Paper 1

Questions are applicable for both core and extended candidates

1 Which statement about a solid, a liquid or a gas is correct?

A A solid has a fixed shape and can be compressed.

B A liquid takes the shape of the container it is in and can be compressed.

C A solid has no fixed shape and cannot be compressed.

D A gas takes the shape of the container it is in and can be compressed.

2 The arrangements of particles in solids, liquids and gases are different.

Which statement about the molecules in ice, water or steam is correct?

A The H_2O molecules are on average closest together in steam.

B The H_2O molecules are on average furthest apart in water.

C The H_2O molecules in steam have the second highest average velocity.

D The H_2O molecules in ice are able to vibrate.

3 Which statement about liquids and gases is correct?

A $1\,cm^3$ of gas contains more particles than $1\,cm^3$ of liquid.

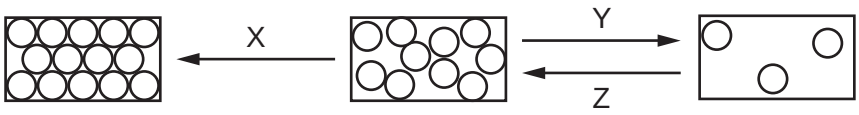
B A given mass of liquid has a fixed volume at room temperature.

C Particles in a liquid can easily be forced closer together.

D Particles in a liquid have fixed positions.

4 The three rectangles show the arrangements of the particles in each of the three states of matter.

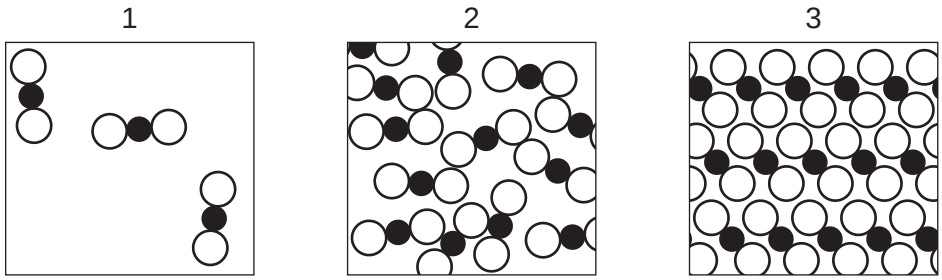
X, Y and Z represent the processes needed to change from one state to another.



What are the processes X, Y and Z?

	X	Y	Z
A	melting	condensing	evaporating
B	evaporating	melting	freezing
C	melting	freezing	condensing
D	freezing	evaporating	condensing

5 Diagrams of the three states of matter for carbon dioxide are shown.



Which two diagrams show the states of matter before and after the sublimation of carbon dioxide?

A 2 to 1 **B** 2 to 3 **C** 3 to 1 **D** 3 to 2

6 Which row describes the spacing and arrangement of particles in a solid, a liquid and a gas?

	solid	liquid	gas
A	close together and randomly arranged	close together and regularly arranged	far apart and randomly arranged
B	close together and randomly arranged	far apart and randomly arranged	close together and randomly arranged
C	close together and regularly arranged	close together and randomly arranged	far apart and randomly arranged
D	close together and regularly arranged	close together and regularly arranged	close together and randomly arranged

7 The melting points and boiling points of three elements, at 1 atm pressure, are shown.

	melting point / °C	boiling point / °C
argon	–189	–186
nitrogen	–210	–196
oxygen	–218	–183

Separate samples of argon, nitrogen and oxygen are stored at –200 °C and at 1 atm pressure.

How many samples are liquids?

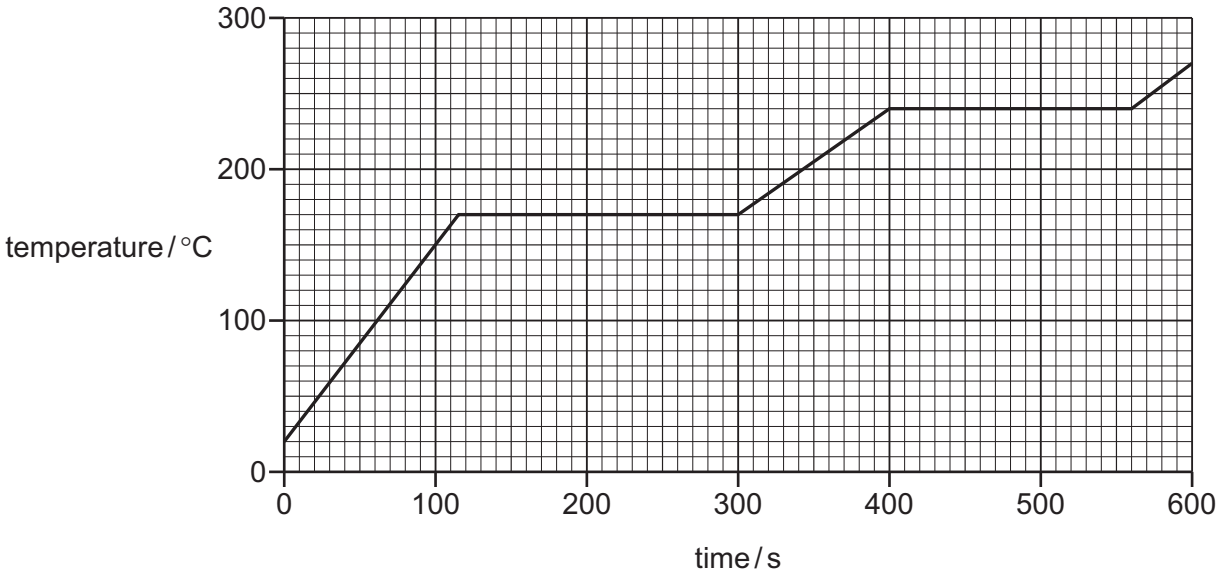
A 0 **B** 1 **C** 2 **D** 3

Paper 2

Questions are applicable for both core and extended candidates unless indicated in the question

8 Solid X is heated for 600 seconds.

The graph shows the heating curve that is obtained. **(extended only)**



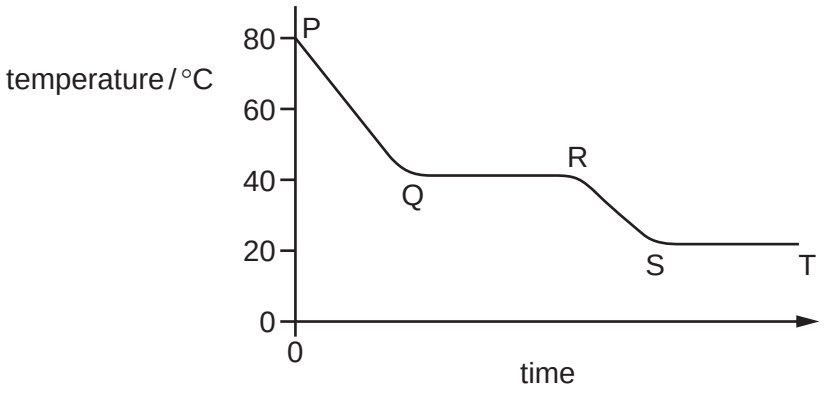
What is the melting point of X? **(extended only)**

A 20 °C **B** 170 °C **C** 240 °C **D** 270 °C

9 Substance M is a solid at 30 °C. **(extended only)**

The substance is heated to 80 °C and its temperature measured as it cools down to room temperature.

The cooling curve is shown.



Between which times is substance M freezing? **(extended only)**

A P to Q **B** Q to R **C** R to S **D** S to T

10 A gas is placed in a sealed container. The gas has a pressure of one atmosphere and a temperature of 50 °C.

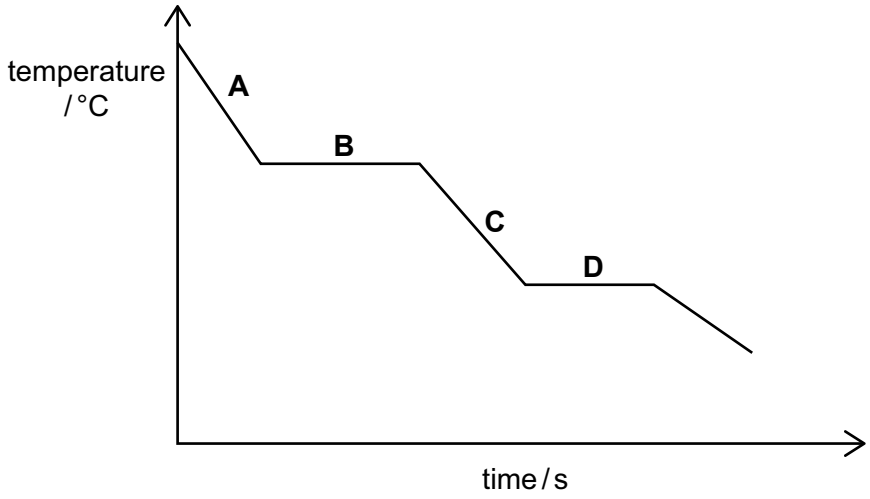
It is heated to 100 °C.

Which row describes the cause of the pressure of the gas and the effect of increasing the temperature of the gas? **(extended only)**

	cause of gas pressure	the effect of increased temperature of the gas
A	collisions between gas particles	collisions become less frequent
B	collisions between gas particles	the average speed of the gas particles increases
C	collisions between gas particles and the container	collisions become less frequent
D	collisions between gas particles and the container	the average speed of the gas particles increases

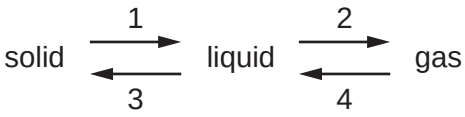
11 A gaseous substance is slowly cooled and the temperature recorded every second.

The results are shown on the graph. **(extended only)**



At which point is the substance a solid? **(extended only)**

12 The diagram shows the changes of state between a solid, a liquid and a gas.



In which changes of state is energy being given out?

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