

## Final test: Temperature, Heat, Gas Laws, Thermodynamics

- 1) We all know that when 2 objects at different temperatures are placed in contact after a certain amount of time they will reach the same temperature. How is this process called? Try to explain how it works with your own words.

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- 2) You mix 3 L of water at 94°C with 4 Kg of water at 20°C and with 200 mL of water at 1°C. What is the final temperature of the mixture?

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- 3) Near the sea or near a big lake it is warmer than in places in the middle of continents. Why does this happen? Try to explain it in terms of heat capacity and specific heat capacity.

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- 4) What's the minimum quantity of ice (at 0°C) that you need to cool down 300 mL of ice from 24°C to 0°C? (latent heat of fusion of ice  $q_f = 3.34 \times 10^5$  J/Kg, specific heat of water  $c_s = 4182$  J/KgK)

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- 5) Fill the gaps about Boyle's law:

Boyle's law: When \_\_\_\_\_ is held constant, the pressure and volume of a gas are \_\_\_\_\_ proportional.

Mathematically, Boyle's law states:  $PV =$  \_\_\_\_\_ or  $P_1V_1 =$  \_\_\_\_\_.

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- 6) Fill the gaps about Charles' law:

Charles' law: When \_\_\_\_\_ is held constant, the volume and temperature of a gas are \_\_\_\_\_ proportional.

Mathematically, Charles' law states:  $V/T =$  \_\_\_\_\_ or  $V_1/T_1 =$  \_\_\_\_\_.

The \_\_\_\_\_ temperature scale must be used in all gas law problems.

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7) Fill the gaps about Gay-Lussac's law:

Gay-Lussac's law: When \_\_\_\_\_ is held constant, the pressure and temperature of a gas are \_\_\_\_\_ proportional.

Mathematically, Gay-Lussac's law states:  $P/T = \text{_____}$  or  $P_1/T_1 = \text{_____}$ .

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8) Draw three P-V diagrams representing an isothermal, an isobaric and an isochoric process.

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9) What is the work done by a gas during an isochoric process?

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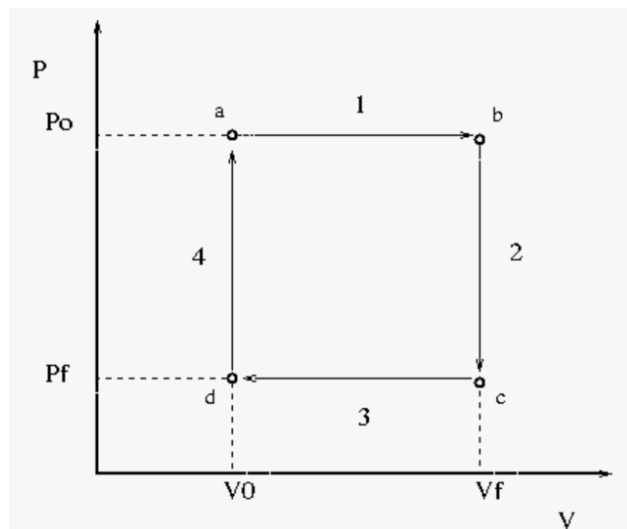
10) A gas in a cylinder with a piston expands from 0.2 L to 1 L at a constant pressure of 3.2 atm. What kind of process is it? What's the net work done by the gas during the process?

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11) Look at the cyclic process in the following figure.

a. What kind of processes are 1, 2, 3 and 4?

b. What is the net work that can be extracted from this cycle if  $P_0 = 4 \text{ atm}$ ,  $P_f = 1 \text{ atm}$ ,  $V_0 = 300 \text{ cm}^3$ ,  $V_f = 900 \text{ cm}^3$ ?



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SCORE: \_\_\_\_\_/47