

Chapter 5 Progress Questions

Air Pressure

1. Air pressure is equal to the total weight of a vertical column of air with a unit cross-sectional area extending from the place of measurement to the top of the atmosphere. Air pressure at sea level is approximately 14.7 pounds per square inch or approximately _____ kilograms per square centimeter.

- a. 0.68
- b. 1.0
- c. 2054

2. Air pressure is reported in a variety of units. The air pressure unit most commonly reported to the public is based on the height of a column of mercury which exerts at its base the same pressure as the atmosphere at that place. This pressure measurement technique is adequate for many purposes because the height of the mercury column is directly proportional to air pressure. The average (standard) sea-level atmospheric pressure is _____ inches of mercury. This is equivalent to 76 cm or 760 mm of mercury.

- a. 28.76
- b. 29.34
- c. 29.92
- d. 30.15

3. In the United States, meteorologists currently use the millibar (mb) unit as the standard unit of air pressure (equal to a hectoPascal). Standard sea-level air pressure is _____ mb.

- a. 997.05
- b. 1004.56
- c. 1013.25

4. Because air pressure is determined by the weight of the overlying air, knowing air pressure values at sea level and at different altitudes makes it possible to determine the amount of atmosphere (by mass) that is above and below a particular altitude. For example, average sea-level air pressure is approximately 1000 mb. At the altitude where the pressure is 500 mb, half of the mass of an atmospheric column would be below and half above. From the Standard Atmosphere Table, this occurs at an average altitude of about _____ km above sea level.

- a. 3.0
- b. 5.5
- c. 7.6

5. According to the Standard Atmosphere, on average 25% of the atmosphere's mass (25% of pressure) is found above an altitude of approximately _____ km., or, stating it another way, 75% of the atmosphere's mass is found below that altitude.

- a. 8
- b. 10
- c. 12

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6. A pressure-sensitive altimeter used in aircraft to measure altitude is a(n) _____ barometer.
- aneroid
 - mercurial
7. To compare air pressures from place to place on the Earth's surface, a reduction-to-sea-level adjustment is made. Consequently, on a surface weather map the assumption is made that for purposes of pressure analysis all stations are located at an altitude of _____ m above sea level.
- 1
 - 0
 - 1
8. By employing this sea-level correction, surface weather maps are thus constant _____ maps.
- pressure
 - altitude
9. With an increase in altitude, air pressure decreases _____ rapidly in cold air than in warm air.
- more
 - less
10. Water vapor molecules have less mass than air "molecules". As a result, surface air pressure in a humid air mass would be _____ than that in a dry air mass if their temperatures and other characteristics are the same.
- higher
 - lower
11. Avogadro's Law states that equal volumes of gases (or gas mixtures) measured under the same conditions of temperature and pressure contain _____ number of molecules.
- equal
 - unequal
12. Surface air pressure will _____ in regions where less air converges at the surface than ascends.
- rise
 - fall
13. The ideal gas law is a relationship between
- density.
 - pressure.
 - temperature.
 - all of these.
14. When a volume of gas expands due to decreasing surrounding pressure, the volume undergoes
- expansional cooling.
 - compressional warming.

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15. Ascending, unsaturated air _____ at the rate of 9.8 degrees Celsius per 1000 m.

a. warms

b. cools