

# Bell Work, Oct 28 – 31, 2013

Gasses, Pressure, Kinetic Theory,  
Temperature, Pressure, Heating Curve

# Bell Work, Monday, Oct 28, 2013

**8 short questions.**

**1. What do we know about the particles in our model so far?** (They have \_\_\_\_\_ & take up \_\_\_\_\_ and they can not be \_\_\_\_\_.)

**They have mass & take up space (volume) and can not be divided**

**2. What do we know about how our particles arrange themselves in the model so far? What is this property called?**

**These particles can "pack together" in different ways, giving different substances and different states of matter This property of packing together is called density.**

**3. Whose model is this? Democritus**

**4. How does Conservation Of Mass affect our model?**

**These particles are neither created or destroyed. They can rearrange themselves into different substances.**

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- 5. What new features have we added to our model?** ( Hint: kinetic Theory, what does kinetic mean.)

**Our particles are always in motion except at absolute zero (  $0^{\circ}$  K)**

- 6. What does temperature measure?**

**The motion of particles.**

- 7. How is thermal or kinetic energy transferred?**

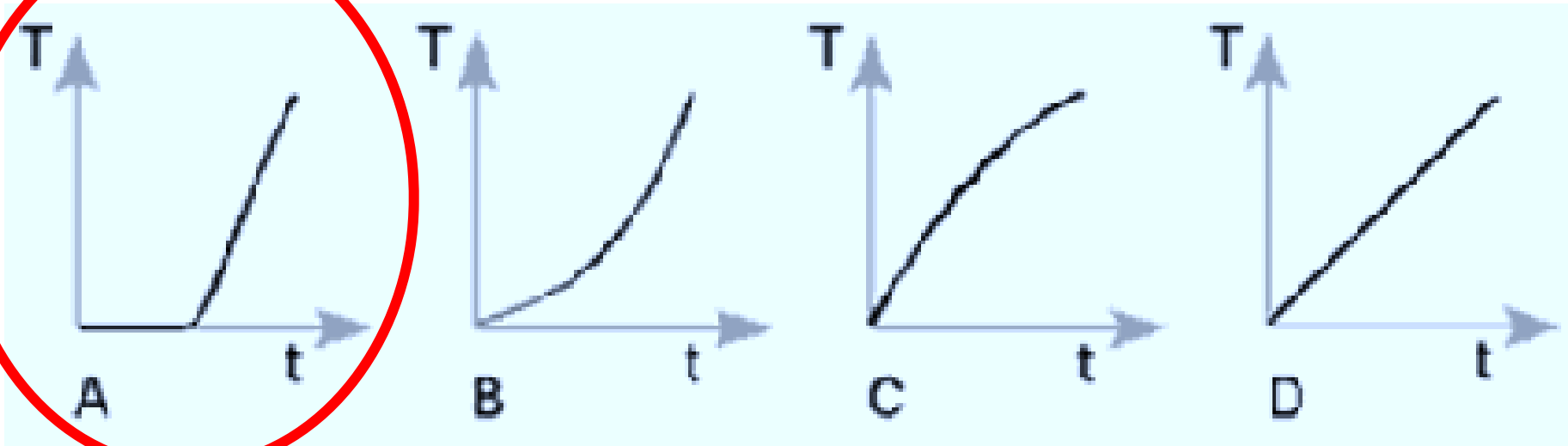
**Through the collision of particles.**

- 8. What is pressure?**

**Pressure is how hard and how often the particles collide with a container wall.**

# Bell Work, Tuesday, Oct 29, 2013

Draw the graphs



**1. Choose the graph which best describes the change in temperature of ice water ( $T$ ) as a function of time ( $t$ ), neglecting any heat loss to the environment**

- a. The temperature stays constant for a while, then rises (A)
- b. The temperature rises more slowly at first, then faster (B)
- c. The temperature rises more rapidly at first, then slower (C)
- d. The temperature rises at a constant rate (D)

# Bell Work, Tuesday, Oct 29, 2013

Draw the chart

**2. Compare and contrast temperature measured in the Celsius scale and the absolute (aka: Kelvin scale).**

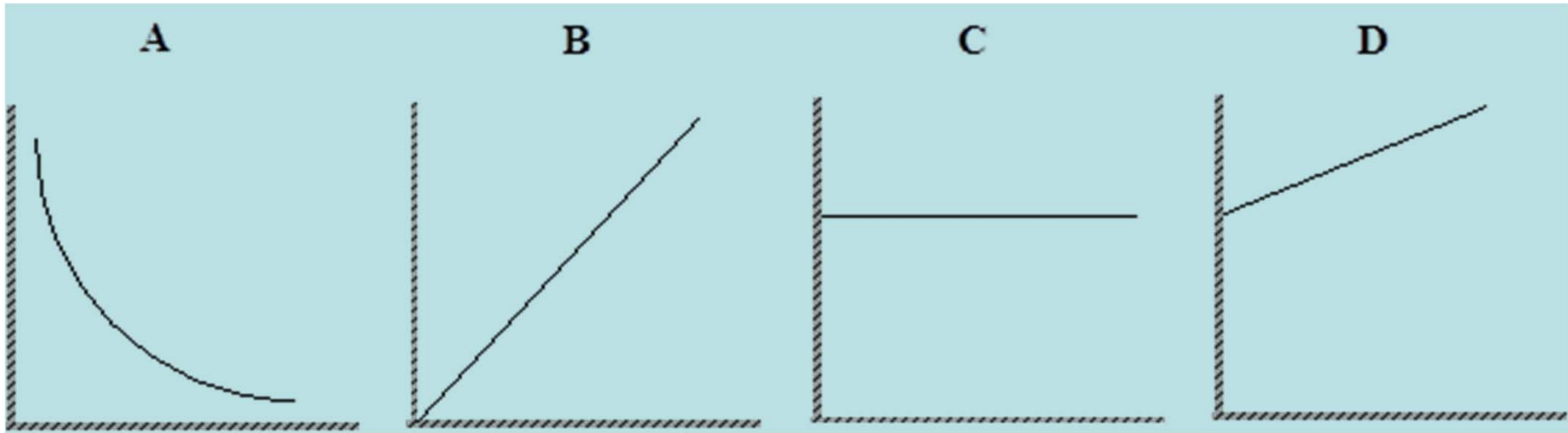
**Compare:  $1^{\circ}\text{C} = 1^{\circ}\text{K}$**

**Contrast: Celsius begins at -273, kelvin begins at 0, and:**

	Celsius	Absolute (Kelvin)
Boiling point of water	100	373
Room temperature	25	298
Freezing Point of Water	0	273
Absolute zero	-273	0

# Bell Work, Wednesday, Oct 29, 2013

Draw the graphs, 9 questions



1. Which graph represents the relationship between the pressure of a gas and its volume? **A**
2. Which graph represents the relationship between the pressure of a gas and the absolute temperature? **B**
3. Which graph represents the relationship between the pressure of a gas and the Celsius temperature? **D**
4. Which graph represents the relationship between the pressure of a gas and the number of particles? **B**

# Bell Work, Wednesday, Oct 29, 2013

## Sketch the Graphs

5. What is meant by “directly related.”

**A straight line with a positive slope.**

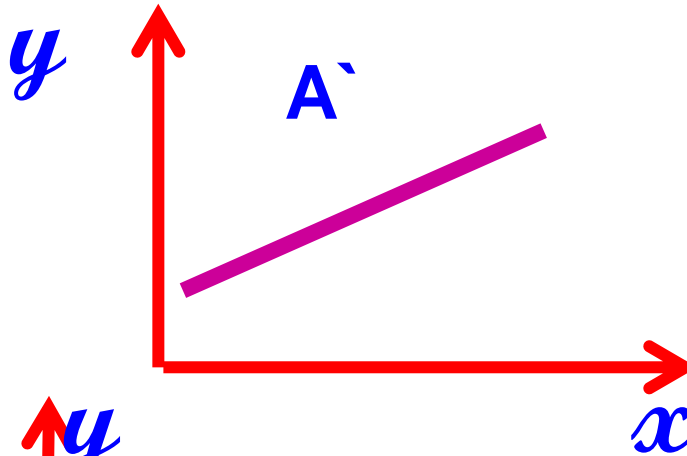
(x gets bigger, y gets bigger)

6. What is meant by indirectly related?

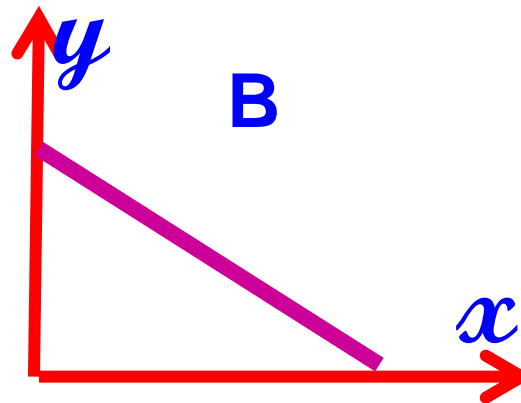
**A straight line with a negative slope.**

(x gets bigger, y gets smaller)

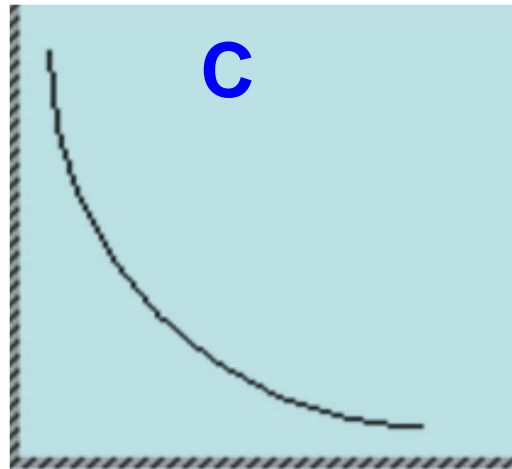
7. Determine the correct relationship for the graphs.



**7 A. directly related or direct relationship**



**7 B. indirectly related or indirect relationship**



**7 C. inverse relationship (x gets bigger, y gets smaller)**

# Bell Work, Wednesday, Oct 29, 2013

8. Explain the following:  $P \propto n$ ,  $P \propto \frac{1}{V}$ ,  $P \propto T$ ,  $V \propto T$

$\propto$  means “proportional”,

P= pressure, T = Temperature. V= volume, n = amount of particles

$P \propto n$  = pressure is proportional to number of particles: if P increases, n increases. If P decreases, n decreases.

$P \propto T$  = pressure is proportional to temperature: if P increases, T increases. If P decreases, T decreases.

$V \propto T$  = volume is proportional to temperature: if V increases, T increases. If V decreases, T decreases.

$P \propto \frac{1}{V}$  = pressure is inversely proportional to volume: if P increases, V decreases. If P decreases, V increases.



9. Predict the effect of changing P, V or T on any of the other variables.

**n = number of particles**

*if T triples, P will increase by 3.*

*if T is halved, V will decrease by  $\frac{1}{2}$ .*

*if V doubles then P decreases by  $\frac{1}{2}$ .*

*if P triples then V decreases by  $\frac{1}{3}$ .*

*If P is reduced by  $\frac{1}{4}$ , volume will increase by 4.*

*If volume is reduced in half, P will double.*

*If P doubles, the number of particles will double.*

*If the number of particles is reduced by  $\frac{1}{3}$  the pressure will decrease by  $\frac{1}{3}$*

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9. Predict the effect of changing P, V or T on any of the other variables.

$$P \propto \frac{1}{V} \quad P \propto T \quad V \propto T \quad P \propto n$$

If  $P \uparrow$ , then  $V \downarrow$  or if P doubles then V decreases  $\frac{1}{2}$ , or visa versa, etc.

If  $T \uparrow$  then P also  $\uparrow$ , or if T triples, P triples or visa versa.

If  $T \uparrow$  then V also  $\uparrow$  or if T doubles, V doubles or visa versa.

If P  $\uparrow$  then n also  $\uparrow$ , or if P *quadruples* then n will *quadruple*.

# Bell Work, Thursday, Oct 31, 2013

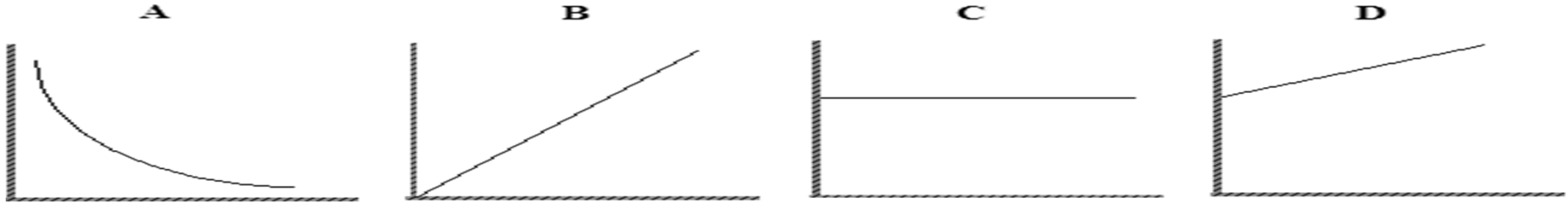
1. If you heat up cold water the density of the warmer water

a. stays the same

d. decreases

Decreases then increases

c. increases.



2. Which graph (see Wed. Bell Work) represents the relationship between the volume of a gas and the Celsius temperature?

a. A

b. B

c. C

d. D

3. Which graph (see Wed. Bell Work) represents the relationship between the volume of a gas and the Kelvin (absolute) temperature?

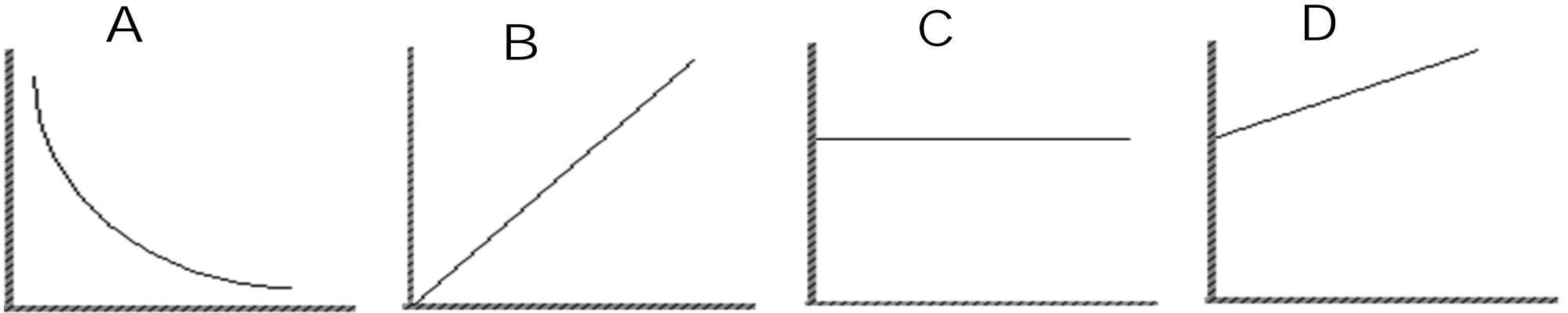
a. A

b. B

c. C

d. D

# Write this on your study guide



**2. Which graph (see Wed. Bell Work) represents the relationship between the volume of a gas and the Celsius temperature?**

- a. A      b. B      c. C      **d. D**

**3. Which graph represents the relationship between the volume of a gas and the Kelvin (absolute) temperature?**

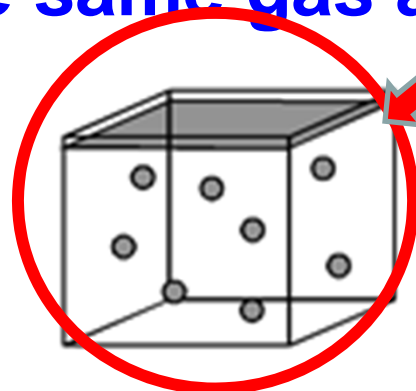
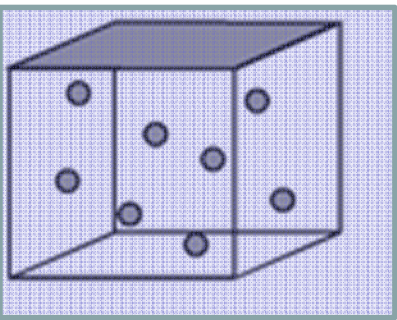
- a. A      **b. B**      c. C      d. D

**\*. Which graph (see Wed. Bell Work) represents Celsius temperature not changing?**

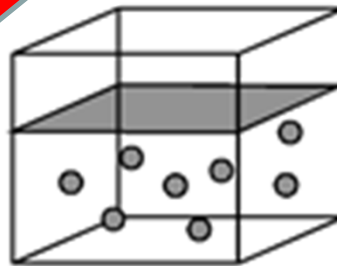
- a. A      b. B      **c. C**      d. D

# Bell Work, Thursday, Oct 31, 2013

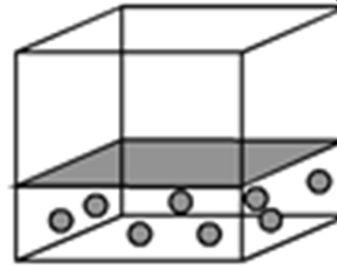
4. The diagram below left shows a representation of a sample of gas at  $25^{\circ}\text{C}$ . Which of the following best represents the same gas at  $0^{\circ}\text{C}$ ? At  $-250^{\circ}\text{C}$ ?



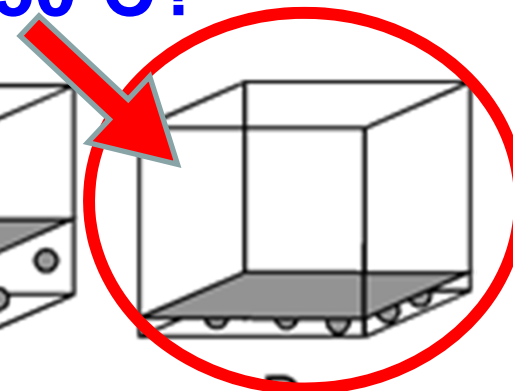
A



B



C



D

5. When a sample of gas is heated, its thermal energy

- a. increases
- b. decreases
- c. remains the same
- d. varies depending on the pressure
- e. varies depending on the volume

# Bell Work, Thursday, Oct 31, 2013

**6. The pressure exerted by a gas in a container depends on**

- a. the space between the molecules
- b. the instrument used to measure the pressure
- c. the number of collisions between gas molecules and other gas molecules
- d. the number of collisions between gas molecules and the walls of the container**

**7. State an example of gas diffusion?**

**The odor of perfume spreading throughout a room.**

**8. State an example of liquid diffusion?**

**A drop of food coloring spreading out and mixing in with water.**