B1 · What we measure about a gas; pressure and its units · Worked examples and practice

Name: _____ Date: _____

Worked examples

Read these first. There is one for each kind of question in this lesson.

Example 1 · Change a pressure from one unit to another

Use 1 atm = 101.325 kPa = 760 mm Hg. Convert 0.925 atm to kilopascals.

1. Write the pressure you are given: 0.925 atm.
2. Choose the two equal values you need: 1 atm = 101.325 kPa.
3. Put the unit you want on top: kPa on top, atm on the bottom.
4. Multiply and round: 0.925 atm × 101.325 kPa / 1 atm = 93.7 kPa.
5. Check: the old unit, atm, cancels. The new unit, kPa, is left.

Answer: The pressure is 93.7 kPa.

Example 2 · Explain pressure with particles

A soccer ball is pumped up until it feels hard. Explain, using particles, why it gets harder.

1. Pumping puts more air particles inside the ball.
2. So more particles hit the inside wall every second.
3. More hits on the wall each second means more pressure.

Answer: More particles hit the wall each second, so the pressure is higher and the ball feels harder.

Practice

Questions 1 to 4 are easy. Questions 5 to 8 are medium. Questions 9 and 10 are harder.

EASY

1. A bicycle tire is full of air. Name the four things you could measure about the air inside it. Give the symbol for each.

EASY

2. Explain, using particles, what causes the pressure of a gas on the walls of its container.

EASY

3. Use 1 atm = 101.325 kPa = 760 mm Hg. Convert 2.00 atm to kilopascals. What is the pressure in kPa?

EASY

4. Use 1 atm = 101.325 kPa = 760 mm Hg. Convert 380 mm Hg to atmospheres. What is the pressure in atm?

MEDIUM

5. Use 1 atm = 101.325 kPa = 760 mm Hg. Convert 98.5 kPa to atmospheres. What is the pressure in atm?

MEDIUM

6. Use 1 atm = 101.325 kPa = 760 mm Hg. Convert 1.80 atm to millimetres of mercury. What is the pressure in mm Hg?

MEDIUM

7. Use 1 atm = 101.325 kPa = 760 mm Hg. Convert 745 mm Hg to kilopascals. What is the pressure in kPa?

MEDIUM

8. Use 1 atm = 101.325 kPa = 760 mm Hg. Convert 115 kPa to millimetres of mercury. What is the pressure in mm Hg?

HARDER

9. Use 1 atm = 101.325 kPa = 760 mm Hg. The air pressure in city A is 99.2 kPa. In city B it is 752 mm Hg. Which city has the higher air pressure? Show your work.

HARDER

10. Use 1 atm = 101.325 kPa = 760 mm Hg. A steel tank holds air at 1.50 atm. More air is pumped in at the same temperature, and the gauge rises to 3.00 atm. Give both pressures in kilopascals. Then explain, using particles, why the pressure rose.