



www.megalecture.com · www.youtube.com/@megalecture

Online tutoring for Cambridge IGCSE, O Level & A Level Physics

IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Thermal Properties of Matter

Paper 1 — Multiple-Choice Questions (topical compilation)

Fahad H. Ahmad

Contact: **+92 323 509 4443**

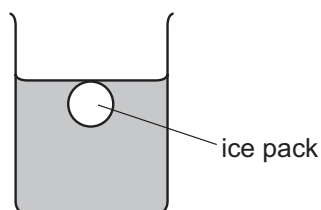
M.Eng NUS Singapore · B.Eng NUST · 15+ years of teaching experience in Singapore, UAE & Pakistan · 60,000+ subscribers and 20 million+ video lecture views.

www.Megalecture.com · +92 323 509 4443

2.2 Thermal properties and temperature

PAPER 1

- 1 An ice pack is used to cool 0.25 kg of water. The specific heat capacity of water is $4.2 \text{ kJ}/(\text{kg } ^\circ\text{C})$.



How much thermal energy (heat) must the ice pack extract from the water to reduce the water temperature by 15°C ?

- A** 0.070 kJ **B** 1.1 kJ **C** 16 kJ **D** 250 kJ

5054/11/M/J/11 /Q18

- 2 Fillings in teeth should be made from a material which

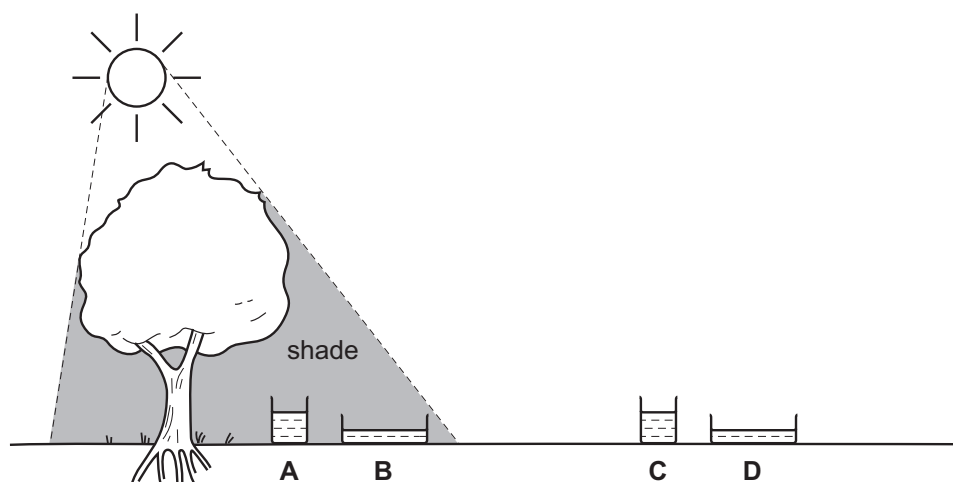
- A** does not expand when heated.
- B** expands by the same amount as the tooth when heated.
- C** expands less than the tooth when heated.
- D** expands more than the tooth when heated.

5054/11/M/J/11/Q19

- 3 Four containers are filled with equal volumes of water at the same temperature.

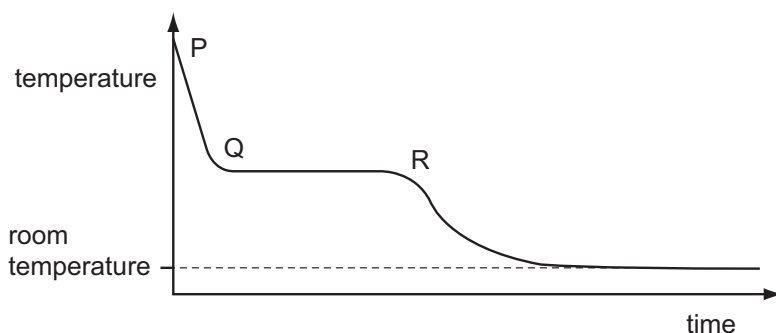
Containers **A** and **B** are shaded by a tree. Sunlight falls on containers **C** and **D**.

From which container does all the water evaporate first?



5054/11/M/J/12/Q16

- 4 A hot liquid is allowed to cool. The graph shows the cooling curve.



In which part of the curve is latent heat released?

- A** PQ **B** QR **C** RS **D** ST

5054/11/M/J/12/Q19

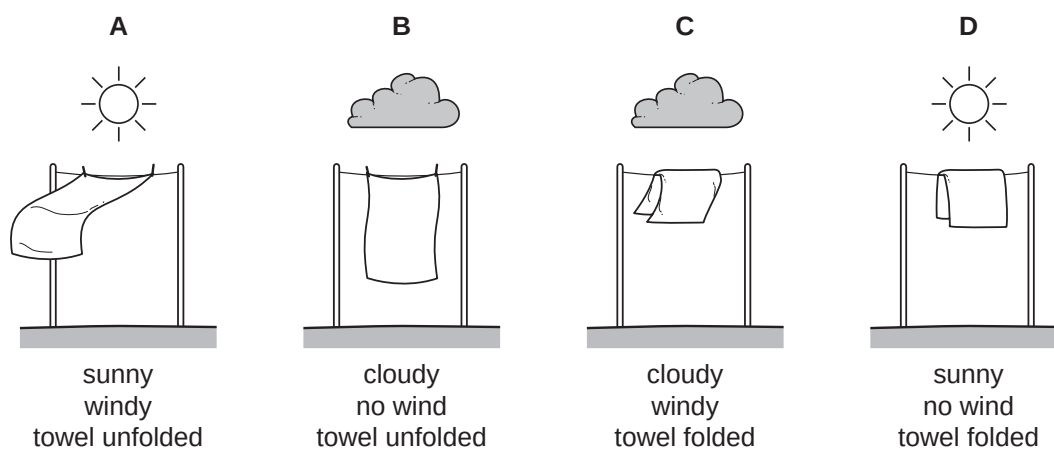
- 5 For the same temperature rise and the same original volume, which of the three states of matter expands the most and which state expands the least?

	expands most	expands least
A	gas	solid
B	liquid	gas
C	solid	gas
D	solid	liquid

5054/11/M/J/12/Q20

- 6 Four wet towels are hung out to dry as shown.

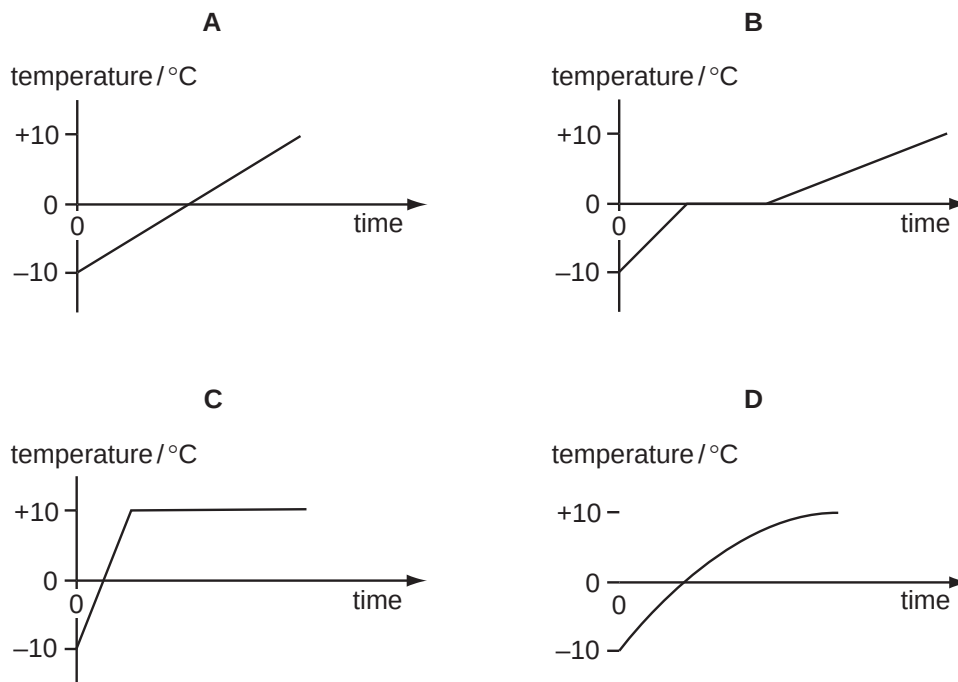
Which towel dries most quickly?



5054/12/M/J/12/Q16

- 7 Ice at -10°C is heated until it is water at $+10^{\circ}\text{C}$.

Which graph shows how the temperature changes with time?



5054/12/M/J/12/Q19

- 8 A substance has a melting point of -17°C and a boiling point of 117°C .

In which state does the substance exist at -10°C and at 110°C ?

	at -10°C	at 110°C
A	solid	liquid
B	solid	gas
C	liquid	liquid
D	liquid	gas

5054/12/M/J/12/Q20

- 9 Thermal energy of 12000 J is supplied to a 2.0 kg mass of copper.

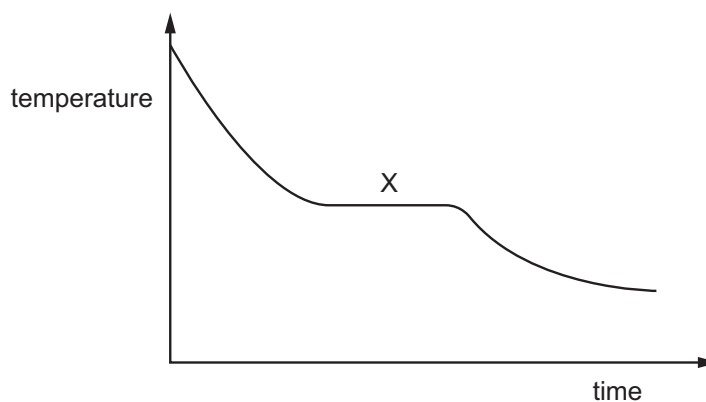
The specific heat capacity of copper is $400 \text{ J}/(\text{kg } ^{\circ}\text{C})$.

What is the rise in temperature?

- A** 15°C **B** 30°C **C** 60°C **D** 100°C

5054/12/M/J/13/Q18

- 10 A hot liquid is poured into a beaker. The graph shows how the temperature of the liquid changes as it cools towards room temperature.

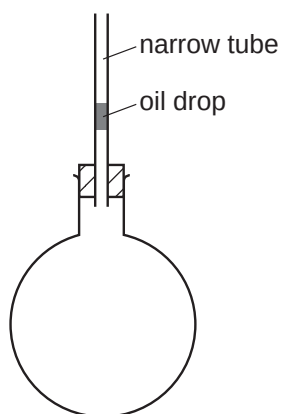


What is occurring at region X?

- A boiling and evaporation
- B condensation only
- C evaporation only
- D solidification and evaporation

5054/11/M/J/14/Q20

- 11 The diagram shows a flask containing air. The air is trapped by a drop of oil in a narrow tube.



When the flask is heated the oil drop rises up the tube.

Which statement is **not** correct?

- A The air molecules each get larger.
- B The air molecules hit the container with greater force.
- C The air molecules move faster.
- D The air molecules move further apart.

5054/12/M/J/14/Q21

- 12 Thermal energy is transferred to a solid. First it melts and then it boils to produce a gas.

Which statement about the temperature is correct?

- A When melting and boiling the temperature does not change.
- B When melting and boiling the temperature increases.
- C When melting the temperature increases but when boiling the temperature stays the same.
- D When melting the temperature stays the same but when boiling the temperature increases.

5054/12/M/J/14/Q22

- 13 Which substance in the table is liquid at 20 °C?

	melting point / °C	boiling point / °C
A	−218	−183
B	−39	357
C	44	280
D	119	444

5054/11/M/J/15/Q19

- 14 In a liquid, some energetic molecules break free from the surface even when the liquid is too cold for bubbles to form.

What is the name of this process?

- A boiling
- B condensation
- C convection
- D evaporation

5054/12/M/J/15/Q21

- 15 Four beakers contain equal volumes of water at two different temperatures. The beakers are placed in the open air.

From which beaker does water evaporate the fastest?

	surface area of beaker / cm ²	temperature of water / °C
A	20	20
B	20	40
C	40	20
D	40	40

5054/11/M/J/17/Q18

- 16 The table shows the melting points and the boiling points of some elements.

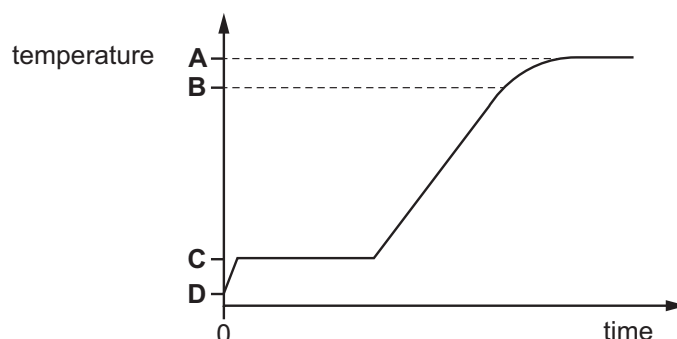
Which element is a liquid over the largest range of temperature?

	element	melting point / °C	boiling point / °C
A	bromine	-7	59
B	chlorine	-102	-34
C	fluorine	-220	-188
D	iodine	114	184

5054/11/M/J/17/Q21

- 17 Some ice cubes are taken from a freezer and heated in a container. The readings of temperature and time are recorded on the graph.

Which temperature is 0 °C?



5054/11/M/J/17/Q22

- 18** There is a tight metal lid on a glass jar. The lid is loosened by pouring hot water over it.

Which physics property explains this?

- A** convection
- B** evaporation
- C** expansion
- D** radiation

5054/11/M/J/17/Q25

- 19** What is described as 'the escape of more energetic molecules from the surface of a liquid'?

- A** condensation
- B** evaporation
- C** melting
- D** radiation

5054/11/M/J/18/Q17

- 20** What happens when a solid is heated and expands?

- A** The molecules do not change size and the spaces between the molecules become larger.
- B** The molecules expand and the spaces between the molecules become larger.
- C** The molecules expand and the spaces between the molecules become smaller.
- D** The molecules expand and the spaces between the molecules do not change size.

5054/11/M/J/18/Q19

- 21** Equal masses of copper and water are heated to the same temperature. As they cool down, the copper and the water lose thermal energy at the same rate.

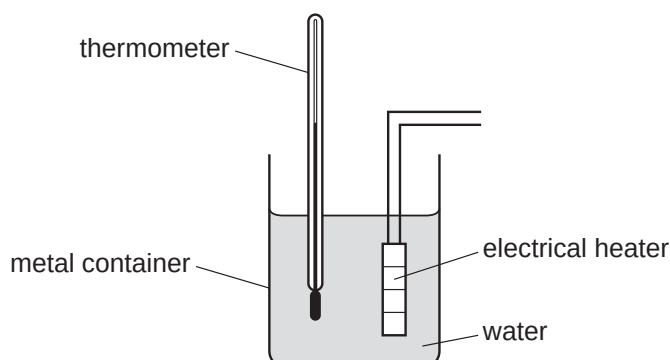
The temperature of the copper falls faster.

Why is this?

- A** Copper has a larger specific heat capacity.
- B** Copper has a larger specific latent heat.
- C** Copper has a smaller specific heat capacity.
- D** Copper has a smaller specific latent heat.

5054/12/M/J/18/Q20

- 22 The diagram shows a set of apparatus used to determine the specific heat capacity of water.

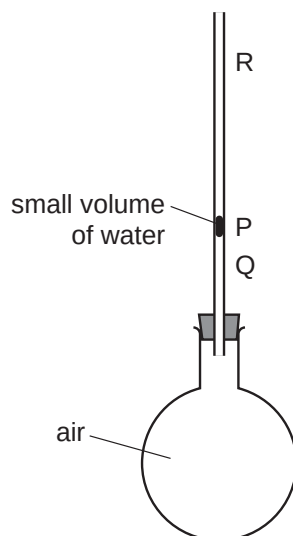


What does **not** affect the rate at which energy is lost to the surroundings?

- A insulating the container
- B placing a lid on the container
- C polishing the outer surface of the container
- D moving the thermometer closer to the heater

5054/11/M/J/19/Q17

- 23 The diagram shows air trapped in a flask by a small volume of water in a thin tube.



When the flask is held in a student's hands, the small volume of water first moves down from P to Q, and then up to R.

Why does the small volume of water move like this?

- A The flask contracts and then the air expands.
- B The flask expands and then the air contracts.
- C The flask expands and then the air expands less than the flask.
- D The flask expands and then the air expands more than the flask.

5054/11/M/J/19/Q20

24 How is *latent heat* defined?

- A the thermal energy absorbed or emitted by unit mass during a change of state without a temperature change
- B the thermal energy absorbed or emitted by unit mass during unit temperature change
- C the thermal energy absorbed or emitted during a change of state without a temperature change
- D the thermal energy absorbed or emitted during unit temperature change

5054/12/M/J/19/Q22

25 The temperature of a body increases by 1°C .

Which other quantity also increases?

- A heat capacity
- B internal energy
- C specific heat capacity
- D specific latent heat

5054/11/M/J/20/Q22

26 What always happens when the temperature increases?

- A A gas at constant pressure expands.
- B A metal rod becomes longer, but its volume remains constant.
- C A liquid contracts and then expands.
- D The hole in the centre of a metal disc becomes smaller.

5054/12/M/J/20/Q26

27 Which statement about the thermal expansion of solids, liquids and gases is correct?

- A Liquids do not expand.
- B Liquids expand more than gases but less than solids.
- C Liquids expand more than solids but less than gases.
- D Liquids expand the same amount as solids but less than gases.

5054/12/M/J/21/Q21

- 28 Which list shows the states of matter in order of expansion from smallest to greatest for the same temperature rise?

A gas → liquid → solid
B liquid → solid → gas
C solid → gas → liquid
D solid → liquid → gas

5054/12/M/J/22/Q21

- 29 Which row describes the boiling and the evaporation of a liquid?

	boiling	evaporation
A	bubbles form throughout the liquid	only occurs at one temperature
B	bubbles form throughout the liquid	produces cooling
C	occurs at any temperature	only occurs at one temperature
D	occurs at any temperature	produces cooling

5054/12/M/J/22/Q22

- 30 A hairdryer is used to blow air across the surface of water in a beaker so that the water evaporates.

What increases the rate of evaporation of the water?

A decreasing the speed of the air from the hairdryer
B decreasing the mass of the water in the beaker
C increasing the surface area of the water by using a wider beaker
D increasing the volume of the water in the beaker

5054/12/M/J/22/Q23

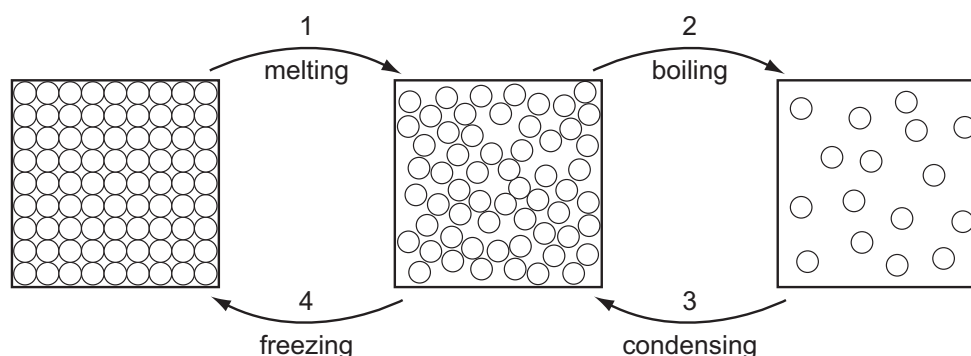
- 31 To raise the temperature of a 2.0 kg block of metal by 20 °C, energy of 5.2 kJ is needed.

What is the value of the specific heat capacity of the metal?

A 0.13 J/(kg °C)
B 52 J/(kg °C)
C 130 J/(kg °C)
D 52 000 J/(kg °C)

5054/11/O/N/11/Q17

32 Substances can change from one state to another as shown.



For substances to change from one state to another, there must be some energy transfer.

Which changes involve the substance taking in energy and which changes involve the substance giving out energy?

	energy taken in	energy given out
A	1 and 2	3 and 4
B	1 and 3	2 and 4
C	2 and 4	1 and 3
D	3 and 4	1 and 2

5054/11/O/N/11/Q19

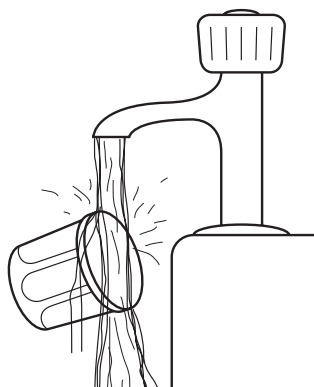
33 Less heat is needed to raise the temperature of 1 kg of copper by 1 °C than is needed to raise the temperature of 1 kg of water by 1 °C.

Which statement explains this?

- A** Copper has a higher melting point.
- B** Copper has a lower specific heat capacity.
- C** Copper has a smaller specific latent heat.
- D** Copper is a better conductor of heat.

5054/11/O/N/12/Q19

- 34** A person cannot unscrew the metal lid of a pot of jam. The lid can be unscrewed after it has been held under hot, running water for a few seconds.



Why is this?

- A** The air pressure in the jar falls.
- B** The glass expands.
- C** The jam melts.
- D** The metal lid expands.

5054/11/O/N/12 /Q20

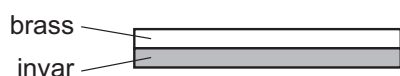
- 35** In hot weather, people use electric fans to keep cool.

Why do the fans make them feel cool?

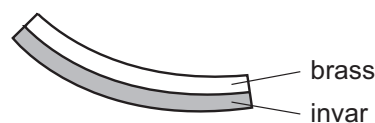
- A** They change one form of energy into another.
- B** They cool the air in the room.
- C** They increase the rate of evaporation from the skin.
- D** They speed up the vibration of air molecules.

5054/12/O/N/12/Q16

- 36 A strip is made from two metals joined together. The diagrams show the strip at room temperature and after it has been cooled.



at room temperature



below room temperature

The change in shape occurs because

- A brass contracts more than invar.
- B brass expands when it cools down.
- C invar and brass contract by equal amounts.
- D invar contracts more than brass.

5054/12/O/N/12/Q20

- 37 The temperature shown by a mercury-in-glass thermometer increases.

Which of the following is constant?

- A the density of the mercury
- B the internal energy of the mercury
- C the mass of the mercury
- D the volume of the mercury

5054/11/O/N/13/Q14

- 38 When a person climbs out of a warm swimming pool on a hot summer day, he feels cold.

Why does this happen?

- A The air has a high specific heat capacity.
- B The air is a better conductor of heat than water.
- C The water droplets increase his surface area.
- D The water takes heat from his body to evaporate.

5054/11/O/N/13/Q17

- 39 Different amounts of energy are supplied to copper blocks of different masses.

Which block experiences the greatest temperature change?

	mass of block / kg	energy supplied / J
A	0.1	200
B	0.2	200
C	0.4	600
D	0.8	400

5054/12/O/N/13/Q18

- 40 The more energetic molecules in a liquid may escape from its top surface.

What is this process called?

- A boiling
- B Brownian motion
- C convection
- D evaporation

5054/12/O/N/13/Q21

- 41 Water is poured into four dishes. In two of the dishes the water has a small surface area and in the other two it has a large surface area. The water in two of the dishes is cool and the water in the other two is warm.

From which dish does the water evaporate the quickest?

	surface area	temperature
A	large	cool
B	large	warm
C	small	cool
D	small	warm

5054/11/O/N/14/Q18

- 42 An electric shower takes in cold water at 17°C . The shower gives 6000 J of energy every second to the cold water and heats it to 37°C . The specific heat capacity of water is $4200\text{ J}/(\text{kg }^{\circ}\text{C})$.

What is the mass of hot water supplied by the shower in one second?

- A** 0.035 kg **B** 0.039 kg **C** 0.071 kg **D** 0.084 kg

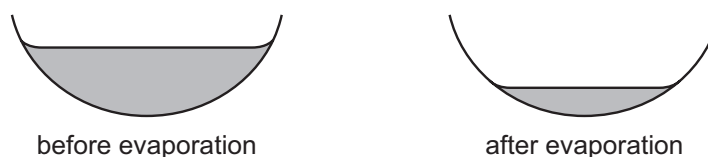
5054/11/O/N/15/Q17

- 43 What is latent heat of vaporisation?

- A** the energy required to make molecules expand
B the energy required to make molecules expand and move apart
C the energy required to make molecules move apart
D the energy required to make molecules move faster

5054/11/O/N/15/Q18

- 44 Some of the liquid in a dish evaporates, as shown in the diagrams.



Which molecules leave the liquid and which molecules in the liquid have greater average kinetic energy?

	molecules that leave have	molecules in the liquid have greater average kinetic energy
A	high energy	before evaporation
B	high energy	after evaporation
C	low energy	before evaporation
D	low energy	after evaporation

5054/12/O/N/15/Q18

- 45 An insulated beaker contains 300 g of water, initially at 30 °C. Water at 100 °C is added until the temperature of the mixture reaches 50 °C.

The specific heat capacity of water is 4.2 J/(g °C).

How much water is added?

- A** 60 g **B** 120 g **C** 180 g **D** 750 g

5054/12/O/N/15/Q19

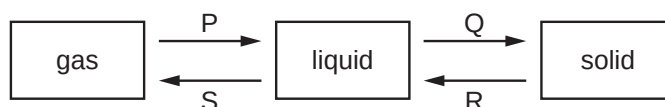
- 46 When a liquid evaporates, molecules escape from its surface.

Which molecules escape, and what happens to the average kinetic energy of the molecules remaining in the liquid?

- A** The less energetic molecules escape and the average kinetic energy decreases.
B The less energetic molecules escape and the average kinetic energy increases.
C The more energetic molecules escape and the average kinetic energy decreases.
D The more energetic molecules escape and the average kinetic energy increases.

5054/11/O/N/16/Q16

- 47 The diagram shows changes of state.

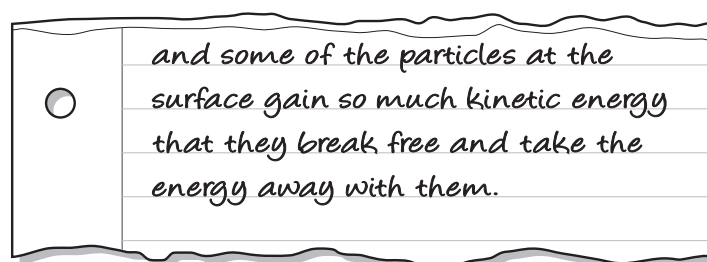


What are the names of the changes of state P, Q, R and S?

	P	Q	R	S
A	condensation	melting	solidification	boiling
B	condensation	solidification	melting	boiling
C	boiling	melting	solidification	condensation
D	boiling	solidification	melting	condensation

5054/11/O/N/16/Q17

- 48 A piece of paper torn out of an exercise book is shown.



Which process is being described?

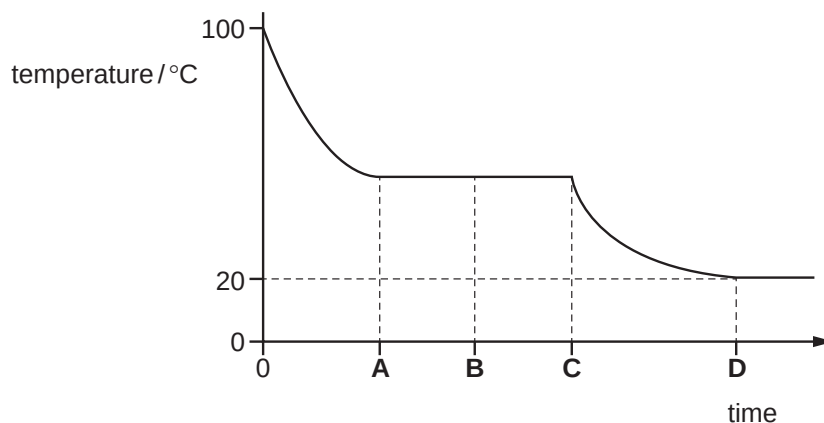
- A** conduction
- B** convection
- C** evaporation
- D** radiation

5054/12/O/N/16/Q19

- 49** A sample of liquid at 100°C is allowed to cool to a room temperature of 20°C .

The diagram shows how the temperature changes with time during the cooling process.

At which time does the sample become completely solid?



5054/12/O/N/16/Q20

- 50** One kilogram of water needs more thermal energy to raise its temperature by 1°C than one kilogram of copper.

Why is this?

- A** copper has a higher specific heat capacity than water
- B** copper has a lower specific heat capacity than water
- C** copper is a better conductor of heat than water
- D** copper is a poorer conductor of heat than water

5054/12/O/N/16/Q21

- 51** Scientists believe that some lakes are shrinking because of evaporation.

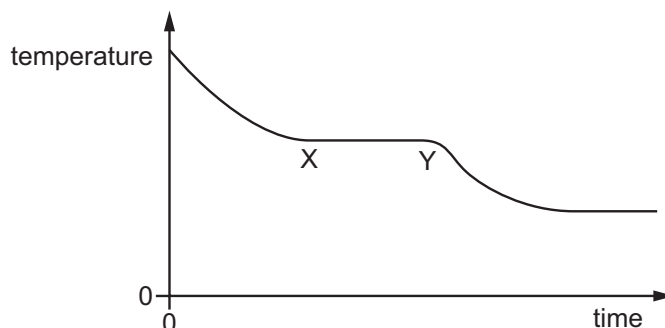
What increases the rate of evaporation?

- A** a decrease in the surface area
- B** a fall in water temperature
- C** an increase in the depth of the lake
- D** wind blowing across the surface

5054/11/O/N/17/Q12

- 52 Solid wax is melted in a boiling tube and then allowed to cool.

The graph shows the cooling curve.



What is happening between points X and Y?

- A The liquid is at its boiling point.
- B The liquid is turning to solid.
- C The solid has reached room temperature.
- D The solid is turning to liquid.

5054/11/O/N/17/Q13

- 53 During boiling and during melting, a substance either takes in energy or gives out energy.

Which row gives the energy transfer corresponding to the change of state?

	during boiling	during melting
A	gives out energy	gives out energy
B	gives out energy	takes in energy
C	takes in energy	gives out energy
D	takes in energy	takes in energy

5054/11/O/N/17/Q14

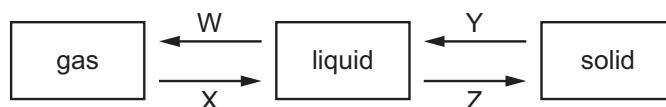
- 54 The temperature of a 50 g mass of a metal is raised by 40 °C. The specific heat capacity of the metal is 0.40 J/(g °C).

How much thermal energy is supplied?

- A 0.32 J B 0.50 J C 500 J D 800 J

5054/11/O/N/17/Q15

- 55 The diagram shows four changes of state W, X, Y and Z.



Which row gives the names of the four changes of state?

	W	X	Y	Z
A	condensation	boiling	freezing	melting
B	condensation	boiling	melting	freezing
C	boiling	condensation	freezing	melting
D	boiling	condensation	melting	freezing

5054/11/O/N/18/Q13

- 56 A metal lid fits tightly on a glass jar.

Which process makes it easier to remove the lid from the jar?

- A** cool the lid only
- B** put the jar and lid in a refrigerator
- C** warm the jar only
- D** warm the lid only

5054/11/O/N/18/Q15

- 57 The specific heat capacity of lead is $130 \text{ J/(kg } ^\circ\text{C)}$. Lead of mass 0.50 kg is heated from 10°C to 35°C .

Which calculation gives the amount of thermal energy, in J, absorbed by the lead?

- A** $0.50 \times 130 \times 25$
- B** $0.50 \times 130 \times 35$
- C** $\frac{0.50 \times 130}{25}$
- D** $\frac{0.50 \times 130}{35}$

5054/11/O/N/18/Q16

- 58** A cold bottle containing a drink is placed on a table on a warm day. Drops of water form on the outside of the bottle.

Which process causes the drops to form?

- A** condensation
- B** conduction
- C** convection
- D** evaporation

5054/12/O/N/18/Q17

- 59** What is the name of the change of state that occurs when a substance changes from a solid to a liquid?

- A** boiling
- B** condensation
- C** evaporation
- D** melting

5054/11/O/N/19/Q21

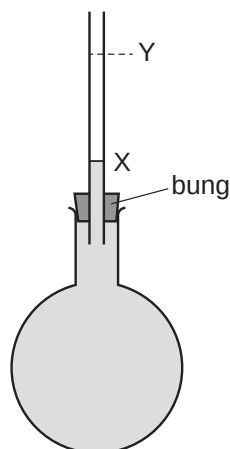
- 60** A metal rod is heated.

What happens to the rod?

- A** Its density decreases and its mass decreases.
- B** Its density decreases and its volume increases.
- C** Its density increases and its mass decreases.
- D** Its density increases and its volume increases.

5054/11/O/N/19/Q22

- 61 The diagram shows a glass flask full of water at 10°C . A long glass tube passes through the bung into the water. The water level in the tube is at X.



The flask is placed in hot water and the water level in the tube eventually rises to Y.

Why does the water level rise?

- A The flask contracts and the water expands.
- B The flask contracts more than the water contracts.
- C The flask expands and the water contracts.
- D The flask expands less than the water expands.

5054/11/O/N/19/Q23

- 62 A glass beaker contains water in a warm room.

The water is initially at the same temperature as the room.

Which change does **not** affect the initial rate of evaporation of the water?

- A changing the temperature of the water
- B using a beaker made of thicker glass
- C using a beaker with a larger cross-sectional area
- D using a fan to blow air over the beaker

5054/11/O/N/19/Q24

63 A student makes four statements about evaporation and boiling.

- 1 Both involve an increase in molecular separation.
- 2 Both occur only at a fixed temperature.
- 3 Both involve the absorption of thermal energy.
- 4 Both occur throughout the liquid.

Which two statements are correct?

- A** 1 and 4 **B** 2 and 4 **C** 1 and 3 **D** 2 and 3

5054/11/O/N/20/Q18

64 A metal disc is heated to 600 °C and then lowered into a beaker of water.

What happens to the mass of the metal disc and to the mass of the water in the beaker?

	mass of metal disc	mass of water in beaker
A	increases	decreases
B	increases	no change
C	no change	decreases
D	no change	increases

5054/11/O/N/20/Q21

65 Which statement about the melting of ice and the boiling of water is correct?

- A** Both processes are accompanied by a decrease in volume.
B Both processes involve energy transfer and a temperature change.
C Both processes involve the absorption of latent heat.
D Both processes result in the increase of intermolecular forces.

5054/11/O/N/20/Q23

66 A student performs an experiment to find out how much energy is needed to change the temperature of a steel nail by 1.0 °C.

Which quantity is the student determining?

- A** the heat capacity of the nail
B the latent heat of the nail
C the specific heat capacity of steel
D the specific latent heat of steel

5054/12/O/N/20/Q19

- 67 A substance has a melting point of -17°C and a boiling point of 117°C .

In which state does the substance exist at -10°C and at 110°C ?

	at -10°C	at 110°C
A	solid	liquid
B	solid	gas
C	liquid	liquid
D	liquid	gas

5054/12/O/N/20/Q20

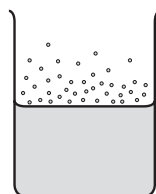
- 68 Less thermal energy is needed to raise the temperature of 1.0 kg of copper by 1.0°C than is needed to raise the temperature of 1.0 kg of water by 1.0°C .

Which statement explains this?

- A** Copper has a higher melting point.
- B** Copper has a lower specific heat capacity.
- C** Copper has a smaller specific latent heat.
- D** Copper is a better conductor of thermal energy.

5054/11/O/N/21/Q13

- 69 The diagram shows a room temperature liquid in a beaker.



What reduces the rate of loss of liquid by evaporation?

- A** blowing air across the top of the beaker
- B** heating the liquid
- C** putting a lid on the beaker
- D** transferring the liquid to a beaker with a larger diameter

5054/11/O/N/21/Q16

- 70 Solar panels are used to heat water with a mass of 500 kg.

The total area of the solar panels is 10 m^2 and the average power output from each square metre of the panels is 300 W. The specific heat capacity of water is $4200 \text{ J / (kg } ^\circ\text{C)}$.

What is the increase in the water temperature after 8.0 hours? (Assume there is no heat loss.)

- A** 0.69°C **B** 4.1°C **C** 5.1°C **D** 41°C

5054/12/O/N/21/Q18

- 71 The temperatures of the water in four beakers are different and areas of the surfaces of the water are also different.

In which beaker is the rate of evaporation of the water greatest?

	temperature of water / $^\circ\text{C}$	surface area of water / cm^2
A	20	50
B	20	100
C	25	50
D	25	100

5054/12/O/N/21/Q20