

Name: \_\_\_\_\_

## Weather, Climate and Society

### First Exam

September 26, 2002

1. (12 pts) List and explain three reasons that make water vapor an extremely important gas in the atmosphere.
1. Makes clouds and precipitation  
2. Releases heat condensation occurs  
3. Absorbs/emits longwave rad.
2. (5 pts) Suppose the temperature outside is 70°F. When the air is cooled to 58°F, the relative humidity reaches 100%. One may conclude that the dew-point temperature is
- (a) 58°F  
(b) 70°F  
(c) 100°F  
(d) none of the above
3. (5 pts) The transfer of energy by direct contact is called conduction
- (a) True            (b) False.
4. (6 pts) On average in the troposphere air temperature \_\_\_\_\_ (increases, decreases, stays the same), air pressure \_\_\_\_\_ (increases, decreases, stays the same), and air density \_\_\_\_\_ (increases, decreases, stays the same) as height increases.
5. (5 pts) The earth's first atmosphere was composed primarily of:
- (a) hydrogen and helium  
(b) oxygen and water vapor  
(c) argon and nitrogen  
(d) carbon dioxide and water vapor
6. (5 pts) \_\_\_\_\_ objects emit radiation.
- (a) Only radioactive  
(b) Some  
(c) Most  
(d) All  
(e) Few
7. (5 pts) Air pressure is essentially a measure of the \_\_\_\_\_ of air molecules.
- (a) collisions  
(b) speed  
(c) phase  
(d) size  
(e) both (b) and (d)
8. (5 pts) Clouds are classified based on
- (a) their altitude  
(b) whether or not they generate precipitation  
(c) their shape  
(d) all of the above  
(e) both (a) and (c)
9. (5 pts) Infrared and visible satellite photographs provide a way of determining both cloud thickness and cloud altitude
- (a) True            (b) False.

10. (9 pts) List the three main gas components of the dry atmosphere by volume, their chemical symbol, and their approximate relative concentration.

Nitrogen - N<sub>2</sub> - 78%  
 Oxygen - O<sub>2</sub> - 20%  
 Argon - Ar - 1%

11. (5 pts) Plant photosynthesis and respiration are two processes in the:
- (a) water cycle
  - (b) carbon cycle
  - (c) ozone cycle
  - (d) oxygen cycle
  - (e) all of the above
  - (f) only (a), (b), and (d)
12. (5 pts) High humidity makes warm temperatures uncomfortable because
- (a) warm air can't hold much water vapor
  - (b) perspiration evaporates too fast when humidity is high
  - (c) people don't sweat much when the humidity is high
  - (d) perspiration doesn't evaporate well when the humidity is high
  - (e) both (c) and (d)
13. (5 pts) The body's principal internal source of heat is the byproduct of its cellular processes.
- (a) True      (b) False.
14. (5 pts) The combination of cold temperatures and strong winds makes your body feel colder, because wind enhances the transfer of heat by
- (a) ultraviolet radiation
  - (b) latent heat
  - (c) conduction and convection
  - (d) infrared radiation
  - (e) both (b) and (c)
15. (5 pts) The troposphere is the layer of the atmosphere that
- (a) has the highest air pressure
  - (b) is closest to the earth's surface
  - (c) has temperatures that increase with height
  - (d) all of the above
  - (e) only (a) and (b)
16. (5 pts) If the weather stations at Tucson and Phoenix report the same sea-level pressure at a given time then the station pressure in Tucson is higher than that in Phoenix.
- (a) True
  - (b) False.
- (Hint: Tucson's elevation is higher than that of Phoenix.)
17. (5 pts) Isobars help meteorologists interpret
- (a) only air pressure patterns
  - (b) only wind circulation patterns
  - (c) both air pressure patterns and wind circulation patterns.
  - (d) none of the above
18. (5pts) With which set of conditions below would you expect wet laundry hanging outdoors on a clothesline to dry more quickly?
- |                                      | Air Temperature | Relative Humidity | Wind Speed |
|--------------------------------------|-----------------|-------------------|------------|
| (a)                                  | 40°F            | 50%               | 10 MPH     |
| (b)                                  | 60°F            | 75%               | 10 MPH     |
| <input checked="" type="radio"/> (c) | 60°F            | 50%               | 20 MPH     |
| (d)                                  | 40°F            | 75%               | 20 MPH     |
| (e)                                  | 60°F            | 75%               | 20 MPH     |

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19. (5 pts) The primary force that causes all winds is:
- (a) inertial force
  - (b) geostrophic force
  - (c) pressure gradient force
  - (d) centripetal force
  - (e) Coriolis force
20. (10 pts) According to the *New York Times* article “Most Deadly of the Natural Disasters: The Heat Wave” it is not easy to assess the number of deaths in a heat wave. Explain the reasons cited in the article behind this statement.
- Hard to determine exact cause of death  
Autopsies not conclusive  
Too many fatalities
21. (5 pts) A cyclone is the general term meteorologist use to refer to a
- (a) low pressure system
  - (b) tornado
  - (c) high pressure system
  - (d) all of the above
22. (5 pts) If an air parcel is given a small push upward and it continues to rise, the atmosphere is said to be:
- (a) neutral
  - (b) stable
  - (c) unstable
  - (d) isothermal
23. (5 pts) Raindrops growth by collision and coalescence occurs
- (a) in cold clouds only
  - (b) in warm clouds only
  - (c) in both warm and cold clouds
  - (d) only in tropical regions
  - (e) only in the polar regions
24. (5 pts) We can generally expect the air to be \_\_\_\_\_ above areas of surface low pressure and \_\_\_\_\_ above areas of surface high pressure.
- (a) sinking, sinking
  - (b) sinking, rising
  - (c) rising, rising
  - (d) rising, sinking
25. (5 pts) According to Newton’s first law of motion,
- (a) an object in motion moves in a straight line at constant speed unless acted on by an unbalanced external force
  - (b) an object at rest remains at rest unless acted on by an unbalanced external force
  - (c) objects in motion always experience a centripetal force
  - (d) an object at rest will always start moving
  - (e) both (a) and (b)