

doing math with gas pressures
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Name _____
 Date _____
 Come for assistance and cheerleading recruitment
 after school Tues, Thurs, or every day 3:00-4:00

ANSWERS

Here are a bunch of helpful numbers and figures
 1 atm = 760 torr = 760 mmHg = 101.325 kPa = 101,325 pascals

- In a container of gas, when temperature decreases pressure usually (decreases / increases).
- In a container of gas, when number of particles decreases pressure usually (decreases / increases).
- In a container of gas, when volume decreases pressure usually (decreases / increases).
- Which of these units are suitable for solving gas math problems?
 - kelvins are (suitable / not suitable)
 - degrees celsius are (suitable / not suitable)

5. Read the problem below and then just check one box (don't do any math):
 pressure will decrease
 pressure will increase

A krypton balloon contains 5,000,000 atoms of krypton at 77.111 kPa pressure. If more krypton atoms are added until there are 7,000,000 atoms in the balloon what will happen to the pressure?

6. Read the problem below and then just check one box (don't do any math):
 pressure will decrease
 pressure will increase

A sample of ethane gas has a volume of 125 mL at 725 torr. If the volume is changed to 100 mL what will happen to the pressure?

7. Read the problem below and then just check one box (don't do any math):
 pressure will decrease
 pressure will increase

A copper container has a volume of 555 mL and is filled with air at 298K. The container is immersed in dry ice. How will the pressure change?

8. Read the problem below and then just check one box (don't do any math):
 pressure will decrease
 pressure will increase

When air in a steel cylinder is compressed from 10 L to 5 L, and temperature remains constant, what will happen to the gas pressure inside the cylinder?

9. Set up and calculate an exact solution to the problem below.

SKIP

A krypton balloon contains 5,000,000 atoms of krypton at 77.111 kPa pressure. If more krypton atoms are added until there are 7,000,000 atoms in the balloon what will be the new pressure (in kPa)?

10. Set up and calculate an exact solution to the problem below.

SKIP

A sample of ethane gas has a volume of 125 mL at 725 torr. If the volume is changed to 100 mL what will be the new pressure?

Write each number in standard decimal style, without an exponent

- 8) 3.92×10^{-2} = 0.0392
 9) 5.67×10^{-8} = 0.000000567
 10) 1.1318×10^5 = 113180

Write each number in scientific notation

- 15) 2068.9 = 2.068×10^3
 16) 8020000 = 8.02×10^6
 17) 0.0000003910 = 3.910×10^{-7}
 18) 0.0008839 = 8.839×10^{-4}

For each pair of quantities mark < , =, or >.

Example: U.S. Deaths due to bicycle accidents > U.S. Deaths due to Ebola

19. The temperature of 300°C water > The temperature of 300K water

20. The mass of a 300 µg object > The mass of a 300 ng object

21. 6.978×10^1 > 9.4608×10^0

22. The value of  > The value of 

this converts to 27°C
use your old glue-in
DON'T MEMORIZE

BY: *DAVID*
 OCT 27 2015

23. write the answer to the correct number of significant figures

$$(8.5 \times 10^6)(8.9 \times 10^3) = 7.565 \times 10^{10} \approx 7.6 \times 10^{10}$$

24. write the answer to the correct number of significant figures

$$\frac{4.3 \times 10^4}{2.5 \times 10^{-6}} = 172 \approx 170$$

Purpose:

How do we use math to get an exact answer to a gas problem?

WARMUP:

1) μ is the abbreviation for 'micro'.

example: μg is microgram

2) kPa is kilopascal

3) Pa is pascal

4) atm is atmospheres

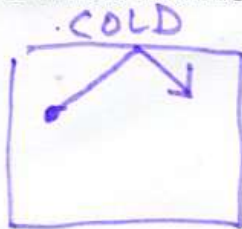
5) α means 'is proportional to'

cutting class = unexcused absence

attending class \propto a GPA

(hook: animated gifs of gas samples)

#1 When the molecules move faster, draw them like this



travels farther

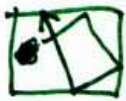
and describe the pressure with this math:

$$\text{Pressure}^{\text{OLD}} \times \left(\frac{\text{big temperature}}{\text{small temperature}} \right) = \text{New pressure}$$

Since new pressure should be more put the bigger kelvins on top

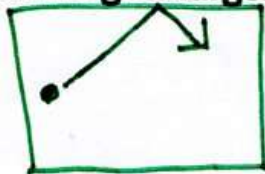
finger vote while holding up the posters from yesterday

#2 When the volume gets larger, draw it like this



three hits

SMALL VOLUME
HIGH PRESSURE



one hit

LARGER VOLUME
LOW PRESSURE

and describe the pressure with this math:

$$\text{ORIGINAL PRESSURE} \times \left(\frac{\text{small volume}}{\text{large volume}} \right) = \text{new pressure (lower)}$$

Underline starter number
Circle numbers in a relationship
Box unit you want for an answer.

Should increase
↓

**Ratios (conversion factors) will have THE SAME units on top and bottom.
**You're allowed to flip the ratios any way you like so that they properly shrink or grow the final answer.

A quantity of gas exerts a pressure of 98.6 kPa at a temperature of 0.00°C. 273K
What pressure will it exert at 21.0°C?
294K same units.

$$98.6 \text{ kPa} \times \left(\frac{294 \text{ K}}{273 \text{ K}} \right) = 106 \text{ kPa}$$

A gas with a volume of 5.0 L at a pressure of 0.85 atm is allowed to expand until the volume is 7.00 L. What is the new pressure?
Pressure should drop

$$0.85 \text{ atm} \times \left(\frac{5.0 \text{ L}}{7.0 \text{ L}} \right) = 0.61 \text{ atm}$$

The pressure in an automobile tire is 2.0 atm and the tire contains 4.00×10^{27} molecules of air. If the tire is pumped up until it contains 4.79×10^{27} molecules of air, what will the new pressure be?

Oxygen gas is at a temperature of 40°C when it occupies a volume of 2.3 liters. To what temperature should it be raised to occupy a volume of 6.5 liters?