CENGAGE | WEBASSIGN



# AP2 Thermal MCQ Test Review (Review)

INSTRUCTOR
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**Current Score**

| QUESTION | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POINTS | 1/1 ✓ | –/1 | 1/1 ✓ | 1/1 ✓ | 1/1 ✓ | 1/1 ✓ | 1/1 ✓ | –/1 | –/1 | –/1 | 1/1 ✓ | –/1 | –/1 | –/1 | –/1 | 1/1 ✓ | –/1 | –/1 | –/1 |

TOTAL SCORE: 11/29 37.9%

**Due Date**

WED, DEC 18, 2024
3:00 PM GMT+8

Request Extension

## Assignment Submission & Scoring

**Assignment Submission**

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

**Assignment Scoring**

Your last submission is used for your score.

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1. **[1/1 Points]** DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

Two blocks of steel, the first of mass 1kg and the second of mass 2kg, are in thermal equilibrium with a third block of aluminum with a mass of 2kg that has a temperature of 400K. What are the respective temperatures of the first and second steel blocks?

- ○ None of the answers listed
- ○ 400K and 200K
- ○ 800K and 400K
- ○ 200K and 400K
- ◉ 400K and 400K ✓

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2. **[1/1 Points]** DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

An ideal gas may be taken from one state to another state with a different pressure, volume, and temperature along several different paths. Quantities that will always be the same for this process, regardless of which path is taken, include which of the following?

I. The change in internal energy of the gas
II. The heat exchanged between the gas and its surroundings
III. The work done by the gas

- ○ I and III only
- ○ II and III only
- ○ I, II, and III
- ◉ I only ✓
- ○ II only

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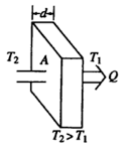
3. **[1/1 Points]** DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

Which of the following will occur if the average speed of the gas molecules in a closed rigid container is increased?

- ◉ The pressure of the gas will increase ✓
- ○ The pressure of the gas will decrease
- ○ The density of the gas will decrease
- ○ The density of the gas will increase
- ○ The temperature of the gas will decrease

4. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

In time *t*, an amount of heat *Q* flows through the solid door of area *A* and thickness *d* represented to the right. The temperatures on each side of the door are $T_2$ and $T_1$, respectively. Which of the following changes would be certain to decrease Q ?




- ○ Decreasing d only
- ○ Increasing d and $T_2 - T_1$ only
- ○ Increasing d, A, and $T_2 - T_1$
- ○ Increasing A only
- ○ Decreasing A and $T_2 - T_1$ only

5. [1/1 Points] DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

A gas with a fixed number of molecules does 32 J of work on its surroundings, and 16 J of heat are transferred from the gas to the surroundings. What happens to the internal energy of the gas?

- ○ It decreases by 16 J
- ○ It increases by 16 J
- ○ It increases by 48 J
- ◉ It decreases by 48 J
- ○ It remains the same

✔

6. [1/1 Points] DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

A vertical force of 30 N is applied uniformly to a flat button with a radius of 1 cm that is lying on a table. Which of the following is the best order of magnitude estimate for the pressure applied to the button?

- ○ $10^3$ Pa
- ○ 10 Pa
- ○ $10^2$ Pa
- ○ $10^4$ Pa
- ◉ $10^5$ Pa

✔

7. [1/1 Points] DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

The temperature of an ideal gas is directly proportional to which of the following?

- ○ Average velocity of the molecules
- ◉ Average translational kinetic energy of the molecules
- ○ Average potential energy of the molecules
- ○ None of the other answers
- ○ Average momentum of the molecules

✔

8. [1/1 Points] DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

Two identical containers hold two different ideal gases, *X* and *Y*, at the same temperature. The number of moles of each gas is the same. The molecular mass of gas *X* is twice that of gas *Y*. The ratio of the pressure of *X* to that of *Y* is

- ○ 2
- ○ $\sqrt{2}$
- ○ 4
- ○ $\frac{1}{2}$
- ◉ 1

✔

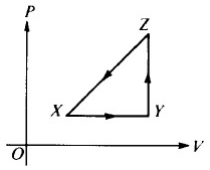
9. [1/1 Points] DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

An ideal gas is made up of N diatomic molecules, each of mass M. All of the following statements about this gas are true EXCEPT:

- (●) All of the molecules have the same speed. ✔
- ( ) The molecules make elastic collisions with each other.
- ( ) The molecules make elastic collisions with the walls of the container.
- ( ) The temperature of the gas is proportional to the average translational kinetic energy of the molecules.
- ( ) The average number of collisions per unit time that the molecules make with the walls of the container depends on the temperature of the gas.

10. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

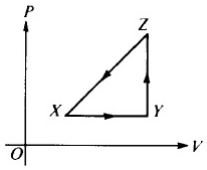
A thermodynamic system is taken from an initial state X along the path XYZX as shown in the PV-diagram to the right. For the process X→Y, ΔU is greater than zero and




- ( ) Q<0 and W=0
- ( ) Q>0 and W>0
- ( ) Q>0 and W<0
- ( ) Q>0 and W=0
- ( ) Q<0 and W>0

11. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

A thermodynamic system is taken from an initial state X along the path XYZX as shown in the PV-diagram to the right. For the process Y→Z, Q is greater than zero and




- ( ) W<0 and ΔU=0
- ( ) W=0 and ΔU<0
- ( ) W>0 and ΔU=0
- ( ) W=0 and ΔU>0
- ( ) W>0 and ΔU>0

12. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

An ideal gas confined in a box initially has pressure . If the absolute temperature of the gas is doubled and the volume of the box is quadrupled, the pressure is

- ( ) $\frac{P}{4}$
- ( ) $\frac{P}{2}$
- ( ) $2P$
- ( ) $P$
- ( ) $\frac{P}{8}$

13. [1/1 Points] DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

James Joule did much to establish the value of the

- ( ) specific heat capacity of helium
- ( ) universal gravitational constant
- ( ) speed of light
- (●) mechanical equivalent of heat ✔
- ( ) charge of an electron

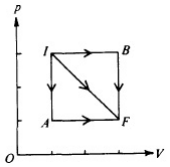
14. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

An ideal gas in a closed container initially has volume *V*, pressure *P*. and Kelvin temperature *T*. If the temperature is changed to *3T*, which of the following pairs of pressure and volume values is possible?

- ○ *3P* and *3V*
- ○ *P* and *V*
- ○ $\frac{P}{3}$ and *V*
- ○ *3P* and *V*
- ○ *P* and $\frac{V}{3}$

15. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

If three identical samples of an ideal gas are taken from initial state I to final state F along the paths IAF, IF, and IBF as shown in the PV-diagram to the right, which of the following must be true?




- ○ The expansion along path IF is adiabatic.
- ○ The change in internal energy of the gas is the same for all three paths.
- ○ The heat absorbed by the gas is the same for all three paths.
- ○ The expansion along path IF is isothermal.
- ○ The work done by the gas is the same for all three paths.

16. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

If the average kinetic energy of the molecules in an ideal gas at a temperature of 300 K is $E$, the average kinetic energy at a temperature of 600 K is

- ○ $4E$
- ○ $\frac{E}{\sqrt{2}}$
- ○ $2E$
- ○ $\sqrt{2}E$
- ○ $E$

17. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

A metal rod of length L and cross-sectional area A connects two thermal reservoirs of temperatures $T_1$ and $T_2$. The amount of heat transferred through the rod per unit time is directly proportional to

- ○ $A$ and $L$
- ○ $\frac{1}{A}$ and $L$
- ○ $A$ and $L^2$
- ○ $\frac{1}{A}$ and $\frac{1}{L}$
- ○ $A$ and $\frac{1}{L}$

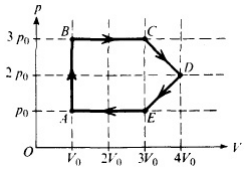
18. [1/1 Points] DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

Which of the following is always a characteristic an adiabatic process?

- ○ The pressure does not change (Δ P = 0).
- ○ No work is done on or by the system (W = 0).
- ○ The internal energy does not change (ΔU = 0).
- ◉ No heat flows into or out of the system (Q = 0). ✔
- ○ The temperature does not change (ΔT = 0).

19. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

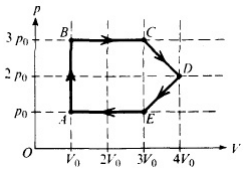
An ideal gas undergoes a cyclic process as shown on the graph to the right of pressure P versus volume V. During which process is no work done on or by the gas?




- DE
- CD
- AB
- BC
- EA

20. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

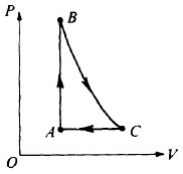
An ideal gas undergoes a cyclic process as shown on the graph to the right of pressure P versus volume V. At which point is the gas at its highest temperature?




- A
- C
- E
- D
- B

21. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

Gas in a chamber passes through the cycle ABCA as shown in the diagram to the right. In the process AB, 12 joules of heat is added to the gas. In the process BC, no heat is exchanged with the gas. For the complete cycle ABCA, the work done by the gas is 8 joules. How much heat is added to or removed from the gas during process CA ?




- 20 J is added.
- 4 J is added.
- No heat is added to or removed from the gas.
- 4 J is removed.
- 20 J is removed.

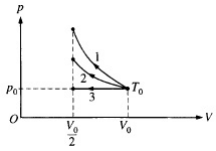
22. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

If the gas in a container absorbs 275 joules of heat, has 125 joules of work done on it, and then does 50 joules of work, what is the increase in the internal energy of the gas?

- 400 J
- 450 J
- 350 J
- 100 J
- 200 J

23. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

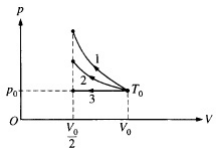
A certain quantity of an ideal gas initially at temperature $T_0$, pressure $p_0$, and volume $V_0$ is compressed to one-half its initial volume. As shown to the right, the process may be adiabatic (process 1), isothermal (process 2), or isobaric (process 3). Which of the following is true of the mechanical work done on the gas?




- It is the same for all three processes.
- It is the same for processes I and 2 and less for process 3.
- It is greatest for process 3.
- It is greatest for process 1.
- It is the same for processes 2 and 3 and less for process 1.

24. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

A certain quantity of an ideal gas initially at temperature $T_0$, pressure $p_0$, and volume $V_0$ is compressed to one-half its initial volume. As shown to the right, the process may be adiabatic (process 1), isothermal (process 2), or isobaric (process 3). Which of the following is true of the final temperature of this gas?




- It is greatest for process 1.
- It is greatest for process 3.
- It is the same for processes 1 and 2.
- It is the same for processes 1 and 3.
- It is greatest for process 2.

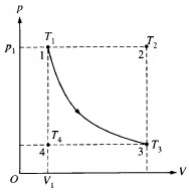
25. [1/1 Points] DETAILS MY NOTES PREVIOUS ANSWERS ASK YOUR TEACHER

In a certain process, 400 J of heat is added to a system and the system simultaneously does 100 J of work. The change in internal energy of the system is

- -300 J
- 400 J
- 300 J ✔
- -100 J
- 500 J

26. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

An ideal gas is initially in a state that corresponds to point 1 on the graph above, where it has pressure $p_1$, volume $V_1$, and temperature $T_1$. The gas undergoes an isothermal process represented by the curve shown, which takes it to a final state 3 at temperature $T_3$. If $T_2$ and $T_4$ are the temperatures the gas would have at points 2 and 4, respectively, which of the following relationships is true?




- $T_1 < T_4$
- $T_1 = T_2$
- $T_1 < T_3$
- $T_1 = T_4$
- $T_1 < T_2$

27. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

The absolute temperature of a sample of monatomic ideal gas is doubled at constant volume. What effect, if any, does this have on the pressure and density of the sample of gas?

| | Pressure: | Density: |
|---|---|---|
| A | Remains the same | Remains the same |
| B | Remains the same | Doubles |
| C | Doubles | Remains the same |
| D | Doubles | Is multiplied by a factor of 4 |
| E | Is multiplied by a factor of 4 | Doubles |

---Select---

28. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

Which of the following statements is NOT a correct assumption of the classical model of an ideal gas?

- The molecules are in random motion.
- The volume of the molecules is negligible compared with the volume occupied by the gas.
- The only appreciable forces on the molecules are those that occur during collisions.
- The molecules obey Newton's laws of motion.
- The collisions between molecules are inelastic.

29. [–/1 Points] DETAILS MY NOTES ASK YOUR TEACHER

A sample of an ideal gas is in a tank of constant volume. The sample absorbs heat energy so that its temperature changes from 300 K to 600 K. If $v_1$ is the average speed of the gas molecules before the absorption of heat and $v_2$ is their average speed after the absorption of heat, what is the ratio $v_2/v_1$ ?

- 1
- 4
- $\frac{1}{2}$
- $\sqrt{2}$
- 2