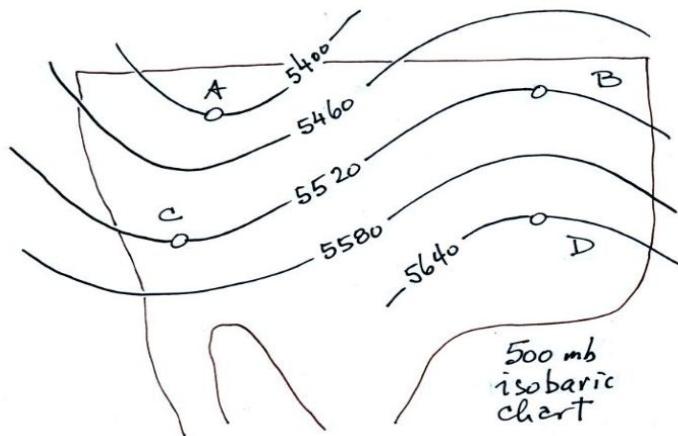
2. Little Timmy is currently engaging in one of his favorite pastimes—scouring some Doppler Radar. He recognizes a peculiar feature that he realizes is a bow echo. What atmospheric feature could this indicate?

- a) Tornado
- b) Hurricane
- c) Cold Front
- d) Warm Front

3. Which of the following are true about aerosols and their effect on Earth's radiative budget?

- a) Aerosols reduce atmospheric transitivity solely via changing cloud structure
- b) Sulfate aerosols from Kilauea (Hawaii) create brighter clouds relative to those in the Pacific
- c) Aerosols serve as condensation nuclei, which create clouds that are less dense than normal
- d) During the winter, aerosols allow for chemical reactions that produce reactive chlorine

Consider the figure below. Answer the four questions that follow using the figure.



4. Which of the following locations have the same pressure?

- a) They all have different pressures
- b) B and C
- c) A and D
- d) They all have the same pressure

5. Under which point is there most likely to be clear skies?

- a) A
- b) B
- c) C
- d) D
- e) Surface conditions cannot be extrapolated

6. At which point is convergence most likely?

- a) A
- b) B
- c) C
- d) D
- e) Impossible to tell

7. Which of the following is closest to the prevailing wind direction 50 miles west of point D?

- a) N
- b) E
- c) S
- d) W

8. Which of the following statements are true about fog? (*)

- a) Radiation fog tends to form close to the ground surface
- b) Precipitation fog occurs when it rains through warm air
- c) Advection fog forms from surface contact of vertical winds
- d) Steam fog occurs over Lake Baikal during the winter
- e) Upslope fog forms adiabatically

9. Which of the following are true about theories of precipitation formation? (*)

- a) The Bergeron process occurs because the environment is supersaturated with respect to ice, but not water
- b) At higher altitudes, storm clouds can possess three distinctive layers, of which the second layer is composed of primarily ice crystals
- c) At higher altitudes, ice crystals mixed in with the supercooled water in the highest layers of the clouds can become freezing nuclei and form the centers of growing ice crystals
- d) At lower altitudes, water droplets within clouds remain separate from each other

10. Which of the following best explains why the horizontal pressure gradient force (PGF) typically increases with height throughout the troposphere, reaching maximum values in the vicinity of the tropopause?

- a) Because air density decreases with height, the PGF actually decreases with height
- b) With stronger wind speeds aloft, a stronger Coriolis force is present. This requires a strong horizontal pressure gradient to keep the flow in balance
- c) Pressure decreases more rapidly with height in cold air than in warm air; the farther up you go, the greater the accumulated difference in pressure (or height)
- d) Because the density of air decreases with height, the pressure gradient force increases with height- the PGF is inversely proportional to density

11. All of the following are important for heavy lake effect snow except:

- a) Deep layer of cold polar air flowing over much warmer lake
- b) A small lake fetch
- c) An inversion located above the 700 millibar level
- d) A minimal amount of directional wind shear with height

Consider the following data:

<i>Sea Level Temperature</i>	<i>Dew Point</i>	<i>Dry Adiabatic Lapse Rate</i>	<i>Wet Adiabatic Lapse Rate</i>	<i>Dew Point Lapse Rate</i>	<i>Environmental Lapse Rate</i>
28 degrees Celsius	8 degrees Celsius	10 degrees Celsius per kilometer	6 degrees Celsius per kilometer	2 degrees Celsius per kilometer	8 degrees Celsius per kilometer

12. At what minimum altitude will clouds begin to form?

- a) 1 km
- b) 1.5 km
- c) 2 km
- d) 2.5 km

13. At what minimum altitude will clouds begin to exhibit significant vertical development (hint: they must be convectively buoyant)?

- a) 2 km
- b) 3 km
- c) 4 km
- d) 5 km

14. Nor'easters that strike New England often occur with a pressure area northeast of the storm, over the Atlantic Canada. Which is true about the characteristics of such a storm? (*)

- a) The strong pressure gradient between the high and low pressure systems result in strong winds.
- b) Nor'easters have a low pressure system core
- c) Blocking of Greenland's high pressure systems decreases the longevity of Nor'easters
- d) Climate change will make Nor'easters less likely to occur
- e) All of the above

15. Which of the following statements are true of thunderstorm development? (*)

- a) Even a small amount of dry air is highly detrimental to thunderstorm development, as it may start a chain reaction that leads to dispersal of the developing storm
- b) Downdrafts are highly detrimental to thunderstorm development, as they prevent updrafts from bringing warm moist air aloft
- c) Gust fronts are unlikely to generate more thunderstorms, as they are composed of mostly cold air
- d) A plane wanting to avoid the bulk of severe thunderstorms should fly right below the tropopause