

10 | Thermal Physics | Review

Name _____ Period _____

1. Convert the following temperatures to complete the table

Kelvin temperature / K	Celsius temperature / °C
40	
	100
0	
	350

2. Which has a higher temperature? An 80°C cup of hot chocolate or 15°C Lake Minnetonka?
3. Which contains more heat energy? An 80°C cup of hot chocolate or 15°C Lake Minnetonka?
4. Highlight the difference between evaporation and boiling of a liquid under atmospheric pressure:
5. How much energy is needed to increase the temperature of 5 kg of copper ($c = 390 \text{ J kg}^{-1} \text{ K}^{-1}$) from 25°C to 47°C?
6. A 100 W heater is placed in an insulated container holding 500 grams of water. If the water has a specific heat capacity of $4180 \text{ J kg}^{-1} \text{ K}^{-1}$ and a starting temperature of 20°C, what is the final temperature after 65 seconds?

7. If you have 150 grams of water ($c = 4180 \text{ J kg}^{-1} \text{ K}^{-1}$) at 30.0°C and you put in a 30-gram chunk of an unknown substance at 87.4°C . If the temperature equalizes at 32.4°C , what is the specific heat of the unknown substance?
8. What is the final temperature if you add a 50-gram iron washer ($c = 448 \text{ J kg}^{-1} \text{ K}^{-1}$) at a temperature of 100°C to an insulated container with 200-grams of 20°C water ($c = 4180 \text{ J kg}^{-1} \text{ K}^{-1}$).
9. How much heat is needed to transform 0.3 kg of water at 60°C into water vapor at 115°C ?

Specific Heat of Water Vapor	$2000 \text{ J kg}^{-1} \text{ K}^{-1}$
Specific Heat of Water	$4180 \text{ J kg}^{-1} \text{ K}^{-1}$
Latent Heat of Fusion	$334,000 \text{ J kg}^{-1}$
Latent Heat of Vaporization	$2,260,000 \text{ J kg}^{-1}$

10. Explain how adding heat to a system can change a substances kinetic energy and potential energy:

11. Which of the following is an important assumption of the kinetic theory of ideal gases?
- The forces between molecules are zero.
 - All the molecules travel with the same speed.
 - The molecular potential energies are constant.
 - The molecules have zero momentum.

12. Ideal samples of O_2 (32 g mol^{-1}) and He_2 (8 g mol^{-1}) are both kept at a temperature of 50°C .

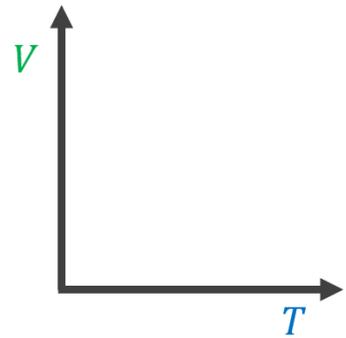
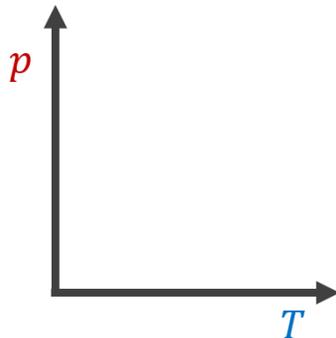
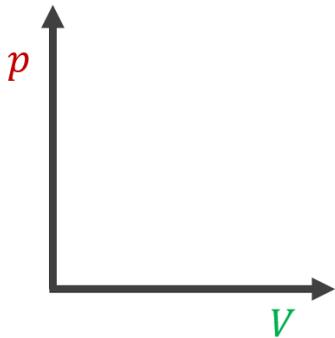
What is the ratio $\frac{\text{average speed of molecules of Oxygen}}{\text{average speed of molecules of Helium}}$?

13. Normal air pressure is about $1.00 \times 10^5 \text{ Pa}$. What is the total force that acts on an area of 1 mm^2 ?

14. The molar mass of water is 18 g mol^{-1} . How many molecules are there in 1 kg of water?

15. What volume of gas contains 0.780 mol of gas at 264 K at atmospheric pressure ($1.00 \times 10^5 \text{ Pa}$)?

16. Complete the following graphs between the properties of an ideal gas



17. A balloon containing air was kept in a freezer at a temperature of -8.80°C . When its volume was 210 cm^3 and its pressure was $1.60 \times 10^5 \text{ Pa}$ it was moved and placed outside where the temperature was 31°C . If the volume increased to 224 cm^3 , what was the new pressure inside the balloon?