Thermodynamics Review

This is a preview of the draft version of the quiz

Started: Nov 4 at 9:44am

Quiz Instructions

Question 1 — 1 pts

Which of the following are true?

- [ ] An increase of 1◦C is more than an increase of 1K
- [ ] 350K is higher than the boiling temperature of water at 1atm
- [ ] 10K is a higher temperature than −270◦C
- [ ] It is impossible to be at −300◦C

Question 2 — 1 pts

How many moles of an ideal gas are in a cube 10m on each side at 10kPa and 10◦C?

- [ ] 6050

- [ ] 5750
- [ ] 2250
- [ ] 4250

Question 3

1 pts

How many particles of an ideal gas are in a sphere one micrometer in diameter at 10Pa and 10K?

- [ ] 37,900
- [ ] 49,100
- [ ] 91,400
- [ ] 57,200

Question 4

1 pts

What is the rate of heat transfer through a cube of diamond (k=1,000W/mK) that is 10cm on each side held at 348K on one side and 100K on the other?

- [ ] 35kW
- [ ] 25kW

- [ ] 55kW
- [ ] 45kW

Question 5

1 pts

Often windows are double-paned, meaning they contain a layer of air (k=0.58W/mK) that is 2.5cm thick between two sheets of glass. For a double-paned window 1.5m high and 1m wide, what is the rate of heat transfer through just the air layer if the temperature on either side of the air layer is 30◦C and 25◦C?

- [ ] 160W
- [ ] 162W
- [ ] 174W
- [ ] 143W

Question 6

1 pts

A process in which the volume stays constant is referred to as _____.

- [ ] adiabatic
- [ ] isobaric

- [ ] isothermic
- [ ] isochoric

Question 7

1 pts

A bag of an ideal gas is initially at 22 degrees C and 100kPa. If the bag is heated to a pressure of 400kPa, what is the K temperature in the bag, assuming that the volume does not change?

- [ ] 1600
- [ ] 1400
- [ ] 1800
- [ ] 1200

Question 8

1 pts

When the weather turns warm for summer, automobile owners should depressurize their tires to prevent blowouts. If the air pressure in the tires of a 2013 Ford F-350 was correctly 400kPa this winter when the temperature was 1◦C here in Houston and each of the tires contains 85L of pressurized air, then assuming air is an ideal gas, how many moles of air need to be removed from each of the tires when the temperature rises to 36◦C in order to keep the correct pressure of 400kPa?

- [ ] 1.7 mol
- [ ] 1.1 mol
- [ ] 1.3 mol
- [ ] 1.9 mol

Question 9

1 pts

Which of the following can be true about a system with negative ΔU?

When heat is _____ the system, work is done ____ the system.

- [ ] Added to | by
- [ ] removed from | on
- [ ] removed from | by
- [ ] Added to | on

Question 10

1 pts

Situation 1: A piece of ice is placed into a glass of room temperature water.

Situation 2: A marshmallow is held above the flames of a fire.

Situation 3: You touch a metal handrail and it feels cold.

In situation 1, heat flows from _____ to _____.

- the piece of ice; the water
- the ice; the system
- the water; the environment
- the water; the piece of ice

Question 11

1 pts

Situation 1: A piece of ice is placed into a glass of room temperature water.

Situation 2: A marshmallow is held above the flames of a fire.

Situation 3: You touch a metal handrail and it feels cold.

The heat will flow to _____, _____ and _____ for the situations above.

- water, marshmallow, hand
- water, marshmallow, handrail
- ice, marshmallow, hand
- ice, marshmallow, handrail

Question 12

1 pts

A piston is used to compress a gas inside a cylinder. Which of the following statements is true?

- Work was done by the system so it is negative.
- Work was done by the system so it is positive.
- Work was done on the system so it is negative.
- Work was done on the system so it is positive.

Question 13

1 pts

Which of the following devices would be most useful in finding the change in the average kinetic energy of the molecules in a substance?

- a thermometer
- a force sensor
- a volumetric flask
- a microscope

Question 14

1 pts

A gas in a closed container is heated. Which of the following changes would you expect?

- the molecules of the gas will collide less frequently
- the number of molecules of gas increases
- the molecules of the gas gain kinetic energy
- the temperature of the gas will decrease

Question 15

1 pts

Make the following conversion:

Convert 37 degrees Celsius to Kelvin.

Question 16

1 pts

Make the following conversion:

Convert 373 K to degree Celsius.

Question 17

1 pts

Water freezes at 32 degrees Fahrenheit or 0 degrees Celsius. What is the significance of 0 K?

- This is where water freezes.
- This is where Celsius and Fahrenheit scales converge.
- This is where water boils.
- This is absolute zero.

Question 18

1 pts

Which of the following are true?

- There is net heat flow between two objects at the same temperature.
- Plunging an aluminum can full of hot vapor into a cold water bath causes the can to expand.
- Thinner objects can conduct more heat in a given amount of time than thicker objects [related to 'L'].

- Styrofoam conducts heat better than Silver does.

Question 19

1 pts

_____ the temperature of an enclosed gas _____ the velocity of particles, resulting in _____ collisions with the container.

- Lowering | Decreases | Less
- Raising | Decreases | More
- Lowering | Increases | More
- Raising | Increases | Less

Question 20

1 pts

Choose the two statements below that are true for a system at a constant temperature.

- An increase in the pressure of the system will requires an increase in the volume.
- An increase in the pressure of the system will not change the volume of it.
- An increase in the volume of the system will result in a decrease in the pressure.
- In order to decrease the volume of a gas, work must be done by the gas.

- [ ] In order to decrease the volume of a gas, work must be done on the gas.

Question 21 1 pts

Which of the following is a description of heat?

- [ ] energy that moves from an object of higher temperature to an object of lower temperature
- [ ] the total kinetic energy of a substance
- [ ] a bunch of collisions between the molecules of two different objects
- [ ] the average kinetic energy of a substance

Question 22 1 pts

Which of these does NOT describe absolute zero?

- [ ] the temperature at which all motion of molecules ceases
- [ ] the temperature at which gases freeze
- [ ] 0 K
- [ ] the lowest temperature possible

Question 23

1 pts

A beaker of water is heated from 280K to 295K. What is the change in temperature of the water in degrees Celsius?

- [ ] 30
- [ ] 15
- [ ] 10
- [ ] 25
- [ ] 20

Question 24

1 pts

When two solid objects of different temperatures come in contact with each other, their molecules undergo collisions in which kinetic energy is transferred. Which of the following terms best relates to this occurrence?

- [ ] radiation
- [ ] conduction
- [ ] thermal induction
- [ ] convection

Question 25

1 pts

An object that does not allow heat to flow through it easily is called a _____.

- thermal conductor
- thermal heater
- thermal imager
- thermal insulator

Question 26

1 pts

Consider a rectangular slab of an unknown material. For the situation, choose:

A if the change will cause the thermal resistance of the slab to increase.

B if the change will cause the thermal resistance of the slab to decrease.

C if the change will not change the thermal resistance of the slab.

The length of the slab is increased.

- B
- C
- A

Question 27

1 pts

Consider a rectangular slab of an unknown material. For the situation, choose:

A if the change will cause the thermal resistance of the slab to increase.

B if the change will cause the thermal resistance of the slab to decrease.

C if the change will not change the thermal resistance of the slab.

The cross sectional area of the slab is increased.

- [ ] A
- [ ] B
- [ ] C

Question 28

1 pts

Consider a rectangular slab of an unknown material. For the situation, choose:

A if the change will cause the thermal resistance of the slab to increase.

B if the change will cause the thermal resistance of the slab to decrease.

C if the change will not change the thermal resistance of the slab.

The thermal conductivity of the slab is increased.

- [ ] A
- [ ] C
- [ ] B

Question 29

1 pts

Consider the situation. Choose:

A if the heat is transferred primarily by conduction.

B if the heat is transferred primarily by convection.

C if the heat is transferred primarily by radiation.

A pancake is being cooked on the surface of a skillet.

- [ ] C
- [ ] B
- [ ] A

Question 30

1 pts

Consider the situation. Choose:

A if the heat is transferred primarily by conduction.

B if the heat is transferred primarily by convection.

C if the heat is transferred primarily by radiation.

The sun warms your face.

- [ ] A
- [ ] C
- [ ] B

Question 31

1 pts

Consider the situation. Choose:

A if the heat is transferred primarily by conduction.

B if the heat is transferred primarily by convection.

C if the heat is transferred primarily by radiation.

You cool off under a ceiling fan after being outside all afternoon.

- [ ] C
- [ ] B

- [ ] A

Question 32

1 pts

A window in a house is 0.75 m wide, 1.25 m high, and 5cm thick. If the temperature outside the house is 32◦C and the temperature inside the house is 24◦C, how much heat in KJ flows through the window in 1 hour? The thermal conductivity of glass is 1.05 W/mK.

- [ ] 507
- [ ] 607
- [ ] 567
- [ ] 667

Question 33

1 pts

A window in a house is 0.75 m wide, 1.25 m high, and 5cm thick. If the temperature outside the house is 32◦C and the temperature inside the house is 24◦C. The thermal conductivity of glass is 1.05 W/mK.

If the window was made of silver instead of glass, how long would it take in seconds to transfer the same amount of thermal energy? The thermal conductivity of silver is 420W/mK.

- [ ] 120

- [ ] 19
- [ ] 360
- [ ] 9

Question 34

1 pts

If volume of a container is held constant and you _____ the pressure on a gas, the temperature will _____.

- [ ] increase, increase
- [ ] increase, decrease
- [ ] decrease, increase
- [ ] increase, not change

Question 35

1 pts

There are 314,159,265 particles of an ideal gas in a sphere of radius 1.0 mm. What is the temperature in K of the particles if their pressure is 0.01 Pa?

- [ ] 9443
- [ ] 9662

- [ ] 7663
- [ ] 7998

Question 36

1 pts

Which of the following are correctly paired?

- [ ] isobaric | temperature
- [ ] isochoric | volume
- [ ] isochoric | temperature
- [ ] isobaric | volume

Question 37

1 pts

Which of the following are indications that work has been done on the system? (Choose 2)

- [ ] The sign for heat is negative.
- [ ] The sign for work is negative.
- [ ] There is an increase in the total internal energy of the system
- [ ] There is a decrease in the average kinetic energy of the gas molecules.

- [ ] The sign for work is positive.

Question 38

1 pts

60J of heat are added to a system. If the internal energy increases by 75J, how much work in J is done on the system?

- [ ] -15
- [ ] 15
- [ ] -5
- [ ] 5

Question 39

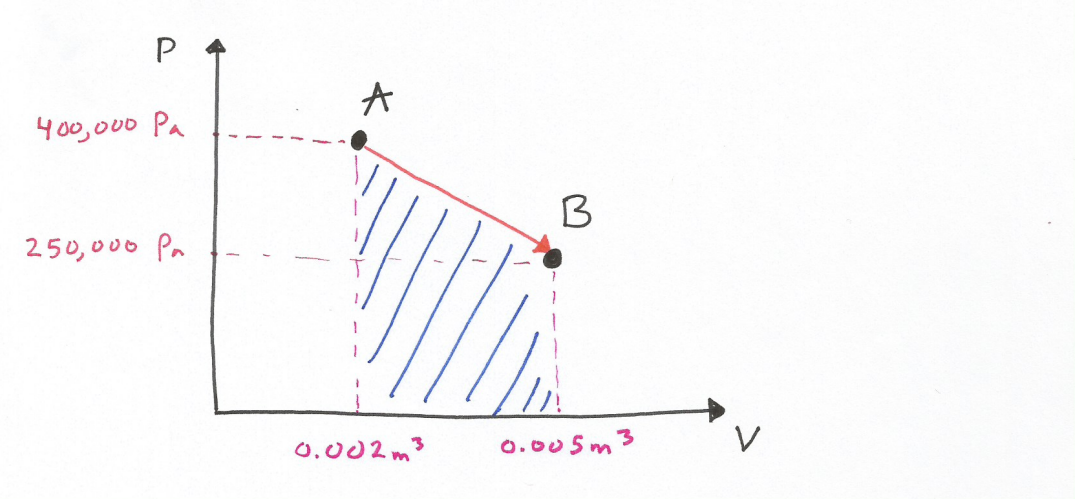
1 pts

A 1.4 mol sample of gas is taken from 0.001 m^3 to 0.005 m^3 at 450,000 Pa while 2,500 J of thermal energy is added. What is the change in internal energy U in J?

- [ ] 800
- [ ] 700
- [ ] 500
- [ ] 600

Question 40

1 pts



Given the PV diagram above, how much work is done on the gas to go from Point A to B?

- [ ] -1000
- [ ] -975
- [ ] -950
- [ ] -900

Quiz saved at 9:52am

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