## **Test Form: A**

## Exam 2: Spring 2011

## Instructions:

- Write your name (last name and first name) on your bubble sheet.
- Write your student identification number on the bubble sheet, and *carefully* fill in the bubbles corresponding to your student id number (starting from the left box and leaving the last box blank)
- Fill in the bubble that corresponds to the Test Form letter listed at the top of this page.
- When answering the questions, select the one letter that **BEST** completes the statement or answers the question and mark this letter on your bubble sheet.
- Each question is worth equal points (2 pts each for 100 total pts).

Remember to read each question and all of the answers carefully before answering the question.

## Good Luck!!!

1. With all other factors being the same you would expect mechanical turbulence

a) to be larger over a smooth surface than a rough surface

b) to be larger over a rough surface than a smooth surface

c) to be the same over both a smooth and a rough surface

2. The Coriolis force causes objects to \_\_\_\_\_ in the Northern hemisphere.

a) increase their speed

b) turn to the right of their direction of motion

c) turn to the left of their direction of motion

d) decrease their speed

3. In general the 300 mb constant pressure surface slopes down from \_\_\_\_\_, and this results in

\_\_\_\_\_ geostrophic wind in mid-latitudes.

a) the equator to the North Pole, easterly

b) the equator to the North Pole, westerly

c) the North Pole to the equator, easterly

d) the North Pole to the equator, westerly

4. True or false: The Coriolis force is zero at the poles and maximum at the equator.

a) true

<u>b) false</u>

5. True or false: The pole to equator temperature gradient is much stronger in winter than in summer. Therefore, the jetstream aloft will generally be much stronger in winter than in summer.

<u>a) true</u>

b) false

6. The \_\_\_\_\_\_ is always directed toward the center of the earth.

a) Coriolis force

b) frictional force

c) vertical pressure gradient force

d) horizontal pressure gradient force

e) gravitational force



Use the following surface weather map to answer questions 7 and 8.

7. Where is the pressure gradient force largest on this surface weather map?

- a) A
- <u>b) B</u>
- c) C
- d) D

8. What is the direction of the pressure gradient force at point B on this map?

a) from the southwest towards the northeast

- b) from the northeast towards the southwest
- c) from the southeast towards the northwest
- d) from the northwest towards the southeast

9. For air that is in hydrostatic balance which two forces are in balance?

a) vertical pressure gradient force and frictional force

b) horizontal pressure gradient force and Coriolis force

c) frictional force and Coriolis force

d) gravitational force and vertical pressure gradient force

e) horizontal pressure gradient force and gravitational force

10. True or false: Rising motion in the atmosphere is typically associated with clear skies.

a) true

b) false



Use the following 500 mb constant pressure map to answer questions 11 to 14. **Vertice 1 Plymouth State Weather Center** 

11. At which point on this map is the geostrophic wind largest?

- a) A
- b) B
- <u>c) C</u>

d) D

12. What is the direction of the geostrophic wind at point C?

a) northwesterly

b) northeasterly

c) southeasterly

d) southwesterly

13. What is the direction of the pressure gradient force at point C?

a) from the northwest towards the southeast

b) from the northeast towards the southwest

c) from the southeast towards the northwest

d) from the southwest towards the northeast

14. What is the direction of the Coriolis force for the geostrophic wind at point C?

a) from the northwest towards the southeast

b) from the northeast towards the southwest

c) from the southeast towards the northwest

d) from the southwest towards the northeast

15. Divergence is a net \_\_\_\_\_ of air molecules into a region of the atmosphere, and is associated with of surface pressure. a) inflow, a decrease b) inflow, an increase c) outflow, a decrease d) outflow, an increase 16. Divergence of air at the surface will result in \_\_\_\_\_ in a column of air, which is typically associated with a) rising motion, clouds and precipitation b) rising motion, clear skies c) sinking motion, clouds and precipitation d) sinking motion, clear skies 17. For anticyclonic flow above the boundary layer the true flow will be the geostrophic value. a) equal to b) greater than c) less than 18. Assuming that the spacing between height contours remains constant an air parcel will \_\_\_\_\_\_ as it moves from a trough to a ridge at 300 mb leading to \_\_\_\_\_ between the trough and ridge. a) speed up, convergence b) speed up, divergence c) slow down, convergence d) slow down, divergence 19. For a straight jetstreak at 300 mb you would expect the surface pressure to decrease below the a) left entrance region and left exit region b) right entrance region and right exit region c) left entrance region and right exit region d) right entrance region and left exit region 20. In the friction layer you would expect \_\_\_\_\_\_ a high pressure center leading to a \_\_\_\_\_\_ of the high pressure. a) divergence from, weakening b) divergence from, strengthening c) convergence into, weakening d) convergence into, strengthening 21. During a winter night over Arctic Canada a column of the atmosphere cools by radiating energy to space. As this column of air cools you would expect the surface pressure to \_\_\_\_\_\_. a) decrease b) increase c) remain unchanged

22. True or false: Convergence throughout an entire air column is associated with increasing surface pressure.

<u>a) true</u>

b) false

23. Which statement about friction is true?

- a) Friction increases surface wind speeds, ultimately leading to air spiraling away from surface highpressure centers.
- b) Friction decreases surface wind speeds, ultimately leading to air spiraling toward surface high-pressure centers.
- c) Friction increases surface wind speeds, ultimately leading to air spiraling toward surface high-pressure centers.
- <u>d)</u> Friction decreases surface wind speeds, ultimately leading to air spiraling away from surface highpressure centers.

24. Divergence of air just below the tropopause will result in \_\_\_\_\_ in a column of air, which is typically associated with \_\_\_\_\_.

a) rising motion, clouds and precipitation

b) rising motion, clear skies

- c) sinking motion, clouds and precipitation
- d) sinking motion, clear skies

25. An airmass that is moist and warm would be called a \_\_\_\_\_\_ airmass.

a) Continental polar

b) Continental tropical

c) Maritime polar

d) Maritime tropical

26. You would expect a continental polar airmass to form over the \_\_\_\_\_.

a) Gulf of Mexico

b) northern Pacific Ocean

c) northern Great Plains of Canada

d) desert southwest of the United States

27. Relatively low sea level pressure is often associated with \_\_\_\_\_.

a) cold airmasses

b) warm airmasses

c) maritime airmasses in the summer

d) maritime airmasses in the winter

e) both b) and d)

Use the following 300 mb map to answer questions 28 to 30. On this map gray shading indicates the position of a jetstreak.



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28. You would expect rising motion due to flow around troughs and ridges to be found at:

a) A and C

- b) B and C
- c) B and D
- d) A and D
- e) A, B, C, and D

29. You would expect convergence due to the jetstreak to be occurring at:

- a) A and C
- b) B and C
- c) B and D
- d) A and D
- e) A, B, C, and D

30. You would expect the surface pressure to be decreasing most rapidly due to the combined effects of the trough and the jetstreak at:

a) A

<u>b) B</u>

c) C

d) D

e) A, B, C, and D

31. The following symbol is used to indicate \_\_\_\_\_.



a) a cold frontb) a warm frontc) an occluded frontd) a stationary fronte) a dryline

32. Based on the following two surface station model reports from before and after a front has passed what type of front has passed this weather station?



a) cold frontb) warm frontc) occluded frontd) dryline

33. In the central United States in the winter as a cold occluded front approaches and passes a location you would typically expect \_\_\_\_\_\_ ahead of the front followed by \_\_\_\_\_\_ after the front passes.

- a) warm temperatures with high dewpoint temperatures, rapidly decreasing temperatures and a decrease in the dewpoint temperature
- b) cold temperatures and low dewpoint temperatures, rising temperatures and increasing dewpoint temperatures

c) high dewpoint temperatures, decreasing dewpoint temperatures and no change in air temperature

d) widespread clouds and cold temperatures, continued widespread clouds and colder temperatures

34. An upper level front typically separates

a) descending dry air from the upper troposphere from ascending moist air from the lower troposphere b) ascending dry air from the upper troposphere from ascending moist air from the lower troposphere

- c) ascending dry air from the upper troposphere from descending moist air from the lower troposphere
- d) descending dry air from the upper troposphere from descending moist air from the lower troposphere

35. \_\_\_\_\_ clouds often form \_\_\_\_\_ cold fronts with warm, moist conditionally unstable air ahead of the cold front.

a) Cumulonimbus, in a squall line along the leading edge of

c) Nimbostratus, in a squall line along the leading edge of

d) Nimbostratus, spread far out ahead of

b) Cumulonimbus, spread far out ahead of

36. Extratropical cyclones do not typically form \_\_\_\_\_\_
a) just east of the Rocky Mountains in eastern Colorado
b) just off of the Texas and Louisiana Gulf Coast
c) over southern California
d) over the Gulf of Alaska

37. You would most likely find a cold, dry airmass moving \_\_\_\_\_\_ on the \_\_\_\_\_ side of an extratropical cyclone in the central United States.
a) towards the south, east
b) towards the north, east
c) towards the south, west
d) towards the north, west

38. For an extratropical cyclone that has just developed east of the Rocky Mountains in the United States you would expect to find the dry line \_\_\_\_\_\_ of the low pressure center and an upper-level front \_\_\_\_\_\_ of the low pressure center.

a) east, west
b) north, south
c) south, south
d) south, north

39. An extratropical cyclone has formed in eastern Colorado, with an upper-level front and dry line aligned to form a single boundary and a cold front further west behind this boundary. You would expect \_\_\_\_\_\_ along the leading edge of the dry line and upper-level front and \_\_\_\_\_\_ along the leading edge of the cold front.
a) clear skies, thunderstorms
b) thunderstorms, thunderstorms
c) thunderstorms, clear skies
d) clear skies, clear skies

40. An extratropical cyclone weakens when its surface pressure \_\_\_\_\_. This change in surface pressure is due to

a) increases, divergence

b) increases, convergence

c) decreases, divergence

d) decreases, convergence

41. During the winter a trowal is often associated with \_\_\_\_\_.

a) clear skies and warm temperatures near the surface

b) clear skies and cold temperatures near the surface

c) cloudy skies and precipitation

d) none of the above

42. As the wind speed in a jetstreak at 300mb increases you would expect the \_\_\_\_\_\_ that occurs in the left-exit region of the jetstreak to \_\_\_\_\_\_ leading to a decrease in the surface pressure below this portion of the jetstreak. a) convergence, increase b) convergence, decrease

c) divergence, increase

d) divergence, decrease

43. An occluded front is a boundary between \_\_\_\_\_\_ airmasses at the surface, with \_\_\_\_\_ air aloft. a) warm and cold, cold b) warm and cold, warm c) cold and colder, cold d) cold and colder, warm 44. As the pattern of 300 mb heights changes from a trough to the west and a ridge to the east of a surface low pressure center to a cutoff low directly above the surface low pressure center you would expect the upper level divergence above the surface low pressure center to \_\_\_\_\_. a) increase b) decrease c) remain constant 45. True or false: A ground blizzard can occur when no new snow is falling. a) true b) false 46. When flesh of the body freezes it is known as \_\_\_\_\_. a) frostbite b) wind chill temperature c) hypothermia d) snow blindness 47. The National Weather Service in Boulder, CO will issue a \_\_\_\_\_\_ when wind speeds are expected to exceed 30 knots and falling or blowing snow will reduce visibility to less than 1/4 mile for at least 3 hours. a) winter storm watch b) winter storm warning c) blizzard warning d) wind chill warning 48. You would expect \_\_\_\_\_\_ sea level pressure to be associated with very cold air. a) low b) near average <u>c) high</u> 49. The strong winds that are characteristic of a blizzard typically occur on the side of a cyclone that has developed over eastern Colorado. a) northwest b) northeast c) southeast d) southwest 50. The snowfall that can occur with a blizzard is associated with the \_\_\_\_\_\_ of a Colorado cyclone. a) warm front b) occluded front c) trowal d) dryline