B1 · What we measure about a gas; pressure and its units · Practice key

This is the worked key. Every practice question is worked step by step.

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.

1. Pressure, P, and volume, V.
2. Temperature, T, and amount in moles, n.

EASY

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

1. Gas particles never stop moving, so they hit the walls.
2. Every hit gives the wall a tiny push.
3. All those tiny pushes together are the pressure.

EASY

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

1. 1 atm = 101.325 kPa. Put kPa on top, so atm cancels.
2. 2.00 atm × 101.325 kPa / 1 atm = 203 kPa.

EASY

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

1. 760 mm Hg = 1 atm. Put atm on top, so mm Hg cancels.
2. 380 mm Hg × 1 atm / 760 mm Hg = 0.500 atm.

MEDIUM

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

1. 101.325 kPa = 1 atm. Put atm on top, so kPa cancels.
2. 98.5 kPa × 1 atm / 101.325 kPa = 0.972 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?

1. 1 atm = 760 mm Hg. Put mm Hg on top, so atm cancels.
2. 1.80 atm × 760 mm Hg / 1 atm = 1370 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?

1. 760 mm Hg = 101.325 kPa. Put kPa on top, so mm Hg cancels.
2. 745 mm Hg × 101.325 kPa / 760 mm Hg = 99.3 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?

1. 101.325 kPa = 760 mm Hg. Put mm Hg on top, so kPa cancels.
2. 115 kPa × 760 mm Hg / 101.325 kPa = 863 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.

1. Change both pressures to the same unit. Change 752 mm Hg to kPa.
2. 760 mm Hg = 101.325 kPa. Put kPa on top, so mm Hg cancels.
3. 752 mm Hg × 101.325 kPa / 760 mm Hg = 100 kPa.
4. 100 kPa is more than 99.2 kPa, so city B has the higher pressure.

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.

1. 1.50 atm × 101.325 kPa / 1 atm = 152 kPa.
2. 3.00 atm × 101.325 kPa / 1 atm = 304 kPa.
3. More particles are now inside the tank.
4. More particles hit the walls each second, so the pressure is higher.