Name _____ Date _____ Class _____

13–2 Practice Problems

1. The air pressure for a certain tire is 109 kPa. What is this pressure in atmospheres?
2. The air pressure inside a submarine is 0.62 atm. What would be the height of a column of mercury balanced by this pressure?
3. The weather news gives the atmospheric pressure as 1.07 atm. What is this atmospheric pressure in mm Hg?
4. An experiment at Sandia National Labs in New Mexico is performed at an atmospheric pressure of 758.7 mm Hg. What is this pressure in atm?
5. A bag of potato chips is sealed in a factory near sea level. The atmospheric pressure at the factory is 761.3 mm Hg. The pressure inside the bag is the same. What is the pressure inside the bag of potato chips in Pa?
6. The same bag of potato chips from Problem 5 is shipped to a town in Colorado, where the atmospheric pressure is 99.82 kPa. What is the difference (in Pa) between the pressure in the bag and the atmospheric pressure of the town?
7. The pressure gauge on a compressed air tank reads 43.2 lb/in^2. What is the pressure in atm?
8. The pressure in the tire of an automobile is 34.8 lb/in^2. What is the pressure in kPa?
9. A gas container is fitted with a manometer. The level of the mercury is 15 mm lower on the open side. Using a laboratory barometer, you find that atmospheric pressure is 750 mm Hg. What is the pressure, in atmospheres, of the gas in the container?
10. A soccer ball is attached to an open-ended manometer. The mercury level in the manometer is 10 mm higher on the side attached to the ball than on the side open to the atmosphere. Atmospheric pressure has already been determined to be 770 mm Hg. What is the gas pressure in the ball?
11. One end of an open-ended manometer is connected to a canister filled with a gas at a pressure of 771.0 mm Hg. The mercury level on the side open to the atmosphere is 11.2 mm higher than on the side connected to the canister. What is the atmospheric pressure in mm Hg?
12. Suppose you are measuring the pressure inside a sealed cabinet using an open-ended manometer. The atmospheric pressure is 762.4 mm Hg. If the mercury level on the side open to the atmosphere is 3.6 mm higher than on the side attached to the cabinet, what is the pressure inside the cabinet in units of kPa?
13. The U-tube of a manometer is 26.4 cm tall. With both ends open, it is filled until the mercury level in each tube is 13.2 cm from the top. What is the largest difference in pressure this manometer can measure in units of mm Hg?
14. A manometer contains a sample of nitrogen gas at a pressure of 88.3 kPa. The level of mercury in the U-tube is 12.8 mm lower on the end open to the atmosphere. What is the atmospheric pressure in kPa?
15. One end of an open-ended manometer is connected to a canister of unknown gas. The atmospheric pressure is 1.03 atm. The mercury level is 18.6 mm higher in the U-tube on the side open to the atmosphere than on the side attached to the canister. What is the pressure of the gas in mm Hg?

$1\ atm = 101.3\ kPa = 101{,}300\ Pa = 760.0\ mm\,Hg = 14.7\ lb/in^2$

Sturmm key

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13.2 Practice Problems 1–9

(1) $\frac{109\ kPa}{1} \cdot \frac{1\ atm}{101.3\ kPa} = \boxed{1.08\ atm}$

(2) $\frac{0.62\ atm}{1} \cdot \frac{760.0\ mm\,Hg}{1\ atm} = 471.2 \rightarrow \boxed{470\ mm\,Hg}$

(3) $\frac{1.07\ atm}{1} \cdot \frac{760.0\ mm\,Hg}{1\ atm} = \boxed{813\ mm\,Hg}$

(4) $\frac{758.7\ mm\,Hg}{1} \cdot \frac{1\ atm}{760.0\ mm\,Hg} = .998289 \rightarrow \boxed{.9983\ atm}$

(5) $\frac{761.3\ mm\,Hg}{1} \cdot \frac{101{,}300\ Pa}{760.0\ mm\,Hg} = 101473 \rightarrow \boxed{101{,}500\ Pa}$

(6) $\frac{99.82\ kPa}{1} \cdot \frac{10^3\ Pa}{1\ kPa} = 99{,}820\ Pa$

$101{,}500 - 99{,}820 = \boxed{1680\ Pa}$

(7) $\frac{43.2\ lb/in^2}{1} \cdot \frac{1\ atm}{14.7\ lb/in^2} = \boxed{2.94\ atm}$ or

(8) $\frac{34.8\ lb/in^2}{1} \cdot \frac{1\ atm}{14.7\ lb/in^2} \cdot \frac{101.3\ kPa}{1\ atm} = 239.8 \rightarrow \boxed{240\ kPa}$

(9) $750\ mm\,Hg - 15\ mm\,Hg = \boxed{735\ mm\,Hg}$