Thermal Properties and temperature – 2023 IGCSE Physics 0625

1. Nov/2023/Paper_ 0625/11/No.13

The melting point of mercury is –39 °C.

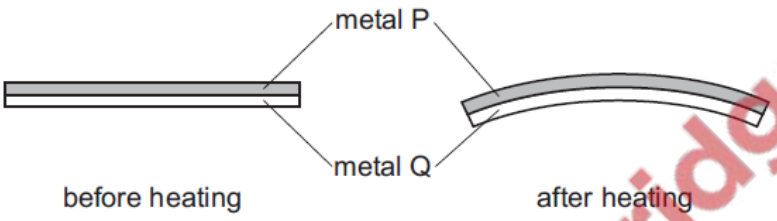
What is the melting point of mercury in kelvin?

A –234 K **B** 61 K **C** 234 K **D** 312 K

2. Nov/2023/Paper_ 0625/11/No.14

A bimetallic strip is used to control the temperature of an electrical appliance. It is made of two different metals fixed together.

The diagram shows the shape of the bimetallic strip before and after heating.



Which statement is correct?

A Metal P contracts more than metal Q on heating.

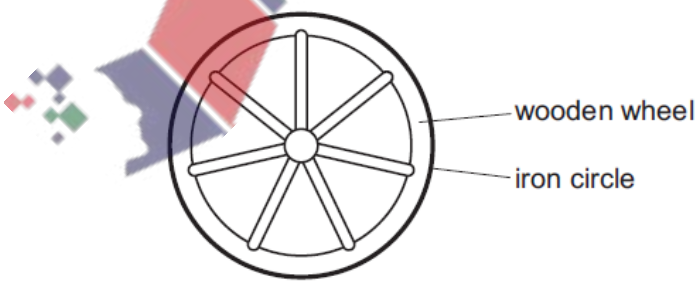
B Metal Q contracts more than metal P on heating.

C Metal P expands more than metal Q on heating.

D Metal Q expands more than metal P on heating.

3. Nov/2023/Paper_ 0625/12/No.14

A wooden wheel can be strengthened by putting a tight circle of iron around it.



Which action would make it easier to fit the circle over the wood?

A cooling the iron circle only

B heating the iron circle

C heating the wooden wheel and cooling the iron circle

D heating the wooden wheel but not heating or cooling the iron circle

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4. Nov/2023/Paper_ 0625/13/No.14

What happens when a metal block is heated?

A Its width, height and length all increase.

B Its width increases only.

C Its height increases only.

D Its length increases only.

5. Nov/2023/Paper_ 0625/13/No.15

Which statement about the temperature of the solid describes what happens when a solid is melting?

A The temperature increases and there is an input of energy.

B The temperature increases and there is no input of energy.

C The temperature remains constant and there is an input of energy.

D The temperature remains constant and there is no input of energy.

6. Nov/2023/Paper_ 0625/21/No.14

On a warm day, a carton of fresh milk is covered with a wet cloth.

Why does this help to reduce the temperature of the milk?

A Some water evaporates from the cloth so the remaining water becomes cooler.

B The water has a very high specific heat capacity.

C The water insulates the milk from the warm air around it.

D Water is always colder than the air around it.

7. Nov/2023/Paper_ 0625/21/No.15

A chef heats some water in a pan on a hotplate.

The temperature of the water rises by 10 °C in time t.

She then puts the same volume of oil in an identical pan on the same hotplate.

The specific heat capacity of water is 2.5 times that of oil and water is 1.1 times denser than oil.

What is the time for the temperature of the oil to rise by 10 °C?

A $0.36t$ **B** $0.44t$ **C** $2.3t$ **D** $2.8t$

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8. Nov/2023/Paper_ 0625/22/No.14

Liquid evaporates from a beaker.

What happens to the temperature of the remaining liquid and how does this temperature change affect the rate of evaporation?

	temperature	rate of evaporation
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

9. Nov/2023/Paper_ 0625/22/No.15

Thermal energy ΔE is supplied to an object of mass m which does not change its state during the heating process. The temperature of the object rises by ΔT.

What is the specific heat capacity of the object?

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

10. Nov/2023/Paper_ 0625/23/No.14

A student splashes water on to her face. Here are three statements about the effects.

P The water uses energy to evaporate.

Q The water gains energy from the student.

R The face of the student cools.

Which statements are correct?

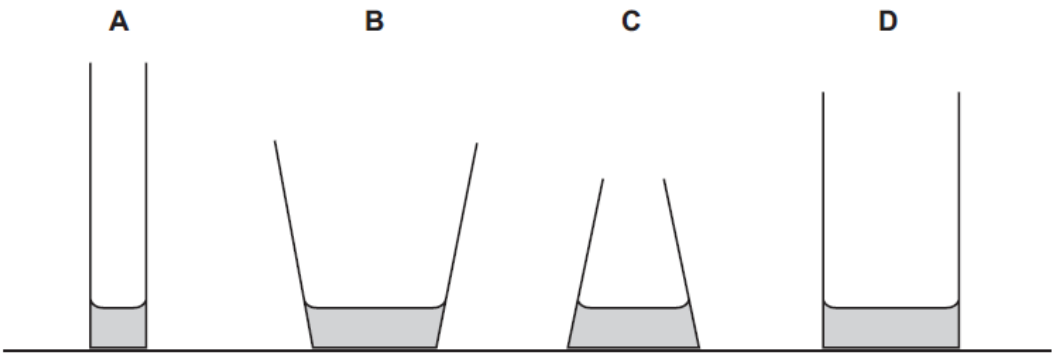
A P and Q only **B** P and R only **C** Q and R only **D** P, Q and R

11. Nov/2023/Paper_ 0625/23/No.15

Four containers each contain water.

More water at the same temperature is added to each container.

From which container does water now evaporate more slowly than it did before?



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12. Nov/2023/Paper_ 0625/42/No.2

Fig. 2.1 shows an electric tumble dryer used to dry wet clothes.

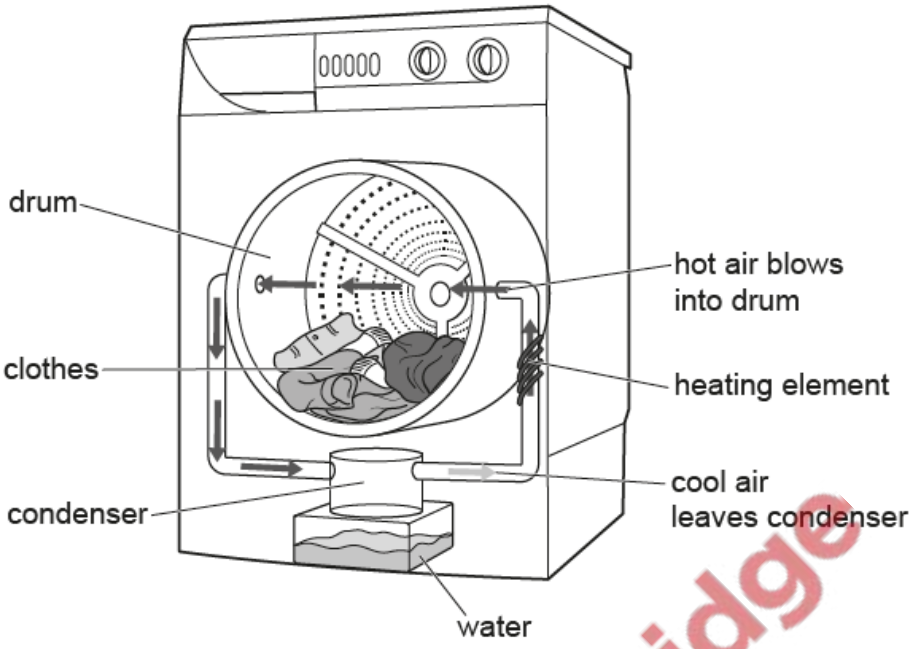

Fig. 2.1

(a) Hot air blows into the drum. The air gains water vapour from the clothes and then leaves the drum. The moist air enters the condenser. Cool air leaves the condenser, passes through the heating element and enters the drum again.

(i) State the process by which the hot air removes water from the wet clothes.

..... [1]

(ii) The air is cooled as it passes through the condenser.

Describe and explain **one** other way in which the air leaving the condenser is different from the air entering the condenser.

description .....

explanation .....

.....

[2]

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(b) The drum of the tumble dryer rotates, lifting up the wet clothes which then fall down through the hot air.

(i) Name the force that causes the clothes to fall down.

..... [1]

(ii) When the drum rotates too fast the clothes remain in contact with the wall of the drum.

State the direction of the resultant force on the clothes during the circular motion.

..... [1]

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13. Nov/2023/Paper_ 0625/42/No.4(b)

(b) The mass of water in the bottle is 0.18 kg. The specific heat capacity of water is 4200 J/(kg °C).

Calculate the thermal energy needed to increase the temperature of the water by 20 °C.

thermal energy = ... [2]

14. Nov/2023/Paper_ 0625/43/No.4

(a) The lowest possible temperature is zero kelvin (0 K).

(i) State the name of this lowest possible temperature.

..... [1]

(ii) Nitrogen boils at 77 K.

Calculate the boiling point of nitrogen on the Celsius scale.

boiling point = ... °C [2]

(b) The temperature of a fixed mass of gas at constant volume changes from 300 K to 400 K.

State and explain, in terms of particles, the effect on the pressure of the gas.

statement .....

explanation .....

.....

.....

.....

[4]

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(c) A sample of gas is at a pressure of 120 kPa. The volume of the gas is doubled at constant temperature.

Calculate the new pressure of the gas.

pressure = ... [2]

[Total: 9]

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15. June/2023/Paper_0625/41/No.4

A student investigates the efficiency of a filament lamp. Fig. 4.1 shows the filament lamp with its glass bulb immersed in water in a beaker.

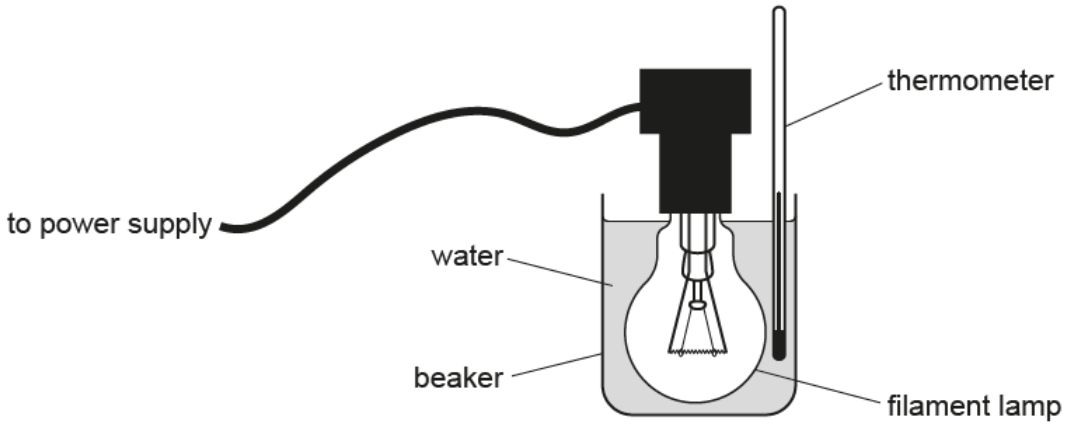

Fig. 4.1

The reading on the thermometer in the water is 19.0 °C.

Only the glass of the lamp is in contact with the water and the electrical connections are completely insulated.

The lamp is switched on.

At the end of the experiment, the temperature of the water is 21.5 °C.

(a) The mass of the water in the beaker is 600 g and the specific heat capacity of water is 4200 J/(kg °C).

(i) Show that the increase in the internal energy of the water is 6300 J.

[3]

(ii) In the experiment, the lamp is switched on for 500 s. The power supplied to the filament lamp is 13 W. The useful energy from the lamp is transferred as light. The energy that increases the temperature of the water is wasted energy.

Determine the maximum possible efficiency of the filament lamp.

maximum possible efficiency = ... [4]

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(b) The efficiency of the lamp is less than the value determined in **(a)(ii)**.

Suggest **one** reason for this.

.....

.....

..... [1]

[Total: 8]

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16. June/2023/Paper_0625/42/No.5(a)

(a) Fig. 5.1 shows an electric heater used to heat a room.

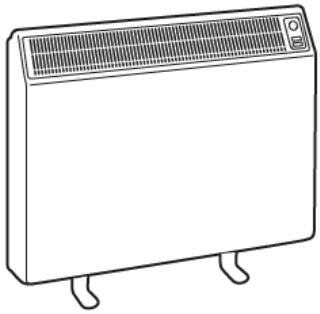

Fig. 5.1

The dimensions of the room are 4.5 m × 6.1 m × 2.4 m.
The density of air is 1.2 kg/m^3.

(i) Show that the mass of air in the room is 79 kg.

[2]

(ii) The power of the heater is 1100 W. The specific heat capacity of air is 1000 J/(kg °C).

Calculate the time taken to increase the temperature of the air in the room from 16.0 °C to 20.0 °C.

time = ... [4]

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(iii) Suggest **one** reason why the time calculated in **(a)(ii)** is the **minimum** time needed to increase the temperature of the air in the room from 16.0 °C to 20.0 °C.

.....

..... [1]

17. June/2023/Paper_0625/43/No.3

(a) **(i)** State which state of matter, solid, liquid or gas, has the greatest thermal expansion and which has the least.

greatest expansion .....

least expansion .....

[2]

(ii) Describe, in terms of the motion and arrangement of particles, the structures of solids and gases.

solids .....

.....

gases .....

.....

[3]

(b) **(i)** Define specific heat capacity.

.....

..... [2]

(ii) A student carries out an experiment to determine the specific heat capacity of a metal. A cylinder of the metal is heated by a 12 W electrical heater.

State the readings that the student takes.

.....

.....

..... [3]

[Total: 10]

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