

O'LEVEL HEAT OBJECTIVES

Question 1

Liquid-in-glass thermometer operates based on

- A The expansion and contraction of liquid when there is a difference in temperature.
- B The expansion and contraction of liquid when there is a difference in thermal energy.
- C The change in conductivity of liquid under the influence of temperature.
- D The change in mass of liquid under the influence of temperature.

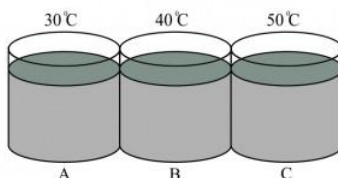
Question 2

A cup is filled with 0.5 kg of water at a temperature of 50°C and a bath tub is filled with 50 kg of water at 30°C . Which of the following is false?

- A There is more thermal energy stored in the bathtub than in the cup.
- B When placed together, heat will flow from the bathtub to the cup.
- C There is more mass of water in the bath tub than in the cup.
- D The water in the cup has a higher temperature than the water in the bathtub.

Question 3

Three glasses of water of the same mass are placed side by side touching each other as shown. Given that the glass A is 30°C , glass B is 40°C and glass C is 50°C , which of the following is true?

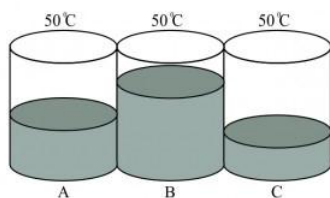


- A Heat flows from glass A to glass B.
- B Heat flows from glass C to glass B and from glass B to glass A.
- C Heat flows in all direction.

D Heat does not flow among these 3 glasses.

Question 4

Three glasses of water of the same temperature are placed side by side touching each other as shown. Given that the glass A contains 0.3 kg of water, glass B contains 0.5 kg of water and glass C contains 0.1 kg of water, which of the following is true?



A Heat flows from glass A to glass B.

B Heat flows from glass B to glass A and from glass B to glass C.

C Heat flows in all direction.

D Heat does not flow among these 3 glasses.

Question 5

When heated, which of the following shows in ascending order the magnitude of expansion of substances?

A Solid, liquid, gas

B Solid, gas, liquid

C liquid, solid, gas

D gas, liquid, Solid

Question 6

Which of the following will show most expansion?

A Heat 8 cm needle from 10°C to 1000°C

B Heat 10 cm needle from 10°C to 1000°C

C Heat a 285 mL glass of water from 1°C to 99°C

D Heat a 1.5 L glass of water from 1°C to 99°C

Question 7

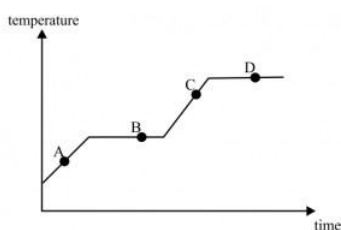
A clinical thermometer is inserted into the mouth of a patient. Why does the doctor need to wait for about a minute before taking the thermometer out of the mouth to read the temperature?

A To wait for the average temperature to be reached

- B To record the maximum temperature of the patient within that 1 minute
- C To allow time for the heat to flow into the mercury till the temperature of the mercury is the same as the temperature of the patient.
- D To wait for the temperature of the patient to cool down in the air-conditioned room.

Question 8

A solid substance is placed in a boiling tube and heated steadily. The temperature-time graph of the substance is as shown below. At which labeled point would the substance be a mixture of liquid and gas?



- A A
- B B
- C C
- D D

Question 9

When ice changes into water at 0°C .

1. Work is done in breaking the molecular structure of ice in solid state.
2. Internal energy is increased.
3. Energy is absorbed to raise the temperature.

- A 1 only
- B 2 only
- C 1 and 2 only
- D 1, 2 and 3

Question 10

During the process of melting,

- A the melting substance gains thermal energy and therefore increases its temperature.
- B the melting substance changes from a liquid to a solid.
- C there is no transfer of thermal energy and therefore the temperature of the substance remains constant.
- D the intermolecular force between the molecules of the substance becomes weaker.

Question 11

When steel melts,

- A the size of the molecules increases.
- B the space between the molecules increases.
- C the molecules vibrate at higher speed.
- D the density of each molecules decreases.

Question 12

When steel increases its temperature,

- A the size of the molecules increases.
- B the space between the molecules increases.
- C the molecules vibrate at higher speed.
- D the density of each molecules decreases.

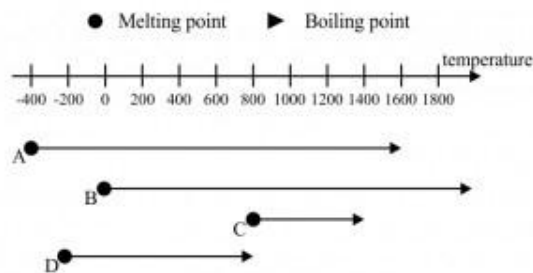
Question 13

What causes the steel to expand when it is being heated?

- A The increase in the size of the molecules
- B The increase in the mass of the molecules
- C The increase in the speed of the molecules
- D The decrease in the density of the molecules

Question 14

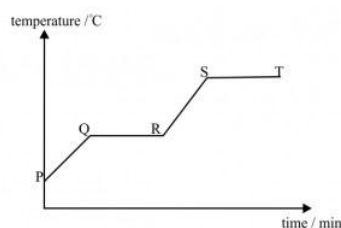
The diagram below shows the melting and boiling points of four different substances.
Which substance is a solid at 0°C and a liquid at 1400°C ?



- A A
- B B
- C C
- D D

Question 15

A solid substance is placed in a boiling tube and heated steadily. The temperature-time graph of the substance is as shown below. At which portion is the substance absorbing latent heat?



- A PQ and QR only
- B RS and ST only
- C PQ and RS only
- D QR and ST only

Question 16

Which of the following is NOT a difference between boiling and evaporation?

- A Evaporation is a slow process but boiling is a fast process.
- B Evaporation takes place at the surface of the liquid but boiling takes place throughout the liquid.
- C Evaporation takes place from 0°C to 100°C but boiling takes place only at the boiling point.
- D During boiling, bubbles are formed but not during evaporation.

Question 17

Which of the following is a difference between boiling and evaporation?

1. Evaporation takes place at any temperature but boiling does not.
2. Evaporation takes place at the surface of the liquid but boiling takes place throughout the liquid.
3. The temperature of the liquid changes during evaporation but remains constant during boiling.

- A 2 only
B 1 and 2 only
C 2 and 3 only
D 1, 2 and 3

Question 18

Which of the following statements is/are correct?

1. Heat is defined as the energy which is transferred from one place to another due to a temperature difference between them.
2. Heat will flow from one body of higher energy level to another of lower energy level.
3. When an object has higher temperature its internal energy is higher than another object of lower temperature.

- A 1 only
B 1 and 3 only
C 2 only
D 2 and 3 only

Question 19

Which of the following statements is/are correct?

1. A body of higher mass has more internal energy than a body of lower mass.
2. A body of higher temperature has more internal energy than a body of lower temperature.
3. A body of higher specific heat capacity has more internal energy than a body of lower specific heat capacity.

- A 1 only

- B 2 only
- C 3 only
- D none of the above

Question 20

Which of the following statements is/are always correct about two objects of the same material in thermal contact?

1. Heat will flow from an object of higher temperature to an object of lower temperature.
2. Heat will flow from an object at liquid state to an object at solid state.
3. Heat will flow from an object of higher internal energy to an object of lower internal energy.

- A 1 only
- B 1 and 2 only
- C 1 and 3 only
- D 1, 2 and 3

Question 21

Which of the following is true?

1. An object of higher mass will have higher internal energy as compared to another object of lower mass. (Incorrect)
2. An object of higher temperature will have higher internal energy as compared to another object of lower temperature. (Incorrect)
3. Two different solid objects of the same mass and temperature will have the same internal energy. (Incorrect)

- A 3 only
- B 1 and 2 only
- C 1, 2 and 3 only
- D none of the above

Question 22

- 1) The table below shows the melting point and boiling point of three liquids.

	Melting point	Boiling point
Alcohol	-115 ⁰ C	78 ⁰ C

Mercury -39°C 357°C

Water 0°C 100°C

Which liquid is most suitable to be used in a thermometer for measuring a temperature range of -10°C to 95°C ?

- A Alcohol only
- B Mercury only
- C Water only
- D None of the above

Question 23

A piece of ice is being heated to water and then to steam. Which of the following statements is true?

- A The molecules expand as it changes from ice to steam.
- B The molecules move faster as it changes from ice to steam.
- C The molecules move closer to each other as it changes from ice to steam.
- D The intermolecular force of attraction increases as ice changes to steam.

Question 24

As gas is being cooled to solid state. Its temperature will remain constant when the substance is

- 1. condensing
 - 2. freezing
 - 3. at thermal equilibrium with the environment.
- A 1 only
 - B 2 only
 - C 1 and 2 only
 - D 1, 2 and 3

Question 25

Mercury melts at -39°C and boils at 357°C . Alcohol melts at -115°C and boils at 78°C . At which temperature are both substances in liquid state?

- A -49°C

- B - 15⁰C
- C 100⁰C
- D 360⁰C

Question 26

Why does the temperature of a liquid drop during evaporation?

- A Air takes away the thermal energy by conduction.
- B Air takes away the thermal energy by radiation.
- C The total energy drops due to liquid molecules escaping to the air as vapour.
- D The average energy drops due the escape of the higher energy molecules into the air as vapour.

Question 27

Object A is 2 kg. It has a temperature of 40⁰C and has an internal energy of 500000 J.
Object B is 2 kg. It has a temperature of 50⁰C and has an internal energy of 400000 J. Which of the following statements is correct?

- A Heat flow from object A to object B.
- B Heat flow from object B to object A.
- C No heat flow between object A and object B.
- D There is not enough information to determine the direction of heat flow.

Question 28

2 kg of ice at 0⁰C is floating on 5 kg of water at 0⁰C. Which of the following statements is true?

- A Heat flow from ice to water
- B Heat flow from water to ice
- C No heat flow between ice and water
- D There is not enough information to determine the direction of heat flow.

Question 29

Conduction is a transfer of thermal energy via

- A Vibration of the particles
- B Differences in densities
- C Movement of particles from one place to another
- D Radiation of wave

Question 30

Convection is transfer of thermal energy due to

- A Vibration of the particles
- B Expansion of fluid
- C Movement of particles from one place to another
- D Radiation of wave

Question 31

What is radiation?

- A Transfer of thermal energy by wave which does not require a material medium
- B Transfer of thermal energy by vibration of nucleus
- C Transfer of thermal energy by the movement of free electrons
- D Transfer of thermal energy by movements of molecules due to a difference in densities.

Question 32

Give a reason why Aluminium is a better conductor than wood?

- A Aluminium has a higher density than wood.
- B Aluminium has a higher specific heat capacity than wood
- C Aluminium has more free electrons than wood
- D Aluminium has a higher mass than wood

Question 33

Conduction happens in

- A Solid only
- B Liquid only
- C Solid and liquid only
- D Solid, Liquid and gas.

Question 34

Convection happens in

- A Liquid only
- B Gas only
- C Liquid and gas only
- D Solid, liquid and gas

Question 35

Which of the following statements about radiation is true?

- 1. Radiation can pass through solids
 - 2. Radiation can pass through liquids
 - 3. Radiation can pass through gases
- A 3 only
 - B 2 and 3 only
 - C 1 and 3 only
 - D 1, 2 and 3

Question 36

Which of the following heat transfer processes can take place in vacuum?

- 1. Conduction
 - 2. Convection
 - 3. Radiation
- A 1 only
 - B 3 only
 - C 1 and 2 only
 - D 1, 2 and 3

Question 37

Which of the following heat transfer processes is/are caused by the movement of particles?

- 1. Conduction
- 2. Convection
- 3. Radiation

- A 1 only
- B 3 only
- C 1 and 2 only
- D 1, 2 and 3

Question 38

Which of the following about conduction is/are true?

1. Conduction can transfer thermal energy faster in denser medium.
2. Conduction cannot happen together with convection.
3. Conduction can transfer thermal energy faster through good electrical conductors.

- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

Question 39

The white porcelain lid of a cup of hot drink is to

1. reduce loss of thermal energy by evaporation.
2. reduce loss of thermal energy by radiation.
3. reduce loss of thermal energy by convection.

- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

Question 40

The wooden handle of a pot

- A Prevents the transfer of thermal energy by conduction to the hand.
- B Reduces the transfer of thermal energy by conduction to the hand.
- C Prevents the transfer of thermal energy by radiation to the hand.

D Reduces the transfer of thermal energy by radiation to the hand.

Question 41

During a barbecue, why do we always cook food on top of the charcoal?

- A To increase the rate of heat transfer by conduction.
- B To increase the rate of heat transfer by convection
- C To increase the rate of heat transfer by radiation
- D To increase the rate of heat transfer by evaporation

Question 42

Which of the following about the vacuum flask are correct?

1. The silvered surface reduces loss of thermal energy by radiation.
 2. The vacuum in the flask reduces loss of thermal energy by radiation.
 3. The stopper reduces loss of thermal energy by convection and evaporation.
- A 1 and 2 only
 - B 1 and 3 only
 - C 2 and 3 only
 - D 1, 2 and 3

Question 43

Cooling fins are used in refrigerators, car radiator and many other cooling devices to dissipate thermal energy out of the system to the environment. Which of the following statements about the cooling fins are correct?

1. The cooling fins are made of metal to ensure that thermal energy is being conducted quickly out to the environment.
 2. The cooling fins are thin for heat to be dissipated to the environment quickly via convection and radiation.
 3. Cooling fins are normally black to achieve higher rate of thermal energy radiation.
- A 1 and 2 only
 - B 1 and 3 only
 - C 2 and 3 only
 - D 1, 2 and 3

Question 44

Petrol storage tanks are not painted black because

- A Black is a good conductor of heat.
- B Black is a bad conductor of heat.
- C Black is a good emitter of radiation.
- D Black is a good absorber of radiation.

Question 45

How does a polar bear keep itself warm?

- 1. By salivating
 - 2. By having thick fur
 - 3. By having white fur
- A 1 and 2 only
 - B 1 and 3 only
 - C 2 and 3 only
 - D 1, 2 and 3

Question 46

Which of the following is false?

- A Dog drools (salivates) to allow heat loss by evaporation.
- B Elephant sprays water over its body to allow heat loss by evaporation.
- C Jack rabbit has enormous ears with many blood vessels to dissipate thermal energy
- D Camel has big humps to store water so that it can dissipate thermal energy by convection.

Question 47

Which of the following is false?

- A We wear white to keep ourselves warm during winter.
- B We wear white to keep ourselves cool during summer.
- C Aluminium foil are used to keep food warm.
- D Pipes are painted black to minimize transfer of thermal energy.

Question 48

Which of the following will increase the rate of heat transfer?

1. Increase the temperature difference
2. Paint the surface black
3. Increase the surface area

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

Question 49

Which of the following is true about pots?

1. Black pots are used for cooking because they increase the rate of cooking.
2. Silver pots are used for keeping food warm because they decrease the rate of heat dissipation.
3. Pots are made of clay to increase the rate of cooking.

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

Question 50

Which of the following can be done to increase the rate of cooking?

1. Use a black pot instead of silver pot.
2. Use a thick pot instead of thin pot
3. Cover the pot with a lid.

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

Question 51

Container A and container B are filled with equal amount of hot water and the temperature of the water in the containers is measured with a thermometer some time

later. It is observed that container A has a much lower temperature than container B. What are the possible reason(s)?

1. Container A is black and container B is silver.
2. Container A has a lid and container B is not covered.
3. Container A is made of steel and container B is made of clay.

- A 1 and 2 only
B 1 and 3 only
C 2 and 3 only
D 1, 2 and 3

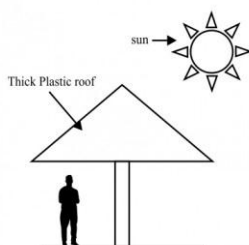
Question 52

Which of the following is true?

- A Sea breeze happens during night time when the sea is cooler than the area.
- B Sea breeze happens during day time when the land is cooler than the sea.
- C Land breeze happens during night time when the land is cooler than the sea.
- D Land breeze happens during day time when the sea is cooler than the land.

Question 53

The diagram shows a man standing under a shelter on a sunny day. Given that the man feels hot, which of the following shows the processes of how thermal energy from the sun reaches the man?

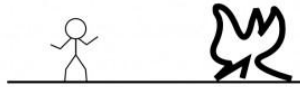


- A Radiation → Conduction → Radiation
- B Radiation → Conduction → Convection
- C Radiation → Convection → Radiation

D Radiation → Convection → Convection

Question 54

The diagram shows a man besides a campfire. How does thermal energy from the campfire reach the man?



- A By radiation
- B By convection
- C By radiation and convection
- D By conduction and convection

Question 55

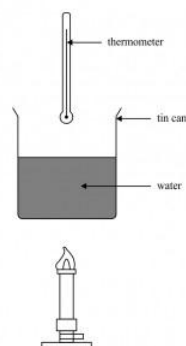
The diagram shows a brick wall in between a man and a campfire. How does thermal energy from the campfire reach the man?



- A Radiation → Conduction → Radiation
- B Radiation → Conduction → Convection
- C Radiation → Convection → Radiation
- D Radiation → Convection → Convection

Question 56

The diagram shows water being heated in a tin can. A thermometer hangs directly above it. How does thermal energy from the heat source reach the thermometer?



- A Radiation → Conduction → Radiation
- B Radiation → Conduction → Convection
- C Radiation → Convection → Radiation
- D Radiation → Convection → Convection

Question 57

Expanded polystyrene is often used to make containers for storing ice-cream because the trapped air reduces loss of thermal energy by

- A Radiation only.
- B Conduction only.
- C Conduction and convection.
- D Conduction, convection and radiation.

Question 58

Which of the following statements about the vacuum flask is incorrect?

- A Loss of thermal energy by radiation is minimized by keeping hot water in a double-walled container.
- B Loss of thermal energy is minimized by using a cork or plastic stopper to close up the neck of the glass container.
- C The vacuum in the double-walled glass container effectively prevents conduction and convection.
- D The walls of the glass container are silvered to reduce radiation.

Question 59

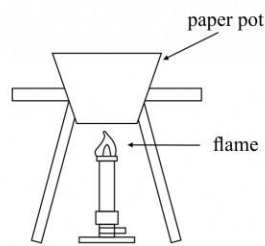
The chief mechanism for conduction in a typical metallic conductor involves

- A The diffusion of atoms in the conductor from the hot end to the cooler end.
- B Atoms near the hot end vibrating with big amplitudes about their fixed positions and transferring their energy to neighboring atoms located in cooler regions by knocking against them.
- C The diffusion of free electrons from the hot end to the cooler end of the conductor carrying their energy along with them.
- D The atoms near the hot end sending out energy to atoms near the cooler end.

Question 60

Some steamboat restaurants use paper pots for their customers to boil the food themselves. What is the reason for the paper not to catch fire when in contact with the flame?

1. The paper is thin and therefore heat is conducted quickly to the water in the paper pot.
2. Water has a boiling point lower than the burning temperature of the paper.
3. The paper is thick enough to withstand the high temperature of the flame.



- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

TO BE HANDED IN ON THE REPORTING DAY.