CAMBRIDGE IGCSE PHYSICS · 0625

PHYSICS



EXAM QUESTION PACK

TOPIC 2: THERMAL PHYSICS

SCORE	PERCENTAGE
/	%

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Thermal Properties & Temperature

Question Paper 1

Level	IGCSE
Subject	Physics (0625/0972)
Exam Board	Cambridge International Examinations (CIE)
Topic	General Physics
Sub-Topic	Thermal Properties & Temperature
Booklet	Question Paper 1

Time allowed: **24 minutes**

Score: **/19**

Percentage: **/100**

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	55%	50%	43%	35%	<30%

Question 1

A beaker contains 0.500 kg of water at a temperature of 3.0 °C. The beaker is heated, and the internal energy of the water increases by 21.0 kJ.

The specific heat capacity of water is 4200 J / (kg °C).

What is the temperature of the water after it has been heated?

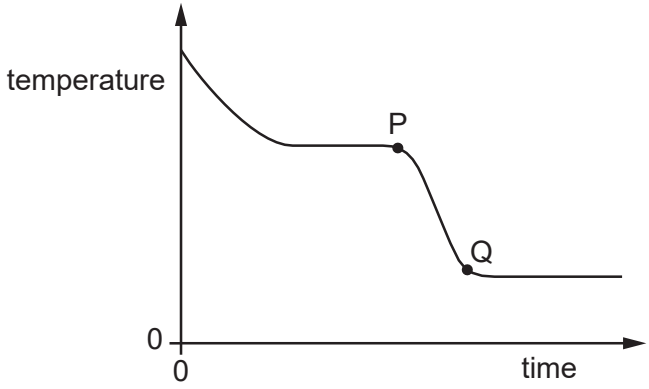
A 5.5 °C B 10.0 °C C 13.0 °C D 31.5 °C

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Question 2

A substance loses thermal energy (heat) to the surroundings at a steady rate.

The graph shows how the temperature of the substance changes with time.



What could the portion PQ of the graph represent?

A. gas condensing

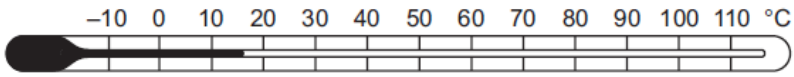
B. gas cooling

C. liquid cooling

D. liquid solidifying

Question 3

A student wishes to check the upper and the lower fixed points on a Celsius scale thermometer.



She has four beakers P, Q, R and S.

Beaker P contains a mixture of ice and salt.

Beaker Q contains a mixture of ice and water.

Beaker R contains boiling salt solution.

Beaker S contains boiling water.

Which two beakers should she use to check the fixed points?

A P and R B P and S C Q and R D Q and S

Question 4

Which statement describes what happens as ice at 0 °C starts to melt to become water?

A. Energy is absorbed and the temperature remains constant.

B. Energy is absorbed and the temperature rises.

C. Energy is released and the temperature remains constant.

D. Energy is released and the temperature rises.

Question 5

5.0 g of water at 25 °C is dropped onto a large block of ice at 0 °C. The water cools to 0 °C and some of the ice melts.

Assume that all the energy lost by the water is gained by the ice.

What is the mass of ice that melts?

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

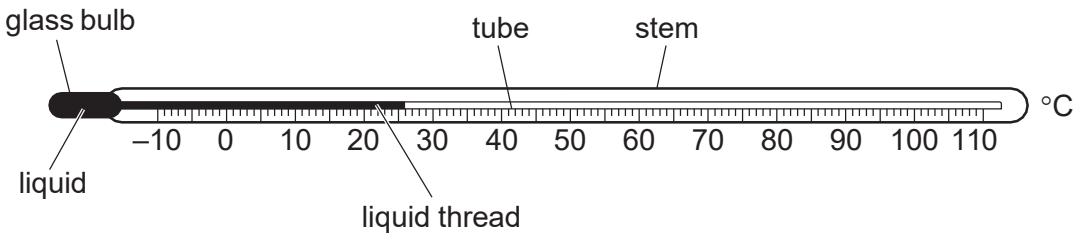
The specific latent heat of fusion of ice is 340 J/g.

A 0.062 g B 0.087 g C 1.5 g D 10 g

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Question 6

The diagram shows a liquid-in-glass thermometer.



How can the thermometer be made more sensitive?

A. increase the internal diameter of the tube containing the liquid thread

B. increase the internal volume of the glass bulb and the volume of the liquid

C. increase the length of the tube and stem

D. increase the thickness of the glass in the glass bulb

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Question 7

In an experiment to measure specific heat capacity, a block of aluminium is heated and its rise in temperature is measured.

The amount of energy gained by the block is E. The mass of the block is m. The rise in temperature of the block is ΔT.

Which expression gives the specific heat capacity of aluminium?

A $\frac{m}{E\Delta T}$ B $\frac{m\Delta T}{E}$ C $\frac{E}{m\Delta T}$ D $\frac{E\Delta T}{m}$

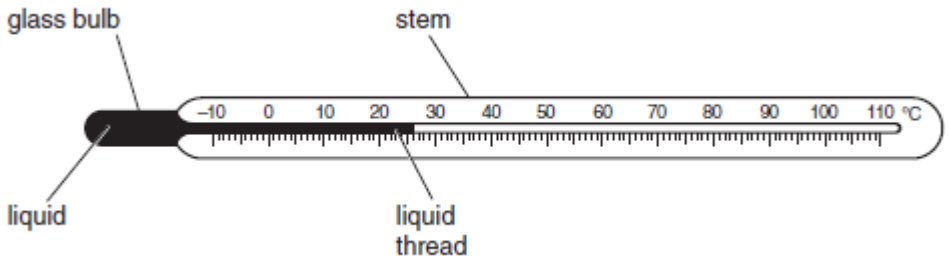
Question 8

Which line in the table shows the relative expansion of the three states of matter from the most expansion to the least expansion?

	most expansion				least expansion
A	solids	>	liquids	>	gases
B	solids	>	gases	>	liquids
C	gases	>	liquids	>	solids
D	gases	>	solids	>	liquids

Question 9

The diagram shows a liquid-in-glass thermometer.



Which two features both affect the sensitivity of the thermometer?

A. mass of liquid and diameter of liquid thread

B. mass of liquid and length of stem

C. thickness of glass bulb and diameter of liquid thread

D. thickness of glass bulb and length of stem

Question 10

A student wishes to calculate the specific heat capacity of copper.

He has a block of copper and an electrical heater. He knows the power of the heater.

Which other apparatus does he need?

	balance	stop watch	thermometer
A	✓	✓	✓
B	✓	✓	×
C	✓	×	✓
D	×	✓	✓

key

✓ = needed

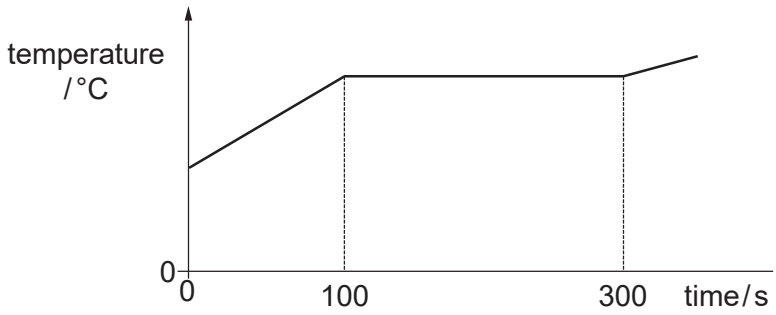
× = not needed

Question 11

A mass of 0.20 kg of a substance is initially solid.

It is heated at a steady rate of 500 W.

The graph shows how the temperature of the substance changes with time.



What is the specific latent heat of fusion of the substance?

A 20 000 J / kg

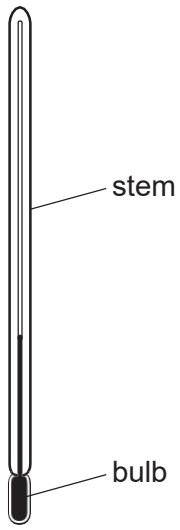
B 30 000 J / kg

C 500 000 J / kg

D 750 000 J / kg

Question 12

The thermometer in the diagram has no scale.



Where must the bulb be placed so that 0 °C can be marked on the stem?

A. in a freezer

B. in pure boiling water

C. in pure cold water

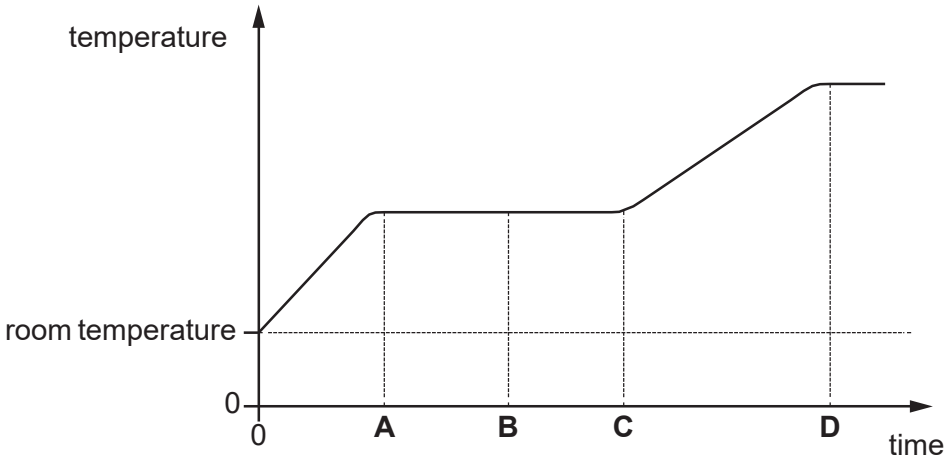
D. in pure melting ice

Question 13

A solid is heated from room temperature.

The graph shows how its temperature changes with time as it is heated constantly.

At which time has it just become **completely** liquid?



Question 14

Two metal blocks X and Y are at room temperature. Each block is heated so that its temperature rises by 10 °C.

The blocks are now allowed to cool back to room temperature.

Block Y has a greater thermal capacity than block X.

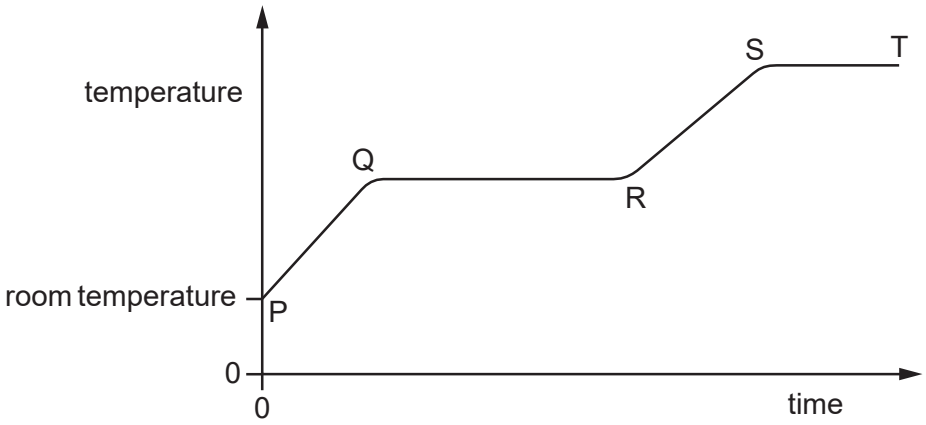
Which block needs more thermal (heat) energy to heat it up by 10 °C and which block loses more thermal (heat) energy as it cools back to room temperature?

	more energy	
	heating	cooling
A	X	X
B	X	Y
C	Y	X
D	Y	Y

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Question 15

A solid is heated from room temperature. The graph shows how its temperature changes with time as it is heated constantly.



Between which labelled points on the graph is the substance partly solid and partly liquid?

A between P and Q

B between Q and R

C between R and S

D between S and T

Question 16

A circular metal disc is heated.

Which quantity decreases?

A its density

B its diameter

C its thickness

D its volume

Question 17

The same quantity of thermal (heat) energy is given to two objects X and Y. The temperature rise of object X is less than the temperature rise of object Y.

What accounts for this difference?

A X has a larger thermal capacity than Y.

B X is a better thermal conductor than Y.

C Y has a larger thermal capacity than X.

D Y is a better thermal conductor than X.

Question 18

A block of copper and a block of lead are heated. The internal energy of each block increases by the same amount.

The block of copper has a lower thermal capacity than the block of lead.

Which conclusion can be made from this information?

A. The temperature increase of the copper is greater than the temperature increase of the lead.

B. The temperature increase of the copper is the same as the temperature increase of the lead.

C. The temperature increase of the copper is less than the temperature increase of the lead.

D. The melting point of copper is lower than the melting point of lead.

Question 19

The diagram shows a mercury-in-glass thermometer. The scale of the thermometer has not been marked.



The length l increases uniformly with temperature.

The length l is measured when the thermometer bulb is placed in water at 0 °C, and also when it is in water at 100 °C. The table shows the results.

temperature / °C	length l / cm
0	2.0
100	26.0

What is the value of l when the bulb is placed in water at 50 °C?

A 12.0 cm B 13.0 cm C 14.0 cm D 16.0 cm

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Thermal Processes

Question Paper 1

Level	IGCSE
Subject	Physics (0625/0972)
Exam Board	Cambridge International Examinations (CIE)
Topic	General Physics
Sub-Topic	Thermal Processes
Booklet	Question Paper 1

Time allowed: **23 minutes**

Score: **/18**

Percentage: **/100**

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	55%	50%	43%	35%	<30%

Question 1

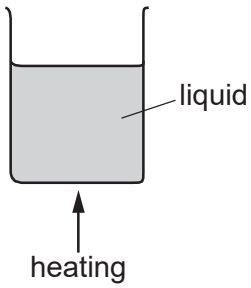
Two otherwise identical cars, one black and one white, are at the same initial temperature. The cars are left in bright sunshine and their temperatures increase. During the night their temperatures decrease.

Which car shows the greater rate of temperature increase and which car shows the greater rate of temperature decrease?

	greater rate of temperature increase	greater rate of temperature decrease
A	black	black
B	black	white
C	white	black
D	white	white

Question 2

A liquid is heated in a beaker.



The density of the liquid changes as its temperature increases. This causes energy to be transferred throughout the liquid.

How does the density change and what is this energy transfer process?

	density	energy transfer process
A	decreases	conduction
B	decreases	convection
C	increases	conduction
D	increases	convection

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Question 3

Which processes occur in a metal to cause thermal conduction?

	electron transfer	proton transfer	lattice vibration
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

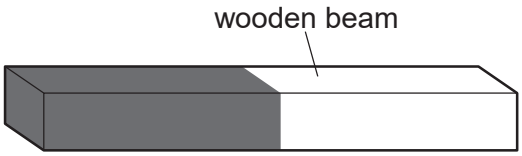
key

✓ = process occurs

X = process does not occur

Question 4

A wooden beam is painted part black and part white. The beam absorbs infra-red radiation from the Sun during the day, and loses infra-red radiation to the surroundings at night.



Which part of the beam heats up more quickly during the day, and which part cools down more quickly at night?

	part heating up more quickly	part cooling down more quickly
A	black	black
B	black	white
C	white	black
D	white	white

Question 5

Which row shows the surface that is the better absorber and the surface that is the better emitter of infra-red radiation?

	better absorber	better emitter
A	black surface	black surface
B	black surface	white surface
C	white surface	black surface
D	white surface	white surface

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Question 6

A student suggests some uses for containers made from good thermal conductors and for containers made from poor thermal conductors.

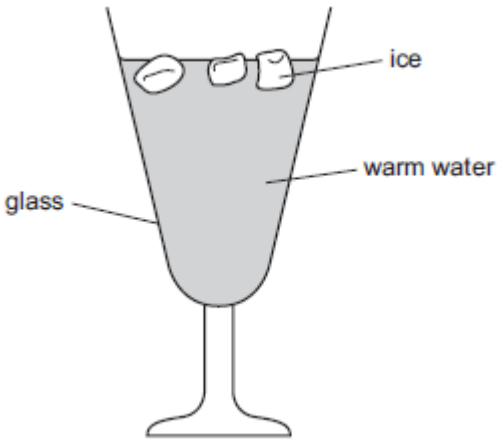
In which row are both suggested uses correct?

	good thermal conductor	poor thermal conductor
A	keeping a cold liquid at a low temperature	transferring thermal energy quickly from a hot liquid
B	keeping a hot liquid at a high temperature	keeping a cold liquid at a low temperature
C	transferring thermal energy quickly from a hot liquid	transferring thermal energy quickly to a cold liquid
D	transferring thermal energy quickly to a cold liquid	keeping a hot liquid at a high temperature

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Question 7

The diagram shows some ice being used to lower the temperature of some warm water.



What is the main process by which the water at the bottom of the glass becomes cool?

A. condensation

B. conduction

C. convection

D. radiation

Question 8

Thermal energy travels through space from the Sun to the Earth. Space is a vacuum.

How is thermal energy transferred from the Sun to the Earth?

A by conduction only

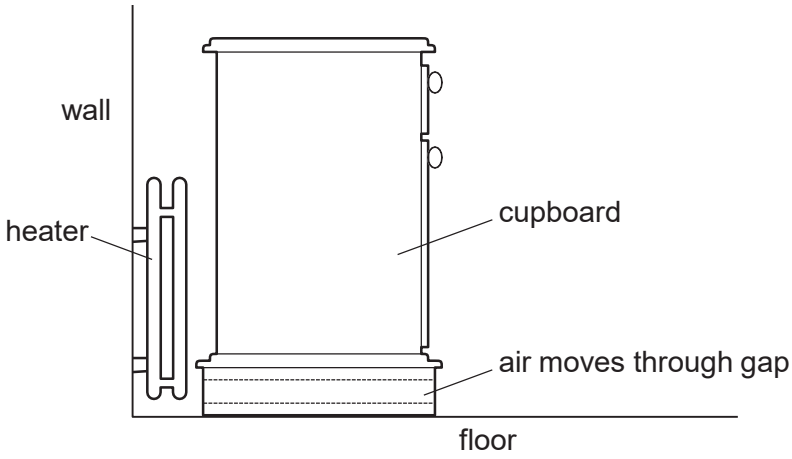
B by convection only

C by radiation only

D by convection and radiation

Question 9

A cupboard is placed in front of a heater. Air can move through a gap under the cupboard.



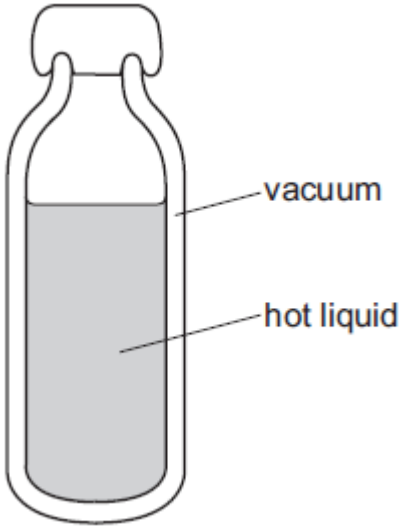
Which row describes the temperature, and the direction of movement, of the air in the gap?

	air temperature	air direction
A	cool	away from the heater
B	cool	towards the heater
C	warm	away from the heater
D	warm	towards the heater

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Question 10

The diagram shows a vacuum flask used to keep liquid hot.



How does thermal energy pass through the vacuum?

A conduction only

B convection only

C radiation

D conduction and convection

Question 11

One method of heat transfer involves the energy travelling at a much greater speed than in other methods.

What is the name of this method?

A conduction

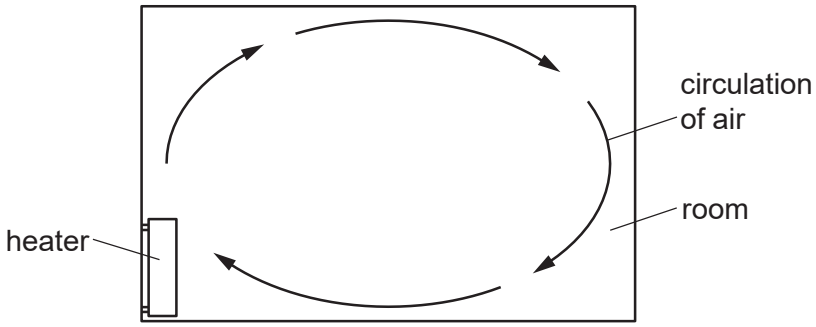
B convection

C evaporation

D radiation

Question 12

The air in a room is heated by a heater. The diagram shows the circulation of the air in the room.



Which statement about the air that is heated is correct?

A The air contracts and becomes less dense.

B The air contracts and becomes more dense.

C The air expands and becomes less dense.

D The air expands and becomes more dense.

Question 13

Four rods are made from different metals P, Q, R and S. The rods have equal lengths and equal diameters. The rods are heated at one end, in the same way.

The table shows the time taken for the temperature at the other end of each rod to rise by 1.0 °C.

Which metal is the best conductor of thermal energy (heat)?

metal	time taken/s
P	35
Q	30
R	45
S	40

A metal P B metal Q C metal R D metal S

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Question 14

In a refrigerator, the cooling unit can be fitted either at the top or at the bottom. In an oven, the heater can be fitted either at the top or at the bottom.

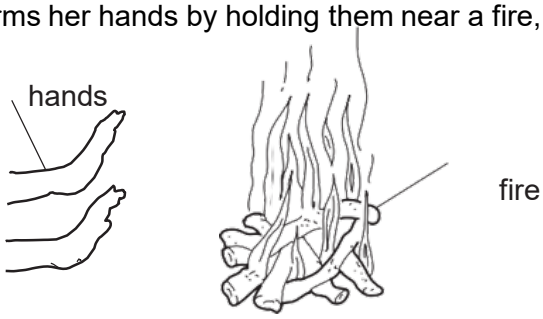
Which row shows the best position for the cooling unit and the best position for the heater?

	Cooling unit	heater
A	bottom	bottom
B	bottom	top
C	top	bottom
D	top	top

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Question 15

A girl is outdoors. She warms her hands by holding them near a fire, as shown.



How does the heat from the fire reach her hands?

A. conduction only

B. convection and conduction

C. convection and radiation

D. radiation only

Question 16

A heating engineer fits a heater to the ceiling of an office so that workers in the office are kept warm.

How does thermal energy reach the workers below the heater?

A conduction and convection

B convection and radiation

C convection only

D radiation only

Question 17

Which row shows how heating changes the density of air, and the name of the method of energy transfer caused by this density change?

	density	method of energy transfer
A	decreases	conduction
B	decreases	convection
C	increases	conduction
D	increases	convection

Question 18

What is the name of the process of heat transfer using electromagnetic waves?

A conduction

B convection

C evaporation

D radiation