Name:

**1.** When a gas in a thermally insulated cylinder is suddenly compressed, the change of state is

A. adiabatic.

B. isothermal.

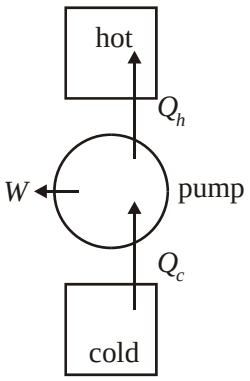
C. isobaric.

D. isochoric.

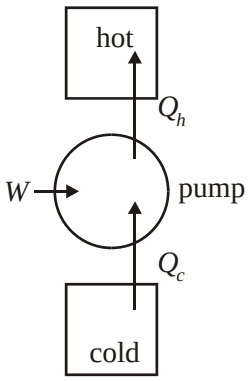
**(1)**

**2.** Which **one** of the following diagrams correctly represents the directions of the energy transfers that take place in a heat pump?

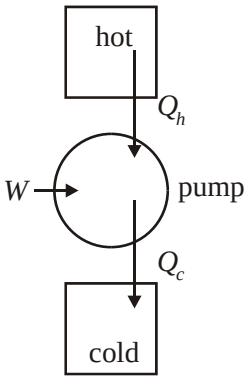
A.



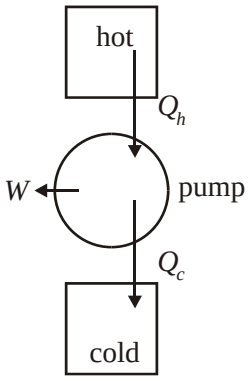

B.




C.



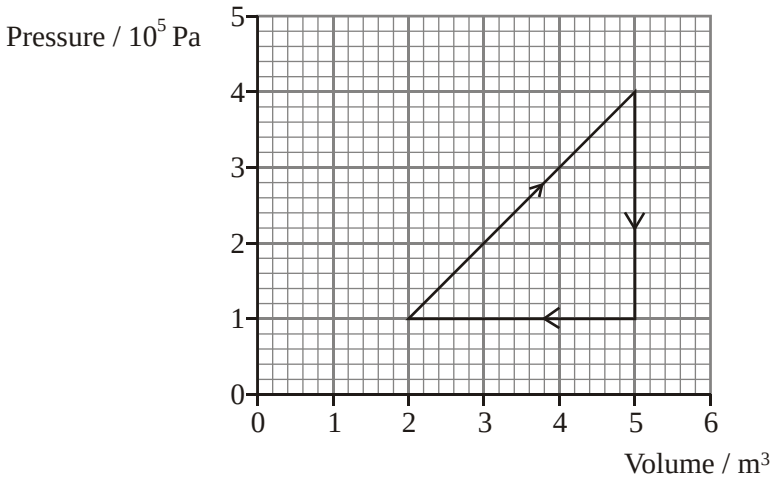

D.




**(1)**

Name:

**3.** The graph below shows the variation with volume of the pressure of a system.




The work done in compressing the gas from R to P is

A. $5.0 \times 10^5$J.

B. $4.5 \times 10^5$J.

C. $3.0 \times 10^5$J.

D. 0.

**(1)**

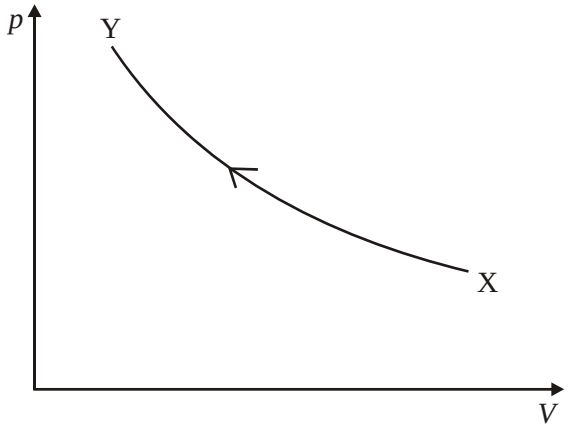
**4.** Which two values of temperature are equivalent to the nearest degree when measured on the Kelvin and on the Celsius scales of temperature?

| | **Kelvin scale** | **Celsius scale** |
|---|---|---|
| A. | 40 | 313 |
| B. | 273 | 100 |
| C. | 313 | 40 |
| D. | 373 | 0 |

**(1)**

Name:

**5.** A sample of an ideal gas is held in an insulated container and it undergoes an adiabatic change. The graph below shows the change in pressure $p$ with change in volume $V$ as the gas changes from X to Y.




Which of the following describes correctly the work done and the change in the internal energy of the gas?

| | Work done | Internal energy |
|---|---|---|
| A. | on the gas | increases |
| B. | on the gas | decreases |
| C. | by the gas | decreases |
| D. | by the gas | increases |

**(1)**

**6.** A substance changes from solid to liquid at its normal melting temperature. What change, if any, occurs in the average kinetic energy and the average potential energy of its molecules?

| | Average kinetic energy | Average potential energy |
|---|---|---|
| A. | constant | constant |
| B. | increases | constant |
| C. | increases | decreases |
| D. | constant | increases |

**(1)**

Name:

**7.** The specific latent heat of vaporization of a substance is greater than its specific latent heat of fusion because

A. boiling takes place at a higher temperature than melting.

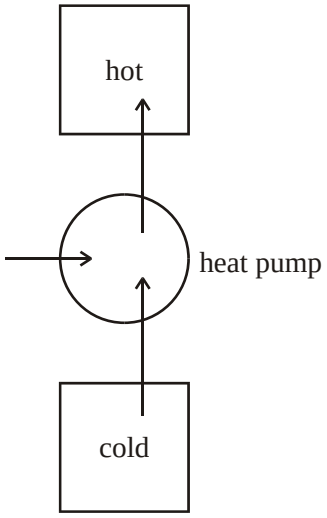
B. thermal energy is required to raise the temperature from the melting point to the boiling point.

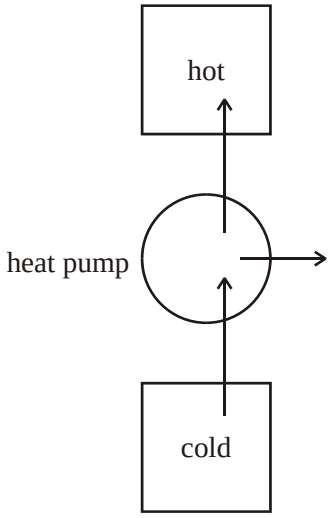
C. the volume of the substance decreases on freezing but increases when boiling.

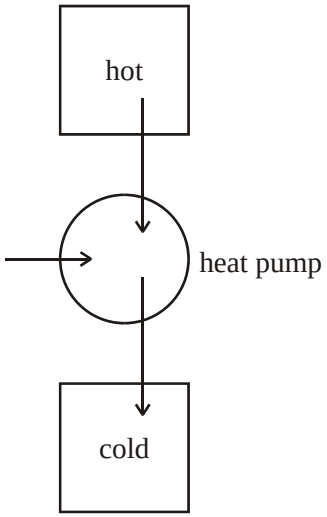
D. the increase in potential energy of the molecules is greater on boiling than on melting.

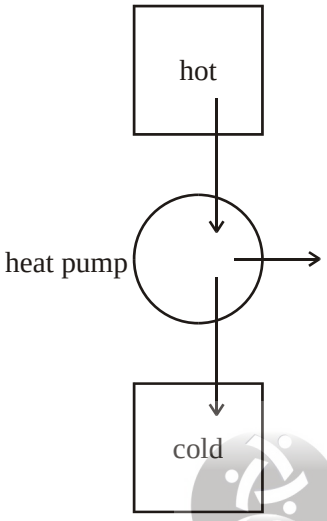
**(1)**

**8.** Which **one** of the following diagrams correctly shows the energy transfer paths for a heat pump operating between a hot and a cold reservoir?




**(1)**

Name:

**9.** A heat engine operates in a Carnot cycle between two reservoirs, a hot reservoir at temperature $T_H$ and a cold reservoir at temperature $T_C$. The efficiency of the engine is 50%. The temperature of the hot reservoir is increased to $2T_H$. The efficiency of the engine is now

A. 25%.

B. 33%.

C. 75%.

D. 100%.

**(1)**

**10.** In one cycle of a heat engine, 300 J of energy is absorbed and 200 J of energy is ejected. The efficiency of the engine is

A. $\frac{3}{2}$.

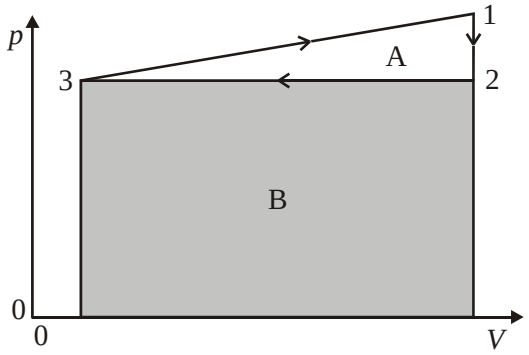
B. $\frac{2}{3}$.

C. $\frac{1}{2}$.

D. $\frac{1}{3}$.

**(1)**

**11.** The diagram shows the variation with volume $V$ of pressure $p$ during one complete cycle of a heat engine.



The work done is represented by the area

A. A.

B. B.

C. (B + A).

D. (B – A).

**(1)**

**12.** A gas expands rapidly. The process is approximately

A. isobaric.

B. isothermal.

C. adiabatic.

D. isovolumetric.

**(1)**

**13.** Which of the following is the internal energy of a system?

A. The total thermal energy gained by the system during melting and boiling.

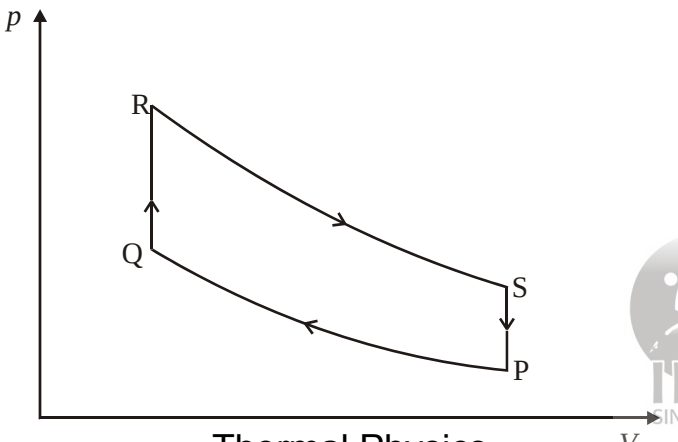
B. The sum of the potential and the kinetic energies of the particles of the system.

C. The total external work done on the system during melting and boiling.

D. The change in the potential energy of the system that occurs during melting and boiling.

**(1)**

**14.** The graph below shows the variation with volume V of the pressure p of a gas during one cycle of an engine.



During which operations, PQ, QR, RS and SP does the gas do external work?

A. PQ only

B. RS only

C. QR and RS only

D. PQ and RS only

**(1)**

**15.** A Carnot engine takes in thermal energy at kelvin temperature *H* and rejects some of this energy at kelvin temperature *L*. Which of the following expressions gives the efficiency of the engine?

A. $\frac{L}{H}$

B. $\frac{H}{L} - 1$

C. $\frac{H}{L} + 1$

D. $1 - \frac{L}{H}$

**(1)**

**16.** A liquid is evaporating, causing the liquid to cool.
The temperature of the liquid decreases because

A. the number of liquid molecules is decreasing.

B. the mean kinetic energy of the liquid molecules is decreasing.

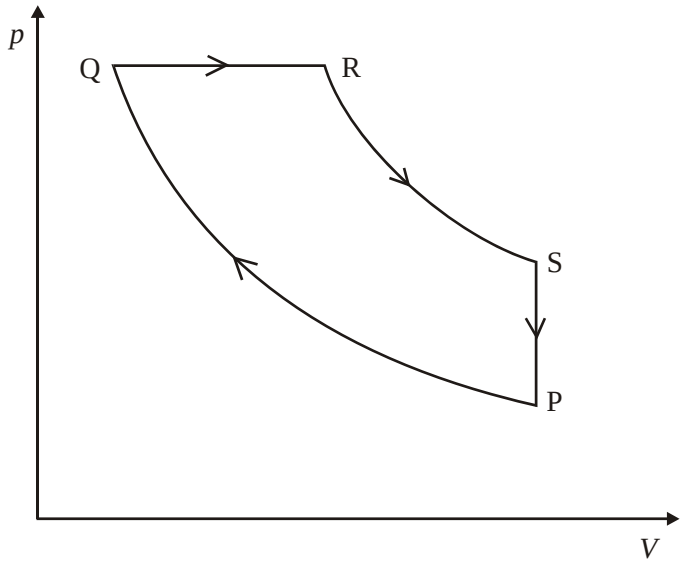
C. the pressure above the liquid surface is increasing.

D. the rate of evaporation is increasing.

**(1)**

Name:

**17.** The diagram shows the pressure/volume (*p*/*V*) diagram for one cycle PQRS of an engine.




In which sections of the cycle is work done **on** the engine?

A. SP only

B. PQ only

C. SP and PQ only

D. RS and SP only

**(1)**

**18.** A Carnot engine operates between two thermal reservoirs. The thermodynamic temperature of the higher-temperature reservoir is $T_H$ and of the lower, $T_L$.

Which **one** of the following is a correct expression for the efficiency of the engine?

A. $\frac{T_H}{T_L}$

B. $\frac{T_L}{T_H}$

C. $1 - \left(\frac{T_H}{T_L}\right)$

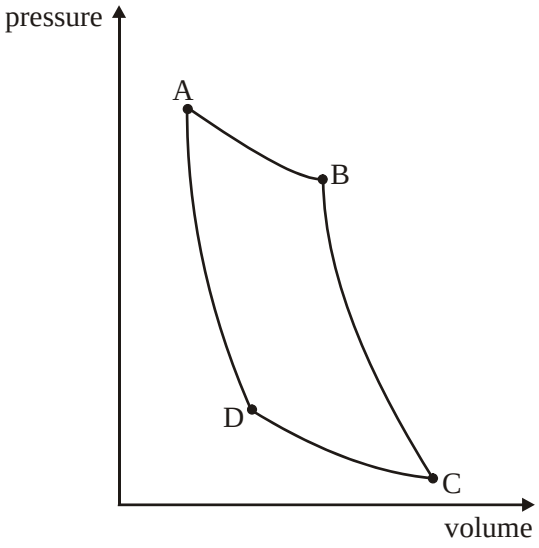
D. $1 - \left(\frac{T_L}{T_H}\right)$



**(1)**

Name:

**19.** The diagram below represents the four stages of a Carnot Cycle.




Which of the following describes the process A → B?

A. Isothermal expansion

B. Isothermal compression

C. Adiabatic expansion

D. Adiabatic compression

**(1)**

**20.** The second law of thermodynamics states that the entropy of the universe is

A. increasing.

B. decreasing.

C. zero.

D. constant but not zero.

**(1)**